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Washington University in St. Louis

School of Medicine

2003/2004

BULLETIN *of* WASHINGTON UNIVERSITY
SCHOOL *of* MEDICINE
ST. LOUIS, MISSOURI

BULLETIN OF WASHINGTON UNIVERSITY

St. Louis, Missouri

School of Medicine
2003/2004

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SCHOOLS OF WASHINGTON UNIVERSITY

All schools are located at One Brookings Drive, St. Louis, Missouri 63130 except Medicine (660 S. Euclid Ave., St. Louis, Missouri 63110). A University-sponsored shuttle bus travels between the Hilltop Campus and the Medical Center at regular intervals.

Arts and Sciences
- ***College of Arts and Sciences***
- ***Graduate School of Arts and Sciences***
- ***University College***

School of Architecture
School of Art
Olin School of Business
School of Engineering and Applied Science
School of Law
School of Medicine
George Warren Brown School of Social Work

The information that appears in this Bulletin was compiled in the spring of 2003. It is current as of April 1, 2003.

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CALENDAR 2003-2004

2003

JUNE

20 **Friday** Clinic orientation for third-year students.

23 **Monday** Academic year begins for the third- and fourth-year classes.

27 **Friday** Deadline for registration and initial payment of tuition for the third- and fourth-year classes.

JULY

4 **Friday** Independence Day observance.

AUGUST

12 **Tuesday** Orientation, matriculation and initial fee payment for the first-year class.

18 **Monday** Academic year begins for the first- and second-year classes.

22 **Friday** Deadline for registration and initial payment of tuition for the second-year class.

SEPTEMBER

1 **Monday** Labor Day observance.

25 **Thursday** Danforth Symposium; no classes beyond noon for first- or second-year students.

NOVEMBER

27 **Thursday** Thanksgiving Day observance.

28 **Friday** Holiday for first- and second-year classes.

DECEMBER

20 **Saturday** Winter recess begins at 1 p.m. for all classes.

2004

JANUARY

5 **Monday** Winter recess ends at 8 a.m. for all classes.

9 **Friday** Deadline for payment of the balance of tuition for all classes.

19 **Monday** Martin Luther King, Jr. Day observance.

MARCH

28 **Sunday** Spring recess begins for the first- and second-year classes.

APRIL

2 **Friday** Spring recess begins at 8 a.m. for the third- and fourth-year classes.

5 **Monday** Classes resume for all classes.

30 **Friday** Merit Scholarship activities.

MAY

1 **Saturday** Merit Scholarship activities.

9 **Sunday** Academic year ends at 5 p.m. for the graduating students.

14 **Friday** Academic year ends at 5 p.m. for the second-year class.

21 **Friday** Commencement.

28 **Friday** Academic year ends at 5 p.m. for the first-year class.

31 **Monday** Memorial Day observance.

JUNE

4 **Friday** Clinical clerkships end at 5 p.m.

Friday Doctoring Retreat begins for students in Clinical Clerkships.

10 **Thursday** Doctoring Retreat ends at 5 p.m. for students in Clinical Clerkships.

Thursday Academic year ends at 5 p.m. for students in Clinical Clerkships.

SCHEDULE OF CLERKSHIP AND ELECTIVE INTERVALS

Weeks	***Dates***
1-4	June 23, 2003 - July 20, 2003
5-8	July 21, 2003 - August 17, 2003
9-12	August 18, 2003 - September 14, 2003
13-16	September 15, 2003 - October 12, 2003
17-20	October 13, 2003 - November 9, 2003
21-24	November 10, 2003 - December 7, 2003
25-28	December 8, 2003 - January 18, 2004 (Winter recess December 20, 2003 through January 4, 2004)
29-32	January 19, 2004 - February 15, 2004
33-36	February 16, 2004 - March 14, 2004
37-40	March 15, 2004 - April 11, 2004
41-44	April 12, 2004 - May 9, 2004
45-48	May 10, 2004 - June 4, 2004 (clerkships only)

Final examinations for clinical clerkships are administered at the end of each clerkship. Exact date, time and location are announced by the coursemaster.

THE STUDY OF MEDICINE AT WASHINGTON UNIVERSITY

MISSION STATEMENT FOR WASHINGTON UNIVERSITY

The mission of Washington University is the promotion of learning — learning by students and by faculty. Teaching, the transmission of knowledge, is central to our mission, as is research, the creation of new knowledge. Faculty composed of scholars, scientists, artists and members of the learned professions serve society by teaching; by adding to the store of human art, understanding, and wisdom; and by providing direct services such as health care.

Our goals are:

to foster excellence in our teaching, research, scholarship and service;

to prepare students with the attitudes, skills and habits of lifelong learning and with leadership skills, enabling them to be useful members of a global society; and

to be an exemplary institution in our home community, St. Louis, as well as in the nation and the world.

To this end we intend:

to judge ourselves by the most demanding standards;

to attract people of great ability from all types of backgrounds;

to encourage faculty and students to be bold, independent and creative thinkers; and

to provide the infrastructure to support teaching, research, scholarship and service for the present and for future generations. Our institution is committed to the philosophy that teaching and research are best conducted in facilities where dedication to safety, health, and environmental stewardship is exemplary.

OBJECTIVES OF THE EDUCATIONAL PROGRAM FOR MEDICAL STUDENTS

Washington University School of Medicine provides students with a supportive, stimulating and challenging environment in which to acquire a thorough foundation in scientific medicine and develop skills, professional attitudes and personal commitments necessary for the practice of medicine at the highest possible level of excellence. In addition, the medical school fosters a commitment to collegiality, respect of individuality, community involvement and leadership through many extracurricular organizations and activities supported by the school. The educational program is designed to ensure that each graduating student will demonstrate the following:

Knowledge of core concepts and principles of human biology.

Knowledge of the scientific foundations of medicine and medical practice including disease pathogenesis and treatment, illness prevention and health maintenance.

Proficiency in applying the scientific method to the practice of medicine including the processes of problem identification, data collection, hypothesis formulation and the application of deductive reasoning to clinical problem-solving.

Knowledge of human behavior and an understanding of the impact of ethnic and cultural characteristics, socioeconomic factors, and other social factors on the practice of medicine.

Proficiency in obtaining an appropriate medical history, performing a physical examination, and performing basic procedures necessary for the practice of medicine.

Cognitive skills essential to the formulation of clinical questions, critical evaluation of scientific and clinical data, and effective application of this data to clinical problem-solving.

Efficient and effective utilization of educational resources, and proficiency in acquisition and assimilation of new information and practices.

Recognition of uncertainty in clinical decision-making and current medical practices and an appreciation of the need to discard and replace obsolete information and practices.

Effective oral and written communication skills with patients and their families, members of the academic and medical communities, and other members of the community at large.

Commitment to provide compassionate care for all people.

Dedication to inquiry and to life-long learning through self-education and self-assessment, and active participation as teachers of patients, colleagues and members of the community.

Appreciation of the essential role of biomedical research in the advancement of medicine and a commitment to the spirit of collaboration and support of basic science and clinical research efforts.

Dedication to high standards of professional integrity and ethical behavior in clinical practice and biomedical research.

Description of Undergraduate Medical Education Program by Year

First Year

The first-year curriculum focuses on the acquisition of a core knowledge of human biology, as well as on an introduction to the essentials of good patient care. Diversity among matriculants in undergraduate background, and in approaches to learning, is recognized and fostered. The courses are graded Pass/Fail, and a variety of didactic means are made available including lectures, small groups, extensive course syllabi, clinical correlations, and a Lotus Notes computerized curriculum database. The *Practice of Medicine I* uses regular patient interactions and integrative cases to teach students to skillfully interview and examine patients, as well as the fundamentals of bioethics, health promotion/disease prevention, biostatistics, and epidemiology. An optional summer research program between the first and second year provides an opportunity for students to explore various areas of basic science or clinical research.

Second Year

The second-year curriculum is focused on human pathophysiology and pathology. Through lectures, small group discussions, laboratory exercises and independent study, students acquire broad, detailed knowledge of mechanisms of disease pathogenesis, clinopathological relationships and fundamental principles of therapy. The *Practice of Medicine II* continues students' introduction to the fundamentals of patient care, and emphasizes organizing and interpreting clinical information to form a problem list, differential diagnosis, and treatment plan. Students also learn how to accurately document and concisely present clinical information. Supervised clinical experiences and small group discussions further engender development of the professional attitudes and high ethical standards required for the third-year clinical clerkships.

Third Year

The overall goal of the third year is implementation of fundamental interactive clinical skills necessary for the practice of medicine at the highest possible level of excellence. Students achieve this goal by participating in intensive, closely supervised training experiences in the core clinical clerkships involving inpatient and ambulatory settings and interactions with patients who present a spectrum of emergent, urgent, routine and chronic clinical problems. Through these experiences, students exhibit growth and maturation in their abilities to take medical histories, perform complete physical examinations, synthesize findings into a diagnosis, formulate treatment plans, and document and present information in a concise, logical and organized fashion. During the clinical clerkships, students learn to use the biomedical literature and other educational resources in the service of their patients and in self-directed learning. Students also use their personal experiences and rapidly expanding knowledge of human behavior and ethnic, cultural, socioeconomic and other social factors to develop their own personal standards of compassionate, respectful and ethical behavior in the practice of medicine.

Fourth Year

The overall goals of the fourth year are to consolidate, enhance and refine the basic clinical skills developed during the clinical clerkships and to explore specialty areas within the field of medicine. This is accomplished by providing each student with optimal preparation for selecting and pursuing graduate medical education opportunities in his/her chosen field of medical practice and/or research.

HISTORY

The education of physicians at Washington University began in 1891. Under an ordinance enacted April 14, 1891, establishing a Medical Department of Washington University, the St. Louis Medical College (an independent medical college in St. Louis) was brought under the wing of the well-established University. The faculty of the college eagerly agreed to the union, stating "Most of the great medical schools of the world have always been integrant departments of universities, and the examples which America furnishes give added testimony to the fructifying influence of the contact of students and teachers of professional schools with the workers in universities." Eight years later, the Missouri Medical College (another independent college in the city) also joined Washington University, and thus the two most famous medical colleges in the city were merged with the University.

In 1909, Abraham Flexner began a survey of 155 medical schools in the United States and Canada for the Carnegie Foundation for the Advancement of Teaching. The survey created a national sensation. Some schools collapsed, others pooled their resources, while still others reorganized. The Medical School of Washington University did not escape criticism. In the report Flexner made to Henry Smith Pritchett, Ph.D., president of the Carnegie Foundation for the Advancement of Teaching and former professor of astronomy at Washington University, he said that one of two courses must be adopted: "The department must be either abolished or reorganized."

Dr. Pritchett mailed the report to Robert S. Brookings, a St. Louis merchant who was president of the Board of Directors of Washington University. Brookings was shocked and immediately went to New York to see Flexner, demanding proof that the conditions were as bad as described. Both returned to St. Louis and the two men went through the School. In less than two hours, Brookings was convinced that drastic action was necessary if the School was to be one of the foremost institutions of medical education and research. The meeting in 1909 of Brookings and Flexner was of unsurpassed significance in the history of the Washington University School of Medicine, for it led to the complete reorganization of the School and the establishment of the present Medical Center. Abraham Flexner inspired the dream of a model medical school; Robert Brookings accepted the challenge, and with the energy and vision which characterized all his enterprises, made the dream a reality.

No time was lost in making changes. The Bulletin of the Medical School for July 1910 made the following statement: "The Corporation of the University, becoming convinced that in no other direction could greater service be rendered than through a great, modern medical school, determined to reorganize the School and to place it in the front rank of American medical institutions. It has called to the heads of a number of leading departments the ablest men it could secure."

When Robert A. Barnes died in 1892, he left a will which directed the trustees of his estate to use $840,000 for the erection and equipment of a hospital "for sick and injured persons, without distinction of creed, under the auspices of the Methodist Episcopal Church, South." Investigation by the trustees into the cost of building a modern hospital convinced them that the sum was not large enough to build an efficient, fireproof building, and they therefore invested the trust. By 1912 the value had increased to $2 million, a sum which permitted the building of a hospital and left an endowment greater than the original fund.

At the same time the trustees were studying hospital construction, Robert Brookings was studying medical schools. It was apparent to everyone concerned that the two projects, the building of a medical school and the construction of a modern hospital, were so interrelated that the purpose of each would be more successfully fulfilled by an affiliation. A medical school would provide a highly trained staff and would assure the most modern methods and superior laboratory facilities for the hospital. A teaching hospital would give patients superior care and, at the same time, provide the essential clinical experience consistent with modern medical teaching methods.

In the spring of 1912, construction was begun on the medical school and hospital buildings which today form the nucleus of the present center. The laboratories were moved from their old quarters in downtown St. Louis into the new buildings on Euclid Avenue and Kingshighway Boulevard during the summer of 1914, and late in the fall of the same year the activities of the Washington University Hospital were transferred to Barnes Hospital. Concomitantly, the St. Louis Children's Hospital, then located on Jefferson Avenue, became affiliated with the School of Medicine and moved to its new quarters in the Medical Center.

On April 28, 29 and 30, 1915, exercises were held to celebrate the completion of this group of buildings designed to promote the practice, the teaching and the progress of medicine. The dedication ceremonies marked what Dr. William H. Welch of The Johns Hopkins University called "one of the most significant events in the history of medical education in America." Robert S. Brookings, the one man most responsible for the reorganization, voiced the hope that "our efforts will contribute, in some measure, to raising the standard of medical education in the West, and that we will add, through research activities, our fair quota to the sum of the world's knowledge of medicine." These prophetic words have been realized.

In the ensuing years, the Medical Center has continued to grow, and now its facilities are among the best in the world. With the increase in size of the physical plant there has come a substantial increase

in the number of the faculty; the expansion has been made without compromise to the standards that marked the early development of the Medical Center. As a result, significant achievements in both research and clinical areas have been steadily recorded.

FACULTY

The Washington University School of Medicine has one of the finest faculties of any medical school in the nation. Recognized for their distinguished achievements in original research, 12 current faculty members have been elected to the National Academy of Sciences. Seventeen Nobel laureates have been associated with the School of Medicine.

During Fiscal Year 2002, 108 members of the faculty held individual or career development awards: 57 from the National Institutes of Health; one from the American Association for the Study of Liver Disease; one from the American College of Rheumatology; one from the American College of Surgeons; one from the American Diabetes Foundation; two from the American Digestive Health Foundation; 10 from the American Heart Association; one from the American Lung Association; one from the American Society of Clinical Oncology, one from the American Society of Transplantation; one from the Arthritis Foundation; 10 from Burroughs Wellcome Fund; one from the Doris Duke Charitable Foundation; one from the Infectious Disease Society of America; one from the W.M. Keck Foundation; two from the Esther A. and Joseph Klingenstein Fund, Inc.; three from the Leukemia Society of America, Inc.; one from the National Alliance for Research on Schizophrenia and Depression; one from the National Hemophilia Foundation; one from the Open Society Institute; one from the Orthopaedic Research and Education Foundation; one from the Parker B. Francis Foundation; three from the Radiological Society of North America, Inc. Research and Education Fund; four from Research to Prevent Blindness, Inc.; and one from the Whitaker Foundation.

The School of Medicine has 20 faculty members with Method to Extend Research in Time (MERIT) status, a special recognition given to only a few NIH grantees, which provides long-term, uninterrupted financial support to investigators who have demonstrated superior achievement during previous research projects.

In 2002-2003, the School employed 1,328 full-time, salaried faculty members in its 20 preclinical and clinical departments. The clinical departments are further strengthened by 1,141 part-time faculty members, a group of physicians who practice their medical specialties in St. Louis and are members of one or more of the staffs of the hospitals in the Washington University Medical Center.

STUDENTS

The School of Medicine attracts a student body of exceptional quality. The 2002 Entering Class of 122 students was selected from a pool of 3,676 applicants. The School is a national institution with 46 states and 28 countries represented in the current enrollment.

In 2003, the School conferred the M.D. degree upon 83 individuals. In addition, three students received the M.A./M.D. degrees and 23 students graduated with the M.D. and the Ph.D. degrees. Graduating students who participated in the 2003 National Residency Matching Program matched in programs recognized for high quality and selectivity. Beginning on page 241, the graduates are listed by name, hometown, undergraduate and graduate schools attended and year of degree, type of postgraduate residency program, name of hospital and the city in which it is located.

The student body of the School of Medicine numbers 566 medical students. Programs also are conducted for 399 students who are pursuing graduate degrees in clinical investigation, health administration, occupational therapy, physical therapy, psychiatric epidemiology or genetic epidemiology. The Division of Biology and Biomedical Sciences has extensive graduate training programs for 573 students seeking the Doctor of Philosophy degree in areas of Bioorganic Chemistry, Computational Biology, Developmental Biology, Evolutionary and Population Biology, Immunology, Molecular Biophysics, Molecular Cell Biology, Biochemistry, Molecular Genetics, Molecular Microbiology and Microbial Pathogenesis, Neurosciences and Plant Biology.

TEACHING FACILITIES

The 230-acre *Washington University Medical Center,* spread over portions of 15 city blocks, is located along the eastern edge of Forest Park in St. Louis. Along the western edge of the park is the 169-acre Hilltop Campus of the University. A regularly scheduled shuttle bus, operated for the benefit of students, faculty and staff, brings the two campuses within 10 minutes of each other.

The Medical Center was incorporated in 1962. It now consists of the Washington University School of Medicine, Barnes-Jewish Hospital, St. Louis Children's Hospital, Barnard Hospital and Central Institute for the Deaf, and is affiliated with BJC Health System. Two integral units of the Medical Center are the world-famous Mallinckrodt Institute of Radiology (MIR) and the Center for Computational Biology.

The Medical Center generates an annual financial impact of more than $2.3 billion on the St. Louis area, including employment, taxes, purchasing, construction projects and the reverberation of that activity through the community. With more than 15,000 employees, the Medical Center is the second largest place of employment in the metropolitan area.

Unprecedented growth has occurred at the Medical Center over the past 10 years. At the School of Medicine alone during the past three years, more than $220 million has been expended on renovation and new construction. Capital improvements have added 475,000 square feet of space to the medical school during this same period. In the most recent fiscal year, more than $55 million of capital improvements were made at the School.

In the last 10 years, School of Medicine expansion has included the Eric P. Newman Education Center; the CSRB North Tower Research Addition; the East McDonnell Sciences Building; the Specialized Interim Research Facility; the Mallinckrodt Institute of Radiology Imaging Research Facility, East Building; the 4480 Clayton Avenue Building; the McDonnell Pediatric Research Building; the Southwest Tower; and the Center for Advanced Medicine.

The 45,160-gross-square-foot Eric P. Newman Education Center, completed in December 1995, accommodates non-degree professional education for the Medical Center. The education center provides auditoriums, classrooms, meeting space and lecture halls to support and enhance a comprehensive education program. The 136,977-gross-square-foot, seven-story East McDonnell Sciences Building is a maximum-barrier research facility to accommodate higher brain function research and transgenic studies.

The 10-story Clinical Sciences Research Building (CSRB) North Tower Research Addition, 201,349 gross square feet, consolidates all medical school specialized research into one structure. The top three floors of the addition house wet lab research space. The addition of 45,000 gross square feet and renovation of 22,000 gross square feet in the Mallinckrodt Institute of Radiology Imaging Research Facility, East Building, provided space for the creation of an Imaging Center that houses four major MRI (Magnetic Resonance Imaging) units. The 494,500-gross-square-foot, 1,500-car parking garage, built on the northeast corner of Taylor and Clayton avenues, is a reinforced, seven-story structure that provides much-needed additional parking. Moreover, the new 230,000-square-foot McDonnell Pediatric Research Building adds new, state-of-the-art research facilities, 4.5 floors for the Department of Pediatrics, three floors for the Department of Molecular Microbiology, and one half floor for the Department of Medicine, on the corner of Euclid Avenue and Children's Place. This new building includes a Barnes & Noble bookstore with a coffee shop on the ground floor level.

The Center for Advanced Medicine, located at the corner of Euclid and Forest Park avenues, which opened in November 2001, is a shared facility between the School and BJC. This building brings all of the Medical Center's clinics together under one roof. The School of Medicine occupies 243,400 square feet in the Center for Advanced Medicine and 50,000 square feet on two floors in the Southwest Tower. Located in the heart of the Center for Advanced Medicine is the 66,150 square foot Siteman Cancer Center. The Siteman Cancer Center is the only designated cancer center by the National Cancer Institute in the region.

In addition, major renovations to existing buildings continue, with emphasis on research facilities. Within the last two years, renovations totalling $33 million have been completed. Major improvements and renovations were made to MIR's East Imaging Facility in 1998. The Department of Biochemistry has undertaken a significant renovation of the first floor of the South Building for new laboratories and offices. The Department of Genetics expanded its operations during 1999 in the Genome Sequencing Center, located at 4444 Forest Park Ave., through a major, multi-year grant from the NIH to accelerate the Human Genome Project and in 2002 through renovations on the seventh and eighth floors of McDonnell Sciences Research Building. Ongoing improvements to the campus infrastructure are being made through the Public Realm Project, which is focused on landscape and streetscape enhancements.

The School of Medicine is divided into two segments. Clinical departments are on the west side of the Medical Center, adjacent to hospital and patient areas. Preclinical departments are to the east. Research and instructional endeavors occupy the greater portion of the facilities, with more than 1.6 million gross square feet devoted to these activities. In the aggregate, the medical school occupies more than 4 million gross square feet of space.

The focal point of the preclinical teaching activities is the McDonnell Medical Sciences Building, the center of activity for entering medical students. The McDonnell Building, with 300,000 square feet of first-class research laboratories and classroom space, was made possible by James Smith McDonnell III, a generous benefactor of Washington University. Rising nine floors above ground, it contains administrative offices and two lecture halls on the first floor. Multidisciplinary teaching laboratories for first- and second-year students, as well as offices and research laboratories for the seven basic science departments, are located on the upper floors. Modern centralized animal quarters are housed in the basement. In addition, two floors (15,467 gross square feet) of Olin Residence Hall have been converted into student carrels, classrooms and conference rooms.

The North and South Buildings, in which the work of several Nobel laureates has centered, have been renovated extensively. Along with the Cancer Research Building, they continue to provide space for laboratories, offices and some departmental facilities. The East Building houses an MRI facility, computer installation and other components of the Mallinckrodt Institute of Radiology. The East Building also houses several administrative office suites.

A network of pedestrian bridges provides the ability to move freely among the major facilities, enhancing the interaction of all Medical Center

institutions and benefiting research and patient care.

Other facilities owned or operated by Washington University include:

Biotechnology Center. This five-story facility was recently renovated into laboratories for the departments of Psychiatry, Medicine and Pathology.

McMillan Hospital. McMillan houses offices and research laboratories for the Departments of Neurological Surgery, Neurology, Ophthalmology and Visual Sciences, and Otolaryngology.

The Edward Mallinckrodt Institute of Radiology (MIR). Mallinckrodt Institute is internationally recognized for excellence in teaching, research and clinical services. Housed in its own 13-story building, MIR also has satellite facilities in Barnes-Jewish, St. Louis Children's and Wohl hospitals; the Clinical Sciences Research and East buildings; the Scott Avenue Imaging Center; the Center for Advanced Medicine; and the Knight Emergency and Trauma Center.

Renard Hospital. With consolidation of psychiatric patient care services in the West Pavilion, this eight-story structure provides additional office and laboratory space for the Department of Psychiatry.

St. Louis Maternity Hospital. Maternity Hospital houses offices for the Departments of Obstetrics and Gynecology, and Ophthalmology and Visual Sciences. A Perinatal Center and laboratories for research in the physiology of reproduction are located in this building.

West Building. The West Building contains offices and research laboratories for the Departments of Pathology and Internal Medicine.

David P. Wohl, Jr. Memorial Hospital (10 floors). Wohl Hospital, opened in 1953, provides offices and laboratories for the Departments of Medicine and Surgery.

David P. Wohl, Jr. Memorial-Washington University Outpatient Clinics. The clinics are administered by Barnes-Jewish Hospital. Many of the clinics located on the first five floors moved to the newly constructed Center for Advanced Medicine, with the vacated space available for research needs. The lower five floors contain clinical space and space for translational research. The first floor is home for the Chromalloy Kidney Dialysis Center. The upper five floors are devoted to research facilities for several departments of the School of Medicine.

4444 Forest Park. This 294,302-gross-square-foot building houses administrative offices of various medical school departments, the Program in Physical Therapy, the Program in Occupational Therapy and a major research facility for the Department of Genetics and the Genome Sequencing Center.

Bernard Becker Medical Library. Founded in 1911, the Washington University Medical School library is one of the oldest and most comprehensive west of the Mississippi. Today, the Bernard Becker Medical Library serves as an information hub for the Medical Center and extends its services and resources to the global health science community.

The facility, completed in 1989, integrates two components: the Health Sciences Collections, and the Medical School Computing and Networking Services. The eight-level, 114,000-square-foot structure has a capacity for more than 300,000 volumes. The Health Sciences Collection includes more than 200,000 volumes, some 2,000 audiovisual items and over 2,000 current journal subscriptions.

Information Services, as part of Communication and Outreach, answers a wide range of questions covering biomedical and general information. Staff may be contacted by telephone, (314) 362-7085, by electronic mail, *reference@medicine.wustl.edu*, or at the Information Services desk on Level 1 of the library. Information Services offers individual and group training in database searching. Audience-specific classes can be designed for Medline, Evidence Based Medicine or information management software. Training sessions can be held in the library or off site.

E-Catalog provides complete and current information about the library's collections. It includes access to over 1,400 electronic full-text journals, 50 online books, and numerous selected web sites. Ovid Online is the library's premier tool for searching and retrieving biomedical journal literature. Other valuable electronic resources include the Web of Science, Journal Citation Reports and the Cochrane Library. Remote access for these products is available for office or home use. Materials not owned by Becker Medical Library can be obtained through interlibrary loan and document delivery service.

Instructional Technologies and Library Systems (ITLS) offers more than 2,000 audiovisual titles and computer programs, a network of advanced personal computer workstations, and a large computer education classroom. The staff supports student computing. ITLS pioneered the use of high-capacity networks and digital imaging technology in the medical curriculum. ITLS also supports peripheral computer laboratories at other educational sites within the Medical Center.

The Medical School Computing and Networking Services provides the capability for electronic mail, Internet access and a wide array of specialized software services for all faculty, students and Medical Center collaborators. The facility consists of a broad complement of high-performance servers to accommodate the heterogeneous needs of the Medical Center. A help desk service is available to all faculty and staff during normal working hours. The division also ensures that network-based information resources available from the library are disseminated effectively to all Medical Center collaborators.

The library's Archives and Rare Book unit includes almost 22,000 volumes and outstanding collections such as the Bernard Becker Collection in Ophthalmology, the CID-Max Goldstein Collection in Speech and Hearing, the H. Richard Tyler Collection in Neurology, and the Paracelsus Collection of the

St. Louis Medical Society. The archives of the Medical Center contain the records and private papers of the School, memorabilia and oral histories of individuals who have made important contributions to American medicine. Among the manuscript collections are papers of William Beaumont, Joseph Erlanger, E.V. Cowdry, Evarts Graham and Carl Cori.

The Bernard Becker Medical Library takes pride in providing the latest biomedical information to the Medical Center. For detailed information about the library's programs and services visit: *becker.wustl.edu*.

Library hours and telephone numbers are:

Monday-Thursday	7:30 a.m. - midnight
Friday	7:30 a.m. - 10 p.m.
Saturday	8:30 a.m. - 6 p.m.
Sunday	12 p.m. - midnight

Expanded study hours during exam periods and holiday hours are posted as needed.

Circulation	(314) 747-0023
Reference	(314) 362-7085
Interlibrary Loan	(314) 362-2780
Instructional Technologies and Library Systems	(314) 362-2793
Archives & Rare Books	(314) 362-4236
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Barnes-Jewish Hospital, a 1,385-bed teaching and research facility, is the largest hospital in Missouri, with 608,154 inpatient admissions, outpatient, and emergency department visits from patients around the world. It provides clinical experience for medical students for all clinical departments except Pediatrics. The medical staff is composed exclusively of members of the faculty of the School of Medicine.

Rated by *U.S. News & World Report* as one of the top 10 hospitals in the country, Barnes-Jewish Hospital has a premier reputation in patient care, medical education, research and community service. Its areas of expertise include cancer, cardiology, cardiothoracic surgery, endocrinology, gastroenterology, geriatrics, gynecology, infectious diseases, nephrology, neurology, neurosurgery, ophthalmology, orthopaedic surgery, otolaryngology, pulmonary disease, rheumatology, transplantation and urology.

St. Louis Children's Hospital. Since 1879, St. Louis Children's Hospital has been at the forefront of pediatric medicine, with physicians, nurses and staff who dedicate their lives to the care of children. The hospital provides a full range of health services to children and their families throughout its 300-mile service area, as well as nationally and internationally. Its spectrum of pediatric specialty services includes newborn medicine, neurosurgery and the world's largest pediatric lung transplant program. In 2003, Children's Hospital was rated #6 on *Child* magazine's Top 10 list of the best children's hospitals in America.

St. Louis Children's Hospital also provides an array of community outreach services, including pediatric mobile health vans, injury prevention programs, educational classes on parenting and child development, as well as patient and parent support groups. The hospital also operates the 454-KIDS Answer Line, a free child health information service and physician referral line staffed by pediatric registered nurses and referral specialists.

Barnes-Jewish and St. Louis Children's hospitals are members of *BJC HealthCare*, a regional health care system that provides community-based and academic health care services at more than 100 inpatient and ambulatory care sites throughout Missouri and southern Illinois. BJC, in partnership with its physicians, provides a full continuum of health care services, including wellness and health promotion; primary, acute and ambulatory care; skilled nursing; long-term care; home health care; and hospice care.

Barnard Free Skin and Cancer Hospital houses the Washington University General Clinic Research Center (GCRC). Through a collaboration among Barnard, Barnes-Jewish Hospital and Washington University, medically indigent patients with cancer or diseases of the skin receive free care from Washington University physicians at the Alvin J. Siteman Cancer Center and Barnes-Jewish Hospital.

Central Institute for the Deaf. Founded in 1914 as a place where teachers, parents and professionals work together to help children with hearing loss, Central Institute for the Deaf is an internationally recognized center for oral education, scientific research and the education of professionals in audiology, deaf education and speech and hearing sciences. CID helps hearing-impaired children from birth through age 12 learn listening, language, speech and academic skills, prepares graduate students for careers in speech and hearing, provides clinical services and conducts basic and applied research in hearing and deafness. CID's acoustically enhanced "quiet school" features the Joanne Parrish Knight Family Center, serving children and their families from birth to 3. The Harold W. Siebens Hearing Research Center houses state-of-the-art biology laboratories and core facilities.

Central Institute for the Deaf houses the Speech, Hearing and Education Library, a premier collection of materials devoted to deafness, hearing impairment, audiology, speech pathology, language, communication, acoustics, noise, hearing conservation, early childhood education, behavioral sciences, physiology, psychology, anatomy, mechanical and digital instrumentation, neurology, neurobiology and otolaryngology.

The collection contains more than 3,000 monographs/books, 2,000 bound journal/serial volumes and 75 current journal/serial subscriptions as well as extensive collections of periodic reports from major academic institutions worldwide, government documents and journal articles dating from the 19th

century. Associated with this library is the CID/Max Goldstein Historic Devices for Hearing Collection, including hearing devices dating from 1796.

The *Alvin J. Siteman Cancer Center* at Washington University School of Medicine and Barnes-Jewish Hospital is world-renowned for its basic science, translational research and patient care. The Siteman Cancer Center holds nearly $95 million in extramural funding for cancer research and is organized into eight research programs (cancer genetics, cancer and developmental biology, tumor immunology, hematopoietic development and malignancy, cellular proliferation, oncologic imaging, prevention and control, clinical and translational research). The Siteman Cancer Center also provides 12 shared resource facilities to its more than 250 research members. Shared resource facilities include: bioinformatics core, biostatistics core, clinical trials core, embryonic stem cell core, hereditary cancer core, high-speed cell sorter core, molecular core laboratory, multiplexed gene analysis core, pharmacology core, proteomics core, small animal cancer imaging core and tissue procurement core.

Other hospitals. The following hospitals also are associated with the School of Medicine, and various members of their staffs hold University appointments:

- Christian Hospitals Northeast and Northwest: 517 beds
- Metropolitan St. Louis Psychiatric Center: 125 beds
- Missouri Baptist Medical Center: 358 beds
- Veterans Administration Medical Center: 104 beds
- Shriners Hospital for Children: 80 beds

RESEARCH ACTIVITIES

Grants and contracts totaling more than $367 million supported faculty research efforts at the School of Medicine in fiscal year 2002. Substantial additional support was provided directly to faculty investigators by the Howard Hughes Medical Institute and by the Barnes-Jewish Hospital Foundation. Gifts and grants from private sources, including alumni, individuals, foundations, corporations and other organizations, totaled $49.9 million from 6,261 entities.

The School of Medicine received $289.5 million from the National Institutes of Health in grants in fiscal year 2001, making it the fourth-largest recipient of NIH dollars among the 125 U.S. medical schools.

That money came in 655 separate grants, 588 of which were designated as research grants. Funds supporting training came in 35 additional grants, 31 grants were for fellowships and one grant was for construction. NIH research grants supported the investigations of at least 713 full-time faculty members.

The Johns Hopkins University	$382,006,714
University of Pennsylvania	$347,729,353
Washington University	**$328,381,301**
University of California, San Francisco	$313,335,255

The many medical firsts at the School of Medicine include:

- With international teams, announced the first working draft of the human genome and sequenced the first plant genome.
- Obtained cells that, when injected into the spinal cord, reinsulate nerve axons and allow some improvement in neurological function in animals.
- Developed genetically altered mice that do not become obese or develop diabetes when fed a high-fat diet.
- Developed a genetic test that detects whether an individual will develop a form of thyroid cancer and would benefit from thyroid removal-the first surgical prevention of cancer based on genetic test results.
- Developed a rating scale used worldwide to diagnose Alzheimer's disease.
- Developed a new strategy for creating vaccines and antibiotics against bacteria such as those that infect the bladder.
- Uncovered key players in programmed cell death, which rids the body of surplus or abnormal cells, and discovered how cancer cells avoid the self-destruct signal.
- Created the first PET scanner, a device that images the brain at work.
- Among the first to give patients insulin for diabetes.
- Proposed the now-common practice of taking aspirin to help prevent heart attacks.
- Pioneered research into excitotoxicity and brain injury.
- Developed a blood test for early diagnosis of prostate cancer.
- Developed a surgical procedure to remove damaged portions of emphysema patients' lungs, dramatically improving function.
- Developed a cure for hepatitis B in cases diagnosed early.
- Created a surgical cure for the abnormal heart rhythm called atrial fibrillation.
- Developed a blood test that quickly and safely identifies whether a heart attack patient will require invasive treatment.

Ongoing research includes:

- Identifying a link between AIDS drugs and diseases such as osteoporosis and diabetes; developing better methods of treating HIV-positive patients.
- Imaging language areas of the brain during recovery from stroke to observe the brain's natural

rehabilitation pattern, leading to a better understanding of normal language processes and helping to optimize stroke therapy.

- Leading an international research team in the identification and isolation of a genetic risk factor for Alzheimer's disease.
- Developing a method to block the ability of the malaria parasite to spread in the bloodstream.
- Studying unsafe sleep practices and their relation to the risk of infant death.
- Developing drug therapies for histoplasmosis and other disease-causing fungi, as well as malaria and other major tropical diseases.
- Investigating nerve transplants, including the world's first nerve transplant using nerve tissue from a cadaver donor.
- Identifying clinical signs of early Alzheimer's and studying events that trigger the disease.
- Imaging brains of healthy children and those with perinatal stroke to understand how the brain develops and recovers from injury.
- Researching the role of the immune system in tumor formation.
- Developing and using new imaging tools to study how brain cells for their connections.
- Developing a new model of asthma that addresses the role of antiviral response.
- Developing and using new minimally invasive surgery techniques, including robotics.
- Improving diagnostic tools for cancer.
- Imaging people with schizophrenia to identify anatomical markers of the disease.
- Identifying the role of ethnicity in response to drugs such as chemotherapy.
- Developing a more complete understanding of hemoglobin, the oxygen-carrying protein in red blood cells.
- Identifying new rehabilitation methods that improve function in old and new spinal cord injury and stroke patients.
- Studying the underlying cause of recurrent urinary tract infections.
- Using antibiotics to treat abdominal aortic aneurysms.

CURRICULUM

The curriculum is the product of prolonged and continuing study, by both faculty and students, of the present and probable future course of medical science and medical practice, and of the ways in which medical education can be kept abreast of this course. It is planned to provide students who enter medical school with diverse backgrounds and interests and who will undertake a wide variety of careers with the basic knowledge and skills essential for their further professional development. Modern medical education can no longer hope to be comprehensive; it must be selective. Yet students must develop facility in the understanding and use of several related technical languages: those of anatomy, chemistry, physiology and clinical medicine. They must share responsibility for the care of the patient. They also must learn how these areas of endeavor are interrelated, how the organization and needs of society influence the methods of providing medical care, and how new knowledge is acquired and old knowledge re-evaluated.

The curriculum includes a core experience based upon a sequence of courses that will introduce students to the broad panorama of medicine. The principles, the methods of investigation, the problems and the opportunities in each of the major disciplines of medical science and medical practice are presented in such a way as to help students select the career best suited to their abilities and goals.

In the final year of the medical school curriculum, the required elective program helps students to decide where major interests lie. It also enables them to benefit from the wide range of specialized knowledge and skills found in the faculty. As there is not enough time for all students to be introduced to each of today's areas of specialization, the elective program permits students to select, according to their desires, the areas they wish to explore or to study in depth.

Table of Courses/Coursemasters 2003-2004

FIRST YEAR

First-year courses are taught during the 38-week academic year.

Course No.	*Course Title*
M75 503	Cell and Organ Systems Biology *Paul C. Bridgman, Ph.D., 362-3449 (Histology)* *Robert S. Wilkinson, Ph.D., 362-2300 (Physiology)*
M05 501A	Human Anatomy and Development *Glenn C. Conroy, Ph.D., 362-3397*
M30 523	Immunology *Andrey S. Shaw, M.D., 362-4614*
M30 511	Medical Genetics *Alison J. Whelan, M.D., 362-7800*
M30 526	Microbes and Pathogenesis *Henry V. Huang, Ph.D., 362-2755*
M15 502	Molecular Foundations of Medicine *Linda J. Pike, Ph.D., 362-9502*
M35 554	Neural Sciences *David C. Van Essen, Ph.D., 362-7043*

M25 507 The Practice of Medicine I
Robert J. Rothbaum, M.D., 454-6173
- Clinical Skills
  Katherine E. Henderson, M.D., 362-8065
- Ethics and Health Policy
  Rebecca Dresser, J.D., 454-7116
- Health Promotion/Disease Prevention
  Bradley A. Evanoff, M.D., M.P.H., 286-2546
- Interpreting Illness
  Stephen S. Lefrak, M.D., 454-7116
- Patient-Physician Communication
  Kellie L. Flood, M.D., 286-2713
- Scientific Method of Clinical Medicine and Research
  Jay F. Piccirillo, M.D., 362-7394

Selectives

M04 • General Selectives
Koong-Nah Chung, Ph.D., 362-4395

M04 • Medical Humanities
Stephen S. Lefrak, M.D, 454-7116

A selective is 10 clock hours in duration. Examples of selective offerings from last year include:

M04 501 Anatomy Through the Eyes of the Radiologist
M04 514 Cardiovascular Biophysics
M04 519 Case Problems in Biochemistry and Cell Biology
M04 526 New Diseases, New Pathogens
M04 533 Tropical Medicine
M04 534A Progression of Kidney Disease
M04 536 Autonomic Mechanisms in Diseased States
M04 537 Cardiovascular Control Mechanism
M04 552 Genetics and Molecular Biology of Ion Channels
M04 561 Brain Blood Vessels
M04 5667 Microcirculation
M04 582 Alzheimer's Disease
M04 584 Medical Aspects of Domestic Violence
M04 587A Physician as Health Protector and Patient Advocate
M04 589 Topics in Viral Pathogenesis
M04 596 Ion Channels and Disease

SECOND YEAR

Second-year courses are taught during the 36-week academic year.

Course No. *Course Title*

M25 611B Cardiovascular Disease
Dana R. Abendschein, Ph.D., 362-8925

M25 614 Dermatology
Lynn A. Cornelius, M.D., 362-8187
Jeffrey E. Petersen, M.D., 996-8810

M35 632 Diseases of the Nervous System
Allyson Zazulia, M.D., 362-6378

M55 660B Clinical Topics in Otolaryngology
Joel A. Goebel, M.D., 747-0553
James M. Hartman, M.D., 367-7346

M25 615A Endocrinology and Metabolism
William E. Clutter, M.D., 362-8094

M25 620A Gastrointestinal and Liver Diseases/Nutrition
Deborah C. Rubin, M.D., 362-8940

M25 625A Hematology and Oncology
Scot G. Hickman, M.D., 289-6308

M25 605A Infectious Diseases
Nigar Kirmani, M.D., 454-8214

M45 635B Obstetrics/Gynecology
Andrea P. Stephens, M.D., 362-1016, 362-3126

M60 665 Pathology
Erika C. Crouch, Ph.D., M.D., 454-8462

M65 640 Pediatrics
Leonard B. Bacharier, M.D., 454-6299

M25 607 The Practice of Medicine II
Megan Wren, M.D., 362-8050
- Clinical Skills
  Katherine E. Henderson, M.D., 362-8065
- Ethics and Health Policy
  Rebecca S. Dresser, J.D., 454-7116
- Health Promotion/Disease Prevention
  Bradley A. Evanoff, M.D., M.P.H., 286-2546
- Interpreting Illness
  Stephen S. Lefrak, M.D., 454-7116
- Medicine Patient Sessions
  Katherine E. Henderson, M.D., 362-8065
- *Neurology* Patient Sessions
  Allyson Zazulia, M.D., 362-6378
- Ophthalmology
  Morton E. Smith, M.D., 362-5722
- Patient-Physician Communication
  Kellie L. Flood, M.D., 286-2713
- Radiology
  Sanjeev Bhalla, M.D., 362-2927
  Harvey S. Glaser, M.D., 362-2927
- Scientific Method of Clinical Medicine and Research
  Jay F. Piccirillo, M.D., 362-7394

M70 670A Principles of Pharmacology
Douglas F. Covey, Ph.D., 362-1726

M85 676A Diseases of the Nervous System: Psychiatry
Laura J. Bierut, M.D., 362-3492

M25 612B Pulmonary Diseases
Michael B. Lippmann, M.D., 289-6306

M25 613B Renal and Genitourinary Diseases
Stanley Misler, Ph.D., M.D., 454-7966
David Windus, M.D., 362-7211

M25 606A Rheumatology
Leslie E. Kahl, M.D., 454-7279

THIRD YEAR

Clinical Clerkship (Third) Year is a 48-week academic year.

Course No.	*Course Title*	*Weeks*
	Selective Clerkships: (choice of one block)	4
M25 714	• Ambulatory: Emergency Medicine Clerkship *Mark Levine, M.D., 362-6743* *Sandy Sineff, M.D., 362-7959*	
M26 713	• Ambulatory: Family Medicine Clerkship *Walton Sumner II, M.D., 454-8164*	
M25 740	• Dermatology Clerkship *Lynn Cornelius, M.D., 454-8622*	
M25 750	• Geriatric Clerkship *David B. Carr, M.D., 286-2706*	
M25 730	• Physical Medicine and Rehabilitation Clerkship *Oksana Volshteyn, M.D., 454-7757*	
M90 740	• Radiation Oncology Clerkship *Joseph R. Simpson, M.D., Ph.D., 362-8567*	
M85 775	Consultation/Liaison Psychiatry Clerkship *Kevin J. Black, M.D., 747-2013*	
M95 790	Integrated Surgical Disciplines Clerkship *Eric Choi, M.D., 362-8029*	12
M25 710	Medicine Clerkship *Thomas M. De Fer, M.D., 362-8050*	12
M35 720	Neurology Clerkship *Mark P. Goldberg, M.D., 362-3258*	4
M85 770	Psychiatry Clerkship *Kevin J. Black, M.D., 747-2013*	4
	Women's and Children's Health Clerkships	12
M65 760	• Pediatrics Clerkship *Angela M. Sharkey, M.D., 454-6299* *Kathleen A. McGann, M.D., 454-6299*	
M45 730	• Obstetrics/Gynecology Clerkship *Andrea P. Stephens, M.D., 362-1016, 362-3126*	

FOURTH YEAR

Elective (Fourth) Year is a 44-week academic year.

To qualify for the Doctor of Medicine degree at Washington University School of Medicine, fourth-year students are required to participate in a minimum of 36 weeks of electives (full-time clinical or research courses). Two-thirds of the minimum required time for the Elective Year must be taken exclusively in residence in the Washington University School of Medicine elective course program. A complete listing of fourth-year elective offerings at Washington University School of Medicine is available through the Office of the Associate Dean for Medical Student Education. Students may participate in clinical electives of four weeks duration. If a student takes a research elective, that elective must be of at least six weeks' duration.

A maximum of 12 weeks' credit is allowed for full-time elective coursework taken at other academic institutions. These may be clinical or research electives. Students desiring credit for work to be done at other institutions must petition the Associate Dean for Medical Student Education. Absolutely no credit will be granted for electives undertaken prior to approval from the appropriate administrative committees.

Credit may be given for elective work done at any point in the standard four-year Doctor of Medicine degree program so long as participation conforms to current elective guidelines, and a) the student is a duly registered, full-time student for a minimum of three years and nine months, including scheduled vacation time, and tuition is paid for four complete academic years; or b) if transferring into the third-year class, the student is a duly registered, full-time student for a minimum of 22 months and tuition is paid for two complete academic years.

Students are encouraged to take lecture-seminar elective courses, but such offerings are optional. Clock hours for the year total 1,386 (36 weeks).

Remuneration for work done while participating in electives for credit is *prohibited.*

Lectureships and Visiting Professorships

Several established lectureships enable the School to bring to the Medical Center each year distinguished guests who contribute significantly to the richness of student life.

Ben T. Abelson Memorial Lectureship in Pediatric Hematology-Oncology. Established by Mrs. Ben T. (Ann) Abelson, the first lecture was held on January 8, 1988.

Harry Alexander Visiting Professorship. Established in 1964 by former house staff and friends of Dr. Harry Alexander to provide an annual visiting professor in the Department of Medicine.

Alpha Omega Alpha Lectureship. Given each year by a faculty member of the students' selection.

Daniel R. Biello Memorial Lectureship. Established in 1986 by friends, students and colleagues of Dr. Daniel R. Biello to provide an annual lectureship devoted to advances in radiology and nuclear medicine.

George H. Bishop Lectureship. Supported by funds made available by friends interested in the advancement of neurology.

Daniel Bisno, M.D., Memorial Lecture on Ethics in Ophthalmology. Established in 2001 by David C. Bisno, M.D., in memory of his father.

Estelle Brodman Lectureship Fund. Established in 1981 by friends and colleagues of Dr. Brodman in honor of her distinguished contributions to the School of Medicine.

The James Barrett Brown Visiting Professorship in Plastic and Reconstructive Surgery. Created in 1969 by patients, friends, colleagues and former students to honor Dr. Brown.

Thomas H. Burford Lectureship in Thoracic Surgery. Founded in 1971 by friends of Dr. Burford.

H. Marvin Camel Lectureship. Established in 1999 by family, friends and colleagues to honor Dr. H. Marvin Camel's retirement.

Glover H. Copher Lectureship in Cancer. Founded in 1971 with endowment provided by Dr. Copher and friends.

The Carl F. and Gerty T. Cori Visiting Professorship. Established in 1985 in honor of Nobel Laureates Carl and Gerty Cori by the Edward Mallinckrodt, Jr. Foundation, colleagues, faculty and former students.

Philip R. Dodge Lectureship. Established in 1987 by friends and colleagues to provide an annual lectureship in the Department of Pediatrics.

Joseph Erlanger Lectureship. Established in 1989 by the Department of Cell Biology and Physiology to honor Dr. Erlanger.

I. Jerome Flance Visiting Professorship. Established in 1977 by former students and friends of Dr. Flance to provide annually a visiting professor in the Division of Pulmonary Diseases.

Julia Hudson Freund Lecture in Oncology. Established in 1982 by S.E. Freund in memory of his wife to provide a visiting lectureship in clinical oncology in the Division of Oncology. This was endowed in 2002 by the Harry and Flora D. Freund Memorial Foundation.

Harvey A. and Dorismae Hacker Friedman Lecture on Aging.

Edwin F. Gildea, Jr. Lectureship in Psychiatry. Established in 1978 by friends, colleagues and former students of Dr. Gildea.

Joseph J. Gitt Visiting Professorship in Clinical Neurology. Established in 1971 by his family and friends to honor Dr. Gitt.

Graham Colloquium. A gift from Mr. and Mrs. Evarts Graham, Jr., in 1963 to encourage opportunities for students to expand their views on social, philosophical, artistic and political topics.

The Evarts A. Graham Lecture. Established in 1985 by the Washington University Alumni of the Phi Beta Pi medical fraternity to honor the memory of Dr. Evarts A. Graham.

Samuel B. Guze Lectureship. Established in 1990 by friends and colleagues to honor Dr. Guze.

Carl Gayler Harford Lectureship. Established in 1977 by the family of one of Dr. Harford's patients in gratitude for his contributions to teaching clinical medicine and virology.

Alexis F. Hartmann, Sr. Lectureship. Established in 1960 by friends interested in pediatrics to provide an annual lecture in Dr. Hartmann's honor.

Alex H. Kaplan Visiting Professorship/Lectureship. Established in 1986 by Dr. and Mrs. Alex H. Kaplan to support a visiting psychoanalyst.

Michael and Irene Karl Lectureship in General Internal Medicine. Created in 1983 by Mr. and Mrs. Meyer Kopolow to provide an annual lectureship in honor of Drs. Michael and Irene Karl.

The Jack and Barry Kayes Lectureship in Ophthalmology and Visual Sciences. Established in 2001 by Dr. Jack and Mrs. Barry Kayes to endow a lectureship in the Department of Ophthalmology and Visual Sciences.

Charles Kilo, M.D. Lectureship in Internal Medicine. Established in 1998 by Mrs. Ola H. Blodgett to pay tribute to the expert and compassionate care provided by Dr. Charles Kilo.

David M. Kipnis Lectureship in Molecular Biology and Pharmacology. Established in 1998 to provide an annual lecture in honor of Dr. Kipnis.

Robert S. Klayman Memorial Lecture. Established in 1997 by Mrs. Robert S. Klayman, in memory of her husband, to support an annual lecture on Parkinson's Disease Research.

Kroc Visiting Lectureship Program. Established in 1985 by The Kroc Foundation in honor of Ray A. and Robert L. Kroc.

Paul E. Lacy Lectureship in Pathology. Established in 1987 by The Kilo Diabetes and Vascular Research Foundation in honor of Dr. Lacy's many contributions to pathology and diabetes research, and to recognize his collaboration over the years with the co-founders of The Kilo Foundation.

William M. Landau Lectureship. This lectureship was established in 1995 by friends, family and colleagues of Dr. Landau.

Marvin and Barbara Levin Visiting Lectureship. Established in 1997 by Dr. Marvin & Mrs. Barbara Levin to support an endocrinology lectureship in Medicine.

Irwin Levy Memorial Fund. Supports the Dr. Irwin Levy Visiting Lectureship in Neurology, which was established in 1978 by Mr. and Mrs. Meyer Kopolow.

Oliver H. Lowry Lectureship. Established in 1978 by friends, colleagues and former students of Dr. Lowry.

H. Relton McCarroll, Sr. Visiting Professorship in Orthopaedic Surgery. Created in 1972 by patients, friends, colleagues and former students in honor of Dr. McCarroll.

Edward Massie Lectureship in Cardiovascular Disease. Established in 1981 by Edward J. Simon, M.D., Bernard Shanker and other grateful colleagues and patients.

G. Leland Melson II Lectureship. Established in 1993 in memory of Dr. Melson by his friends and colleagues.

J. Neal and Lois Middelkamp Lectureship. Established in 2001 by Dr. J. Neal and Lois Middelkamp to support a pediatric lectureship in infectious diseases and advances in pediatric education for medical students, residents and pediatricians, all life-long interests of Dr. Middelkamp.

The Dr. and Mrs. William B. Mill, Jr. Lectureship. Established in 2001 in the Department of Radiation Oncology by Dr. and Mrs. William B. Mill, Jr. This was given in recognition of the career accomplishments of Carlos A. Perez, M.D., and the impact he had on the professional development of Dr. Mill.

Carl V. Moore Lectureship. Established in 1973 by friends and patients of Dr. Carl V. Moore.

Carl A. Moyer Visiting Professorship of Surgery. Established in 1978 by The Harry Freund Memorial Foundation to support an annual lecture in honor of Dr. Moyer's contribution to surgery.

National Kidney Foundation — Saulo Klahr, M.D. Lectureship. Established in 1991 by the Kidney Foundation to honor Dr. Klahr, past president of the National Kidney Foundation and the John E. and Adaline Simon Professor and Vice Chair of the Department of Medicine at Washington University.

Joseph H. Ogura Lectureship. Established in 1977 by friends and colleagues of Dr. Ogura as a tribute to his numerous scientific accomplishments and contributions to the School of Medicine and graduate medical education, and his commitment to patient care.

Carlos A. Perez Endowed Lectureship in Oncology. Established in 2002 in the Department of Radiation Oncology by Dr. Perez's friends, colleagues, and current and former trainees in grateful recognition for his inspiration, guidance and leadership.

Dr. Roy H. Petrie Lectureship. Established in 2000 with gifts from various donors in memory of Roy H. Petrie, M.D.

Rose and Samuel Pollock Surgical Lectureship. Established in 1976 by Dr. Joseph H. Pollock in memory of his parents.

The Probstein Oncology Lectureship. Established in 1985 by Mr. and Mrs. Norman K. Probstein in appreciation of professional services provided by William Fair, M.D., former head of the urology division of the Department of Surgery, and Carlos Perez, M.D., professor emeritus of radiology and head of radiation oncology at the Medical Center's Mallinckrodt Institute of Radiology.

James A. Purdy Endowed Lectureship. Established by Elekta Oncology Systems, Ltd. in 2002 to honor Dr. James Purdy for his contributions to the field of Radiation Oncology.

Eli Robins Lectureship in Psychiatry. Established in 1977 by friends, colleagues and former students of Dr. Robins.

Peggy Sansone Memorial Lectureship. Created in 2002 by Anthony F. Sansone, Jr. and the Peggy Sansone Special Angel Foundation to promote the exchange of ideas and scientific information on the topic of depression and the role of spirituality in personality development, happiness and mental health. The lecture is a memorial to Mr. Sansone's wife, Peggy Sansone.

Julio V. Santiago Leadership. Established in 1999 by the Department of Pediatrics as a lasting tribute to Julio V. Santiago, M.D., for his long-standing contributions to the areas of diabetes, endocrinology and metabolism.

The Rena Schechter Memorial Lectureship in Cancer Research in the Department of Medicine. Established in 1996 by Dr. Samuel E. Schechter to create a lectureship in cancer research in memory of his wife, Rena Schechter.

Dr. Alexander and Helena Schonfeld Lectureship. This lectureship was established in 1994 by Mrs. Helena Schonfeld, in honor of her son, Gustav Schonfeld, Professor of Medicine at Washington University School of Medicine.

Henry G. Schwartz Lectureship. Created in 1983 by former residents and colleagues from the neurosurgery department to honor Dr. Schwartz.

Wendell G. Scott Memorial Lectureship. Established in 1972 by friends and colleagues of Dr. Wendell G. Scott.

Major G. Seelig Lectureship. Established in 1948 in the field of surgery by friends of Dr. and Mrs. Seelig.

Philip A. Shaffer Lectureship. Founded in 1957 by friends of Dr. Shaffer in recognition of his accomplishments in biochemistry.

Earl E. and Wilma Shephard Orthopaedics/ Otolaryngology Memorial Lecture. Established in 1994 through a bequest by Dr. and Mrs. Shephard.

Frank O. Shobe Lectureship. Established in 1986 by friends of Dr. Shobe to honor him as a physician and teacher.

Donald C. Shreffler Genetic Lectureship. Established in 1995 by Mrs. Donald C. Shreffler as a memorial to her husband.

Eduardo Slatopolsky Lectureship. Established in 1988 by Mr. and Mrs. William Wolff in honor of Dr. Slatopolsky's 25-year association with the School.

C. R. Stephen, M.D., F.F.A.R.C.S. Fund for Lecture and Clinical Research in Anesthesiology. Established in 1986 by former students, residents, faculty and friends in honor of Dr. Stephen, first Head of the Department of Anesthesiology.

Sterling Drug Visiting Professorship in Pharmacology. Established in 1986 to honor Ernst Zander, M.D., former medical director of Sterling Drug, Inc.

Arthur W. Stickle Lectureship in Pediatric Ophthalmology. Established by Arthur and Emily Stickle in 1995 with their generous gift in recognition of Dr. Stickle's medical training in the Department of Ophthalmology and Visual Sciences and his special professional contribution to the field of pediatric ophthalmology.

The Richard A. and Betty H. Sutter Visiting Professorship in Occupational and Industrial Medicine. Established in 1985 by Dr. and Mrs. Sutter to encourage opportunities for students, faculty, other physicians and the St. Louis community to expand the understanding and practice of occupational medicine.

Jessie L. Ternberg Pediatric Surgery Visiting Lectureship. Made possible from a fund established in 1977 by Mr. Meyer Kopolow to honor Dr. Ternberg.

Robert J. Terry Lectureship (1939) and Visiting Professorship (1982). Established by alumni and Charles S. Terry, his son, respectively, "for the purpose of fostering greater appreciation of the study of anatomy."

Donald L. Thurston Memorial Lectureship. Established in 1988 by his wife, Dr. Jean Holowach Thurston, and his colleagues and friends, the lectureship is devoted to the history of biomedical advances.

Leonard J. Tolmach Lectureship. Established in 1995, this lectureship was endowed by friends and colleagues to honor the legacy of Dr. Tolmach. The lecture theme is radiation biology in clinical radiation oncology.

Mildred Trotter Lectureship. Established in 1975 by friends and former students of Mildred Trotter to bring a distinguished woman scientist to the School of Medicine each year.

Rudolph A. Tuteur Pulmonary Lectureship. This lectureship is endowed by family, friends, patients and colleagues of the Tuteur family to memorialize Rudolph A. Tuteur. The goal of this annual fall event is to promote further understanding of problems associated with chronic pulmonary disease from which he suffered.

Course Evaluations

Systematic course evaluation is performed for each year of the curriculum by faculty peers, teaching faculty and students. This system permits problem identification, ensures timeliness of feedback, promotes discussion of new teaching methodologies, allows curriculum inventory, recommends changes in course offerings and provides better integration of the curriculum. These reviews are guided through a Curriculum Evaluation Committee (CEC) for each of the preclinical years of instruction and another CEC to evaluate both clinical years (*i.e.*, CEC I = first year, CEC II = second year, CEC III = third and fourth years).

The Office of the Associate Dean for Medical Student Education oversees the evaluation system, which is coordinated by Ms. Kelly Noll in the Curriculum Evaluation Office (362-3404). The collected data are forwarded to the respective coursemasters, the Committee on Medical Education and the Academic Affairs Committee.

Adviser System

Student advising occurs within two broad programs.

1. Clinical Advisers: The first-year students are assigned in small groups to selected faculty advisers, representing both basic science and clinical faculty. These groups meet on an informal basis, usually in the hospital setting. The students and faculty member explore mutually interesting topics which may include seeing patients, observing procedures, discussing health insurance or reading journal papers. The advisers serve as faculty contacts but do not have any formal academic advisory role.

Each first-year student is invited to join one of the three academic societies. Entering students are divided equally among the societies. Incoming first-year students and their faculty advisers share the same academic society.

2. Career (fourth-year) Advisers: Each third-year student selects a fourth-year adviser from a list of potential faculty advisers. In most cases, the adviser is a faculty member in the field in which the student will be seeking a residency appointment. The career advisers have responsibility for reviewing the student's choice for fourth-year electives and making appropriate recommendations for the structure and content of the elective year. In addition, fourth-year advisers serve as valuable resources for information about residency programs.

In addition to the advising programs described, students seek informal advising from faculty with whom they have had contact, either through classroom work, research or clerkships. Students also have faculty and alumni contact through membership in the academic societies.

DEGREE PROGRAMS

The Washington University School of Medicine offers four programs leading to the M.D. degree: a regular four-year program, a five-year program, the M.A./M.D. program and a combined M.D./Ph.D. program.

Doctor of Medicine

By conferring the M.D. degree, the University certifies that the student is competent to undertake a career as a doctor of medicine. It certifies further that, in addition to medical knowledge and skills, the graduate possesses qualities of personality — compassion, emotional stability and a responsible attitude — essential to an effective professional life.

A course of medical education for the M.D. degree ordinarily consists of a minimum of four years of study. Students recommended for the Doctor of Medicine degree must be of good moral character, they must have completed an entire academic course of instruction as matriculated medical students, they must have passed all required subjects or the equivalent and have received satisfactory grades in the work of the full academic course, and they must have discharged all current indebtedness to the University. Individuals applying for licensure must be at least 21 years of age.

At the end of the final academic year, students who have fulfilled these requirements will be eligible for the M.D. degree.

Five-Year Program

In addition to the regular four-year program leading to the M.D. degree and the M.A./M.D. degree program, students are permitted to spend one additional year in an academic program in a medical or medically related field. In exceptional circum-

stances, an additional year may be permitted. The student may receive a stipend but may not be considered an employee of the University. The program must be arranged with an academic adviser and is subject to the approval of the Associate Dean for Student Affairs.

Master of Arts and Doctor of Medicine

The objective of the M.A./M.D. Program is to provide one full year of individual, full-time, in-depth research experience for medical students in preparation for a career in academic medicine. Program participants absent themselves from medical school and spend 12 months working on basic biomedical research or hypothesis-driven clinical research in the lab of a faculty member. Degree requirements include a presentation before a research advisory committee, submission of a publication-quality manuscript and participation in a research ethics seminar. No academic credit toward the M.D. degree will be given, but research and thesis may be continued as senior elective for credit. Fellowship stipends and other support are available through the Howard Hughes Medical Institute (basic science research), Doris Duke Foundation (clinical research), the National Institute of Diabetes & Digestive & Kidney Diseases (GI, hepatology, endocrinology, nutrition, nephrology and hematology research) and the J. Max Rukes Fund (endocrine and metabolism research). Students unable to qualify for one of these awards may also apply for support from the dean of the medical school. Funding amounts may vary and some of these sources have deadlines in early November. Please contact the M.A./M.D. program administrator at (314) 747-6787 for details.

Doctor of Philosophy

The Division of Biology and Biomedical Sciences offers predoctoral programs in Biochemistry, Bioorganic Chemistry, Computational Biology, Developmental Biology, Evolutionary and Population Biology, Immunology, Molecular Biophysics, Molecular Cell Biology, Molecular Genetics, Molecular Microbiology and Microbial Pathogenesis, Neurosciences and Plant Biology. These educational activities are organized on an interdepartmental basis by the faculty of all clinical and preclinical departments of the School of Medicine, as well as the departments of Biology and Chemistry in the School of Arts & Sciences. All degrees are awarded through the Washington University Graduate School of Arts & Sciences. Additional information about the Divisional programs may be obtained by contacting:

Graduate Studies Office
Washington University School of Medicine
660 S. Euclid Ave., Campus Box 8226
St. Louis, MO 63110-1093
(800) 852-9074

Doctor of Medicine and Doctor of Philosophy

Washington University offers a combined M.D./Ph.D. degree program that utilizes the resources of the Division of Biology and Biomedical Sciences and the School of Medicine under the auspices of the Medical Scientist Training Program (MSTP). The purpose of the program is to train individuals in medicine and biomedical research to prepare them for careers as physician scientists. The program was inaugurated in 1969, and is one of the oldest and largest in the country. The program, normally completed in seven years, has been highly successful; more than 80 percent of those who have completed postgraduate training are actively involved in research programs at leading institutions.

All students in the program receive financial support in the form of stipends (currently $20,500 per year), health coverage, disability and life insurance, and full tuition remission for both the M.D. and Ph.D. phases of training.

Only students who have spent the equivalent of at least two semesters in laboratory research should apply to the Medical Scientist Training Program. Applicants must meet the requirements for admission to both the School of Medicine and the Graduate School of Arts and Sciences, although the Graduate Record Examination is not required. In addition, students planning to concentrate in disciplines related to the chemical or physical sciences should have completed mathematics through calculus, physics and physical chemistry, and advanced organic chemistry. A course in differential equations also is recommended. For those students whose major interests are in the more biological aspects of medical science, the quantitative requirements for chemistry are less extensive, but a strong background in mathematics, chemistry and physics is still important. Although most individuals enter the program as first-year students, applications will be accepted from students in their first or second year at this medical school. The program matriculates approximately 25 new students each year, which represents one-fifth of the entering medical school class.

The program consists of three parts: 1) two years of an enhanced medical curriculum, 2) at least three years of original research toward a thesis to satisfy the requirements for the Ph.D. degree, and 3) at least 15 months of clinical training based on a student's career goals. Both degrees are awarded at the completion of the program.

Funding support begins when the student begins the program, either in June or at the beginning of the medical school year. Students are encouraged to begin the program in June. For these students, the first week is spent visiting faculty in various departments and choosing a laboratory in which to carry out a short research project before beginning the medical school year.

MSTP students complete medical and graduate school courses in the first two years. They are expected to do a summer research project between the first and second years of medical school. The laboratories selected for summer research need not be those chosen for the Ph.D. portion of the program.

While the Medical Scientist Training Program includes all medical courses required for the M.D. degree, it incorporates a high degree of flexibility for individuals through a wide range of electives and graduate courses, some of which may be taken during the first year of the medical curriculum. Every effort is made to individualize each student's curriculum based on previous background and current interests. The medical and Ph.D. curricula are integrated, which permits students to take Ph.D. coursework in lieu of certain medical school coursework. In this way, students may substantially meet the coursework requirements of the Ph.D. program during the first two medical school years. The MSTP director and co-director meet with students individually to help them decide on a personalized curriculum and appropriate laboratory rotations.

The MSTP Committee monitors the performance of each student, and a high scholastic standing as well as a commitment to research is expected.

Students normally spend between three and five years in the Graduate School of Arts and Sciences or the School of Engineering satisfying the following requirements:

1) Completion of required graduate coursework;
2) Successful performance in qualifying examinations;
3) Execution of original research suitable for a dissertation;
4) Defense of the thesis; and
5) Completion of a one-semester teaching assistantship.

The Ph.D. degree may be obtained in the Program in Biomedical Engineering or any of the programs of the Division of Biology and Biomedical Sciences. The Division, now in its 28th year, is a leader in interdisciplinary biomedical education. Member departments of the Division include all clinical and preclinical departments of the Medical School, as well as the Departments of Biology and Chemistry. These departments jointly provide training in the following interdisciplinary programs:

Biochemistry
Bioorganic Chemistry
Computational Biology
Developmental Biology
Evolutionary and Population Biology
Immunology
Molecular Biophysics
Molecular Cell Biology
Molecular Genetics
Molecular Microbiology and Microbial Pathogenesis
Neurosciences

Students may conduct research under any of the faculty affiliated with these programs and with faculty in the Biomedical Engineering program.

A series of monthly seminars featuring physician scientists is held for M.D./ Ph.D. students. These seminars are aimed at stimulating student interest in clinical medicine, increasing awareness of major research problems in clinical medicine and exposing students to diverse career paths in academic medicine.

M.D./Ph.D. students attend an annual weekend retreat during which students present their research. The retreat also features discussions led by experts on topics selected by students.

To keep students in the Ph.D. phase of training up to date on their clinical skills, monthly opportunities are offered for clinical interactions. Students are matched individually with a clinical mentor in the specialty of their choice. These interactions include going on rounds and attending conferences.

A special two-week non-graded tutorial for M.D./ Ph.D. students facilitates their transition into the clinical phase of training.

Finally, MSTP students are required to complete a minimum of 15 months of clinical training. Opportunities exist to meet part of the requirement while engaged in Ph.D. training. Students may opt to do up to 24 months of clinics. The intensive clinical training is the last formal requirement for the M.D. degree. Both the Ph.D. and M.D. degrees will be granted at the conclusion of clinical training.

Application Procedure: Students interested in applying to the Medical Scientist Training Program must apply to Washington University School of Medicine, which participates in the American Medical College Application Service (AMCAS). The MSTP application may be downloaded after July 1 at *www.dbbs.wustl.edu/mstp/*. Those who wish additional information about the program may contact:

Medical Scientist Training Program
Washington University School of Medicine
Campus Box 8226, 660 S. Euclid Ave.
St. Louis, MO 63110-1093
(800) 852-4625
E-mail: *mstp@dbbs.wustl.edu*
Web site: *www.dbbs.wustl.edu/mstp/*

APPLYING FOR ADMISSION

For updated information, check our Admissions home page:
medschool.wustl.edu/admissions

Preparation for the Study of Medicine

Entrance requirements to the School of Medicine include:

1. Evidence of superior intellectual ability and scholastic achievement;
2. Completion of at least 90 semester hours of college courses in an approved college or university;
3. Completion of the Medical College Admission Test of the Association of American Medical Colleges; and
4. Evidence of character, a caring and compassionate attitude, scientific and humanitarian interests, effective communication skills, and motivation suitable for a career in medicine.

Chemistry, physics and mathematics provide the tools for modern biology, for medicine and for the biological basis of patient care. Thus, a firm grounding in these subjects is essential for the study of medical sciences. Entering students are expected to have had at least the equivalent of one-year courses at the undergraduate level in physics and biology; to have studied mathematics through integral calculus; and to have a background in chemistry, including one year of general or inorganic chemistry and one year of organic chemistry. In selected instances, one or more of these prerequisites may be waived by the Committee on Admissions, but applicants are strongly advised to pursue their interests in these and in other areas of science.

A major goal of undergraduate college work should be development of the intellectual talents of the individual. This often involves the pursuit of some area of knowledge in-depth, whether in the humanities, social sciences or natural sciences. At the same time, a diversity of background is encouraged in order to provide a necessary foundation for cultural development. Specific courses, other than the few in the natural sciences, are not prerequisites because a great variety of courses may prepare students for the many roles they may play in their medical careers.

Policy for International Students

The admission decision at Washington University School of Medicine is based on academic and personal merit and not on the ability of the student to pay the costs of education. However, individuals who are not citizens of the United States of America or who do not hold U.S. Permanent Resident Visa status are not eligible for financial aid due to regulations covering many programs used by the School to fund financial assistance. Therefore, in order for the School to complete the required documents which are necessary for issuance of a visa, the student must document, by a date and in a manner designated by the School, that the necessary amount of funds, as established by the School, is available to pay the costs of education (tuition and living expenses) for the anticipated period of enrollment, normally four years. Documentation of the required amount of financial resources may be by a letter of credit or by deposit of funds in an escrow account with a bank designated by the School.

Application Procedure

Washington University School of Medicine participates in the American Medical College Application Service (AMCAS) of the Association of American Medical Colleges. AMCAS provides a centralized system for applying to any participating medical school with only one application and one set of official transcripts of academic work.

The AMCAS Application for Admission, common to all participating medical schools, is distributed by the AMCAS and pre-professional advisers. Applicants are urged to file their applications as early as possible.

Applicants to the first-year class must submit their AMCAS application so that it is postmarked no later than December 1 of the year prior to that in which they want to matriculate. On receipt of the application from AMCAS, the Office of Admissions promptly contacts the applicant regarding the additional steps to be taken to complete the application. These include completing a supplemental application via the Internet at *medschool.wustl.edu/admissions*, submission of letters of recommendation and payment of a nonrefundable Application Service Fee of $50. Applicants can check the status of their application via the Internet at the same web site as noted above. Once the application is complete, the Committee on Admissions evaluates it.

The Committee would like to interview every applicant; however, since this would involve several thousand applicants, it is physically impossible to accomplish. Therefore, selected applicants are invited for a personal interview, as well as a tour of the School of Medicine and the Washington University Medical Center. This visit provides an opportunity for the applicant to meet and talk with students and faculty members.

If an applicant is planning an interview trip that will include the St. Louis area, it is appropriate to write the Interview-Appointments Secretary, Committee on Admissions, Box 8107, Washington University School of Medicine, 660 S. Euclid Ave., St. Louis, MO 63110-1093, to inquire if an interview has been authorized. Communication by facsimile and e-mail is encouraged. The fax number for the Committee

on Admissions is (314) 362-4658. The e-mail address is *wumscoa@msnotes.wustl.edu*. The inquiry should be made at least three weeks in advance of the anticipated travel. The Office of Admissions is open weekdays from 8:30 a.m. to 5 p.m. Central Time.

Admission decisions are made by the Committee on Admissions. Washington University School of Medicine operates on a rolling admissions schedule beginning October 15, and applicants are notified as soon as a final decision has been made on their application. By April 15, every applicant should have a final decision: accepted, waiting list, or not accepted.

Upon notification of acceptance for admission to the School, the applicant is required to file a Statement of Intent within two weeks. Three options are presented: 1) accept the offer of admission and submit the $100 acceptance deposit; 2) accept the offer of admission, submit the $100 deposit and request financial aid materials; or 3) decline the offer of admission. The $100 acceptance deposit reserves a place in the class and is applied to the tuition charge at the time of matriculation. If an accepted applicant withdraws from the class with written notification to the Admissions Office prior to May 15, the deposit is refunded. The School of Medicine abides by the traffic rules regarding application timelines as established by AMCAS. Accepted applicants who are non-compliant may have their acceptance into the class rescinded.

Full-Tuition Scholarships

In 1978, the School of Medicine established a scholarship program that based selection on merit rather than financial need. As one of the first merit scholarship programs for medical students, the Distinguished Student Scholarship Program has recognized and rewarded academic excellence and personal achievement for 26 years. Over this time, the School of Medicine increased the number of merit scholarships with the establishment of the Distinguished Minority Student Scholarship Program. And, to honor outstanding alumni of Washington University, the Medical Center Alumni Association created in 1989 the Distinguished Alumni Scholarship Program. In 1998, the Barnes-Jewish Hospital Medical Staff Association committed to funding one full-tuition, four-year scholarship to one student in each entering class. Beginning with the 2002-2003 academic year, two additional "named" scholarships were made available through the generosity of individuals.

Most merit-based scholarships are awarded to students in the first-year class and are subject to annual renewal. Recipients of these scholarships are expected to maintain academic excellence. If a scholarship is not renewed, the student may file for financial aid from the School. For scholarship recipients who document financial need above the full-tuition scholarship, additional funds are available to provide support up to the total cost of education. Scholarship recipients may not concurrently participate in the School's Medical Scientist Training Program or the Armed Forces Health Professions Scholarship Program.

Distinguished Student Scholarships

Up to five full-tuition scholarships may be awarded annually to members of the entering first-year class. In early fall 2003, selected applicants for admission to the School's 2004 first-year class will be invited to file applications for scholarship consideration. Final selection of scholarship recipients will be made by a committee of the faculty and will be based on demonstrated superior intellectual achievement as well as an assessment of the applicant's character, attitude, motivation and maturity. The announcement of the 2004-2005 scholarship recipients will be made during the week following the on-campus interviews on Saturday, May 1, 2004.

Distinguished Minority Student Scholarships

Up to five scholarships may be awarded to eligible minority students in the entering first-year class. A Scholarship Selection Committee identifies those to be considered for scholarship, and award notifications follow within two weeks.

Distinguished Alumni Scholarships

Up to four full-tuition scholarships are awarded annually to members of the entering first-year class. The application procedure and selection process are the same as for the Distinguished Student Scholarships. Since 1989, Distinguished Alumni Scholarships have been named in honor of:

Leonard Berg, M.D.
Grace E. Bergner, M.D.
Stanley J. Birge, M.D.
Eugene M. Bricker, M.D.
J. William Campbell, M.D.
David B. Clifford, M.D.
Justin J. Cordonnier, M.D.
John D. Davidson, M.D.
Robert C. Drews, M.D.
Ronald G. Evens, M.D.
I.J. Flance, M.D.
Mark E. Frisse, M.D.
Bernard T. Garfinkel, M.D.
Deborah J. Gersell, M.D.
David Goldring, M.D.
Samuel B. Guze, M.D.
Paul O. Hagemann, M.D.
Alexis F. Hartmann, M.D.
John C. Herweg, M.D.
Robert S. Karsh, M.D.
John M. Kissane, M.D.
Ira J. Kodner, M.D.
Allan E. Kolker, M.D.
Stuart A. Kornfeld, M.D.
Nicholas T. Kouchoukos, M.D.
William M. Landau, M.D.

Virgil Loeb, M.D.
Robert H. Lund, M.D.
Alan P. Lyss, M.D.
Philip W. Majerus, M.D.
Gerald Medoff, M.D.
Paul A. Mennes, M.D.
J. Neal Middelkamp, M.D.
Benjamin Milder, M.D.
Barbara S. Monsees, M.D.
Carl V. Moore, M.D.
D. Michael Nelson, M.D., Ph.D.
Robert C. Packman, M.D.
Charles W. Parker, M.D.
Mary L. Parker, M.D.
Alan L. Pearlman, M.D.
Frederick D. Peterson, M.D.
Gordon W. Philpott, M.D.
Gary A. Ratkin, M.D.
Edward H. Reinhard, M.D.
Fred C. Reynolds, M.D.
George Sato, M.D.
Gustav Schonfeld, M.D.
Hyman R. Senturia, M.D.
Gary D. Shackelford, M.D.
Penelope G. Shackelford, M.D.
Barry A. Siegel, M.D.
Arnold W. Strauss, M.D.
Steven L. Teitelbaum, M.D.
Jessie L. Ternberg, Ph.D., M.D.
Mildred Trotter, Ph.D.
Stuart Weiss, M.D.

The 2003-2004 Distinguished Alumni Scholarships honor:
Walter F. Benoist, M.D.
James W. Fleshman, M.D.
Alexis F. Hartmann Jr., M.D.
Clay F. Semenkovich, M.D.

Barnes-Jewish Hospital Medical Staff Association Scholarship

One full-tuition, four-year scholarship will be awarded to a student in each entering class beginning in 1999. Selection of the Barnes-Jewish Hospital Medical Staff Assocation Scholar is the same as for the Distinguished Student Scholarship.

Third-Year Class Transfer Program

Each year, Washington University School of Medicine accepts a limited number of transfer students into its third-year class depending on the availability of positions. Transfer applications are accepted from well-qualified second-year students who are enrolled in good standing and eligible to continue in their L.C.M.E.-accredited U.S. medical schools. Applicants must also have a compelling personal reason for requesting transfer and must have the full approval of the dean of their current school. Accepted students are required to successfully complete the USMLE Step 1 examination.

Transfer application forms for admittance into the third-year class are available after October 1 for the following academic year. The deadline for submission of applications is March 31. Those applicants selected for interview will be invited to visit the Medical Center. Applicants will be notified of the decision of the Committee on Admissions by May 15 or when a position becomes available. Inquiries should be directed to:

Third-Year Class Transfer Program
Washington University School of Medicine
Campus Box 8077, 660 S. Euclid Ave.
St. Louis, MO 63110-1093
Phone: (314) 362-6844
Fax: (314) 362-4658
E-mail: wumscoa@msnotes.wustl.edu

FINANCIAL INFORMATION

Cost of Education

For the first-year class matriculant, tuition and housing rates for the 2003-2004 academic year are listed below. Students who enter in 2003 will benefit from a tuition stabilization plan, which provides that their annual tuition of $37,032 will be constant over four years. The items listed below provide an estimate of the expenses for a single student in the 38-week first-year class. The total of these figures suggests a basic minimum budget of approximately $46,901. Allowances for entertainment, travel, clothing and other miscellaneous items must be added to this estimate.

Tuition (includes Student Health Service and Microscope Lending Plan)	$37,032
Books, supplies and instruments	1,613
Housing and food	8,256

Student Health Service

The Student Health Service provides comprehensive health care, including hospitalization, for all students in the School of Medicine. Health insurance coverage for dependents of students can be arranged for an additional charge.

Long-term group disability insurance is provided for medical students. Coverage may be converted to an individual portable policy prior to graduation.

Microscope Lending Plan

Microscopes that meet the technical requirements set by the faculty are provided at no additional charge to each student in the first- and second-year classes. The plan saves students the high cost of microscope purchase and makes available to them a superior quality instrument.

Registration, Payment of Financial Obligations and Refunds

For the convenience of our students, the Washington University billing system provides a central financial account against which most student expenses incurred at the University will be posted, including but not limited to tuition, dormitory charges, parking, library fines, etc. This policy, when referring to tuition and other charges, includes any and all charges posted to this account.

All payments of tuition and other University charges are due and payable on the dates specified in the published calendars of the programs in the School of Medicine. Failure of a student to register when required and pay tuition and other charges incurred on or before the date specified in the published calendar will result in a late fee of $50 to be added to the amount due. The late fee will be imposed seven (7) days after the due date if full payment has not been received. Tuition and other charges are usually payable twice a year, at registration time and again at the middle of the academic year as listed on the schedule on the academic calendar.

Any payment due from the student and not paid by the specified date will accrue interest at the usury rate in effect on the first business day of the month in which the payment is due. This fee will be imposed on any accounts not paid in full within 30 days of the due date. Any amount not paid when due plus accrued interest thereon must be paid in full within three months of the due date to avoid suspension from classes.

If a student fails to settle such unpaid amounts within three months of the original due date, the School will not release the student's academic record, grade reports or transcript pending settlement of the unpaid account. A student who has not satisfied all of his/her delinquent financial obligations to Washington University (tuition, Olin Residence Hall rental, parking, etc.) one month before the end of the end of the academic year will not be allowed to progress to the next academic year, or be issued a diploma.

Students who rely on financial aid funds to meet their obligations should submit their applications for processing according to application deadlines published by the Office of Financial Aid. Deadlines allow for receipt of financial aid funds if applications are filed by the deadline. The Office of Student Financial Aid will assist students with loan applications and financial planning upon request.

A student who withdraws from the School will receive a pro rata refund of tuition and appropriate fees. The refund will be based on the ratio of the class days enrolled (from the first day of classes to the termination date) to the total number of class days in the term for which tuition and fees were paid. It is understood that the date on which a student formally notifies the Registrar's Office in writing of the decision to withdraw from the School of Medicine shall be regarded as the termination date, with no retroactive clause to be accepted. A prospective date will be accepted, however. If tuition and fees were paid entirely or in part by financial aid from the School, the refund will be applied first to the total repayment of the accounts from which financial aid was drawn, with any remaining refund balance given to the student. Financial aid received in excess of the costs of tuition and fees must be refunded by the student to the School on the same pro rata basis as calculated for the tuition refund outlined above. Examples of the application of the refund policy may be requested from the Registrar's Office.

Financial Assistance

The ability to finance a medical education at Washington University does not influence the student selection process. As all students accepted for admission have proven scholastic ability, financial assistance is awarded solely on the basis of documented financial need which cannot be met by student and family resources. Students who consider themselves financially independent of their parents must arrange for loans to replace the amount of support parents are analyzed to have the potential to contribute. The School of Medicine's Office of Financial Aid (Box 8059) will assist students in making these arrangements.

In responding to the Admissions Committee's offer of admission, an accepted student may request financial aid application materials. The Financial Aid Office acknowledges the student's intent and provides instructions for completing the FAFSA. **Everyone** applying for financial aid must complete a Free Application for Federal Student Aid (FAFSA) and designate Washington University School of Medicine, School Code **#G24620**, as a recipient. Medical school financial aid application documents and detailed instructions will be made available after January 1, 2004.

The financial aid application materials solicit information about the applicant and parents, including a detailed description of resources and liabilities. If an applicant's parents are separated or divorced, the financial information is required from both biological parents (excluding income and assets of their spouse, if remarried). If the applicant is married, similar information is required of the spouse. The School expects the applicant to complete and submit the financial aid documents within two weeks from the date the applicant receives them. Official copies of both biological parents' and the applicant's U.S. Individual Income Tax Returns complete the data required for financial aid consideration.

While "permanent residents" of the United States are eligible for most federal financial aid programs, need-based financial aid from Washington is only awarded if the applicant and both biological parents

can provide official, audited documents with the same detailed information as provided on a U.S. income tax return. All information is held in strict confidence.

Financial aid awards are credited toward payment of tuition and fees. Proceeds from loans may be disbursed directly to the borrower. The loan portion of an award will be funded through the resources of the School of Medicine or through the federal Stafford Loan program. All loans awarded by the committee are free of interest while a student is enrolled in the School. Financial aid awards are made for a given academic year. Students may reapply for financial assistance in succeeding years if they remain in good academic and personal standing, and if there is continued financial need. Awards made to a student may vary from year to year, depending upon the student's needs and upon the availability of funds to the Committee. Students are responsible for filing applications for renewal of awards in the spring of each year.

The committee holds that students receiving assistance have an obligation to notify the committee in writing if their financial situation changes, for example, through employment or receipt of a scholarship not anticipated at the time the application was submitted.

First- and second-year students are urged not to accept employment during the academic year. A number of fourth-year students find employment in hospitals within the Medical Center. The personnel office provides assistance to students' spouses seeking employment.

Standards for Satisfactory Academic Progress for Financial Aid Eligibility

Federal law and regulations require that all students receiving financial assistance from Federal Title IV funds maintain satisfactory academic progress. The policy presents the standards adopted by the Washington University School of Medicine and applies to all students.

In order to maintain satisfactory academic progress, the maximum time frame of full-time enrollment for completion of each program is as follows:

Four-year M.D. program:	6 years
Five-year M.D. program:	7-1/2 years
M.A./M.D. program:	7-1/2 years (or 9 years if a 2-year M.A. is pursued)

Periods of non-enrollment are NOT counted in the measurement of satisfactory academic progress but all periods of attendance, regardless of whether the student received Title IV aid, are counted.

This policy is applied in the context of each individual student's enrollment status in order to accommodate the student who does not enroll on a full-time basis. For example, if a student enrolls in a four-year program, the full-time student would meet the 150 percent maximum after six years of full-time enrollment, and the half-time student is expected to complete in twelve years. If a student vacillates between full-time and half-time enrollment, that student would have a maximum time frame between six and 12 years, and the maximum time frame for that student would be continuously adjusted.

Academic requirements for the M.D. degree include the satisfactory completion of the curriculum designated by the faculty. The progress of each student working toward an M.D. degree is monitored carefully by the Committee on Academic Evaluation of Students (CAES). Refer to the section "Assessing Academic Achievement" on page 31.

A student failing to meet the standards of progress as determined by the Committee on Academic Evaluation of Students shall be placed on financial aid probation. While on probation the student may receive financial assistance for one trimester, semester or equivalent time period. At the conclusion of this period, the student must have achieved compliance with each standard. A student who does not achieve compliance with each standard by the conclusion of the probationary period is suspended from financial aid eligibility. The Office of Student Financial Aid must notify a student of implementation of probationary status and/or suspension.

A student shall be reinstated for financial aid eligibility at such time as that student has completed satisfactorily sufficient coursework to meet the standards of progress. A student on financial aid probation or suspension may appeal that status by indicating in writing to the Director of Student Financial Aid the existence of mitigating circumstances which should result in reinstatement of financial aid eligibility. Each appeal will be considered on its merit by the Committee on Student Financial Aid.

The Director of Student Financial Aid shall have primary responsibility for enforcement of this policy. The director shall provide in writing to each student at the time of initial enrollment a copy of this policy. The director shall ascertain at the time of each disbursement of funds and prior to certification of a financial aid application that the student is in compliance with the policy.

Scholarship Funds

Helen M. Aff-Drum Scholarship Fund. Established in 1988 to provide scholarship support to financially deserving medical students.

African-American Medical Alumni Scholarship. A two-year full tuition scholarship supported by African-American alumni and friends of the School of Medicine will be awarded to a student in the first-year class for academic excellence, personal achievement and service to the African-American community.

American Medical Association — Education and Research Foundation Medical Student Assistance Fund. Begun in 1983, donors' gifts supplement the Foundation's gift to support excellence and contribute to the Distinguished Student Scholarships and

Distinguished Alumni Scholarships Program.

Anderson Student Scholarship. Established through bequest in 2001 by Rolf L. Anderson, M.D., '62.

Isak and Breine Ascher Scholarship Fund. The late Dr. Eduard Ascher, M.D., '42, established this scholarship through a trust to memorialize his parents, who were lost in the Holocaust during WWII. He chose Washington University School of Medicine because of their willingness to "give a chance" to an Austrian refugee.

Dr. William Monroe Baker Fund. Established in 1988 under the will of Miss Lola Braxton in memory of Dr. Baker to provide scholarship assistance to worthy students who would be otherwise unable to obtain a medical education.

The Barnes Hospital Society Scholarships. Established in 1989 by the attending staff physicians of what was formerly Barnes Hospital, one scholarship is awarded to a first-year student based on financial need, four book scholarships are awarded to first-year students based on financial need and an additional four book scholarships are awarded to second-year students who demonstrated distinguished academic achievement in the first-year curriculum.

Barnes-Jewish Hospital Medical Staff Association Scholarship. Established in 1998 by the Barnes-Jewish Hospital Medical Staff Association to provide financial assistance to students based on academic excellence.

Floyd A. and Rita Sue Barnett Scholarship Fund. Established in 1994 from a trust agreement (1989) of Floyd and Rita Sue Barnett for scholarships for students who are academically well-qualified and financially deserving.

The Dr. Joseph A. and Helene H. Bauer Scholarship Fund. Created in 1987 by Dr. and Mrs. Joseph A. Bauer to provide scholarship support to academically well-qualified and financially deserving medical students.

Albert G. Blanke, Jr. Endowed Scholarship Fund. Established by a generous gift in 1982, the fund provides scholarship assistance for deserving students in the School of Medicine.

Isabel Valle Brookings Scholarship Fund. Established in 1957 by Isabel Valle Brookings (Mrs. Robert S.) for scholarships and loans in the School of Medicine.

Jane Stewart and Robert S. Brua, M.D. Scholarship Fund. Established in 1996 through the generosity of Dr. Brua.

Ruth Elizabeth Calkins Scholarship Fund. Established by Dr. Delevan Calkins in honor of his granddaughter.

Gilbert L. Chamberlain, M.D. Scholarship Fund. Created in 1971 by Dr. Gilbert L. Chamberlain to be used to aid worthy students in acquiring their medical education.

Dr. Pierre I. Chandeysson Scholarship Fund. Created in memory of Dr. Chandeysson by his daughter, Carol M. Chandeysson, to provide scholarship assistance to worthy students.

Cecil M. Charles — Nu Sigma Nu Medical Student Scholarship Fund. Established by the Nu Sigma Nu Medical Fraternity in memory of Dr. Charles.

Class of 1945 Scholarship Fund. Established by the alumni from the class of 1945 in honor of their 45th reunion.

Class of 1956 Scholarship Fund. Established in 1996 by members of the class of 1956 in honor of their 40th reunion.

Class of 1964 Scholarship Fund. Established in 1993 by the alumni from the class of 1964 to support scholarships.

Class of 1968 Scholarship Fund. Established in 1998 by the alumni from the class of 1968 in honor of their 30th reunion to support student scholarships.

Class of 1969 Scholarship Fund. Established in 1994 by members of the class of 1969 in honor of their 25th reunion.

Class of 1970 Scholarship Fund. Established in 1996 by members of the class of 1970 in honor of their 25th reunion.

Class of 1971 Scholarship Fund. Established in 1999 by members of the class of 1971 in honor of their 25th reunion.

Class of 1972 Scholarship Fund. Established in 1999 by members of the class of 1972 in honor of their 25th reunion.

Class of 1973 Scholarship Fund. Established in 2000 by members of the class of 1973 in honor of their 25th reunion.

Class of 1974 Scholarship Fund. Established in 2002 by members of the class of 1974 for their 25th reunion and to honor the memory of their classmate, Jonathan Mann.

Grace Strong Coburn Scholarship Fund. Created in 1962 through the bequest of Mrs. Grace Strong Coburn for scholarships in the School of Medicine.

Jack W. Cole, M.D. Scholarship. Established in 2002 by Mrs. Ruth Kraft Cole, in memory of her late husband, a 1944 graduate of WUSM, and to recognize Dr. Cole's deep appreciation for the education he received. Preference will be given to a student pursuing a career in academic medicine.

T. Griswold Comstock Scholarships. Established under the will of Marilla E. Comstock for students who would otherwise be unable to obtain a medical education.

Frederick J. Cornwell, Jr. Scholarship Fund. For scholarship and other financial help for worthy medical students and for medical students, interns and residents to use for research purposes.

Clark and Mildred Cox Scholarship. Established in 1998 with a donation from the Clark Cox Trust for scholarships for women.

Arpad Csapo, M.D. Memorial Scholarship Fund. Established in 1982 by Elise Csapo in memory of her husband, and by his friends and colleagues to provide assistance for students who have shown promise in fields relating to reproductive medicine.

William H. and Elizabeth Gray Danforth Scholars Program. Established in 1998 in honor of Chancellor Danforth's retirement. The Scholar recipients must demonstrate outstanding academic promise and a record of community service that reflects Dr. Danforth's values and actions.

Harriet Arey and John D. Davidson Scholarship. Established in 2000 by Harriet Arey and John D. Davidson for scholarships in the School of Medicine.

Davie Family Scholarship. Established by Joseph Davie, M.D. '68, and his family to support scholarships for deserving medical students.

Paul and Ruth DeBruine Scholarship. Established in 1994 by Dr. and Mrs. Paul DeBruine in honor of his 35th medical school reunion to provide scholarship support to academically well-qualified and financially deserving medical students.

Distinguished Minority Student Scholarships. Up to seven full-tuition scholarships are awarded to students in each first-year class for academic excellence and personal achievement.

Dr. Charles Drabkin Scholarship Fund. Created in 1964 to provide financial assistance to medical students.

Robert B. Fickel, D.D.S. Scholarship Fund. Received in 1990 and given in memory of Dr. Fickel's uncle, W. H. Fickel, M.D. '12. Awards are made to students after their first year of study.

Carl Fisch Scholarship Fund. Created in memory of Dr. Fisch by his daughter, Marguerite F. Blackmer. Provides support to students who demonstrate financial need.

Flance Medical Scientist Traineeship. Established in honor of faculty member and alumnus I. Jerome Flance, M.D. '35 by the Harry Edison Foundation for support of a student in the Medical Scientist Training Program.

George F. Gill Scholarship Fund. Instituted in memory of a former clinical professor of pediatrics.

Helen H. Glaser Scholarship for Women Medical Students. Established in 1999 by Robert J. Glaser, M.D., emeritus trustee and former faculty member, in memory of his wife, Helen H. Glaser, M.D. '47.

Norman M. and Eleanor H. Gross Scholarship Fund. Established in 2001 through a bequest from Mr. Gross for financially needy medical students.

Paul H. and Lila L. Guttman Student Aid Fund. Established in 1976 to provide financial assistance to qualified medical students.

Paul O. and Nancy P. Hagemann Scholarship Fund. Established by Dr. and Mrs. Hagemann to assist academically well-qualified students with documented financial need.

Lee B. & Virginia G. Harrison Memorial Student Fund. Established in 1996 for scholarships for students who intend to pursue a career in internal medicine or family practice. Dr. Harrison was a 1927 graduate of the School of Medicine.

Harvielle-Bailey Scholarship. Established in 1970 under the will of Miss Isabel Bailey Harvielle as a memorial to Dr. Charles Poplin Harvielle and Dr. Steele Bailey, Jr., alumni of the School.

Dr. and Mrs. Charles Y. (Yueh-Gin Gung) Hu Scholarship Fund. Established in 2002 to provide a scholarship to a medical student of Chinese descent.

Dr. Grace Huse Memorial Fund. Provides scholarship awards for deserving Washington University medical students.

Jackson Johnson Scholarship Fund. Provided through a bequest in 1930 from Jackson Johnson.

Dr. Lorraine A. Johnsrud Scholarship Fund. Established in 1983 as a memorial to Lorraine from her classmates, friends and family to assist deserving medical students in the funding of their medical expenses.

Stanley C. Jones Scholarship Fund. Established in 1995 under the will of H. Roberta Jones as a memorial to her husband.

Henry J. Kaiser Family Foundation — Medical Century Club Scholarship Fund. Following the foundation's generous gift in 1980 for medical student scholarships, the Medical Century Club accepted the challenge to raise new scholarship funds to match an additional gift from the foundation.

George D. Kettelkamp Scholarship Fund. Established in 1969 by Mrs. Kettelkamp in memory of her husband, an alumnus of the School of Medicine.

M. Kenton King, M.D. Scholarship Fund. Created by the Executive Faculty to honor Dr. King at the time of his retirement in 1989 as Dean of the School of Medicine after having served in that position for 25 years.

Albert F. Koetter, M.D. Scholarship Fund. Established in 1978 by Mrs. Stella Koetter Darrow in memory of her father, an alumnus and former faculty member of the School of Medicine. At least one full-tuition scholarship is awarded annually on the basis of academic achievement and financial need.

Anne L. Lehmann Scholarship Fund. Established in 1983 to grant continued scholarship support to medical students.

Life and Health Insurance Medical Research Scholarship Fund. Established for the training of promising scholars intent upon a career in research and academic medicine.

Life Insurance Medical Scholarship Fund. Created in 1972 from residual funds in the Life Insurance Medical Research Fund, scholarship support is now awarded to students in the M.D. degree program.

Maude L. Lindsey Memorial Scholarships. Created in 1976 to assist students in the School of Medicine.

John R. Lionberger, Jr. Medical Scholarship Endowment Fund. Created in 1982 by Dr. John R. Lionberger to be used to aid worthy students in acquiring their medical education.

E.A. Marquard Memorial Student Scholarship. Established in 1994 from the E. Alfred Marquard Memorial Student Loan Fund to provide scholarships for deserving and needy financially deserving medical students.

Alma Mavis Scholarship Fund. Created in 1988 under the will of Alma Mavis to assist students intending to practice family (general) medicine.

Eliza McMillan Scholarship Fund. Provides assistance to young women in any of several schools of the University to secure an education.

Medical Center Alumni Scholarship Fund. Awarded on the basis of academic achievement and financial need.

Roy B. and Viola Miller Memorial Fund. Created in 1963 through the bequest of Roy B. Miller to provide scholarships for medical students and for post graduate students engaged in study and research in the medical sciences.

The Warren S. and Dorothy J. Miller Scholarship Fund. Established in 1982 through the bequest of Dorothy J. Miller to provide scholarships for any students engaged in studies leading to the degree of Doctor of Medicine and especially for those students with an aptitude and desire for the general practice in internal medicine.

Joseph J. and Ernesta G. Mira Scholarship Fund. Established in 1988 by Dr. and Mrs. Mira to provide assistance to students from the Alton, Illinois area, including the counties of Madison, Jersey, Calhoun, Greene and Macoupin.

The Monsanto Scholars Program. Established in 1990 with generous support from the Monsanto Fund, The Monsanto-Washington University Minority Medical Scientist Scholarship Program provides a monthly stipend and full tuition support for outstanding minority students who are committed to becoming academic physicians. Participants pursue both the M.D. and Ph.D. degrees in the six-year Medical Scientist Training Program (MSTP).

John and Ruth Musselman Medical Scholarship. Established in 1997 by the John & Ruth Musselman Medical Scholarship Trust to provide scholarships to deserving students.

Mr. and Mrs. Spencer T. Olin Fellowships for Women. Provides for annual financial support to women in any of several disciplines. Application deadline is February 1.

Spencer T. and Ann W. Olin Medical Fellowships. Created in an effort to help fill the continuing shortage of physicians who pursue careers in biomedical research, the awards are primarily for students in the Medical Scientist Training Program.

Dr. Sidney F. and Dora K. Pakula Scholarship Fund. Established in 2001 by Dr. and Mrs. Lawrence C. Pakula in memory of Dr. Pakula's parents to support student scholarships.

William B. Parker Scholarship Fund. Established in 1976 by the School of Medicine in honor of William B. Parker's 51 years of service to the School.

William A. Peck, M.D. Scholars in Medicine. Established in 2002 to recognize Dr. Peck's 14 years of service to the Medical Center and Washington University community. University trustees, faculty, staff, alumni and friends honored Dr. Peck with gifts to this scholarship.

Phi Beta Pi — Charles Ruggieri Scholarship Fund. Established in 1985 by the Washington University Alumni of the Phi Beta Pi medical fraternity to honor Charles Ruggieri and to assist deserving medical students enrolled in Washington University School of Medicine with the funding of their undergraduate medical education.

Philpott Family Scholarship Fund. Established in 1995 by the Philpott family to provide support for medical students with financial need and excellent academic achievement.

The George M. (M.D. '32) and George K. (M.D. '64) Powell Medical Student Scholarship Fund. Established in 1984 by Mrs. George M. Powell in grateful appreciation for the medical education provided to her husband and son by the Washington University School of Medicine, which so positively affected the lives of the Powell families.

Henry and Louise Reller Scholarship. To be given to medical students in the name of the parents of Louise Reller.

Lyman K. Richardson, M.D. Scholarship Fund. Established in 1993 by Mrs. Ellen Richardson to provide scholarship support to medical students.

Samuel Jennings Roberts Scholarship Fund. Created to provide scholarships for any students engaged in study leading to the degree of Doctor of Medicine.

Robert Allen Roblee Scholarship Fund. Established in 1948 through the gift of Mrs. Joseph H. Roblee for students in the School of Medicine.

Thomas W. and Elizabeth J. Rucker Scholarship Fund. Created in 1956 under the will of Eugenia I. Rucker, in memory of her mother and father.

J. Max Rukes Scholarship Fund. Established in 1987, the fund provides scholarship support to deserving medical school students who are doing research in endocrinology or the chemistry of metabolism.

Joseph H. Scharf Scholarship Fund. Provided in 1949 through the bequest of Dr. Joseph H. Scharf.

Robert G. and Maxine W. Scheibe Scholarship. Established in 1999 by Robert G. Scheibe, a 1960 Washington University graduate who also received his medical degree here in 1964 and his wife, Maxine, who is a 1966 graduate of the Washington University School of Nursing.

William H. and Ella M. Schewe Fund. Established to provide financial assistance to worthy students in the medical school.

Scholars in Medicine Program. Established in 1999 with gifts from individual donors to create scholarships to support medical students in the name of the donor.

School of Medicine Scholarship Fund. Created in 1970 to provide financial assistance for medical students.

Edna Schrick, M.D. Scholarship Fund. Established in 1992 by Dr. Schrick to provide scholarship support to female medical students.

Senior Merit Scholarship. Established by an anonymous alumnus of the School of Medicine, it provides a full-tuition scholarship to a senior student who has earned a distinguished record of academic and personal achievements during the first three years in the medical school.

Dr. John B. Shapleigh Scholarship Fund. Established in 1926 with the bequest of Dr. John B. Shapleigh and supplemented by contributions from Mrs. Shapleigh and Miss Margaret Shapleigh.

Alexander Balridge Shaw Scholarship Fund. Created in 1958 through the bequest of Roy A. Shaw in memory of his father, Dr. Alexander Balridge Shaw.

William T. Shearer and Lynn Des Prez Underrepresented Minorities Scholarship. Created by William T. Shearer, M.D. '70, and his wife, Lynn Des Prez. Scholarships are awarded to medical students from underrepresented minorities with preference given to African-American students.

Dr. Edward Hiroshi Shigeoka Scholarship Fund. Created in 1988 by Dorothy F. Shigeoka in memory of her husband, Dr. Edward Hiroshi Shigeoka, to help disadvantaged and deserving students pursue their careers in medicine.

Ernie Simms Scholarship Fund. Founded in 1984 by friends, colleagues and former students of Professor Simms in recognition of his contributions to scholarly research and teaching in the Department of Microbiology and Immunology.

Stanley B. Smith, M.D., Scholarship Fund. Established in 2001 in memory of Samuel and Dora Smith, Dr. Smith's parents, to support student scholarships.

Southern Medical Association Student Scholarship. Awarded to a third-year student in recognition of outstanding academic achievements of a physician-in-training.

Beulah B. Strickling Scholarship Fund. Established in 1960 with a bequest from Mrs. Beulah B. Strickling.

Marleah Hammond Strominger Scholarship. Established in 1971 by the family and friends of Marleah Hammond Strominger. The recipient shall be a motivated student with need for financial assistance and shall come from a disadvantaged background.

Mary and Ernst Stuebrk Scholarship Fund. Established in 1987 to assist medical students with documented financial need.

Edwin H. and Virginia M. Terrill Scholarship Fund. Established in 1964 with the bequest of Dr. Edwin H. Terrill, an alumnus. It was Dr. Terrill's hope that scholarship recipients would repay into the fund the amount of the award.

Mildred Trotter Scholarship Fund. For students with documented financial need, the fund was established in 1979 by Dr. and Mrs. Paul Guttman, and supplemented by former students of Dr. Trotter, as a tribute to her many years of teaching in the Department of Anatomy.

Hiromu Tsuchiya Scholarship Fund. Created to provide scholarships in the School of Medicine.

Tuholske-Jonas-Tuholske Medical Scholarship Fund. Established in 1974 by Rose T. Jonas in memory of her father, husband and brother. The recipient shall be a senior student preparing to enter the field of surgery, obstetrics and gynecology, or internal medicine.

Dr. Cornelia M. Van Prooyen Scholarship Fund. Established in 1987, the fund provides scholarship support and other financial assistance to female medical students.

George S. and Aspasia N. Vellios Scholarship Fund. Established by Frank Vellios, M.D. '46, in honor of his parents. Scholarships are awarded to deserving medical students with financial need.

Louis H. Waltke and Marie Waltke Memorial Fund for Medical Education. Created in 1984 to provide scholarships and fellowships at the School of Medicine.

Dr. George S. Wilson Scholarship Fund. Established in 1988 with the bequest of Dr. George S. Wilson to provide scholarship support to medical students.

George and Irene Wolf Medical Scholarship Fund. Established by the donors to benefit students in the School of Medicine.

George Zografakis Memorial Scholarship Fund. Created by the family and friends of Dr. Zografakis, a distinguished faculty member in the Department of Surgery.

Loan Funds

Auer-Rosenfeld Memorial Loan Fund. Established by Mrs. Elizabeth Auer to be used for educational loans to students.

Dr. John C. Boetto Loan Fund. Established in 1993 by a bequest from Mrs. Josephine D. Boetto as a memorial to her son to provide loans for deserving medical students.

Otto W. Brandhorst Loan Fund. Created in 1985 by the estate of Fern Crawford. This fund supports loans to students in the School of Medicine.

Dr. Harold A. Budke Loan. Established in 1998 to provide financial assistance to needy and deserving medical students.

Harold A. Budke, M.D., Loan Fund II. Established in 2001 with a bequest from the estate of Etta Elise Wedemeyer to provide loans to needy and deserving female students who will practice family medicine, internal medicine or obstetrics-gynecology medicine.

Class of 1947 Loan Fund. Established in 1996 by members of the class of 1947 in honor of their 50th reunion.

Jess K. Goldberg Memorial Loan Fund by Ophelia H. Kooden and Violet G. Sachs. Created in 1970 to provide zero-interest loans for medical students in

memory of the donors' brother who passed away while attending medical school.

Health Professions Student Loan Fund. Established by federal legislation for medical students with a demonstrated financial need. Loans are available for long terms at favorable rates.

William Randolph Hearst Medical Scholars Loan Fund. In 1989, the Hearst Foundation provided funding for a new and innovative loan program which provides interest-free loans to students in their last year of study.

Ursula Hecker Loan Fund. Established in 1967 by a bequest from Ursula Lee Hecker for the use and benefit of worthy, deserving and needy medical students.

Kathy E. Holden Loan Fund. Established by Mrs. Roland Holden and the Roland and Ruby Holden Foundation in honor of her granddaughter, Kathy E. Holden, and in recognition of W. Edwin Dodson, M.D., to support loans to deserving medical students.

Horncrest Foundation — School of Medicine Loan Fund. In 1982, the trustees of the Horncrest Foundation approved a proposal on behalf of the School of Medicine to match up to a generous annual cap for five year loan funds solicited by the School. The campaign was extremely successful and now provides loan funds to students with documented financial need.

W. K. Kellogg Foundation Loan Fund. Provides financial assistance to medical students in need of such aid.

Gustel and Edith H. Kiewitt Scholarship Loan Fund. Provides loan funds for medical students.

Medical Scholars Loan Program. Established in 1985 by members of the William Greenleaf Eliot Society, this fund provides an interest-free source of long-term student loans. Annual contributions from alumni and friends support this perpetual and growing resource upon which current and future medical students will draw.

George W. Merck Memorial Loan Fund. Established in 1959 by The Merck Company Foundation, the original purpose of the loan was modified in 1983 to provide loans to graduating students which would help bridge the transition from student to resident physician.

Mound City Medical Forum Minority Student Emergency Loan Fund. Established in 1988 by the Mound City Medical Forum, a professional organization of black physicians in St. Louis and a component society of the National Medical Association, the fund provides short-term, no-interest loans for minority students.

Edward F. Musgrave Loan Fund. Established in 1981 by Mrs. Jeannette L. Musgrave. The fund supports medical student loans.

Goldie H. Penn and Lloyd L. Penn, M.D. Student Loan Fund. Dr. Penn, M.D. '33 established the fund in 1977 to aid well-qualified and deserving students.

Perkins Student Loan. A federal program (formerly National Direct Student Loan) to provide loans to students with financial need. Permits repayment over an extended period at a favorable interest rate.

Dr. William C. and Elva Pratt Loan Fund. Established in 1982 for medical students with demonstrated financial need.

G. H. Reinhardt Memorial Scholarship Loan Fund. Established in 1947 through the bequest of G. H. Reinhardt.

Aline Rixman Loan Fund. Created in 1940 by William Rixman in memory of his wife, the fund is used to alleviate unexpected financial emergencies of medical students.

James L. and Dorothy Rouner Loan Fund. Established in 1997 by Dr. James and Mrs. Dorothy Rouner to be used for medical students pursuing a career in primary care–general internal medicine.

Caroline O. Schlesinger Loan Fund. Established in 1969 to provide financial support for medical students.

School of Medicine Student Loan Fund. Established to make loans to students with documented financial needs.

Washington University Medical Center Alumni Association Loan Fund. Provides emergency loans to medical students.

The Alan A. and Edith L. Wolff Loan Fund. Established in 1993 by Mrs. Edith L. Wolff to provide loans to students with demonstrated financial need who are in their final year of study for the Doctor of Medicine degree.

ASSESSING ACADEMIC ACHIEVEMENT

Committee on Academic Evaluation of Students

Responsibility of the Committee

Overall evaluation of academic performance by students at the Washington University School of Medicine will be made by the Committee on Academic Evaluation of Students (CAES). The deliberations of the CAES are generally positive in approach and are committed to the ultimate aim of assisting students to successfully complete the courses of study required by the School. The principle that careful selection of students will minimize attrition from the School is strongly endorsed by the CAES. The CAES has several important roles, including:

1. Approving promotion of students to a subsequent year of study;

2. Recommending to the Executive Faculty those students who have successfully completed all the prescribed requirements of the School and are qualified to receive the Doctor of Medicine degree;

3. Requiring entry of a student into an individualized program of study; and

4. Deciding upon matters of academic disciplinary action.

It is also the ultimate responsibility of the CAES to decide whether each student meets the academic and ethical standards necessary to enter the profession of medicine.

The rules governing operation of the CAES apply to students in the following categories:

1. Students who are engaged in the preclinical and clinical education requirements for the M.D. degree;

2. Students in a five-year M.A./M.D. degree program taking the pre-clinical or clinical portion of their M.D. education;

3. Students in the Medical Scientist Training Program (MSTP) taking the preclinical and clinical portion of their M.D. education; and

4. Those selected students with a prior medically relevant Ph.D. who have been approved by the Medical Science Training Placement Curriculum Committee (MSTPCC) and are enrolled in the M.D. portion of their education.

Membership of CAES

A) *Appointed and* ex officio *membership* — There will be 12 voting faculty members of the CAES, and membership will be appointed for a four-year term by the Dean of the School of Medicine following nomination of suitable individuals by the department heads. Initial appointments will be staggered for periods of one-, two-, three- or four-year terms. A faculty member may be reappointed to serve on CAES. Membership will be equally divided between clinical and preclinical departments. In addition, CAES membership will include, in *ex officio* capacity, the Registrar (non-voting) and the Associate Dean of Students (non-voting). The Associate Deans of Medical Student Education, Admissions, Diversity Programs and the Director of the Student Health Service may attend CAES meetings as non-voting observers.

B) *Guests* — A coursemaster who is not a member of the CAES but who has submitted a Fail/Incomplete grade for a student which is to be discussed at a meeting of the CAES will be present at the meeting to provide information concerning the student's performance. Alternatively, a coursemaster will send a designated representative. In the event that a coursemaster or designated representative is not present, final action for that student will be deferred until adequate information concerning the student's performance is available.

Chair of CAES

A faculty member will be appointed by the Dean from within the CAES committee to serve as chair. The term of the chair will be four years.

Meeting Frequency

CAES meetings must occur in a timely manner after final examinations or reexaminations (i.e., as soon as practical after grades are submitted to the Registrar). Generally grades will be submitted to the Registrar within 15 days of the completion of an examination or within four days of a reexamination. A meeting of the Committee also may be convened at any time such that timely review of student performance and action thereupon is provided.

Quorum for CAES Meetings

Seven voting members must be present to consider items of academic disciplinary action (i.e., recommendation for dismissal from enrollment or entry into Individual Study Program).

The Evaluation and Grading System

General

A) Students are required to take all examinations at the specified time. A student may be excused from this rule for extenuating circumstances at the discretion of the coursemaster. Such occasions will be promptly reported to the Registrar. In the event of inability to attend a scheduled examination due to illness, unless extenuating circumstances exist, the student is required to inform the coursemaster prior to the examination and to be evaluated by the Student Health Service. In the event that the student cannot reach the relevant coursemaster, the student should contact the Associate Dean for Student Affairs.

B) In order to continue their studies at the Washington University School of Medicine, students must demonstrate sound judgment, responsibility, a sensitivity and compassion for individual needs, an ability to synthesize and apply knowledge and the capability of becoming a safe and effective physician. Breaches of these principles will be referred to the CAES for review.

C) At the annual CAES meeting, the Committee will vote to recommend promotion of students who have successfully completed all the requirements of the current academic year to the studies of the subsequent year.

D) At the conclusion of each academic year students receive a grade report which indicates the grade achieved in each course. When all the official grades have been received, the official transcript, in addition to listing courses and grades achieved, lists the grade distribution in each course (with the exception of selective and elective courses).

E) Prior to graduation, students are required to complete and pass all coursework. Occasionally students are permitted to complete equivalent coursework at other institutions with the permission

of the responsible department and written notification to the Registrar.

F) It is the responsibility of students who feel that personal concerns, health problems, or any other factors may be adversely affecting their academic performance to bring such matters to the attention of the Director of the University Health Service or the Associate Dean of Student Affairs for possible accommodations.

Grading System

A) First Year

Courses in the first-year curriculum are evaluated on a Pass (P) or Fail (F) basis. For purposes of the official grade records of the School of Medicine, grades used for the first year are:

- P = Pass, indicating satisfactory performance
- F* = Fail
- E = Temporary grade, makeup of failed exam pending
- I** = Incomplete, temporary grade pending completion of course requirements, replaced with an F if not removed within 30 days
- L = Successful audit
- NG = Course credit earned, students not graded
- W = Withdrawal from a course
- Z = Unsuccessful audit

Failure of any examination which comprises a significant portion of the final grade (typically 20% or more) must be reported by the coursemaster to the Associate Dean for Student Affairs. In the event of a failure of a single exam within the course, the coursemaster may allow one attempt at remediation of this examination. The scheduling of a remedial examination will be agreed upon by the coursemaster and student but shall not extend beyond 30 days after the end of the course or academic year, whichever occurs first. Days of recess for Winter Break or Spring Break will not be counted in the 30 days. A grade of "E" will be submitted by the coursemaster if the remedial examination is not accomplished within the course dates. This grade will stand on the academic record until it is replaced with a valid final grade of Pass or Fail. Grades of "E" that are not resolved within 30 days will be replaced with a grade of Fail (F). If the student successfully remediates the examination, and has otherwise passed the course, a Pass (P) will be recorded by the Registrar. A student may remediate only one examination in any course.

*Any grade of F remains on the student's academic record. When the course is repeated or remediated the new grade will appear as a separate entry in addition to the failing grade.

**Incomplete (I) indicates that, because of a delay excused by the coursemaster, the student has not completed the requirements to pass a course.

B) Second and Subsequent Years

For purposes of the official grade records of the School of Medicine, the following grades are used for subsequent years:

- H = Honors, reflecting a truly outstanding performance
- HP = High Pass, awarded for excellent/very good work
- P = Pass, indicating satisfactory performance
- F* = Fail
- I** = Incomplete, temporary grade pending completion of course requirements, replaced with an F if not removed within 30 days
- Cr#/NCr# = Credit/No Credit for some second-year courses
- L = Successful audit
- NG = Course credit earned, students not graded
- W = Withdrawal from a course
- Z = Unsuccessful audit

*Any grade of F remains on the student's academic record. When the course is repeated or remediated the new grade will appear as a separate entry in addition to the failing grade.

A failing grade will be recorded on the official educational record when a student fails the subject examination (defined as scoring at less than the 10th percentile as reported by the NBME) for the second time. A failing grade will be recorded when a student fails the clinical portion of the clinical clerkship or elective. In both events, the failing grade remains on the student's official educational record. When the course is remediated the new grade will also appear on the student's official educational record.

**Incomplete (I) indicates that, because of a delay excused by the coursemaster, the student has not completed the requirements to pass a course.

C) Grade Reporting

Final grades will be submitted to the Registrar by coursemasters within ten (10) working days of the final examination or final class meeting for the first two years. For third and fourth years, grades are due within ten (10) working days of the receipt of standardized examination scores or the last day of the rotation if no examination is given. A web-based University system, WEBSTAC, provides timely access to grades for the first two years. Grades and evaluations of student clinical performance are submitted on a standardized form and are available for review in the Office of Student Affairs throughout the academic year. Final grades for the clinical clerkships and electives are recorded in the Univer-

sity student information system at the end of the academic year and are subsequently available on WEBSTAC, which is updated quarterly. A paper copy of final grades is available upon request from the Registrar's Office.

D) Grade Point Average, Class Ranking and Grade Distributions
The School of Medicine does not calculate grade point averages. Hours of credit appearing on the transcript reflect clock hours scheduled for the course or clinical rotation. For the purpose of residency applications only, students are placed in the upper, middle or lower third of the class according to a formula which considers weighting of courses and each academic year. This ranking is not recorded on the permanent academic record and therefore does not appear on transcripts. It may appear in the student's dean's letter. At the conclusion of the academic year, when all the official grades have been received, the official transcript, in addition to listing courses and grades achieved, gives the grade distribution in each course with the exception of elective and selective courses.

E) Grade Appeals
A student who wishes to appeal his/her grade should file his/her request for review along with the basis for the appeal with the coursemaster within 30 days of the course completion. If reasons beyond the student's control delay the resolution of the appeal past the 30 day deadline, the Registrar must be notified so that the final transcripts, grade distributions and match rankings for the academic year can be held pending resolution of the matter. If this notice is not filed with the Registrar prior to the deadline, the grade cannot be accepted. Students participating in the residency match should also notify the office of career counseling that a grade appeal is in process.

NO GRADE CHANGES ARE PERMITTED FOR THE ACADEMIC YEAR AFTER JULY 15.

Actions for Academic Review

General

A) "Actions for Academic Review" refer to procedures used at the School in the event that a student fails a course or fails to complete a course in the requisite time.

B) In the event of any initial failure of a course offered at the School, the student will meet with the Associate Dean for Student Affairs to formulate a plan to remediate such failure.

C) If the Registrar has recorded a Fail or Incomplete grade in two or more courses in a single year or cumulatively three courses between years, the student's academic performance will be referred to CAES for review and determination of a course of action. Actions for Academic Review shall be referred to CAES for consideration by the Associate Dean for Student Affairs or Registrar's office.

D) Refer to The Individual Study Program (ISP) section for guidelines pertaining to students engaged in an ISP.

E) When the performance of a student is referred to CAES for potential academic review, the following rules will apply.
1) No student may take more than three years to complete the coursework required for the first two years. The end of such a "three year" period, is defined as 36 months from the date of matriculation to the School. Time periods included in a "Leave of Absence" are not counted in these 36 months.
2) In the absence of extenuating circumstances, no student may take more than two academic years to complete the coursework required in the first year curriculum.
3) The Associate Dean of Student Affairs shall notify the student of the course(s) for which Academic Review is proposed and the date and time at which the CAES will address the matter. The Associate Dean for Student Affairs, the Registrar, the coursemaster(s) or their designated representatives, shall present the matter to the CAES in a closed and confidential CAES meeting.
4) The student shall be permitted, upon written request, in advance of the CAES meeting, to appear on his or her own behalf. At the student's written request, he or she may be accompanied by a member of the faculty or staff of the School of Medicine for guidance and support. Alternatively, again following written request, the student may be accompanied by a fellow student enrolled in the School of Medicine.
5) A record of the CAES meeting shall be preserved for purposes of review by the School of Medicine's Appeals Committee, as necessary. The CAES's decision shall be by majority vote and shall be communicated, in writing, to the student by the Registrar's office.
6) For students referred for course failure, CAES meetings will have, in addition to the grade report forms for the course for which the student is referred to CAES, a complete record of the student's academic performance and the student file.
7) The maximum number of attempts to pass any individual course during enrollment in the School, including time in an ISP, will be three.
8) Throughout the enrollment of a student it is within the jurisdiction of CAES to terminate the enrollment of a student who has demonstrated serious academic failure or breaches listed under The Evaluation and Grading System, section B. Such a course of action for serious academic failure will generally apply to a student for whom the Registrar has recorded Fail/Incomplete grades in three or more subjects.

F) Cumulative Academic Review/Academic Warning Prior to promotion to the clinical year, the CAES will review the cumulative academic record of each student brought forth by the Associate Dean for Student Affairs to determine whether the student's academic performance justifies advancement to the clinical phase of the medical education without warning. Typically, three (3) remediated examinations and/or failing grades during the first two years of the curriculum would raise concerns about the student's fund of knowledge and readiness to participate in clinical care of patients. Students with overall records indicating such serious academic failure may be dismissed, may be required to repeat specific preclinical course work or may be advanced to the third year with academic warning.

Upon notification of advancement with academic warning into the clerkship year, the student must meet with the Associate Dean for Student Affairs 1) to review the planned clerkship schedule in order to consider schedule changes to facilitate successful clinical experiences; 2) to pursue available resources for academic intervention; and 3) to address any additional problems that may arise. It is recommended that these students seek tutorial assistance through each clerkship coursemaster.

A third-year student who has received an academic warning after the first two years and then fails any component of a clinical clerkship may be dismissed from the school.

First Year

A) If a student has received a Fail/Incomplete grade in a single first-year course, the Associate Dean for Student Affairs will meet with the student to formulate a plan from the following options:
1) take a re-examination in the course at a time prescribed by the coursemaster before August of the following academic year, OR
2) enroll in and successfully complete, at the level designated by the coursemaster, a summer course at a different institution, such course being completed and passed by the beginning of classes for the second year.

B) A student who, for a single course, fails the re-examination taken to remediate a failed course or fails to successfully complete an approved summer course will be referred for CAES to review and propose a recommended course of action. The CAES may require such a student to enter an ISP or may terminate enrollment. Alternatively the CAES may permit a re-examination. If this re-examination is failed enrollment will be terminated.

C) A student for whom the Registrar has recorded a Fail/Incomplete grade in two or more courses during the first year will be referred to CAES for determination of a course of action.

D) For students referred to CAES, under Actions for Academic Review, First-Year, section C (above), the Committee may decide to permit the student to take re-examinations, if a re-examination has not already been taken, in the courses for which Failed/Incomplete grades have been recorded. Such re-examinations will generally occur during the last week of the inter-academic year break. If such a re-examination is failed, the student may be required to enter an ISP or be dismissed from enrollment in the School.

E) The Associate Dean for Student Affairs may also request that the CAES review performance of a student who has demonstrated poor academic performance, either by demonstrating poor academic performance in two or more courses at interval evaluations conducted throughout the course, or by failing two or more examinations that are remediated within the course. In such instances the CAES may recommend a course of action.

If Fail/Incomplete grades have been recorded for two or more courses or a single re-examination, the CAES may require that a student enter an Individual Study Program or that enrollment in the School be terminated. If a student has failed three attempts to pass a course, enrollment will be terminated.

F) See "General–F."

Second Year

A) Regarding courses of the second year, the Associate Dean for Student Affairs will meet with the students in the following categories regarding taking a re-examination, according to the schedule listed under the next section, labelled "B:"
1) a student for whom a Fail or Incomplete grade has been recorded in a single complete year-long course in the second year curriculum, OR
2) a student for whom a Fail or Incomplete grade has been recorded in one or two block-long courses.

B) Re-examinations in complete courses in Pathology or Clinical Medicine will generally be offered during the last week of the inter-academic year break, prior to entry into the third year. Re-examinations for students who have failed one or two block-long courses will be generally offered at a time determined by the coursemaster and the Associate Dean for Student Affairs. All re-examinations must be offered to students and completed by them prior to the start of the next academic year.

Students who fail a re-examination of a single course will be referred to the CAES to determine a course of action. The CAES may decide that the student must enter an ISP. Alternatively, a re-examination may be offered. If the re-examination is failed, enrollment will be terminated.

C) Students in the second year for whom the Registrar has recorded Fail/Incomplete grades under the following categories will be referred to CAES for review and resolution of a recommended course of action:
1) two year-long courses OR
2) three or more block-long courses OR
3) one complete year-long course and two block-long courses OR
4) a student for whom the Registrar has recorded a Fail/Incomplete grade in any re-examination.

D) At review by CAES for students referred to above (section C above), the Committee may decide to permit the student to take re-examinations, if a re-examination has not already been taken, in the courses for which Failed/Incomplete grades have been recorded. Such re-examinations will generally occur during the last week of the interacademic year break. The CAES may allow the student to defer beginning the clinical rotations so that re-examinations may be taken up to 12 weeks after the beginning of the usual cycle of clinical clerkships. Such extra time, used for study and preparation, will ordinarily mean that the student will not have the usual unscheduled time in the elective year. In the event that a Fail/Incomplete grade is recorded at a re-examination, CAES may require that a student enter an Individualized Study Program or that enrollment in the School of Medicine be terminated.

In the event that CAES decides not simply to permit re-examination, the CAES may require that the student enter an Individualized Study Program as detailed below, or that enrollment in the School be terminated.

E) The Associate Dean for Student Affairs may also request that the CAES review performance of a student who has demonstrated poor academic performance in two or more courses at interval evaluations conducted throughout the course when such performance has been reported to the Associate Dean. In such instances the CAES may recommend a course of action.

F) No student will be permitted to begin clinical rotations of the third year until all first- and second-year courses have been successfully completed.

G) See "General–F."

Third and Subsequent Years

A) Regarding performances beyond the second year, the Associate Dean for Student Affairs will meet with a student for whom a single Fail/Incomplete grade has been entered regarding the requirements stipulated by the relevant coursemaster to remediate the grade entered. Options will generally include a re-examination or repeating all or a portion of the course. If a Fail/Incomplete grade has been entered following the prescribed remediation, the student will be referred to the CAES to determine a course of action. When such a student is referred to the CAES, the CAES may permit a re-examination or re-taking or repeating all or a portion of the course. If the course is failed a third time, enrollment in the School of Medicine will be terminated.

B) A student beyond the second year for whom the Registrar has recorded two or more failing grades in the clinical rotations or electives will be referred to CAES for review and proposal of a course of action.

C) Any student who fails to achieve a passing grade (defined as greater than or equal to 10th percentile as reported by the NBME) on any two or more subject (shelf) examinations conducted as part of the evaluation of clerkships will be referred to CAES for review and proposal for a course of action.

D) The Associate Dean for Student Affairs may also request that the CAES review performance of a student who has demonstrated poor academic performance in two or more courses at interval evaluations conducted throughout the course when such performance has been reported to the Associate Dean. In such instances the CAES may recommend a course of action.

E) For students referred to CAES, the Committee may endorse or amend the recommendations of coursemasters from whom Fail/Incomplete grades have been entered for students beyond the second-year curriculum regarding a necessary course of action to remediate the grades entered. In the event that a student fails such a course of remediation, as defined by the coursemaster and approved by the CAES, CAES may require that the rotation be repeated or that enrollment of a student in the School be terminated. Students will generally be permitted three attempts to achieve a passing grade in any clerkship course. If three failing examination grades or final clerkship grades have been submitted for a course, enrollment will be terminated.

F) A student who advances to the clinical years with academic warning and who fails any component of a clerkship will be referred to CAES for action including possible termination. See "General–F."

Individual Study Program

The educational program is designed to assist the specialized needs of all medical students in an individualized and personalized manner. Tutorial assistance is available to any student at any time as detailed below. Occasionally students who have difficulty in handling the normal academic course load will be required to enter an Individualized Study Program (ISP), requiring five years to complete rather than four years.

The following rules govern students engaged in an ISP:

A) Recommendation requiring entry into an ISP is made by the CAES after careful consideration of the student's academic performance at intervals throughout the curriculum.

B) The intent of an ISP is to optimize the prospect that the student will successfully complete the curriculum.

C) The specific program of any ISP (i.e. the content and sequences of courses) will be determined by the student and the Associate Dean for Student Affairs with input from relevant coursemasters and the CAES. The specific recommendations of the CAES will generally be adopted. The CAES may delineate for the student required to enter an ISP the consequences of a Fail/Incomplete grade recorded in any course once the student has entered the ISP. The plan for execution of an ISP, once established, will be recorded in the student's file in the Registrar's office and a copy provided to the student.

D) Unless extenuating circumstances exist, ISP students are required to take the examinations for a particular course in their usual temporal relationship to the coursework. Requests for consideration of unusual circumstances should be recorded in the student's file in the Registrar's office.

E) In the event that a Fail or Incomplete grade is recorded for a student after entry into an ISP, a re-examination schedule will be determined by CAES. If a Fail/Incomplete grade is recorded for the re-examination of a single course for which two previous final examinations have been failed, enrollment in the School of Medicine will be terminated. If a Fail or Incomplete is recorded for the re-examination of a single course which the student has not previously failed, the student may be permitted to repeat the course.

F) At the completion of the time for their ISP, ISP students who have not successfully completed and received a grade of Pass or above in the usual courses of the first- and second-year curricula by the start of the second six-week period in the year of the clinical clerkship will be dismissed from enrollment in the School.

Tutorial Assistance Program

Students experiencing difficulty in any course may request tutorial assistance. Such requests should initially be directed towards the coursemasters and thereafter to the Associate Dean for Student Affairs. Students who are repeating courses will be offered the opportunity for tutorial assistance. CAES may also require that a student seek tutorial assistance.

Leave of Absence

A) A student may request a leave of absence for academic or personal reasons by submitting a statement in writing to the Office of Student Affairs. Such a statement should include indication of the beginning and anticipated ending dates and a brief statement of the reason (academic or personal). Requests for leave of absence must be approved by the Associate Dean for Student Affairs. Leaves of absence shall be granted for no more than one year, but in unusual cases may be renewed by CAES for a second year after discussion with the Associate Dean for Student Affairs. Students requiring a personal leave of absence for medical reasons must submit a supporting letter from the Director of the Student Health Service.

B) In extreme cases where a student may pose a danger to others, an involuntary leave of absence may be imposed. In such a matter the following procedure applies:

1) The Chancellor or his designate may impose an involuntary leave of absence when there is evidence that a student has committed an offense under these rules or the University's Judicial Code and there is evidence that the continued presence of the student on the University campus or as a participant in a clinical rotation poses a substantial threat to himself or herself, to patients or to the rights of others to continue their normal University function and activities.

2) Imposition of the involuntary leave of absence may result in denial of access to the campus, prohibition of class attendance and/or prohibition of participation in clinical rotations.

3) If an involuntary leave of absence is imposed, the suspending authority shall prepare a written notice of the imposition and shall have the notice mailed certified or personally presented to the student. The written notice shall include a brief statement of the reasons therefor, and a brief statement of the procedures provided for resolving cases of involuntary leave of absence under these rules.

4) The student shall be given an opportunity to appear personally before the suspending authority within five (5) business days from the date of service of the notice of imposition of the involuntary leave of absence. If the student asks to appear personally before the suspending authority, only the following issues shall be considered:

a. Whether the suspending authority's information concerning the student's conduct is reliable; and
b. Whether under all the circumstances, there is a reasonable basis for believing that the continued presence of the student on campus or in clinical rotations poses a substantial threat to the student, to patients or to the rights of others to engage in their normal University functions and activities.

5) Within one week of the date of imposition of the involuntary leave of absence, the suspending

authority shall either file a statement of charges against the student with the University Judicial Board, and shall have the statement or charges served, by mail or personal service, upon the student and the dean of the school or college or director of the program in which the student is enrolled or initiate proceedings under these rules to convene a Disciplinary Committee.
6) A temporary suspension shall end when
(i) rescinded by the suspending authority, or
(ii) upon the failure of the suspending authority to promptly file a statement of charges with the University Judicial Board or a Disciplinary Committee, or (iii) when the case is heard and decided by the University Judicial Board, or the Disciplinary Committee.

Return of students from involuntary leave of absence requires clearance of both the Director of the Student Health Service and the Associate Dean for Student Affairs.

C) Students receiving financial aid should be advised that at the end of sixty (60) days or more leave of absence, the grace period for loan repayment during a leave of absence may be exhausted. In such cases there will be an obligation for the student to start payments. According to the Federal rules under which loans are made, the use of a grace period during a leave of absence will generally mean that the schedule for loan repayment may be changed. Students who are receiving financial assistance should consult with the Financial Aid Office to determine the implications of a Leave of Absence for their financial aid.

Policy on Student Status and Benefits During Research Years or Leave of Absence

M.D./Ph.D.

Student status is maintained while in the research phase of the M.D./Ph.D. program. Students are registered in the graduate school during the research years. Both student health and disability coverage are provided by the Division of Biology and Biomedical Sciences.

M.A./M.D.

Student status is maintained while in the research phase of the M.A./M.D. program. Students are registered in the graduate school during the research year. Both student health and disability coverage are provided.

Five-Year M.D. Program

Research Year Here: Student status is maintained throughout the approved research year. In exceptional circumstances, a second research year may be permitted. The student may receive a stipend, but may not be considered an employee of the university. Students are registered in the School of Medicine. Both disability and student health coverage are required and are payable by the student. Outside funding often covers such fees.

Research Year Away: Student status is maintained throughout the approved research year. Students are registered in the School of Medicine. Both disability and student health coverage are optional with proof of like coverage. The cost of either elected coverage is payable by the student. Outside funding often allows these costs.

Leave of Absence

Leave of Absence Year Here: Student status is *not* maintained during the leave of absence though benefits of student health coverage and disability insurance are optional throughout an approved leave. Costs are payable by the M.D. program students. M.D./M.A. and M.D./Ph.D. students may request support for these costs from the Division of Biology and Biomedical Sciences if funds are available. The Office of Financial Aid should be consulted for information regarding loan repayment and grace periods when on a leave of absence.

Leave of Absence Year Away: Same as Leave of Absence Year Here.

Appeals Process

The School of Medicine has the right and responsibility to assure that each student, during the time of enrollment, demonstrates levels of academic achievement and ethical stature appropriate to the practice of medicine. The School must also ensure provision of fairness in discharging those rights and responsibilities.

An Appeals Committee, composed of faculty members appointed by the Dean of the School of Medicine, shall be created to review decisions under Academic Review. A quorum of this committee shall consist of five (5) members.

Within twenty (20) days of the date on which an Academic Disciplinary Action decision is rendered by CAES, the student may request, in writing to the Registrar, that the School of Medicine's Appeals Committee review the record of such CAES decision or that the Appeals Committee request that the CAES consider additional information which was not previously presented to CAES. The letter to the Registrar should include the basis for the appeal as well as any new information of relevance.

The Appeals Committee shall review the record of the CAES decision solely to determine whether the pertinent CAES procedures were followed and whether all relevant information was considered by the CAES. If the appeal is based on a contention that all relevant information was not presented to CAES, the appeal must provide the Appeals Committee with adequate reason why the student did not present this information at the CAES meeting in question. On all appeals the Appeals Committee may either remand the matter to the CAES for reconsideration

with its explanation for the remand, or deny the appeal. However, the Appeals Committee shall not substitute its opinions of the merit of matter and appeal for those of CAES. The Appeals Committee shall provide its decision in writing to the Dean, the student, the CAES, the Associate Dean for Student Affairs and the Registrar. The Appeals Committee shall determine whether the student may continue his or her curriculum pending its review of a CAES decision.

Within twenty (20) days of the date of an Appeals Committee's decision or referral back to CAES, the student may request, in writing, that the Dean of the School of Medicine review the decision of the Appeals Committee. The decision of the Dean shall be final.

Research Integrity Policy

Allegations of breach of research integrity policy are the primary responsibility of the Research Integrity Committee of the School of Medicine. Complaints regarding students enrolled for the M.D. degree will be directed promptly to that committee. The Research Integrity Committee will promptly investigate the charges and report its conclusions and recommendations to the Dean, who will convene a Disciplinary Committee.

For further information, refer to the policy's web site: *www.wustl.edu/policies/research.html*

Procedures Concerning Breaches of Professional Integrity

Matters involving possible breaches of professional integrity shall be brought to the attention of the Associate Dean for Student Affairs. Behavior inappropriate to the medical profession shall mean breaches of personal confidence and trust including cheating or unauthorized use of materials during examinations; abuse, misrepresentations or other seriously improper conduct in relation to patients or colleagues including breaches of confidentiality; and other misconduct, misrepresentation or failure in personal actions or in meeting obligations, so as to raise serious unresolved doubts about the integrity of the student to enter the practice of medicine. In such matters, the following rules apply:

A) The individual(s) raising the questions of possible misconduct shall present them in writing to the Associate Dean for Student Affairs and shall be reminded of their confidentiality.

B) The Associate Dean for Student Affairs shall convene a meeting with the Associate Dean for Admissions or the Associate Dean for Medical Student Education to review the complaint and decide whether further action is necessary.

C) If further inquiry is deemed necessary, the Associate Dean for Student Affairs and one of the Associate Deans listed under section B will discuss the complaint with the student.

D) If the Associate Dean for Student Affairs considers the matter sufficiently serious, a recommendation will be made to the Dean to convene a Disciplinary Committee.

E) Appointment to a Disciplinary Committee will be made by the Dean and will include four faculty members and one academic representative from the Office of Student Affairs. Appointees will decline if assurances of their impartiality in the matter are not evident. Members of the Committee will elect a chairperson who will be responsible for applying correct procedure to the hearing. The Registrar will attend the meeting to record the minutes. A simple majority will prevail (3 out of 5 votes), except when the motion is for recommending to the Dean dismissal from enrollment in the School, where 4 out of 5 votes will be required. The recommendation of the Disciplinary Committee will be forwarded to the Dean, who will decide upon the disciplinary action to be taken.

F) If the Disciplinary Committee is convened, the Associate Dean for Student Affairs will forward all information concerning the matter to the Committee.

G) The Disciplinary Committee shall, whenever possible, convene within one to two weeks after the initial meeting between the student and the Associate Dean for Student Affairs.

H) Prior to the meeting of the Disciplinary Committee, the Associate Dean for Student Affairs will inform the student in writing regarding the time, date and place of the meeting, that the proceedings are completely confidential, and that the student may bring a faculty member, staff member or fellow student of the School of Medicine for guidance and support. A copy of the complaint will be provided to the student.

I) The following guidelines will be applied to the conduct of a Disciplinary Committee and these will be made available to members of the committee at the opening of the meeting. The aim of the Committee is to provide fair and prompt review of the inquiry. The Committee is not positioned in an adversarial role against the student but simply to review the evidence as presented and determine its decision regarding disciplinary action. The Committee has neither the advantages nor limitations inherent in a court of law. Innocence of the student being questioned will be presumed. No facts or conclusions will be assumed. The decision as to the whether the student perpetrated the alleged act will be made solely on the basis of evidence and testimony presented at the meeting. During the hearing the student will have access to all the evidence presented. The record of such proceedings will be held

confidentially with access restricted to Committee members, the student involved, and members of the Administration involved in the proceedings.

J) All who appear before the Committee are assured that their appearance occurs without fear of repercussions from their testimony.

K) After the meeting and decision of the Disciplinary Committee, the Associate Dean for Student Affairs will inform the student verbally and in writing of the result within three working days.

L) The student will have access to the written record of the meeting's proceedings.

M) Unless it is determined by the Associate Dean for Student Affairs that extraordinary circumstances exist (e.g. physical threat to others), the student will be permitted to continue in the usual academic activities during the Disciplinary proceedings.

N) In the event that the student wishes to appeal the decision of the Dean dismissing the student from enrollment in the School, such an appeal should be directed to the Judicial Administrator of the University according to the University Judicial Code. The decision of the Judicial Administrator shall be final.

Liability Insurance

Washington University provides general liability insurance for all students or practicums while participating in required clinical experiences. In addition, Washington University voluntarily provides a defense and indemnification benefit for matriculated students who are candidates for the M.D. degree at the School of Medicine (WUSM).

The benefit is provided to WUSM students for defense and indemnification of claims arising out of activities which are part of academic programs and only while a student is acting in his or her capacity as a medical student enrolled in the undergraduate medical program at the School of Medicine. This policy is subject to terms, conditions, limitations and exclusions, and each request for defense/indemnification will be decided on a case-by-case basis at the sole discretion of the University.

Defense/indemnification will not be provided for any criminal act or any act committed while in violation of any law or ordinance or University program guideline, or where the injury or damage resulted from intentional wrongdoing, gross negligence or recklessness, or in the event that the action or proceeding is brought by or on behalf of Washington University. This indemnification does not cover any liability which is insured elsewhere, but it may be in excess of any amount payable under any other such insurance.

Any incident, either actual or alleged involving patient injury which could lead to a claim, which you have knowledge of must be reported immediately to the Risk Management Office of the School of Medicine, 362-6956.

If you have any questions about Washington University's professional liability program, please feel free to call the Risk Management Office.

United States Medical Licensing Exam (USMLE)

The USMLE is designed to "assess the examinees' understanding of and ability to apply concepts and principles that are important in health and disease." The USMLE represents a single uniform examination for medical licensure in the United States, and as such, is a minimum requirement for obtaining a medical license.

The USMLE consists of three separate examinations: USMLE Step 1, generally taken following the second-year curriculum, tests knowledge in the basic sciences; USMLE Step 2, generally taken prior to graduation, tests proficiency in clinical sciences; and USMLE Step 3, taken during internship.

Further information can be obtained from the Bulletin of Information published by the National Board of Medical Examiners, and is available, along with application forms, at: *www.nbme.org*.

STUDENT LIFE

St. Louis

St. Louis is one of the most livable areas in the United States, with a cost of living that ranks consistently lower than many other comparable cities. For recreation, the lively arts, and great everyday living, St. Louis is a city of opportunity and variety.

The Gateway Arch — St. Louis' preeminent symbol — represents the joining of old and new on the historic Mississippi riverfront. Rising in front of a dramatic skyline, the Arch symbolizes St. Louis' role as the Gateway to the West. Today, as in the past, St. Louis is a prominent cultural and commercial city linking the north and south, east and west, through its traditions and its view of the future. The Arch itself, designed by Eero Saarinen, is a remarkable sculptural achievement and an incredible engineering feat, worthy of its dramatic setting. It frames the commercial center of downtown and the Old Courthouse, where in 1847 Dred Scott argued his right to be a free man.

Ambitious renovation and architectural experimentation characterize busy downtown St. Louis. The Old Post Office and the massive Romanesque Union Station have been revitalized. Union Station houses a hotel and expansive shopping mall, inviting convention visitors and tourists to explore commerce St. Louis-style. New corporate headquarters buildings downtown display the variety of modern architecture evident in major metropolitan centers around the nation. Members of the Washington

University School of Architecture consult with local firms in the creation of new structures and the refurbishing of the old. A housing area in the fashionable Central West End, home to the Washington University Medical Center, is the design of a School of Architecture professor.

Though the St. Louis area has nearly 2.5 million residents, living here is simple and affordable. A convenient, modern highway system and a simple city plan allow easy access to all parts of the city and its many activities. A light rail line — MetroLink — runs from Lambert Airport through Laclede's Landing in the downtown area and on to Illinois. A stop at the Medical Center makes this mode of transportation especially convenient for medical school faculty, students and staff.

A keynote to St. Louis is variety. Any taste in housing, cuisine, lifestyle and leisure activities can be found in the greater St. Louis area, but St. Louis is less expensive than comparable cities. Attractive, affordable residential communities abound here, many of them within a two-mile radius of Washington University. The Central West End, University City and Clayton — all of which border Washington University — provide attractive housing and recreational opportunities. To the north, small shops, galleries and ethnic restaurants dot the main street of University City. Adjacent to the Washington University Medical Center and close to the Hilltop Campus is the Central West End — fashionable, trendy and restored to its late-19th century grandeur. To the west are the elegant homes and multifamily dwellings of Clayton. Those who come to St. Louis to be associated with the University find apartments that range in price from $450-$650 per month, and purchase properties ranging from $90,000 and up, all in the immediate area. For those who desire a more suburban lifestyle, west St. Louis County is a growing and beautiful area.

Cultural Opportunities

Once settled, new St. Louisans discover the rich recreational and cultural life here. The effects of the St. Louis renaissance are easily seen in its theaters, galleries and festivals. The Saint Louis Symphony, among the finest in the nation, performs at historic Powell Hall. Symphony members bring their skills to the community through teaching and chamber concerts as well. Several hold appointments in the Washington University music department, which also has close ties with the St. Louis Conservatory and Schools for the Arts (CASA), an institution offering high-level, intense training in music and the arts. In the downtown area, the rich St. Louis traditions in jazz, blues and ragtime music are continued in a number of lounges and clubs.

The Opera Theatre of St. Louis has been enormously successful, nationally and internationally, bringing English-language versions of the classics and presentation of contemporary operas to the stage. The Repertory Theatre of St. Louis has an extensive annual season, which includes experimental works and traditional dramas. The Stages St. Louis Theatre Co.; Kirkwood Theatre Guild; West End Players Guild; Act., Inc.; Historyonics Theatre Co.; and the Saint Louis Black Repertory Company enrich the dramatic offerings available in the immediate area. On campus, Edison Theatre offers the very highest quality in national and international programs in theater, dance and music each season.

Broadway comes to St. Louis at the Fox Theatre, a $2 million renovation of a 1929 example of exotic cinema temple art. Galleries sprinkled throughout the area bring the most current in visual arts to St. Louis, while antique shops remind us of the past. St. Louisans tend to be avid moviegoers. Supplementing the standard movie fare available throughout the metropolitan area are two theaters close to campus, the Hi-Pointe and the Tivoli, both offering excellent foreign films. The St. Louis International Film Festival takes place every fall.

When the St. Louis Art Museum was built for the 1904 World's Fair, much of the Washington University collection was housed in it. Standing on a hill in Forest Park, the museum was called the jewel of the Fair. By 1929, it exhibited the entire University art collection and provided space for fine arts students and faculty shows. Though in 1960 Washington University built its own museum — the Gallery of Art housed in Steinberg Hall — and moved its collection there, ties with the St. Louis Art Museum remain very close. Students in art and in business intern at the Art Museum, working in arts management and gallery organization.

St. Louis also features Laumeier Sculpture Park, which displays 60 large-scale sculptures representing artists of international renown. St. Louis has two major historical museums as well: the Missouri Historical Society in Forest Park and the Museum of Westward Expansion under the Gateway Arch.

Recreation

For recreation, St. Louisans may use any of 93 parks that dot the metropolitan area. In Forest Park, which lies between the two Washington University campuses, are the Art Museum, The Muny (an outdoor theater), the famed St. Louis Zoo, municipal golf courses, tennis and handball courts, a skating rink, and acres of paths, picnic areas, gardens and wooded groves. Tower Grove Park is in south St. Louis, and adjoining it is the Missouri Botanical Garden, world famous for its research, collections and facilities. The Garden's professional staff members hold positions on the Washington University faculty and make the extensive research facilities available to students.

Farther afield, St. Louis residents find outdoor adventure in the countryside beyond the city. In the Ozark Mountains, on the rivers of Missouri, on the lakes of neighboring Illinois, variety abounds. Camping, hiking, floating, rock climbing and caving are among the many possibilities within a few hours' drive of St. Louis. For sailors, there is Carlyle Lake in

Illinois. And for those with rod and reel, the Missouri streams are made to order.

The Washington University Athletic Complex provides outstanding resources to athletes at every level of ability. Open to all members of the University community, it includes an eight-lane, 25-meter stretch pool, two complete gymnasiums, weight rooms, racquetball courts, a complete outdoor tennis complex and a track complex. Built on the site of the 1904 Olympic games, this state-of-the-art facility offers recreational opportunities year-round for students, faculty and staff.

For the spectator, St. Louis is a splendid sports town. For more than a century, it has hosted one of the oldest traditions in baseball — the St. Louis Cardinals. Dizzy Dean and the Gas House Gang, Stan Musial, Lou Brock, Ozzie Smith and Mark McGwire are all part of Cardinal history.

St. Louis' NFL Rams brought home the Superbowl trophy in 2000, after being welcomed to the community in the fall of 1995. The St. Louis Blues ice hockey team moved here in 1967 and enjoy a winning history. St. Louis also supports a number of semi-pro sports teams.

Employment

St. Louis is a great place to work; job opportunities are varied and abundant. Many companies are distinguished for their excellent working conditions, and commuting is easier than in many large cities.

Many major corporations are located here, as are a variety of retail, transportation and banking organizations. Among the top firms in town are Anheuser-Busch, Emerson, Boeing and May Department Stores. Many support services have grown up around these corporations — including law, accounting, data processing, advertising, public relations and design firms, as well as photographic and audio-visual studios.

One of the largest employers is the Washington University Medical Center — made up of the School of Medicine and several teaching hospitals. Illustrative of the productive ties between University and community, Monsanto supports fellowships for M.D./Ph.D. students and a scholarship for minority medical students at the School of Medicine, and contracts with Washington University for biomedical research.

The John M. Olin School of Business at Washington University enjoys a special relationship with the business community. As a laboratory for student study, internship opportunities, practicums through the Management Center and permanent employment of business graduates, St. Louis plays an integral role in the education of undergraduate and graduate business students. Faculty and student consultants work with corporations to explore new opportunities for growth and development of their firms. The local business and professional communities also have been very supportive of a new graduate internship program, making part-time jobs available to advanced graduate students in the humanities and social sciences divisions of the Graduate School of Arts and Sciences.

Similarly, the School of Law has close ties with the St. Louis legal community and, through its clinical program, offers internships in private and local government offices and in state and federal courts. In addition, the law school is fortunate in the active and interested role of the local bar associations in the development of the school's special programs.

The George Warren Brown School of Social Work also is linked in many ways to the St. Louis social work community. Students find practicum assignments throughout the area, and both students and faculty do research and consult with local agencies.

A strong partnership exists between technologically based businesses and industries in St. Louis and the School of Engineering and Applied Science. Engineering faculty members regularly undertake collaborative research and consulting projects with area firms such as Boeing, Monsanto and Emerson. The cooperative education program gives undergraduate engineering students an opportunity to apply what they learn in the classroom in alternating periods of employment, both in St. Louis and nationwide. Through the engineering school's continuing education division that reaches out to St. Louis' technical community, area residents can pursue an engineering education outside of regular working hours. A program offered in conjunction with the University of Missouri-St. Louis is designed specifically for nontraditional engineering students from St. Louis.

In addition to their ties to local business, both the Hilltop Campus and the School of Medicine at Washington University are dedicated to the support of K-12 education. Students from the medical school participate in a variety of outreach programs, including Students Teaching AIDS to Students (STATS), designed to teach awareness and responsible behavior to junior high school students; the Young Scientist Program, an interactive learning experience that brings high school students to the Medical Center; and health and preventive programs on drug and sex education.

In short, Washington University enjoys a special relationship with St. Louis.

Housing

Those who come to St. Louis to be associated with the Washington University School of Medicine find apartments which range in price from $450-$650 per month, all in the immediate area. The Apartment and Housing Referral Services, located in Millbrook Square on the Hilltop Campus, maintains listings of housing appropriate for married and single students. For information, contact Apartment and Referral Services at Campus Box 1059, 6926 Millbrook Blvd., St. Louis, MO 63130 or (314) 935-5092.

The Spencer T. Olin Residence Hall, (314) 362-3230, located at 4550 Scott Ave. in the Medical Center, has accommodations for approximately 200 single men and women. The building was made possible by generous gifts from Spencer T. Olin, alumni and friends of the School of Medicine. Olin Hall is planned for the convenience of students in the medical or paramedical sciences, and includes shared cooking facilities, a gymnasium, weight room, laundry room and penthouse with a recreational area and large-screen television with satellite system. Every effort is made to provide an atmosphere that not only aids residents in meeting their study obligations, but also recognizes their privileges as graduate students.

The rates for rooms during 2003-2004 are:

Summer 2003 (May 24th - August 3rd)	
Single Room	$895
Large Single	$1,100
Solo Suite	$1,280
Double Room	$610*
Double Suite	$895*

School Year: Mid August-Mid May (Nine Months)	
Single Room	$2,995
Large Single	$3,590
Solo Suite	$4,180
Double Room	$2,010*
Double Suite	$2,995*

*Price per student

Security

Security at the School of Medicine is the responsibility of Protective Services. Uniformed Protective Services Response Officers are on duty 24 hours a day, seven days a week to provide for personal safety, reduce the opportunity for crime, apprehend law violators, provide crime prevention and awareness training and assist in enforcement of University rules and regulations. Armed and unarmed Protective Services personnel are radio-dispatched. They respond immediately to telephone calls made to 362-HELP (4357). Officers patrol the campus on foot, on bicycles and in marked mobile units. Contract Agency guards supplement the in-house staff.

The Medical School access control program makes the campus easily accessible after hours and on weekends. Faculty, staff and students are issued a photo identification badge that identifies the wearer as a member of the medical school community. The badge has a magnetic strip that activates the computerized door lock entrances to the School's buildings. These entrances have two-way intercoms for direct communication with Protective Services' radio dispatcher, as do direct-ring telephones located outside selected campus buildings and "Code Blue" emergency telephones on surface parking lots and in the garages.

Each year Protective Services publishes a summary of statistical information concerning campus crime as required by federal law, on the medical school web page at *medschool.wustl.edu/~fmd/*. Information may be found on the web page under "For Our Students" or "For Our Staff." A daily crime log, information on crime prevention tips and the many services and programs provided by Protective Services also appear on the web page. Individual printouts of the information presented on the web page may be obtained by writing to Washington University School of Medicine, Protective Services Department, Campus Box 8207, 660 S. Euclid Ave., St. Louis, MO 63110, or by calling (314) 362-2698.

Parking

Parking is available on various surface lots and garages owned by the School of Medicine. The surface lots are located near a variety of sites within the Medical Center. Although surface parking space is limited, parking is generally available in the 1,500-space WUSM employee/student garage located at the corner of Clayton and Taylor avenues. Shuttle service is available for transportation from one site to another in accordance with specific shuttle schedules. If additional information is needed, please contact Transportation Services at (314) 362-6824. If you are interested in carpooling, vanpooling, or Bi-State Transit passes please contact our Rideshare Office at (314) 747-0706.

For additional information regarding shuttle routes and times, please see the following web sites:

bjcnet.carenet.org\maps\medcenshut.html
Washington University Medical Center Shuttle

transportation.wustl.edu
Gold Line
Medical School, Lewis Center, Northwest Loop/ North by Northwest
Red Line
West Campus, Galleria, Wohl Center
Green Line
Lewis Center, University City Loop

Check Cashing

Personal checks may be cashed at the Cashier's Office (Room 107, first floor McDonnell Sciences Building). Hours are 9 a.m. to 4 p.m., Monday through Friday. Limit for personal checks is $100 per check or a total of $100 per day. A charge of 25 cents per check is made for this service. Limit for Washington University checks is $200 per day. Your Washington University identification card must be presented when checks are cashed.

Bulletin Boards

Bulletin boards are located on the wall outside the Admissions Office, on the first and second floors of the McDonnell Sciences Building, on the first floor of Olin Residence Hall, and in the lounge on the ground floor of the Bernard Becker Medical Library. Please check these frequently.

Lockers

Student lockers with combination padlocks are located on the second floor of McDonnell Sciences Building. Locker assignments are made by the Registrar's Office for a nominal fee to cover the cost of the padlock. Only padlocks issued by the Registrar's Office may be used.

Mail

First-class student mail sent to the School of Medicine will be put in student mailboxes. This will most probably serve as a temporary mailing address and be used only until students are settled in St. Louis. It is important that mail addressed and sent to the School of Medicine include both student status (WUMS = Washington University Medical Student) and year, as follows:

Jane Doe, WUMS I
Washington University School of Medicine
Campus Box 8077
660 S. Euclid Ave.
St. Louis, MO 63110-1093

Student Health Service

The Student Health Service is located in the East Building, 4525 Scott Ave., Suite 3420. Office hours are 8 a.m. to 4 p.m., Monday through Friday. Telephone numbers:

Information/Appointments	(314) 362-3523
Billing	(314) 362-2346

Entering students are required to have a medical examination prior to matriculation and to show proof of immunity to measles (rubeola), rubella and mumps and a tetanus booster within 10 years. Subsequent medical care is provided as long as enrollment is maintained in the School of Medicine.

Physicians at the Student Health Service provide preventive health care and care for urgent illness. Emergency care is available at the emergency department of Barnes-Jewish Hospital.

Essential costs of hospitalization are covered up to a maximum of $1 million for any one injury or illness. The student or his/her family is responsible for meeting the costs of hospital care in excess of those paid by the Student Health Service.

There are no benefits for outpatient care away from the Medical Center. The responsibility of the Student Health Service for hospitalization and emergency care will end 30 days after an individual ceases to be an officially enrolled student.

Students may purchase coverage for dependents. Details of this plan are available at the Student Health Service.

Counseling Services

Students within the Medical Center may have concerns over poor concentration, ineffective study habits, anxiety over their performance, low self-esteem, getting along with others, grief or depression. The psychiatry and clinical psychology staff members are available to help students cope with these concerns. Initial evaluations are made at the Medical Campus Health Service. Subsequent care may be at the Medical Campus or a designated physician's office. Call 362-3523 for more information. All records are confidential and may not be seen by anyone without the student's written consent.

Students Supporting Students (SOS) is a peer support program for medical students by medical students. Volunteers work closely with Student Health Service for both guidance and referrals. Their voice mail is (314) 362-0286.

Disability Insurance

All students are covered by group disability insurance. A student who is completely disabled for six consecutive months is eligible to receive $500 per month benefit. Coverage increases to $1,300 per month in the third year. Individual disability policies are issued to fourth-year students, increasing the total monthly benefit to $2,000. Individual policies are portable, guaranteed issue, and can be increased after graduation up to a maximum $4,700 per month benefit. Call (314) 362-2346 for more information.

Life Insurance

All students are covered by a $10,000 life insurance benefit. Call (314) 362-2346 for more information.

Dress Code

While the Washington University School of Medicine does not have a written dress code, it is expected that all students will dress in attire that is appropriate for a professional.

Appropriate attire in the clinical setting is especially important, not only because the student will be part of the team representing the medical profession to patients, but also because the student will be representing the School of Medicine.

Appropriate attire for male students on the clinical services includes man-tailored shirt and tie, trousers or slacks and closed toe shoes. Appropriate attire for female students includes a dress, a blouse, tailored shirt or sweater, and slacks or skirt. Both men and women should wear a short white jacket with the appropriate hospital identification card clearly visible.

Student Organizations

Students at Washington University School of Medicine are active participants in medical student organizations on the local, state and national levels. The American Medical Student Association (AMSA), the Student National Medical Association (SNMA), the American Medical Women's Association (AMWA), the Asian-Pacific American Medical Students Association (APAMSA), the Medical Student Section of the American Medical Association (AMA-MSS), the Missouri State Medical Association (MSMA), the Organization of Student Representatives (OSR) in the Association of American Medical Colleges (AAMC) and the Student Organized Community Clinic (SOCC) provide forums for addressing the educational, social and political concerns of medical students. The School of Medicine supports student participation in these national organizations and provides partial funding for travel and other expenses on an annual basis.

Academic Societies

To foster communication between students and faculty, three academic societies — The Joseph Erlanger and Evarts Graham Society, The Carl and Gerty Cori Society, and The Oliver Lowry and Carl Moore Society — meet independently throughout the academic year to enjoy a social hour, dinner and conversation. The societies promote a collegial environment for the medical school's diverse faculty and student body.

AMA-MSS

Washington University has an active chapter of the American Medical Association Medical Student Section. WUSM students are involved at the local, state and national levels and represent Washington University in policy development.

AMSA

On the local level, AMSA is the major student organization at the School of Medicine. The chapter's annual activities include a speaker series and several community service projects. In recent years, the service projects have included an ongoing blood pressure screening program done in conjunction with the American Heart Association.

AMWA

The American Medical Women's Association is a national organization designed to address issues of concern to women in medicine. Washington University has an active student group and funding is available for student representation at regional and national meetings.

APAMSA

The Asian-Pacific American Medical Students Association was founded to address issues and needs specific to Asian-Pacific American medical students. To that end, it serves as a support group for students, fosters student-faculty interaction and promotes cultural awareness, as well as providing a framework for community service programs.

Christian Medical and Dental Society

The Christian Medical and Dental Society (CMDS) fellowship is a nondenominational group that meets on the medical school campus. Part of a national organization founded in 1931, it exists as a source of encouragement, understanding, and support for Christian students, as well as a resource for the entire medical community through information and discussion of such topics as spirituality in patient care, Christian perspectives in medical ethics, and medical missions in the United States and abroad.

Weekly meetings, open to anyone, consist of times of prayer, sharing and Bible study.

Forum for International Health and Tropical Medicine

The Forum for International Health and Tropical Medicine (FIHTM) was formed to promote awareness of international health concerns and facilitate international health experiences for medical students. In addition, the group has worked closely with administration in the design of a formalized international health elective program and funding structure.

MedSTUBS

The Medical Student Used Book Store (MedSTUBS) is a student-run, nonprofit used bookstore that allows students to buy and sell used books. This bookstore fulfills the need for cheaper textbooks and allows the cycling of books to those who will need most of them. Students often find that when they have finished with a course there is no point in keeping the book, because they want a new edition or they know they'll never use it again. Although books are needed for specific third-year rotations, some students find that they don't need the texts after the rotation is over — especially if they are not planning to specialize in that area. MedSTUBS is an opportunity for students to bring in their used texts and set their own prices. Then, when the book sells, MedSTUBs will mail the student a check, minus 5 percent. Students can drop by and browse the growing collection of texts, pretests, atlases, manuals, etc., or drop off their used books in Room 104 of Olin Hall (first floor.) Cash and checks are accepted.

Pediatric Care Organization

The Pediatric Care Organization is a student group working to serve the St. Louis pediatric community. Through this organization, students have the opportunity to work with chronically ill children, provide support for these children's families, and learn about disease in a community-based pediatric setting.

POP is an organization that matches children in the St. Louis area who are suffering from chronic illnesses and the siblings of these children with big brothers and big sisters from Washington University School of Medicine. Medical students meet with their little siblings about every other week, participating in activities that form a meaningful relationship for both the medical student and the child. These activities include going to the zoo, playing on the playground, doing arts and crafts and reading books together. The social work department at St. Louis Children's Hospital serves as a referral source for families, assists in training medical students in dealing with issues associated with chronic disease, and provides ongoing support throughout the duration of the match. The goal of the program is twofold: first, to provide additional love and support to sick children and their families, and second, to allow students to experience firsthand the demands of coping with illness and its stress as it relates to children's everyday lives.

Physicians for Social Responsibility

The Washington University SPSR chapter provides a forum for students interested in environmental health, nuclear disarmament, gun violence prevention, and other areas in which physician activism may have a positive impact on society. The chapter is affiliated with the national PSR organization and International Physicians for the Prevention of Nuclear War (winners of the 1985 Nobel Peace Prize). Current SPSR projects include medical waste reduction and awareness, youth violence prevention, state and federal-level legislative action, and a series of lunchtime multimedia presentations. In addition to these local projects, Washington University SPSR participates in national PSR programs such as the recent "First Monday Campaign to End Gun Violence."

Program for Women in Science and Medicine

The Program for Women in Science and Medicine is designed to foster interaction among women at all levels at the medical school. The program sponsors a variety of informal discussions, receptions and dinners with informative speakers throughout the academic year.

SNMA

The Student National Medical Association (SNMA) is the oldest and largest medical student organization focused around the needs and concerns of African-American, Latino and Native American medical students. This organization is concerned with providing services to medically underserved communities, promoting minority student recruitment and retention to schools that train health personnel and assisting in ways to provide quality education to minorities and women. Washington University has an active SNMA chapter, and funds are available for representation at regional and national meetings as well as for community service activities.

Student Organized Community Clinic (SOCC)

A student/faculty clinic organized by students to serve the indigent.

Washington University Medical Center Housestaff Auxiliary (WUMCHA)

WUMCHA is an organization comprised of female medical students, residents, fellows, attending physicians, female spouses and "significant others" of those affiliated with Washington University Medical Center, including Barnes-Jewish and Children's hospitals, the School of Medicine and Mallinckrodt Institute of Radiology. The purpose of the organization is to provide friendship and social support among its members. In addition to sponsoring numerous recreational and educational activities, WUMCHA publishes a *Welcome Guide*, as well as a directory of members. Annual dues are $20 and information about membership and applications can be obtained by calling Lauren Blum at (314) 994-1921.

Community Service Experience

Participation in a host of community service projects nurtures the students' altruistic nature and provides an alternative educational experience. University-sponsored, student-run, community-based service activities include the Perinatal Project, which provides information concerning well-baby care and prenatal care to women from lower socioeconomic groups and the Drug Education Project, which educates inner-city youngsters concerning the effects of drug and alcohol abuse. The Reproductive Health Project provides sex education to middle school students. The Students Teaching AIDS to Students (STATS) Program allows trained medical students to provide sixth- and seventh-graders with information about AIDS. The combined efforts of medical students, faculty, middle school teachers, parents and speakers with AIDS have made STATS a very successful program. The CoMoTion project serves as a clearinghouse for students to participate in a series of St. Louis outreach programs. Through this project, students have worked in a soup kitchen and shelters for the homeless, supervised a women's center and organized a holiday gift drive for homeless families. The Domestic Violence Action (DVA) group has introduced domestic violence issues into the medical school curriculum. These students also organize yearly symposiums on domestic violence for health care workers from the community.

Student Publications

Students organize and spearhead several publications at the School of Medicine. The *Dis-Orientation Guide* is produced annually as a student-to-student guide to the curriculum and the city.

Intramural Program

Students enrolled in Washington University School of Medicine enjoy an active and diverse Intramural (IM) Program. The IM Program offers students the opportunity to participate in a wide range of sports. Utilizing the state-of-the-art facilities in the University's Athletic Complex, medical students pursue personal athletic interests and enjoy interaction with students enrolled in both undergraduate and graduate degree programs. The IM Program provides an excellent opportunity to socialize with colleagues as well as other graduate students. Differences in curricular demands among participants are considered in scheduling games so that neither academic nor athletic goals are compromised.

Traditionally, the School of Medicine is represented each year by teams or individuals in over 10 intramural sports. In recent years, medical student teams competed in men's and women's flag football, soccer, volleyball, cross country, basketball, swimming, softball, and track and field as well as coed ultimate Frisbee, volleyball, inner tube water polo and softball. In addition, there are different levels of competition so that the needs of both the competitive and recreational athlete can be met.

The School has always made a strong showing in both the mixed and graduate school division, as evidenced by the many championship T-shirts team members sport.

Transcript Service

The transcript service is run individually by the first- and second-year classes. It is a self-funded program in which written transcripts are produced for each lecture during the school year. Students alternate various duties, including tape recording, transcribing, copying and distributing the transcripts. It is a voluntary cooperative effort involving interested students (almost all students join) for a relatively modest fee, and is widely viewed as a valuable endeavor.

Primary Care Summer Preceptorship

Students appreciate early and sustained patient contact. Since 1996 the school has sponsored a primary care preceptorship program for students during the summer between their first and second years of classes. Students select a preceptor in internal medicine, pediatrics or family practice and spend up to eight weeks observing that physician's clinical practice. A stipend is provided to the student. Although many of the preceptors are in St. Louis, others, particularly alumni, are located in cities throughout the country. Applications should be made to Leslie Kahl, M.D., Box 8077.

Student Research Fellowships

Student research is an important part of the educational program. Fellowships in basic science or clinical areas will be awarded each year to selected students who undertake research projects under the direction of faculty members. Research allows students to discover firsthand the problems and rewards of obtaining and assessing new information, thus adding another dimension to their experience as investigators.

Most students take the opportunity for research during the summer after their first year of classes, but incoming students to the school also are eligible. All research must be carried out at the School of Medicine. Students will be awarded a fellowship and stipend for a two-month program. Inquiries should be made to Student Research Fellowships, Koong-Nah Chung, Ph.D., Box 8107.

Alpha Omega Alpha (AOA)

Alpha Omega Alpha is a national medical honor society. Members are selected by a standing AOA committee during the final year of medical school. Selection is based upon academic performance during the first three years, in addition to other qualities such as leadership. Approximately one-sixth of the class is elected to AOA.

Students elected to AOA are honored at an awards dinner during the final year and at a special AOA lecture.

Awards and Prizes

Washington University School of Medicine publicly recognizes and rewards at two annual events outstanding scholarship, research accomplishments and community service of individual students. In December, the Student Awards Luncheon acknowledges academic excellence earned during the first three years of study. As part of the festive commencement activities in May, graduates are recognized for meritorious research and clinical achievements accomplished during their medical school careers.

The Academic Women's Network Leadership Award. Presented to a woman or women in the graduating class who has or have demonstrated outstanding leadership in service to or advancement of women in the community. The 2003 recipient: Sarah M. Lacy.

Morris Alex, M.D. Prize. Awarded each year to that medical student who is outstanding among his or her peers in the second-year Clinical Medicine course. The 2003 recipient: Matthew D. Council.

Alpha Omega Alpha Book Prize. Awarded to a member of the graduating class who has performed outstandingly for the entire medical course. The 2003 recipient: Li Ern Chen.

American College of Physicians William A. Peck, M.D. Book Award. Presented annually to a member of the graduating class committed to a career in internal medicine, in recognition of highest achievement in the field of internal medicine. The 2003 recipient: Joel David Schilling.

American College of Physicians Award for Excellence in Physical Diagnosis. Two recipients are selected annually based on their outstanding performance in the second-year Clinical Medicine course. The 2003 recipient: Amy D. Slansky.

American College of Physicians Clerkship Award. Established in 1992 to be awarded to a student completing the third year of study with meritorious achievement in the internal medicine clinical clerkships. The 2003 recipient: Michele W. Tang.

American Medical Women's Association Janet M. Glasgow Memorial Achievement Citations. Presented to women medical students graduating in the top 10 percent of their class. The 2003 recipients: Deborah Chen-Becker, Amy S. Cheng, Shasa Hu, Sarah Elizabeth Irving, Tracy Lynn McGregor, Kelli Kreul Pettit, Danielle Marie Weems and Katherine Chiayee Yung.

American Medical Women's Association Janet M. Glasgow Memorial Award. Presented to a woman graduating first in her class. The 2003 recipient: Delma Yemisi Jarrett.

Association for Academic Surgery Student Research Award. Recognizes outstanding research efforts by a graduating medical student interested in a surgical career.

The Ruth Bebermeyer Award. Established in 2001 by the WUMCAA executive council to honor Ruth Bebermeyer for her many years of dedicated service to WUMCAA (1990-2000) and to the students of the School of Medicine. The award is given to "a student who has shown extraordinary kindness and sensitivity to the needs of others," whether those others be fellow students, patients, or just people in general. The 2003 recipient: Ashley C. Flynn.

Alexander Berg Prize. Awarded to the student presenting the best results in research in molecular microbiology. The 2003 recipients: Ritu Banerjee and Doran Leonard Fink.

Jacques J. Bronfenbrenner Prize. Provided by Dr. Bronfenbrenner's students in memory of his inspiration as a teacher and a scientist, and awarded to the member of the graduating class who, in the judgment of the Chairman of the Department of Medicine, has done the most outstanding work in infectious diseases or related fields. The 2003 recipient: Doran Leonard Fink.

Dr. Richard S. Brookings and Robert Carter Medical School Prizes. Provided for medical students through a bequest of Robert S. Brookings. The 2003 Dr. Richard S. Brookings recipients: Jessica Henderson Boyd, Sarah Elizabeth Irving, Delma Y. Jarrett and Tracy L. McGregor. The 2003 Robert Carter recipients: Deborah Chen-Becker, Amy S. Cheng, Brent A. Ragar and Raymond Wee.

Dr. Harvey Butcher Prize in Surgery. Awarded annually in memory of Dr. Harvey Butcher to the member of the graduating class who, as judged by the Department of Surgery, shows the greatest promise for general surgery. The 2003 recipient: Li Ern Chen.

Kehar S. Chouke – George Gill Prize in Anatomy. Awarded annually to a first-year medical student who has demonstrated superior scholarship in anatomy. The 2003 recipient: Midori J. Seppa.

Class of 2001 Award. Established by the Class of 2001 as its gift to the medical school. Awards are to be given to third-year medical students in recognition of outstanding performance in the areas of community service and student group activities in the first two years of medical school. The 2003 recipients: Suzanne E. Wahrle and Karen A. Zink.

Carl F. and Gerty T. Cori Prize in Biochemistry. Awarded at the end of the first year to the member of the class who has demonstrated superior scholarship in biochemistry. The 2003 recipients: Kara M. Barnett and Benjamin D. Womack.

Edmund V. Cowdry Prize in Histology. Established in 1969 to honor Dr. Cowdry; awarded to a medical student in the first-year class who has performed meritoriously in microscopic anatomy. The 2003 recipients: Ji Lu and Midori J. Seppa.

Antoinette Frances Dames Award in Cell Biology and Physiology. Awarded annually to a member of the first-year class who has demonstrated superior scholarship in these fields. The 2003 recipients: Joel C. Geerling and Leanna S. Wen.

Elisabeth L. Demonchaux Prize in Pediatrics. Established in 1985, the prize is awarded annually to a graduating student who has done outstanding work in pediatrics. The 2003 recipient: Tracy Lynn McGregor.

Distinguished Minority Medical Student Scholarship Prize. Provided by African-American alumni and friends of Washington University School of Medicine, the prizes are awarded to Minority Scholarship recipients in recognition of their achievements in the first and second year of the curriculum. The 2003 recipients: Nefertari Daaga and Cynthia E. Rogers.

Steven Dresler Prize. Awarded to a graduating student who has demonstrated a commitment to promoting social good, civil rights and civil liberties through social action and volunteerism. The 2003 recipient: Adit A. Ginde.

Dr. William Ellis Award. Established in 1990 by Dr. Ellis and awarded to a senior student in recognition of meritorious research in ophthalmology. The 2003 recipient: Mark Kim Walsh.

The Endocrine Society Medical Student Achievement Award. Recognizing a graduating medical student who has shown special achievement and interest in the general field of endocrinology. The 2003 recipient: Angel Kay Aumock.

The Family Health Foundation of Missouri Scholarship Award. Presented in recognition of academic achievement of a graduating medical

student entering the specialty of family practice. The 2003 recipient: Sarah Elizabeth Irving.

George F. Gill Prize in Pediatrics. Awarded to a member of the graduating class who has demonstrated superior scholarship in pediatrics. The 2003 recipient: Jessica Henderson Boyd.

Max and Evelyn Grand Prize. Established in 1985 by Dr. M. Gilbert Grand, the prize is awarded annually to a fourth-year medical student for excellence in ophthalmic research or clinical ophthalmology. The 2003 recipient: Raymond Wee.

R.R. Hannas Award for Excellence in Emergency Medicine. Offered annually by the Missouri Chapter of the American College of Emergency Physicians for exceptional performance in emergency medicine. The 2003 recipient: Avinash Shantagonda Patil.

Dr. John Esben Kirk Scholastic Award. Established in 1975 and awarded to a graduating student of high scholastic standing. The 2003 recipient: Delma Yemisi Jarrett.

Louis and Dorothy Kovitz Senior Prize in Surgery. Senior award in surgery recognizing a member of the graduating class who has shown the most outstanding ability, zeal and interest in surgical problems. The 2003 recipient: Kristen Ingrid Terrenzi.

I. Wallace Leibner Award. Established in 1988 in memory of Dr. Leibner, the award is given to the member of the graduating class who has demonstrated outstanding ability in the clinical practice of medicine. The 2003 recipient: Ashley Carter Flynn.

Irwin Levy Prize in Neurology and Neurological Surgery. Established in 1980 by friends of Dr. Levy as a tribute to his commitment to clinical teaching. Provides a prize for the student who presents the best performance in the neurology and neurological surgery clerkships. The 2003 recipients: Li Ern Chen and Amy S. Cheng.

Oliver H. Lowry Prize in Pharmacology. Awarded to a second-year medical student for academic excellence in pharmacology. The 2003 recipient: Sajan T. Mahajan.

Edward Massie Prize for Excellence in Cardiology. Awarded to the member of the graduating class, selected by the director of the Division of Cardiovascular Disease in the Department of Medicine, who has done the most outstanding clinical or basic research work in the field of cardiovascular disease. The 2003 recipient: Peter Edward Gabriel.

Howard A. McCordock Book Prize in Pathology. Awarded at the end of the second year to a member of that class for general excellence in pathology. The 2003 recipient: Matthew D. Council.

McGraw-Hill /Appleton & Lange Medical Student Book Award. Awarded annually to medical students for high scholastic standing. The 2003 recipients: Jonathan C. Baker, Matthew D. Council, and Justis P. Ehlers.

Medical Center Alumni Scholarship Fund Prize. Given annually to a student who has shown excellence in his or her work during the preceding year. The 2003 recipient: Geoffrey A. Kerchner.

Medical Fund Society Prizes. One prize awarded annually to a graduating student who has excelled in the study of internal medicine; one prize awarded annually to a student of the fourth-year class who has excelled in the study of surgery. No individual is eligible for both prizes. The 2003 recipients: Staci Alison Mesher and Andrea Chao.

Merck Manual Awards. Given to three graduating medical students for scholastic achievement in medical studies. The 2003 recipients: Joanna Ruth Fair, Ilya Iofin and Michele Wen Tang.

Missouri State Medical Association Award. Presented annually to honor graduates of the senior class. The 2003 recipients: Carrie Bess Daymont, Rachel Aileen Rich and Lance Atlas Roy.

Dr. Helen E. Nash Academic Achievement Award. Given annually to a student who has exhibited to an unusual degree the qualities of industry, perseverance, determination and enthusiasm. The prize is given in honor of Dr. Helen Nash, a pediatrician noted in the St. Louis community for her commitment to excellence, tireless advocacy on behalf of children and endless enthusiasm for the field of medicine. The 2003 recipient: Delma Y. Jarrett.

The Dr. Philip Needleman Pharmacology Prize. Established by his family in 1989 to honor Dr. Needleman, who was Chairman of the Department of Pharmacology from 1976-1989. This annual award is given to a member of the graduating class for outstanding research in pharmacology. The 2003 recipient: Girish Venkata Putcha.

James L. O'Leary Neuroscience Prize. Awarded annually to students who demonstrate the best accomplishments in the neuroscience course. The 2003 recipients: Ian G. Dorward, Virginia M. Pierce and Benjamin D. Womack.

Roy Peterson Award in Anatomy. Awarded for outstanding performance in the Gross Anatomy course in recognition of Dr. Peterson's many contributions as a teacher in the School of Medicine. The 2003 recipient: Benjamin D. Womack.

The Richard and Mildred Poletsky Education Fund. Established in 1995 by the family of Mr. Richard Poletsky, an alumnus of Washington University. A prize is awarded annually to a professional student in the health sciences whose interest is in research on dementia and care of demented patients.

Dr. Philip Rosenblatt Award in Pathology. Given to a medical student for distinguished performance during an elective in pathology or laboratory medicine. The 2003 recipient: Tracy Lynn McGregor.

St. Louis Pediatric Society Senior Prize. Presented to the senior student showing the greatest promise in clinical pediatrics. The 2003 recipient: Elizabeth Lee Somsel.

David F. Silbert Outstanding Teaching Assistant Award. Established in memory of Dr. David Silbert.

Awarded to a teaching assistant in a medical school course in recognition of his/her commitment to teaching. The 2003 recipient: Scott B. Lovitch.

John R. Smith Memorial Fund Award. Created in 1982, it is awarded to a medical student who has done meritorious clinical and/or research work in the Division of Cardiovascular Disease within the Department of Medicine. The 2003 recipient: John Fierros Canales.

Dr. Margaret G. Smith Award. Given to a woman medical student for outstanding achievement in the first two years of medical school. The 2003 recipients: Cara L. O'Brien and Kara E. Sternhell.

Society for Academic Emergency Medicine Excellence in Emergency Medicine Award. Based on demonstrated excellence in the specialty of emergency medicine, it is awarded to a senior medical student at Commencement. The 2003 recipient's: Adit Arun Ginde.

Samuel D. Soule Award in Obstetrics and Gynecology. Presented to a member of the third- or fourth-year class for meritorious achievement in either basic or clinical investigation in obstetrics and gynecology. The 2003 recipient: Erin Lee King.

Jessie L. Ternberg Award. Presented to a woman graduating from the School of Medicine who best exemplifies Dr. Ternberg's indomitable spirit of determination, perseverance and dedication to her patients. The 2003 recipient: Li Ern Chen.

Washington University Internal Medicine Club Research Award. Awarded to the member of the graduating class who has done the most significant research in any area of internal medicine. The 2003 recipient: Maryam Afkarian.

Washington University Summer Research Prize. The award recognizes a student for meritorious research in the Summer Research Fellowship Program at Washington University School of Medicine. The 2003 recipient: Nada M. Kawar.

Samson F. Wennerman Prize in Surgery. Donated by his wife, Zelda E. Wennerman, and awarded annually to the fourth-year student who has demonstrated promise in the field of surgery. The 2003 recipient: Victor Henry van Berkel.

Doris P. and Harry I. Wexler Fund. Established in 1998 by a bequest from Mrs. Wexler, the prize is awarded annually for research in multiple sclerosis and in alternate years research in eye disease.

Park J. White, M.D. Prize. Created in 1992 in honor of the centennial of the birth of Dr. White, who was a distinguished pediatrician, social activist and pioneer teacher of medical ethics. He introduced the first course on medical ethics to students in 1927. The prize is awarded to a student for outstanding performance in the ethics elective offered by the Program for the Humanities in Medicine. The 2003 recipient: Lukas Delbert Wartman.

Hugh M. Wilson Award in Radiology. Given annually to a graduating medical student in recognition of outstanding work in radiology-related subjects, either clinical or basic science. The 2003 recipient: Daniel Eric Hatfield.

The Wynder Prize in Preventive Medicine. An annual prize established in 1994 and awarded to senior medical students who have done the best research in preventive medicine. The 2003 recipients: Adit Arun Ginde and Jennifer Jill Heaton.

James Henry Yalem Prize in Dermatology. Established by Charles Yalem in memory of his son and awarded annually to a member of the fourth-year class for outstanding work in dermatology. The 2003 recipient: Amy S. Cheng.

THE WASHINGTON UNIVERSITY GRADUATE

Residency Training

Although not required by all states for licensure, postgraduate residency training in an approved hospital is considered essential preparation for the practice of medicine. Most Washington University graduates serve three or more years of residency training, and many will gain additional experience as postdoctoral fellows.

In order to aid students in obtaining desirable residency appointments, an active counseling program is maintained. Students in their first, second and third year can participate in career counseling workshops in which they are given very specific information about subspecialties. They are encouraged to look at their own interests, attributes and priorities and, with this information, begin to make decisions about the specialty best suited for them. In addition, small group conferences are held for students to meet with faculty members from a variety of the specialty divisions at Washington University in order to learn more about the fields that they are interested in.

During their third and fourth year, students interact closely with the Career Counseling Office, which provides them with individual counseling to help plan for the residency application process. Students receive general background information about the kinds of residencies available, special issues concerning certain extremely competitive residencies and help identifying faculty members for further assistance. The Career Counseling Office maintains a web site (*medicine.wustl.edu/~residenc*) where students can find information regarding 20 different residency specialities. As the number of residencies may gradually decrease to closely approximate the number of graduates applying, students must make their choices with considerable care. The School participates in the National Resident Matching Program, which offers distinct advantages to applicants.

Results of these efforts have been gratifying. The PGY-1 residencies selected in the most recent residency matching (2003) are identified in the Register of Students beginning on page 241.

The School maintains an active interest in its graduates and is pleased to assist them in subsequent years as they seek more advanced training or staff appointments in the communities in which they settle.

Postdoctoral Training

Those departments that offer postdoctoral fellowships individualize such educational activity up to a maximum of 36 months of academic time. Such fellowships lead integrally to certification by the appropriate specialty and/or subspecialty boards of the American Medical Association.

Fellowship And Other Funds

Alexander and Gertrude Berg Fellowship Fund. Created in 1952 through the bequest of Gertrude Berg to provide a fellowship in the Department of Molecular Microbiology.

Glover H. Copher Fellow in Surgical Research. Established in 1971 to support a postdoctoral fellow in surgery.

William H. Danforth Loan Fund for Interns and Residents in Surgery. Provides financial assistance in the form of loans for postdoctoral students in surgery.

Frederick Lee Hawes Fellowship in Congestive Heart Failure. Established in 1998 to provide a one-year fellowship in congestive heart failure.

Antonio Hernandez, Jr. Fellowship in Pediatric Cardiology. Established in 1987 as a memorial to Dr. Hernandez.

Leopold and Theresa Hofstatter Fellowship. Established in 2000 from the estate of Leopold and Theresa Hofstatter to be used to support fellowships in neurological research.

J. Albert Key Fellowship Fund. Provides a stipend for a fellow in orthopaedic surgery.

Louis and Dorothy Kovitz Fellowship Fund. Established in 1970 by an alumnus and his wife to provide support for research by qualified residents or students interested in surgery, at the discretion of the Head of the Department of Surgery.

Stephen I. Morse Fellowship. Established in 1980 by Carl and Belle Morse in memory of their son; awarded to predoctoral or postdoctoral students pursuing research careers in microbiology, immunology and infectious diseases.

William D. Owens Anesthesiology Research Fellowship. Established in 2000 in honor of William D. Owens, M.D. This fund will allow an individual to do a clinical or basic research fellowship for a two-year period.

Julio Santiago Fellowship. Established in 1998 in memory of Dr. Julio Santiago by the John Henry and Bernadine Foster Foundation to provide one year of advanced training for a Pediatric Metabolism/ Diabetes Fellow.

The Esther and Morton Wohlgemuth Foundation Fellowship. Established to support a fellow in the Division of Cardiovascular Diseases.

Continuing Medical Education

The study of medicine is a lifelong process with continuing medical education being an integral part of the continuum. Since 1973 the School of Medicine has supported this learning endeavor through the operation of the Continuing Medical Education Program. Continuing Medical Education's mission is to provide learning opportunities through periodic courses, regularly scheduled conferences, and enduring materials related to all areas of medical practice to local, national and international physicians and other health professionals that result in improved skills, attitude, competency and performance and increased knowledge in order to improve health care.

Pursuant to this mission the objectives of the continuing medical education program include the following:

- Enable the acquisition of new knowledge and skills through periodic courses, regularly scheduled conferences, and enduring materials for the delivery of quality patient care.
- Translate the results of research to clinical diagnosis and treatment for practicing physicians.
- Apply educational approaches in support of continuous quality improvement in health care delivery.
- Integrate clinical outcome measures for delivery of quality patient care into the educational process.
- Assist physician's adaptation to changing health care delivery environments.
- Support faculty development as postgraduate medical educators and leaders.

Each year more than 40 symposia and more than 120 recurring academic rounds and conferences as well as videos and monographs are provided with CME credit by this office. About 5,000 registrants attend these courses annually and receive more than 90,000 hours of instruction. The educational program is fully accredited by the Accreditation Council for Continuing Medical Education and provides credits to physicians seeking them for the Physician's Recognition Award of the American Medical Association, as well as various other types of state and specialty recertification and relicensure activities.

Medical Alumni and Development Programs

The Department of Medical Alumni and Development Programs works with individuals and organizations to secure the human and financial resources necessary to help the School of Medicine achieve and maintain excellence in research, teaching and patient care.

Washington University Medical Center Alumni Association

The Washington University Medical Center Alumni Association (WUMCAA) was organized more than 60 years ago to foster a continuing spirit of fellowship among graduates, and to maintain and enhance the tradition of excellence of the School of Medicine. Membership is provided to graduates and former house staff of the Medical Center.

The association complements the goals and purposes of the School of Medicine through a variety of programs for its members and current students. Involvement in these activities also provides the opportunity to continue the relationships begun as students and to develop rewarding professional associations.

Student-Alumni Programs

The Office of Medical Alumni and Development Programs and the Alumni Association assist students in a variety of ways. The Association makes a substantial financial commitment each year to support 16 Distinguished Alumni Scholars. These promising medical students receive full tuition, four-year scholarships in honor of great teachers and mentors who were also alumni of the School of Medicine. The Association also provides an activity fund for both the first- and second-year classes and sponsors a reception for the graduating class, their families and faculty. The academic societies also benefit from support by WUMCAA. These provide opportunities for faculty and student interaction in a collegial environment.

In addition, the Association provides financial support to a number of student-initiated community service activities, including a variety of health education programs in public schools and clinics.

Medical Alumni and Development coordinates an alumni resource bank that arranges more formal contacts between alumni and students. Alumni volunteers host students who wish to spend time with a practicing physician, provide information to help students choose a specialty, serve as preceptors for clerkships and electives, and provide overnight lodging to fourth-year students going on residency interviews.

Reunions and Other Events

The Annual Reunion is held in May for medical classes who return at five-year intervals, beginning with the class observing its 10th year following graduation and continuing through the class celebrating its 60th reunion. The reunion schedule includes a scientific program, social events, tours of the Medical Center and the presentation of Alumni/Faculty, Alumni Achievement and Distinguished Service awards. Award recipients are chosen on the basis of personal accomplishment, professional achievement and/or service to the School of Medicine. Members of the graduating class are special guests at the awards banquet and are officially welcomed into Association membership.

The Alumni Office sponsors special alumni activities in selected cities across the United States. Volunteers from each area assist in sponsoring these events, which help alumni to stay abreast of the educational and research activities at the School of Medicine. The Alumni Office also compiles class newsletters for selected classes, including recent graduates and those in the "Diamond+" years (all those classes who have celebrated their 60th reunion).

Alumni Support

Supporting their school generously is a tradition for a large percentage of alumni of the medical school and the affiliated health programs. Each year alumni and friends are solicited for gifts to the Annual Fund, which supports the School's departments, divisions and health care professional programs, as well as scholarships and low-interest loan programs for students. Alumni also designate gifts for special purposes within the School, including specific research, education and training programs.

In 1977, School of Medicine members of the Eliot Society created the Alumni Endowed Professorship Program, through which gifts are used to establish an Alumni Endowed Chair in the School's departments. Eight such chairs have been created thus far.

STANDARDS, POLICIES, STUDENT CONSTITUTION AND BYLAWS

Washington University Policy on Sexual Harassment

I. INTRODUCTION AND POLICY STATEMENT

Washington University is committed to having a positive learning and working environment for its students, faculty, and staff and will not tolerate sexual harassment.

Sexual harassment is an attack on the dignity of individuals and the integrity of the University as an institution of learning. Academic freedom can exist only when every person is free to pursue ideas in a non-threatening, non-coercive atmosphere of mutual respect. Sexual harassment is reprehensible and threatening to the careers, educational experience, and well-being of all members of our community.

Sexual harassment is a form of discrimination that violates University policy. It is also illegal under state and federal law.

This Policy applies to all members of the Washington University community. It allocates responsibilities for helping to ensure that University policy is fairly applied, explains the processes by which complaints of sexual harassment may be brought forward, and provides sanctions for sexual

harassment, which may range from reprimands to termination or dismissal, depending on the severity of the offense. If you believe you have been sexually harassed, Sections IV and V describe options about what you can do and where you can get help. If you believe you have been falsely accused of sexual harassment, the procedures set out below are also available to you. Those charged with implementation of this Policy will, whenever appropriate, encourage and assist those who believe they may have been sexually harassed to pursue the assorted informal means outlined in Section IV below for securing the cessation of unwelcome and offensive conduct.

II. WHAT IS SEXUAL HARASSMENT?

For the purposes of this statement, Washington University has adapted the Equal Employment Opportunity Commission (EEOC) definition of sexual harassment for an academic community: Sexual harassment is defined as any unwelcome sexual advance, request for sexual favor, or other unwelcome verbal or physical conduct of a sexual nature, whether committed on or off campus, when

(1) submission to such conduct is made, either explicitly or implicitly, a term or condition of an individual's employment or academic advancement;

(2) submission to or rejection of such conduct by an individual is used as the basis, or threatened to be used as the basis, for employment or academic decisions or assessments affecting an individual; or

(3) such conduct has the purpose or effect of unreasonably interfering with an individual's work or educational performance or creating an intimidating or hostile environment for work or learning. Such conduct will typically be directed against a particular individual or individuals and will either be abusive or severely humiliating, or will persist despite the objection of the person targeted by the speech or conduct.

Sexual harassment includes but is not limited to situations where one person has authority over another. In such situations, sexual harassment is particularly serious because it may unfairly exploit the power inherent in a faculty member's or supervisor's position.

Sexual harassment can be verbal, visual, physical, or communicated in writing or electronically. Some conduct obviously constitutes sexual harassment — such as a threat that a grade or promotion will depend on submission to sexual advance. But whether particular conduct constitutes sexual harassment will often depend on the specific context of the situation, including the participants' reasonable understanding of the situation, their past dealings with each other, the nature of their professional relationship (*e.g.*, supervisor-subordinate, colleague, etc.), and the specific setting. The inquiry can be particularly complex in an academic community, where the free and open exchange of ideas and viewpoints preserved by the concept of academic freedom may sometimes prove distasteful, disturbing or offensive to some.

Examples of conduct which may constitute sexual harassment include but are not limited to:

- requests for sexual favors
- hugging, rubbing, touching, patting, pinching, or brushing another's body
- inappropriate whistling or staring
- veiled suggestions of sexual activities
- requests for private meetings outside of class or business hours for other than legitimate mentoring purposes
- use in the classroom of sexual jokes, stories, or images in no way germane to the subject of the class
- remarks about a person's body or sexual relationships, activities or experience
- use of inappropriate body images to advertise events

Members of the University community can expect to be free from sexual harassment, and thus all members of the University community should guard against it. The fact that someone did not intend to sexually harass an individual is generally not considered a sufficient defense to a complaint of sexual harassment, although the reasonableness of the accused's perceptions may be considered. In most cases, it is the effect and characteristics of the behavior on the complainant and whether a reasonable person similarly situated would find the conduct offensive that determine whether the behavior constitutes sexual harassment.

III. CONFIDENTIALITY

The University will strive to protect, to the greatest extent possible, the confidentiality of persons reporting harassment and of those accused of harassment. Because the University has an obligation to address sexual harassment, however, the University cannot guarantee complete confidentiality where it would conflict with the University's obligation to investigate meaningfully or, where warranted, take corrective action. Even when some disclosure of the University's information or sources is necessary, it will be limited to the extent possible. The University will, to the extent permitted by law, keep confidential all records of complaints, responses and investi-

gations. The records maintained by the Sexual Harassment Response Coordinator shall be available only to the Coordinator and, to the extent necessary, to administrators and other supervisors charged with responding to allegations of harassment. Allegations of sexual harassment shall not be placed in student records or personnel files unless, after appropriate investigation, such allegations have been sustained. Records maintained by the Coordinator of allegations which do not lead to formal hearings or personnel actions will be discarded after five years unless there are additional, more recent complaints against the same person.

If you want to discuss possible harassment in a more confidential setting or clarify your feelings about whether and how you wish to proceed, you may want to consult a social worker, therapist, or member of the clergy, who is permitted, by law, to assure greater confidentiality. Clergy and counseling resources on campus are listed in *Bearings, Ternion,* and *Safety and Security on the Hilltop Campus.* In addition, any member of the University community may contact the Student Counseling Services at 935-5980 for a confidential discussion and, if desired, referral to off-campus resources.

IV. SEEKING ADVICE; MAKING A COMPLAINT

If you believe that you have been sexually harassed, you have a number of response options, both formal and informal. Some people may wish to pursue informal means instead of or before making a formal complaint; others will not. If an informal procedure is ineffective, the formal procedures will remain open to you. You should select the route you feel most appropriate for your circumstances. However you wish to proceed, you may consult at any time with the Hilltop or Medical Center Sexual Harassment Response Coordinator (listed in the Appendix), whose responsibilities include assisting students, faculty and staff with sexual harassment issues, be they general or specific, formal or informal. You may wish to work with the Coordinator to select an approach.

A. Informal Procedures

1. If you feel comfortable dealing with the situation without assistance, you can:

   a. Clearly say "no" to the person whose behavior is unwelcome.

   b. Communicate either orally or in writing with the person whose behavior is unwelcome. The most useful communication will have three parts:

      (1) A factual description of the incident(s) including date, time, place and specific action.

      (2) A description of the writer's feelings, including any consequences of the incident.

      (3) A request that the conduct cease.

   Frequently such a communication will cause the unwelcome behavior to stop, particularly where the person may not be aware that the conduct is unwelcome or offensive.

2. If you would like to proceed informally, but with the assistance of someone else, you can:

   a. Ask the person's supervisor, *e.g.*, department chair, dean, director, housing office representative, academic advisor, or resident advisor, to speak to the person whose behavior was unwelcome. The purpose of such conversations is the cessation of unwelcome behavior.

   b. Consult with the Coordinator or one of the Sexual Harassment Response Advisors listed in the Appendix and specifically charged with responding to sexual harassment inquiries and complaints.

   These individuals are thoroughly familiar with University policy on sexual harassment and are available to consult with victims of sexual harassment, those charged with sexual harassment, witnesses, and supervisors of parties to a complaint. They can provide information about informal actions that might remedy the situation and discuss University policy on sexual harassment and procedures for resolving complaints.

   c. Ask the Coordinator to mediate or arrange for mediation. Mediation is discussion and negotiation, with the help of a third party, designed to permit the parties to reach a mutually agreeable resolution of a dispute. If a person complaining of sexual harassment seeks mediation, the person accused of harassment agrees, and the Coordinator concludes that mediation would be consistent with the University's legal obligations in responding to and preventing sexual harassment, the Coordinator may mediate or arrange for mediation.

B. Formal Procedures

Whether or not you have attempted to resolve a sexual harassment claim through informal means, you may initiate a formal sexual harassment grievance proceeding by filing a written complaint. This process may lead to a formal hearing at which evidence will be considered and witnesses heard. If this is the course you wish to take, the Coordinator can assist you in filing a complaint.

Complaints, prepared with or without the assistance of the Coordinator, can be filed with the following Committees, with a copy to the Coordinator for your campus:

Complaints against faculty or staff:

Faculty and Administrative Affirmative Action Committee
(complaints by faculty and administrators)

Title IX Grievance Committee
(complaints by students)

Human Resources Advisory Committee
(complaints by staff)

All of these committees may be contacted
c/o Office of Human Resources
North Brookings Hall, Room 126
Campus Box 1184
935-5990

Hearing procedures are set out in the Washington University Discrimination and Sexual Harassment Hearing Procedures. These procedures may be obtained from the Office of Human Resources or from any of the Sexual Harassment Response Coordinators or Advisors.

Complaints against students or student groups:

Office of the Judicial Administrator
Women's Building, Room B27
Campus Box 1136
935-4062

Hearing procedures are set out in the University Judicial Code, found in *Bearings* and *Washington University Faculty Information*. These procedures may also be obtained from the University Judicial Administrator or from the Sexual Harassment Response Coordinator or Advisors.

Whether or not you choose to file a formal complaint, the University may be required, or may otherwise deem it necessary and protective of the academic community, to commence its own investigation.

V. PROTECTION OF RIGHTS

The University will not tolerate retaliation or discrimination against persons who report or charge sexual harassment or against those who testify, assist, or participate in any investigation, proceeding, or hearing involving a complaint of sexual harassment. In this context, retaliation means speech or conduct that adversely affects another's terms or conditions of employment or education and is motivated by an intent to harm the targeted person because of his or her participation in the filing or investigation of an allegation of sexual harassment. Any such retaliation — or any encouragement of another to retaliate — is a serious violation of University policy and law, independent of whether the particular claim of sexual harassment is substantiated. If you believe you have been subjected to retaliation in violation of this rule, you may use the procedures described above to complain and seek redress.

The University seeks to protect the rights of all persons, accusers and accused, to fair procedures. Accusations of sexual harassment typically have injurious and far-reaching effects on the careers and lives of accused individuals. Allegations of sexual harassment must be made in good faith and not out of malice. Knowingly making a false or frivolous allegation of sexual harassment, whether in a formal or informal context, will be treated as a serious offense under this policy and, where it applies, the University Judicial Code. If you believe you have been falsely accused of sexual harassment you may use the procedures of this policy or the University Judicial Code, where applicable, to seek redress. See Section IV, above.

VI. OBLIGATIONS OF VIGILANCE AND REPORTING

The University can respond to specific instances and allegations of harassment only if it is aware of them. The University therefore encourages anyone who believes that he or she has experienced sexual harassment to come forward *promptly* with inquiries, reports or complaints and to seek assistance from the University. In addition, any University employee who becomes aware of instances or allegations of sexual harassment by or against a person under his or her supervisory authority must report it to those charged with responding to such allegations and reports: the appropriate dean, director or department head or other similar administrator or to the Sexual Harassment Response Coordinator or one of the Advisors. It shall be the responsibility of these individuals to respond to allegations and reports of sexual harassment or refer them to other University officials for such response.

Any dean, director or department head, or other similar administrator who becomes aware of information indicating a significant likelihood of sexual harassment must report such information to the Sexual Harassment Response Coordinator for the appropriate campus. These administrators must respond not only when they receive a specific complaint or report alleging improper activity, but also when such matters come to their attention informally. Unconfirmed or disputed allegations should be clearly labelled as such and reports should indicate any steps already taken to investigate or otherwise respond. Administrators may wish to consult with the Coordinator or any of the Advisors prior to investigating or otherwise responding to any situation involving alleged harassment.

VII. POSSIBLE SANCTIONS

Possible sanctions for a person found guilty of behavior in violation of this policy include but are not limited to the following:

- oral or written reprimand, placed in personnel file
- required attendance at a sexual harassment sensitivity program
- an apology to the victim
- oral or written warning
- loss of salary or benefit, such as sabbatical or research or travel funding
- transfer or change of job, class or residential assignment or location (*i.e.*, removing the person from being in a position to retaliate or further harass the victim)
- fine
- demotion
- suspension, probation, termination, dismissal or expulsion

While counseling is not considered a sanction, it may be offered or required in combination with sanctions. Where alcohol is involved in the sexual harassment, such counseling may include an alcohol abuse program.

If students or student groups are guilty of sexual harassment any of the sanctions set forth in the University Judicial Code may also be invoked.

VIII. EDUCATION

The best way to deal with sexual harassment is to prevent it. Education is essential to eliminating sexual harassment. Washington University has developed an ongoing training program. Please call a Sexual Harassment Response Coordinator or Advisor to find out more about these programs, what sexual harassment is, how to respond to it, and what to do when someone asks for advice about sexual harassment.

Appendix: Sexual Harassment Coordinators and Advisors *(as of June 30, 2001)*

Hilltop Campus

Coordinator: Ann Prenatt, 935-8046

Advisors: Kathy Steiner-Lang (complaints by students and others), 935-5910;
To be named (complaints by faculty and others);
Pamela Lokken (complaints by staff and others), 935-5752

Medical Campus

Coordinator: Barbara Cant, 362-4900

Advisors: Leslie Kahl (complaints by students and others), 362-7481;
Apryle Cotton (complaints by faculty, staff and others), 362-7198

Please Note: Other Advisors will be appointed, including men. All appointments are subject to change.

Washington University School of Medicine Policy Against Abusive Conduct

I. POLICY STATEMENT

Washington University School of Medicine (WUSM) is committed to having a positive learning and working environment for its students, faculty, and staff. All individuals have the right to enjoy an environment free from all forms of conduct that can be considered harassing, threatening or intimidating. In addition, academic freedom can exist only when every person is free to pursue ideas in a non-threatening atmosphere of mutual respect. WUSM is committed to protecting the academic freedom and freedom of expression of all members of the school community and this policy against abusive conduct will be applied in a manner that protects those freedoms. Abusive conduct is reprehensible and threatening to the careers, educational experience, and well being of all members of our community and will not be tolerated. This policy applies to all students, faculty and staff and is in addition to the Washington University Policy on Sexual Harassment.

II. WHAT IS ABUSIVE CONDUCT?

Abusive conduct is behavior that creates an intimidating environment and is likely to interfere with an individual's work or education. This conduct can be verbal, visual, physical, or communicated in writing or electronically. Such conduct is typically directed against a particular individual or individuals. It includes, but is not limited to, situations where one person has authority over another. In such situations abusive conduct is particularly serious because it may unfairly exploit the power inherent in a faculty member's or supervisor's position.

Examples of conduct that may be considered abusive include but are not limited to:

- Threatening or intimidating behavior or words (written or oral)
- Obscenities/profanities (verbal or gestures) directed at a person
- Threatening or obscene gestures, jokes or cartoons
- Degrading a person or a group on the basis of a personal or cultural characteristic

- Taunting, jeering, mocking or humiliating another person through acts or words
- Screaming and/or yelling at or around others
- Insulting someone, especially in the presence of others
- Endangering the safety of an individual or individuals

In considering a complaint under this policy, the following understandings shall apply:

1. Abusive conduct must be distinguished from behavior which, even though unpleasant or disconcerting, is appropriate to the carrying out of certain instructional, advisory, or supervisory responsibilities. In the context of patient care clear and direct communication may be necessary in order to deliver safe, effective, appropriate and timely clinical treatment.
2. Instructional responsibilities require appropriate latitude for pedagogical decisions concerning the topics discussed and methods used to draw students into discussion and full participation.

The fact that someone did not intend to be abusive is generally not considered a sufficient defense to a complaint, although the reasonableness of the accuser's perceptions may be considered. In most cases, it is the characteristics and the effect of the behavior on the complainant and whether a reasonable person would find the conduct abusive that determines whether the behavior was abusive.

III. REPORTING ABUSIVE CONDUCT

The Medical School can respond to specific instances and allegations of abusive conduct only if it is aware of them and therefore encourages anyone who believes that he or she has experienced abusive conduct to come forward promptly with inquiries, reports, or complaints and to seek assistance. In addition, any faculty member, manager, or employee who becomes aware of instances or allegations of abusive conduct, by or against a person under his or her supervisory authority, is required to report it to the appropriate dean, director, department head or other similar administrator or to the Human Resources Department. Once a complaint is received, it is the responsibility of the dean, director, department head or similar administrator to respond to the allegations and reports of abusive conduct and take corrective action, if appropriate, or to work with Human Resources to develop such a response and corrective action, if appropriate. All complaints and their resolution must be reported to Human Resources.

IV. PROTECTION OF RIGHTS

1. Retaliation means conduct that adversely affects another's terms or conditions of employment or education and has the effect of harming a person for filing a complaint or for participating in the investigation. Retaliation can take many forms. Examples include but are not limited to:

- Reassignment of work duties without good reason
- Loss of job benefits (*i.e.,* travel)
- Loss of salary
- Termination
- Threats

Against the Complainant: It is a violation of this policy to retaliate against persons who report or make a charge of abusive conduct or against those who testify, assist, or participate in any investigation involving a complaint. Any such retaliation — or any encouragement of another to retaliate — is a violation of this policy, independent of whether the particular claim is substantiated.

Against the Respondent: Lodging a complaint is not proof of prohibited conduct. A complaint shall not be taken into account during reappointment, tenure, promotion, merit, or other evaluation or review until a final determination has been made that the policy has been violated.

2. Knowingly False or Malicious Complaints: Accusations of abusive conduct typically have injurious and far-reaching effects on the careers and lives of accused individuals. Therefore allegations must be made in good faith and not out of malice. Knowingly making a false or frivolous allegation will not be tolerated and will subject the person making such a report to disciplinary action.

V. POSSIBLE SANCTIONS

Possible sanctions for a person found to exhibit abusive conduct include but are not limited to the following:

In many situations, the following examples of sanctions may be sufficient

- oral or written reprimand
- required attendance at a sensitivity program
- apology to the victim
- oral or written warning

In certain situations, the following sanctions may also need to be considered.

- loss of salary or benefit, such as sabbatical or research or travel funding
- loss of non-salary benefits (*i.e.*, travel funding)
- demotion
- suspension, probation, termination

While counseling is not considered a sanction, it may be offered or required in combination with sanctions.

Washington University School of Medicine Guidelines for Professional Conduct in Teacher/ Learner Relationships

I. GOALS OF POLICY

1. To define standards of conduct among all members of the Washington University Medical Center community generally, and specifically within the teacher/learner relationship.
2. To specify a procedure for reporting potential student mistreatment or abuse.
3. To create an administrative mechanism for handling alleged incidents of mistreatment or abuse.
4. To develop a monitoring system to identify individuals or departments whose abusive behavior persists despite intervention.

II. PREAMBLE

The goal of the Washington University Medical Center is to provide patient care, medical education, and biomedical research of the highest quality. Accomplishing this goal depends in part on an atmosphere of mutual respect and collegiality among all those who work here. Disrespectful or abusive conduct of any kind at the Medical Center will not be tolerated. To this end, the School's Committee on the Professional Treatment of Medical Students endorses the Professional Service Commitments outlined by Washington University School of Medicine, as well the standards put forth by the Barnes-Jewish Hospital BJH Cares campaign. These documents address the broad issues of respectful behavior among all members of our Medical Center community. The current document focuses instead on the special issues presented by the teacher/ learner relationship, and applies to all years of the medical school curriculum.

Our students are exceptionally talented individuals, dedicated to becoming outstanding physicians, who have selected this medical school for their training. Effective learning is possible only in an environment where students can trust their teachers to treat them fairly and with respect. The teacher may be a faculty member, resident, student, or other member of the health care team. One manner in which the teacher/learner relationship is unique is that students are vulnerable, depending on many of their teachers for evaluations and recommendations. In addition, medical education includes mastering not just pathophysiology but also the essentials of professional behavior. Students learn professional behavior primarily by observing the actions of their teacher role models. Unprofessional, disrespectful or abusive behavior by teachers is antithetical to standards of professional conduct that medical students are expected to master. These behaviors by teachers may also be self-perpetuating, as students come to believe that such behavior is appropriate when they assume the role of teacher.

III. RESPONSIBILITIES OF TEACHERS AND LEARNERS

The teacher-learner relationship confers rights and responsibilities on both parties. Behaving in ways that embody the ideal student-teacher relationship fosters respectful behavior, minimizes the likelihood of student mistreatment or abuse, and optimizes the educational experience for students.

A. Responsibilities of Teachers

- Be prepared and on time.
- Provide learners with most current materials.
- Treat students fairly, respectfully, and without bias related to their age, race, gender, sexual orientation, disability, religion or national origin.
- Give students timely, constructive and accurate feedback.
- Distinguish between the Socratic method, where insightful questions are a stimulus to learning and discovery, and over-aggressive questioning, where detailed questions are repeatedly presented with the endpoint of embarrassment or humiliation of the student.

B. Responsibilities of Learners

In all settings:

- Be courteous and respectful of teachers and fellow students regardless of their age, race, gender, sexual orientation, disability, religion or national origin.
- Treat fellow students as colleagues, not competitors.
- Take responsibility for maximizing your educational experience by addressing conflicts

and discomforts which may impede your learning.

- Be an enthusiastic learner.
- Be trustworthy and honest.
- Know your limitations and ask for help when needed.

In the clinical setting:

- Put the patients' welfare first.
- Know what's going on with your patients.
- Take the initiative to educate yourself about their illness.
- Put patient welfare ahead of your educational needs.
- Treat all patients and members of the health care team respectfully, regardless of their age, race, gender, sexual orientation, disability, religion or national origin.
- Be compassionate.
- Respect patients' privacy.

IV. UNPROFESSIONAL AND ABUSIVE BEHAVIORS

The responsibilities of teachers and students listed above constitute examples of respectful and professional behaviors. These should be our standards. Some behaviors which fall outside of these guidelines are clearly abusive. More commonly, however, they represent poor judgment, unprofessional behavior or mistreatment. Determining whether a given behavior constitutes abuse or unprofessional behavior is often a matter of perception. It involves a subjective assessment of the intentions of the doer and how the behavior in question was perceived by the recipient. The behaviors listed below in Section A are clearly abusive. Students who feel they may have been abused should discuss the incident or behavior in question with the individuals listed in Section V of this policy. Other disrespectful or unprofessional behaviors, such as (but not limited to) those noted in Section B, may also disrupt the student's educational experience. Students who feel they have been treated in this manner may also discuss the incident or behavior with other students, faculty members or residents, coursemasters, or the individuals listed in Section V of this policy. Students are encouraged to take responsibility for addressing issues which may be detrimental to their educational experience.

A. What is Clearly Student Abuse

1. Unwanted physical contact (such as hitting, slapping, kicking, pushing) or threats of same.
2. Sexual harassment (see the institution's policy on sexual harassment on the medical school web page, *www.medicine.wustl.edu*).
3. Discrimination based on age, race, gender, sexual orientation, disability, religion or national origin.
4. Requiring students to perform personal chores (*i.e.,* running errands, babysitting, etc).

B. Disrespectful or Unprofessional Behavior (This list is not intended to be all-inclusive, but to provide examples of inappropriate behaviors.)

1. Repeated questioning of a student with the primary intent to humiliate or embarrass.
2. Grading based on factors other than performance or merit.
3. Coercing students to do something they find morally objectionable.
4. Public humiliation.
5. Requiring excessive menial, noneducational chores. Work related to the care of patients contributes to the efficient functioning of the team, but must be balanced with educational opportunities.

V. WHAT TO DO IF YOU BELIEVE THAT YOU HAVE BEEN ABUSED OR MISTREATED

First, carefully examine the circumstances of the incident or incidents which occurred. Discuss the event with someone else who witnessed it, or with another student or individual whose judgment you trust. Do they come under the behaviors listed in Section A above? If so, meet with your coursemaster and describe what happened. If the coursemaster takes action to settle the complaint, he/she will submit a written report of these actions to the Associate Dean for Medical Student Education. If you are not satisfied with your interaction with the coursemaster, or do not feel comfortable approaching him/her, meet with the Associate Dean for Medical Student Education. The Associate Dean will follow the procedure listed below.

If you determine that you have been treated disrespectfully or in an unprofessional manner, but have not been abused as described in Section A above, it may still be appropriate to pursue your complaint. You may do this by directly approaching the person whom you feel mistreated you, or by seeking assistance from another student, faculty member, resident, the coursemaster, or the Associate Dean for Medical Student Education. The goal of this process is to foster your educational experience by minimizing behaviors which detract from it.

The University will keep confidential all records of complaints, responses and investigations, to the extent permitted by law. Please refer to the University's policy on sexual harassment, posted on the School's web page at *medicine.wustl.edu/students/policies.htm* for details regarding confidentiality.

VI. PROCEDURE FOR HANDLING COMPLAINTS OF STUDENT ABUSE

The Associate Dean for Medical Student Education will be responsible for hearing complaints of student abuse (as described under Section A above) which are not settled at the coursemaster level. (Complaints settled by the coursemaster will also be relayed to the Associate Dean in writing.) He/she will be responsible for reviewing the complaint and obtaining additional information. If the initial review discloses that the complaint warrants further review, he/she will convene an ad hoc committee to hold a hearing. The accused will be notified in writing of the complaint and the policy for handling such complaints, and will be invited to attend the hearing. A confidential copy of the notification will be sent to the accused's department chair (for faculty and residents), training program director (for residents), or the Associate Dean for Student Affairs (for students).

If, however, the initial review discloses that the complaint has no merit, the Associate Dean for Medical Student Education will dismiss it. The student will be notified and may appeal to the Associate Dean for Student Affairs, who will convene an ad hoc committee to address the complaint.

The ad hoc committee will meet to review the facts of the complaint, and may receive written or oral testimony. All materials will be held confidential by the committee. The accused may attend the hearing, and will be provided the opportunity to rebut the complaint. The chair of the ad hoc committee will submit a written report of the committee's findings to the Associate Dean for Medical Student Education. The Associate Dean will notify the accused and the student in writing of the findings. The department chair, program director or Associate Dean for Student Affairs will also be notified (see above), and will be responsible for determining disciplinary actions, which will not be disclosed to the accusing student. The Associate Dean for Medical Student Education will be notified in writing of any disciplinary action taken. Record of the proceedings will be kept by the Associate Dean for Medical Student Education. All complaints of student abuse brought to the Associate Dean will be cross-checked to determine if the accused has been cited previously.

VII. APPEALS PROCESS

If the accused is a faculty member and wants to appeal the decision of the ad hoc committee or the disciplinary action of the supervisor, a written appeal may be submitted to the University's Committee on Faculty Rights, which will follow its policy for review. If the accused is a resident physician, a written appeal may be submitted to the Associate Dean for Graduate Medical Education.

If the accused is a student, a written appeal may be submitted to the Dean of the School of Medicine. The Dean or his designate will conduct an appeal review by examining the proceedings of the ad hoc committee as well as any new facts the accused student offers for consideration. The Dean or designate will notify the accused student in writing of his decision. There will be no further appeal.

Washington University School of Medicine Policy for Students with Disabilities

It is the goal of Washington University to assist students with disabilities in removing the barriers their disability may pose and provide support in facing the challenge of pursuing an education at Washington University.

Washington University recognizes and accepts its professional, legal and moral responsibility to avoid discrimination in the acceptance and education of qualified students with disabilities and to provide reasonable accommodations to such students consistent with the principles embodied in the law. These guidelines apply to students seeking admittance as well as to those who become disabled while they are enrolled.

Washington University makes every effort to ensure that all qualified applicants and students can participate in and take full advantage of all programs and opportunities offered within the University. Washington University encourages and gives full consideration to all applicants for admission. Washington University does not discriminate in access to its programs and activities on the basis of age, sex, sexual orientation, race, disability, religion, color or national origin.

All students in educational programs at the School of Medicine, those seeking admittance, as well as those who become disabled while they are enrolled, must possess those intellectual, ethical, physical and emotional capabilities required to undertake the full curriculum and to achieve the levels of competence required by the faculty and the profession.

In this regard, we will be guided by the principles outlined below.

A. Responsibilities of the Student

1. Disclosure of Disability

It is the responsibility of a student who has a disability to disclose it and request accommodation from the Dean for Student Affairs or Program Director. The School encourages students with disabilities to identify themselves as early as possible in order to optimize the mobilization of resources and available accommodations.

2. Diagnosis of Disability

Students who are in academic difficulty that might be a consequence of a disability are encouraged to avail themselves of diagnostic services that may lead to accommodations. Furthermore, such students are encouraged to explore with the administration of their academic unit the possibility of a disability if the inquiry is relevant to educational performance

and there is evidence of educational performance problems.

3. Documentation of Disability and Request for Accommodation

The disability, its functional impact and requested accommodation(s) must be documented. If the student discloses a disability and requests accommodation, the School requires documentation of the disability from a qualified professional. The student is financially responsible, unless there are extraordinary and compelling circumstances, for the costs related to the documentation by an appropriately educated and trained professional. The information provided by the professional must be factual, objective and technically valid, and must establish clearly that the disability substantially limits one or more of the student's major life activities. The professional(s) who evaluate the student should identify options for management of the disability. Based on this information, the affected student then should request in writing the accommodations which he or she requests be made. The Dean for Student Affairs or Program Director and the student should work together to arrive at reasonable accommodations. The School may also require a second expert opinion for which the School may be financially responsible under extraordinary and compelling circumstances. The School reserves the right to request as much detailed information from the student and/or the professional(s) as is necessary to assess the scope of the disability and/or the reasonable accommodations.

B. Responsibilities of the School

1. Review of Requests for Accommodation

Requests for accommodations will usually be reviewed by the Dean for Student Affairs or Program Director. An ad hoc assessment team may be convened which may include the Dean for Student Affairs, the educational Program Director (or curriculum supervisor), selected members of the Disabilities Oversight Committee (See Section B.5 below) and other consultants as appropriate to the individual circumstances. The assessment team usually should include (1) individuals who understand the curriculum in question; (2) a person who is knowledgeable about the Americans with Disabilities Act; (3) a person with authority to authorize accommodations and cause them to be implemented.

2. Responsibilities for Accommodation

The School of Medicine is responsible for the costs incurred in making accommodations which are not unduly burdensome or unreasonable. Accommodations may include but may not be limited to academic modifications which do not fundamentally alter the nature of the program, auxiliary services, modifications of the circumstances and methods of qualification examinations, classroom modifications and others. The School's responsibility to accommodate ends when a student with a disability (1) refuses reasonable accommodations; (2) is unable, with reasonable accommodations, to fulfill the essential requirements of the program; (3) fulfills the essential requirements and graduates; or (4) transfers to another institution. The School is not required to provide an accommodation which fundamentally alters the nature of the program, is unduly burdensome or is unreasonable.

3. Confidentiality

Information pertaining to a student's disability and accommodations will be maintained in a file that is kept confidential and separate from the student's academic record. Appropriate faculty, staff and administrators may be informed regarding the disability, limitations, restrictions and accommodations when they have a need to know such information.

4. Application of CAES Policies

The policies and procedures of the School regarding promotion and retention are contained in the CAES Policies for each academic unit. These policies and procedures govern the relationship between the School and all students, including those with disabilities. The School is not obligated to retain a student with a disability who poses a significant threat to the health or safety of others when there is no reasonable accommodation that either eliminates or sufficiently reduces that risk.

5. Disabilities Oversight Committee

There shall exist a standing Disabilities Oversight Committee composed of members designated by the Dean of the School of Medicine. The committee shall have the following responsibilities: periodic review of requests for accommodations and accommodations granted, provide recommendations regarding accommodations for disabilities, to serve as requested on disability appeals committee. This group serves as a resource regarding issues of significance to the institution and to students with disabilities.

C. Appeals

A student with a disability who believes that a request for accommodation has been improperly denied or who perceives that he or she has been discriminated against on the basis of a disability should direct his or her appeal to the Dean of the School of Medicine. As needed, the Dean of the School of Medicine may assemble an advisory group to review appeals and make recommendations. This group may include, but may not be limited to, the following: the chair of the committee that oversees academic evaluation and advancement of students for the particular academic unit, students, and/or representatives of the Disabilities Oversight Committee.

Student Constitution and Bylaws of the Washington University School of Medicine Medical Student Government

Article I:

Name, Purpose, and Membership

A. The name of this organization shall be the Medical Student Government of The Washington University School of Medicine.

B. The purpose of the Medical Student Government shall be the advancement of student interests and welfare to achieve excellence in academic pursuits and professional interactions.

C. The Medical Student Government shall represent all students pursuing a medical degree who are in good standing with the University.

Article II:

Class Officers

A. Offices: Each Class shall elect the following officers: President, Medical Education Representative (MER), Representative to the Organization of Student Representatives (OSR Rep) of the Association of American Medical Colleges (AAMC), Representative to the Graduate-Professional Council (GPC Rep), and a Social Chair/Committee.

B. Duties: Each class officer shall have specific responsibilities:

1. President: Each class shall elect one President. This person shall serve as the official spokesperson for the class in dealings with the Student Government and with the University. The President shall disseminate information regarding medical student affairs and activities. The President shall have oversight and approve of all moneys spent by the Social Chair/Committee. The President shall perform any and all duties that are unique to the class represented.
2. MER: The MER shall represent the class at all meetings of the MERs and Curriculum Evaluation Committee and serve as a liaison between students and faculty on curricular matters. The MER shall poll the class as needed regarding course evaluations and selection of recipients for the various Faculty Awards presented each year.
3. OSR Rep: The OSR Rep shall keep class members up to date with news from the OSR and from the AAMC. The OSR Rep shall represent the University at regional and national meetings of the OSR under an agreement with the University.
4. GPC Rep: The GPC representatives shall represent the School of Medicine at GPC meetings and shall inform the GPC of issues affecting the School of Medicine, learn about issues affecting other schools, discuss and find solutions to problems affecting the whole graduate and professional student population, and plan and advertise social activities that foster communication between all graduate and professional students. The Reps shall be the liaison to the other programs within the School of Medicine, as well as to the rest of the University community. In addition, the four Reps will divide the responsibilities of serving on the Professional and Graduate Students Coordinating Committee (ProGrads), the Medical Campus Committee (temporarily named), and other inter-school/division committees as needed.
5. Social Chair/Committee: The Social Chair/Committee shall organize social functions for class members and interact with other Social Chairs/Committees to organize social functions with other classes and within the University community. The Social Chair/Committee shall consult and obtain approval from the class President for all moneys spent on such functions.

C. Elections: An Election Official designated by the Student Government shall be responsible for the organization and execution of all elections held for offices specified under the Constitution, including President, MER, OSR, and GPC. Elections shall be held for each of the class officer positions according to the following format:

1. Voting Eligibility: All students who will be a member of the class during the term for which the elected officers will serve will be eligible to vote in the election. For elections for first- and second-year offices, a member of the class will be considered to be an individual who is currently planning on taking the M.D. course of study for the upcoming year. For elections for third- and fourth-year offices, a member of the class will be considered to be an individual who is planning on taking the M.D. course of study anytime during the upcoming two years, including any individual planning to pursue an M.A. degree for one year during either the third or fourth year of medical school. Efforts should be made by the appointed election official to extend the opportunity to vote to students who will be entering their respective classes in the upcoming year, including but not limited to the large number of M.D./Ph.D. students returning for their clinical clerkships.
2. Nominations: All students who will be a member of the class during the term for which the elected officers will serve, as defined in Article II. C. 1., will be eligible to be nominated for the election. Nominations for each office shall be held starting at least one week prior to the election and ending no later than three days prior to the election. Nominations shall be submitted in writing to the Election Official. Any student eligible to run for office

may nominate him/herself or another medical student in good standing. Candidates must have the firm intention of carrying out all the duties and obligations of the office for the entire term.

3. Elections and Terms: All terms shall begin upon election. Regular elections shall be held according to the following schedule:
   a. First Year: Elections shall be held within two weeks of the completion of the sixth week of first-semester classes. Each position carries a term of one academic year.
   b. Second Year: Elections shall be held within six weeks prior to the completion of the first academic year. Each position carries a term of one academic year.
   c. Third and Fourth Year: Elections shall be held within six weeks prior to the completion of the second academic year. Each position carries a term of two academic years.
4. Balloting: To be elected a candidate must receive a simple majority (greater than 50 percent) of the votes cast for that particular office by at least a quorum of one-half of the eligible voters. Write-in candidates shall be allowed on this ballot. Absentee ballots shall be allowed if they are given in writing to the Election Official prior to the day of election. Ballot counting shall be the responsibility of the Election Official under the observation of a witness agreeable to all candidates.
5. Runoff Procedures: If no candidate receives a simple majority for a particular position, a runoff between the top two candidates shall be held within three days of the initial election. Write-in candidates will not be allowed on this ballot. To be elected a candidate must receive the most votes cast for that particular office by at least a quorum of one-half of the eligible voters.
6. Appeals: All decisions are made by the Election Official during the election period. Appeals may be made by a candidate in writing to the Chair of the Medical Student Government and will be reviewed and ruled on by a group consisting of the current President, MER, OSR, and GPC from each of the four classes; the decisions of this group will be considered final.
7. Vacant Offices: If any office is vacated before its set term, an election will be held for that office using the procedures outlined above within three weeks of the vacancy. If a current class officer runs for the vacated office, that officer must vacate the post he/she occupies.
8. Removal from Office: In the unfortunate event that a class officer is not fulfilling his/her obligations and duties, MSG by a two-thirds majority of a quorum of one-half may vote to recommend that an officer be removed from office to the class that elected the officer. A vote of recall shall then be held within one week. If a three-fourths majority of a quorum of two-thirds of a class votes to recall the officer, the officer shall be removed from office. An election for vacant office shall then be held.

D. M.D./Ph.D. Research Students: There shall be a Representative of the M.D./Ph.D. students who are outside the core medical curriculum. This Representative shall be selected by a method chosen by the Medical Scientist Training Program (MSTP.) In addition, this individual shall be a full voting member of the MSG .

Article III:

The Medical Student Government

A. Membership: The Student Government shall consist of the President and the Representative to the Committee on Medical Education from each of the four classes, the Representative of M.D./Ph.D. Students, the Representative to the Graduate Professional Council, and the Representative to the Organization of Student Representatives of the Association of American Medical Colleges from each of the four classes. In addition, the Student Government may offer a non-voting position to a duly elected representative of any student group which is recognized nationally, regionally or within the Medical School so long as such a group is open to all medical students without discrimination and that such a group is not in conflict with the goals of the Student Government.

B. Purpose and Responsibilities: The Student Government shall carry out the business of the Student Government pursuant to the goals stated in Article I. The purpose of the Student Government shall be to represent and promote the interests and concerns of the medical student body through activities including but not limited to:
   1. Forming and representing official student body opinions for interaction with the University, its Administration and other groups associated with medical education.
   2. Serving as a forum for interaction between student groups.
   3. Serving as a forum for student-initiated curricular review and reform in the pursuit of academic excellence.
   4. Promoting interaction among the School of Medicine students, faculty and administration, and with the wider University community.
   5. Establishing a funding mechanism and budget with the associated collection and disbursements of funds for activities pursuant to goals stated in Article I.
   6. Organizing elections for class officers and any other official representative of the student body at large.

7. Exercising any such additional authority as may be granted to it by the School of Medicine or by other organizations, so long as such authority is consistent with the purposes stated in Article I.
8. Posting agenda of all meetings for public reference.
9. Formulating all rules and bylaws necessary for the Student Government to carry out the responsibilities and powers granted through this constitution. Such rules and bylaws shall require a simple majority of a quorum of two-thirds of the voting Student Government members.
10. The Student Government shall meet regularly and at intervals of no more than six weeks.
11. Representatives from the various student groups sitting on the Student Government shall keep the Student Government informed of all activities associated with their posts in the form of a written brief to be presented at the Student Government meeting as appropriate for their group's activities.

C. Student Government Offices: There shall be a Student Government Chair and Vice-Chair elected from the voting members of the Student Government. Election shall require a simple majority of the voting Student Government. The election shall be held within six weeks prior to the completion of the academic year. The terms of these offices shall be one academic year.
   1. Student Government Chair: The Student Government Chair shall preside at all meetings of the Student Government and have specific responsibilities:
      a. The Chair shall serve as official representative and spokesperson for the Student Government to the University, its Administration, and to other groups associated with medical education.
      b. The Chair shall be responsible to ensure the duties of the Student Government are carried out efficiently and in a timely manner.
      c. The Chair shall report the names of the Class Officers to the Dean, and post such a list for public reference.
      d. The Chair shall be responsible for overseeing and maintaining records and to set the agenda for such meetings in written form for distribution to Student Government members prior to each meeting.
      e. The MSG shall be responsible for overseeing and maintaining records of all financial transactions of the Student Government. The second-year class president shall regularly update the Student Government on its financial standing, and must make all financial records available to any medical student, member of the Administration, or to any official of the University. All transactions shall require the signatures of the Chair and the Vice-Chair.
      f. The Chair shall be empowered to call for standing and *ad hoc* committees to evaluate and make recommendations about specific areas of concern to the Student Government, the School of Medicine and its students. MSG shall appoint these committees.
      g. The Chair shall be empowered to designate another Student Government member to take on one or more of his/her duties.

Article IV:

Ratification and Amendments

A. In 1993 this Constitution was ratified by a 2/3 majority of a quorum of one-half of the student body pursuing a medical degree.
B. This Constitution can be amended by either a 2/3 majority of a quorum of one-half of the students in their first, second, and third years, or by a unanimous vote of the elected members of the Medical Student Government.

Fourth-Year Class Officers

President
Jason Stephenson

Medical Education Representative (MER)
Kate Carlson

Representative to the Organization of Student Representatives (OSR Rep)
Nefertari Daaga

Representative to the Graduate Professional Council (GPC Rep)
Walter Chan

Third-Year Class Officers

President
Ian Dorward

Medical Education Representative (MER)
Franklin Huang

Representative to the Organization of Student Representatives (OSR Rep)
Kristina Toncray

Representative to the Graduate Professional Council (GPC Rep)
Archit Patel

Second-Year Class Officers

President
Tom Shane

Medical Education Representative (MER)
Gita Mody

Representative to the Organization of Student Representatives (OSR Rep)
Aaron Robison

Representative to the Graduate Professional Council (GPC Rep)
Daniel Ma

Washington University Medical Campus Policy on HIV and HBV Infection

In 1992, the Executive Faculty of the School of Medicine formally adopted a medical campus policy on Human Immunodeficiency Virus (HIV) and Hepatitis B virus (HBV) infections. This policy was updated in 2001 to include Hepatitus C virus (HCV) infections. The purpose of the policy is to provide guidelines to prevent or reduce the transmission of these infectious agents between patients and health care workers.

The policy deals with: 1) the University's responsibilities to infected patients (including obligation to treat, confidentiality and appropriate serologic testing), 2) appropriate health and safety precautions and procedures for faculty, students and staff (including compliance with CDC guidelines, blood and body fluid precautions and handling of needles or sharp instruments), and 3) the University's responsibilities to faculty, staff or students who are infected with HIV, HBV, or HCV infection (including admission to medical school, participation in clinical rotations, serologic testing confidentiality and medical treatment).

The policy makes a distinction between class I activities (those involving no risk of transmission from infected health care workers to patients, such as routine physical examinations, dressing changes, intravenous line placement) and class II activities (those that involve the potential for transmission of HIV, HBV, or HCV from infected health care workers to patients, such as invasive surgical procedures in which trauma to a health care worker is possible).

This policy is comprehensive, and a complete copy is available to any interested student through the Office for Student Affairs.

Technical Standards Statement

Graduates of Washington University with a Doctor of Medicine degree are expected to have broad competence in the basic skills that underlie the general practice of medicine and surgery. All graduates must be able to take a history, examine a person, synthesize the findings into a diagnosis and plan of evaluation and treatment independently. Thus, medical students must possess the requisite sensory, motor, communicative and cognitive capabilities to accomplish these requirements in a reliable manner in order to be competent and safe medical practitioners.

Non-Discrimination Statement

Washington University encourages and gives full consideration to all applicants for admission, financial aid, and employment. The University does not discriminate in access to, or treatment or employment in, its programs and activities on the basis of race, color, age, religion, sex, sexual orientation, national origin, veteran status, or disability. Present Department of Defense policy governing ROTC and AFROTC programs discriminates on the basis of sexual orientation; such discrimination is inconsistent with Washington University policy. Inquiries about compliance should be addressed to the University's Executive Director of Human Resources, Washington University, Campus Box 1184, One Brookings Drive, St. Louis, MO 63130-4899, (314) 935-5990. Applicants who are qualified and who have special needs are considered individually in the selection process. The School of Medicine is committed to recruiting, enrolling and educating an increased number of students from racial minority and educationally deprived groups.

Student Academic Records and Transcripts

The Family Educational Rights and Privacy Act of 1974 (FERPA) provides current and former students of the University with specific rights of access to and control over their student record information. In compliance with the statute, appropriate federal regulations, and guidelines recommended by the American Association of University Registrars and Admissions Officers, the University has adopted procedures that implement these rights.

A copy of the University policies regarding educational records and the release of student record information may be obtained from the medical school's Registrar's Office.

Transcript requests may be made in person or by writing to the Registrar's Office. The written request must include your name, signature, date of birth and approximate dates of attendance.

Voter Registration

The 1998 Higher Education Act requires all postsecondary institutions to make available voter registration forms to all degree-seeking students.

To register to vote in Missouri, you must:

- be a citizen of the United States
- be a resident of Missouri (new residents may register immediately, but proof of residency shall be required.)
- register at least 28 days prior to the election
- be at least 17-1/2 years of age (you must be 18 to vote)
- not be on probation or parole after conviction of a felony, until finally discharged from such probation or parole
- not be convicted of a felony or misdemeanor connected with the right of suffrage
- not be adjudged incapacitated by any court of law
- not be confined under a sentence of imprisonment.

For additional information on voter registration, contact:

Secretary of State
600 W. Main and 208 State Capitol
P.O. Box 778
Jefferson City, MO 65102
(573) 751-2301 or (800) 669-8683
mosl.sos.state.mo.us

DEPARTMENT OF ANATOMY AND NEUROBIOLOGY

The structure of the human body is presented in two courses: Gross Anatomy, offered in the first semester, and Microscopic Anatomy, which extends over the first and second semesters. A third course, Neural Sciences, is taught at the end of the second semester. Gross Anatomy is largely a laboratory course, and lectures deal with anatomical principles and human growth and development. Instruction in Microscopic Anatomy focuses on cell and tissue biology, with laboratory sessions paralleling the lectures in these areas. This is a component of the Cell and Organ Systems Biology course jointly taught with the Department of Cell Biology and Physiology. Neural Sciences is an integrated course that deals with the structure, function and development of the nervous system from molecular, cellular and systems perspectives. Throughout all three courses, attention is paid to the results of recent investigations and to major developments in each field. In addition, the departmental faculty have a lead role in many graduate courses that may be taken as electives by students in any of the four years. The department is well-equipped for specialized work in several areas, including gross anatomy, electron microscopy, tissue culture and all aspects of neurobiology.

FIRST YEAR

M35 554 NEURAL SCIENCES

Instructors: *Jeffery W. Lichtman, M.D., Ph.D.,* 362-2504; *W. Thomas Thach Jr., M.D.,* 362-3538; *David C. Van Essen, Ph.D.,* 362-7043

Neural Sciences is an intensive seven-week course that covers the structure, function and development of the nervous system as seen from molecular, cellular and systems-oriented perspectives. The emphasis is on the organization and function of the nervous system in health, but there is frequent reference to the clinical relevance of material presented. The course includes regular lectures, conference sessions and laboratories, plus a number of clinically oriented presentations. Computer-aided instructional programs, accessible from a variety of locations, provide auxiliary modes of self-paced learning and review. The midterm and final emphasize the core body of important facts and principles presented in lectures and laboratories. (SPRING ONLY).

M05 501A HUMAN ANATOMY AND DEVELOPMENT

Instructor: *Glenn C. Conroy, Ph.D.,* 362-3397

The course is based largely on the dissection of the human body. Lectures on functional and topographic anatomy emphasize the principles of organization of the various systems of the body. Lectures on developmental anatomy stress organogenesis as an adjunct to understanding the normal and abnormal anatomy. An extensive museum of labeled dissected specimens is housed in the dissecting room for ready reference by students who encounter abnormalities or variations in their dissections. Frequent use of CT and MRI scans, radiographs and cross-sections aid in the synthesis of knowledge gained through dissection into clinically useful information. Radiologic anatomy and clinical correlation conferences further aid in this process. Cross-listed with L41 (Bio) 501.

M75 503 CELL AND ORGAN SYSTEMS BIOLOGY

Instructor: *Paul C. Bridgman, Ph.D.,* 362-3449

The structure of cells, tissues and organs is studied with regard to the functional significance of the morphological features. The laboratories consist of the study of prepared slides and electron micrographs. A microscope will be provided for each student. Limited space is available for non-medical students with instructor's permission. This course is cross-listed in Department of Cell Biology and Physiology.

Selectives

M04 552 GENETICS AND MOLECULAR BIOLOGY OF ION CHANNELS

Instructor: *Lawrence B. Salkoff, Ph.D.,* 362-3644

A functional genomics approach to studying membrane excitability. How the new DNA sequence data from genomic and EST sequencing projects can be exploited to get a comprehensive picture of gene families that contribute to membrane excitability. How DNA sequence data can contribute to understanding questions of physiology, development, regulation and structure-function relationships.

FOURTH YEAR
Electives

The department offers a number of graduate-level courses that may be taken as electives by medical students. The department participates in the Division of Biology and Biomedical Sciences, which also offers courses relevant to anatomy and neurobiology.

These course descriptions are presented in the section on Biology and Biomedical Sciences.

L41 (Bio) 5571 CELLULAR NEUROBIOLOGY
L41 (Bio) 5641 COMPUTATIONAL NEUROSCIENCE
L41 (Bio) 5651 NEURAL SYSTEMS
L41 (Bio) 567 ADVANCED TUTORIALS IN NEURAL SCIENCE
L41 (Bio) 590 RESEARCH OPPORTUNITIES

Note — The number preceding the course title indicates that the course is offered by the Division of Biology and Biomedical Sciences and carries credit in the Graduate School of Arts and Sciences.

M05 810 ADVANCED DISSECTION

Instructors: *Staff*, 362-3397

Different regions of the body will be dissected in detail. A period of four weeks should be allowed for each region: head and neck, thorax and abdomen, and superior and inferior limbs. Surgical approaches, cross-sections, X-rays and CT scans can be studied. **Valid start weeks for 4-week blocks are:** Weeks 29, 33, 37 and 41.

M05 820 TEACHING ASSISTANT IN HUMAN ANATOMY

Instructor: *Glenn C. Conroy, Ph.D.*, 362-3397

Offers the student the opportunity to review human anatomy by assisting the Anatomy faculty in teaching first-year medical students in the Anatomy laboratory. **Valid start weeks for 4-week blocks are:** Weeks 13, 17 and 21.

Research (M05 900)
Cross-listed with L41 (Bio) 590

Charles H. Anderson, Ph.D., 362-1799
Computational models of neural systems.

Dora Angelaki, Ph.D., 747-5529
Neural control of eye and head movements. Heading perception and spatial orientation.

Nancy L. Baenziger, Ph.D., 362-2817
Abnormal regulation of receptor signal transduction and neuronal connectivity in cellular models of Alzheimer's disease.

Paul C. Bridgman, Ph.D., 362-3449
Cell biology of the developing nervous system.

Andreas H. Burkhalter, Ph.D., 362-4068
Development and synaptic organization of cortical circuits.

Harold Burton, Ph.D., 362-3556
Cortical functional organization in sighted and blind people.

James M. Cheverud, Ph.D., 362-4188
Evolutionary quantitative genetics, genetics of growth and morphology, gene mapping in mice.

Glenn C. Conroy, Ph.D., 362-3397
Comparative primate anatomy and human evolution.

Ann Marie Craig, Ph.D., 362-0660
Molecular and cellular mechanisms of central neuron synapse formation.

Gregory C. DeAngelis, Ph.D., 747-2253
Neural circuits underlying three-dimensional vision and object representation.

David I. Gottlieb, Ph.D., 362-2758
Embryonic stem cell models of neural development and disease.

Timothy E. Holy, Ph.D., 362-0086
Neural mechanisms of the detection and recognition of pheromones.

Jeffery W. Lichtman, M.D., Ph.D., 362-2504
The mechanisms underlying the formation, maintenance and elimination of synaptic connections.

Arthur D. Loewy, Ph.D., 362-3930
CNS autonomic regulation; viral tracers for defining central circuits.

Michael L. Nonet, Ph.D., 747-1176
Molecular genetic analysis of synaptic development and function in the nematode *C. elegans*.

Karen L. O'Malley, Ph.D., 362-7087
Molecular biology of dopaminergic systems. Mechanisms underlying the specification, regulation and neurodegeneration of dopaminergic systems.

Jane Phillips-Conroy, Ph.D., 362-3396
Behavior, morphology and biology of living primate populations.

Joseph L. Price, Ph.D., 362-3587
Structure and organization of the prefrontal cortex and limbic forebrain, and the neuropathology of mood disorders and Alzheimer's disease.

Yi Rao, Ph.D., 362-9388
Molecular mechanism of axon guidance and neuronal migration.

Lawrence B. Salkoff, Ph.D., 362-3644
Genetics and molecular biology of ion channels.

Joshua R. Sanes, Ph.D., 362-2507
Molecular basis of synapse formation.

Lawrence H. Snyder, M.D., Ph.D., 747-3530
Computational and cognitive issues in cortical control of eye and arm movement.

Paul H. Taghert, Ph.D., 362-3641
Mechanisms of circadian clock output. Development of neurotransmitter properties.

W. Thomas Thach Jr., M.D., 362-3538
Neural control of posture, movement and motor learning; cognitive functions of the cerebellum.

David C. Van Essen, Ph.D., 362-7043
Organization and function of cerebral cortex in general and primate visual cortex in particular.

Rachel O. L. Wong, Ph.D., 362-4941
Development of neuronal connectivity in the central nervous system.

Faculty

EDISON PROFESSOR OF NEUROBIOLOGY AND HEAD OF DEPARTMENT

David C. Van Essen, Ph.D., Harvard University, 1971.

Professor Emeritus and Lecturer

Roy R. Peterson, Ph.D., University of Kansas, 1952.

Professors

Dora Angelaki, Ph.D., University of Minnesota, 1991.

Andreas H. Burkhalter, Ph.D., University of Zurich, 1977. (See Department of Neurological Surgery and Department of Neurology.)

Harold Burton, Ph.D., University of Wisconsin, 1968. (See Department of Cell Biology and Physiology and Department of Radiology.)

James M. Cheverud, Ph.D., University of Wisconsin, 1979. (See Department of Genetics.) (Also Faculty of Arts and Sciences)

Theodore J. Cicero, Ph.D., Purdue University, 1968. (See Department of Psychiatry.)

Glenn C. Conroy, Ph.D., Yale University, 1974. (Also Faculty of Arts and Sciences)

David I. Gottlieb, Ph.D., Washington University, 1971. (See Department of Biochemistry and Molecular Biophysics.)

Stephen M. Highstein, M.D., University of Maryland, 1965; Ph.D., University of Tokyo, 1976. (See Department of Otolaryngology.)

Jeffery W. Lichtman, M.D., Ph.D., Washington University, 1980.

Christopher J. Lingle, Ph.D., University of Oregon, 1979. (See Department of Anesthesiology.)

Arthur D. Loewy, Ph.D., University of Wisconsin, 1969.

Karen L. O'Malley, Ph.D., University of Texas, Austin, 1980.

Tae Sung Park, M.D., Yonsei University, 1971. (See Department of Neurological Surgery, Department of Neurology and Department of Pediatrics.)

Steven E. Petersen, Ph.D., California Institute of Technology, 1981. (Neuropsychology) (See Department of Neurological Surgery, Department of Neurology and Department of Radiology.)

Jane Phillips-Conroy, Ph.D., New York University, 1978. (Also Faculty of Arts and Sciences)

Joseph L. Price, Ph.D., Oxford University, 1969.

Marcus E. Raichle, M.D., University of Washington, 1964. (See Department of Neurology and Department of Radiology.)

Steven M. Rothman, M.D., State University of New York, Upstate, 1973. (See Department of Neurological Surgery, Department of Neurology and Department of Pediatrics.)

Lawrence B. Salkoff, Ph.D., University of California, Berkeley, 1979. (See Department of Genetics.)

Alumni Endowed Professor of Neurobiology

Joshua R. Sanes, Ph.D., Harvard University, 1976.

Joseph H. Steinbach, Ph.D., University of California, San Diego, 1973. (See Department of Anesthesiology.)

Paul H. Taghert, Ph.D., University of Washington, 1981.

W. Thomas Thach Jr., M.D., Harvard University, 1964. (See Department of Neurology and Program in Physical Therapy.)

Mark B. Willard, Ph.D., University of Wisconsin, 1971. (See Department of Biochemistry and Molecular Biophysics.)

Thomas A. Woolsey, M.D., The Johns Hopkins University, 1969. (See Department of Cell Biology and Physiology, Department of Neurological Surgery and Department of Neurology.)

Min Zhuo, Ph.D., University of Iowa, 1992. (See Department of Anesthesiology.)

Charles F. Zorumski, M.D., St. Louis University, 1978. (See Department of Neurology, Department of Neurological Surgery and Department of Psychiatry.)

Research Professor

Charles H. Anderson, Ph.D., Harvard University, 1962.

Associate Professor Emeritus and Lecturer

David N. Menton, Ph.D., Brown University, 1966.

Associate Professors

Paul C. Bridgman, Ph.D., Purdue University, 1980.

Randy Lee Buckner, Ph.D., Washington University, 1995. (Also Faculty of Arts and Sciences)

Maurizio Corbetta, M.D., University of Pavia, Italy, 1985. (See Department of Neurology and Department of Radiology.)

Ann Marie Craig, Ph.D., University of Western Ontario, Canada, 1989.

John G. Csernansky, M.D., New York University, 1979. (See Department of Psychiatry.)

Laura L. Dugan, M.D., Ohio State University, 1987. (See Department of Medicine, Department of Neurological Surgery and Department of Neurology.)

Mark P. Goldberg, M.D., Columbia University, 1984. (See Department of Neurological Surgery and Department of Neurology.)

Ursula W. Goodenough, Ph.D., Harvard University, 1969. (Also Faculty of Arts and Sciences)

M. Rosario Hernandez, D.D.S., University of Chile, 1973. (See Department of Ophthalmology and Visual Sciences.)

Peter D. Lukasiewicz, Ph.D., University of Michigan, 1984. (See Department of Ophthalmology and Visual Sciences.)

Bruce L. Nock, Ph.D., Rutgers University, 1980. (See Department of Psychiatry.)

Michael L. Nonet, Ph.D., Massachusetts Institute of Technology, 1989.

Joel S. Perlmutter, M.D., University of Missouri, 1979. (See Department of Neurological Surgery, Department of Neurology and Department of Radiology.)

Yi Rao, Ph.D., University of California, San Francisco, 1991.

Keith M. Rich, M.D., Indiana University, 1977. (See Department of Neurological Surgery, Department of Neurology and Department of Radiation Oncology.)

Lawrence Tychsen, M.D., Georgetown University, 1979. (See Department of Ophthalmology and Visual Sciences.)

Rachel O.L. Wong, Ph.D., Australian National University, Canberra, 1985.

Research Associate Professors

Nancy L. Baenziger, Ph.D., Washington University, 1971.

Richard A. Baird, Ph.D., University of California, Berkeley, 1981. (See Department of Otolaryngology.) (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

J. David Dickman, Ph.D., University of Wyoming, 1985. (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

Dwayne D. Simmons, Ph.D., Harvard University, 1986. (See Department of Otolaryngology.) (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

Assistant Professors

Gregory C. DeAngelis, Ph.D., University of California, Berkeley, 1992.

James E. Galvin, M.D., UMDNJ-New Jersey Medical School, 1991. (See Department of Neurological Surgery and Department of Neurology.)

Timothy E. Holy, Ph.D., Princeton University, 1997.

John W. McDonald III, M.D., Ph.D., University of Michigan, 1992. (See Department of Neurological Surgery and Department of Neurology.)

Steven J. Mennerick, Ph.D., Washington University, 1995. (See Department of Psychiatry.)

Daniel W. Moran, Ph.D., Arizona State University, 1994. (See Department of Biomedical Engineering.)

Jeffrey J. Neil, M.D., Ph.D., Washington University, 1984. (See Department of Neurological Surgery, Department of Neurology and Department of Pediatrics.)

Jeffrey G. Ojemann, M.D., Washington University, 1992. (See Department of Neurological Surgery and Department of Pediatrics.) (Also Psychology)

Carmelo Romano, Ph.D., Stanford University, 1981. (See Department of Ophthalmology and Visual Sciences.)

Lawrence H. Snyder, M.D., Ph.D., University of Rochester, 1992.

Kurt Thoroughman, Ph.D., The Johns Hopkins University, 1999. (See Department of Biomedical Engineering.)

Ralf Wessel, Ph.D., University of Cambridge, 1992. (Also Faculty of Arts and Sciences)

Ling-Gang Wu, Ph.D., Baylor College of Medicine, 1994. (See Department of Anesthesiology)

Research Assistant Professor

Mark E. Warchol, Ph.D., Northwestern University, 1989. (See Department of Otolaryngology.) (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

Assistant Professor (Adjunct)

Susan M. Fitzpatrick, Ph.D., Cornell University, 1984.

Instructor

Krikor Dikranian, M.D., Medical University of Varna, 1978. Ph.D., 1992.

DEPARTMENT OF ANESTHESIOLOGY

Anesthesiology is a medical specialty encompassing a broad range of medical and scientific activities. The clinical practice of anesthesiology includes: 1) assessment of, consultation for and preparation of patients for anesthesia; 2) provision of insensibility to pain during surgical, obstetric, therapeutic and diagnostic procedures; 3) monitoring and restoration of physiologic homeostasis during the perioperative period, as well as homeostasis in the critically ill or seriously injured patient; 4) diagnosis and treatment of painful syndromes; and 5) clinical management and teaching of cardiopulmonary resuscitation (CPR). The realm of scientific investigation in anesthesiology also spans a broad range. Scientific efforts at the cellular and molecular levels are directed to understanding the molecular mechanisms of anesthesia and analgesia. Clinical research in anesthesia includes broad epidemiological approaches to identifying indicators of outcome as well as prospective clinical studies examining new technologies, anesthetic agents and methods.

The Department of Anesthesiology presents the student with the opportunity to: 1) acquire and apply pharmacologic knowledge related to anesthetic, narcotic, paralytic and sedative drugs and to drugs affecting the autonomic nervous system; 2) understand and apply the basic principles of airway management and mechanical ventilation; 3) understand and apply the principles of cardiopulmonary resuscitation; 4) understand and apply the technical skills and anatomic and pharmacologic knowledge used in performing regional nerve blocks; 5) learn and apply the fundamental principles of acute and chronic pain management; and 6) learn and apply the basic principles of critical care medicine.

Anesthesiology bridges the gap between basic science and clinical medicine. It provides experience in the clinical evaluation and management of patients, and in applied physiology and pharmacology. The Department of Anesthesiology offers student experiences in the operating room, the intensive care unit, the pain clinic and the laboratory.

This clerkship introduces all of the basic aspects of anesthetic practice, including preoperative assessment, intraoperative anesthetic administration, placement and interpretation of invasive and non-invasive physiologic monitoring, airway management and regional anesthetic administration. Students taking this clerkship work one-on-one with attending anesthesiologists and are an integral part of the anesthetic care team. By the end of the clerkship, the student should be able to provide (under supervision) anesthesia for an uncomplicated surgical procedure. This rotation offers a unique opportunity for the student to work directly with attending physicians and to acquire fundamental skills (airway management, invasive monitoring, regional anesthesia) applicable to all aspects of acute medicine.

Students who have taken the anesthesia clerkship in the third year may elect to repeat this rotation in the fourth year. These students will be exposed to more complicated cases and techniques, and will be given increased responsibility for perioperative patient management. Students who have taken the clerkship in the third year also may elect to take an elective in the subspecialty areas of Cardiothoracic Anesthesiology, Pediatric Anesthesiology or Anesthesia for Neurosurgery. Students taking these electives will be exposed to surgical cases of increased complexity requiring specialized invasive monitoring and anesthetic techniques.

A four-week elective also is offered in critical care medicine that is designed to familiarize the student with the diagnosis and treatment of the critically ill surgical patient. This is accomplished by the student becoming an integral part of the intensive care team. Students learn techniques of mechanical ventilation, hemodynamic monitoring, resuscitation and vasoactive drug treatment while managing all aspects of patients assigned to their care.

The clerkship in pain management offers the student the opportunity to participate in comprehensive, multidisciplinary management of acute, chronic and cancer pain problems. Students will be expected to assist in the care of both inpatients and outpatients. Students will learn fundamental aspects of pain management, which should provide the knowledge with which to manage routine acute and cancer pain in their subsequent practice.

Special electives in basic science research as it applies to anesthesiology can be arranged with the principal investigators in the Anesthesiology Research Unit, under the direction of Joe Henry Steinbach, Ph.D. These laboratories focus on various aspects of molecular neurobiology, including ion channel structure and function, G-protein molecular biology, molecular mechanisms of volatile anesthetic action and genetics of anesthetic responsiveness. Arrangements for these special electives are made through the specific investigators: Walter A. Boyle III, M.D.; Zhou-Feng Chen, Ph.D.; C. Michael Crowder, M.D., Ph.D.; Alex S. Evers, M.D.; Narasimhan Gautam, Ph.D.; Richard S. Hotchkiss, M.D.; Christopher J. Lingle, Ph.D.; Joseph H. Steinbach, Ph.D.; Ling-Gang Wu, Ph.D.; or Min Zhuo, Ph.D.

FOURTH YEAR
Electives

M10 805 ANESTHESIOLOGY

Instructor: *Joseph Kras, M.D., D.D.S.,* 747-0300

This clinical elective is designed to familiarize the student with basic aspects of anesthesiology practice. The primary teaching method is patient care in an instructional setting (one-on-one). The student will learn the basics of preoperative evaluation of surgical patients, preanesthetic medication, intraoperative patient management and intraoperative monitoring. The student will be taught practical perioperative fluid and electrolyte therapy, airway management skills, the placement and interpretation of invasive monitoring devices, and regional anesthetic techniques. The student will be an integral part of the anesthesia care team and will participate actively in the anesthetic management of surgical patients. The rotation will also include practical management of some common medical and surgical emergencies using a clinical simulator. By the end of the rotation, we expect that the student will independently (under supervision) provide anesthesia for uncomplicated surgical procedures. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 811 CARDIOTHORACIC ANESTHESIOLOGY

Instructor: *Charles W. Hogue Jr., M.D.,* 362-6584

This clinical elective offers practical experience in the perioperative assessment and management of surgical patients undergoing cardiothoracic procedures. The student, as part of the cardiothoracic anesthesia team composed of faculty members, fellows and residents, will learn basic principles of airway management and lung ventilation, essential aspects of pharmacologic treatment of hemodynamic abnormalities and cardiac dysrhythmias, and management of intraoperative coagulation disturbances. Emphasis will be placed on the interpretation of intraoperative hemodynamic data, echocardiographic finding (TEE), and laboratory results in clinical decision making and treatment approach during anesthesia and surgery. During this rotation, the student will also gain practical experience in endotracheal intubation and the placement of intravenous lines, and invasive monitoring lines, including radial artery and pulmonary artery catheters. At the conclusion of the rotation, the student will have a better understanding of invasive monitoring and data interpretation, as well as a more systematic approach to the management of intra- and postoperative hemodynamic, pulmonary and coagulation abnormalities. The students are expected to attend the didactic sessions of CTA and the Department of Anesthesiology. A presentation or paper will be assigned. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 812 PEDIATRIC ANESTHESIA

Instructors: *Gary E. Hirshberg, M.D.; David Moore, M.D.; David J. Murray, M.D.,* 454-6215

This clinical elective is designed to teach the theory and practice of pediatric anesthesiology and pain management. It features individualized instruction with faculty who specialize in the perioperative care of pediatric patients. The elective consists of three weeks of active participation with pediatric anesthesiologists at St. Louis Children's Hospital and Shriners Hospital for Children learning preanesthetic assessment, the performance of routine anesthetics (which includes instruction and practice in pediatric airway skills), and the management of post-anesthesia care and pain therapies. The final week is tailored to meet the student's individual needs and career goals. Possibilities include exposure to sedation and anesthesia for procedures outside of the operating rooms, and to subspecialties including cardiovascular anesthesia, neurosurgical anesthesia, and acute and chronic pediatric pain management. Students also will have an opportunity to learn the management of some common medical emergencies in the Clinical Simulation Center. **Valid start weeks for 4-week blocks are:** Weeks 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 819 CARDIOTHORACIC CRITICAL CARE

Instructors: *Eric Jacobsohn, M.B.Ch.B.; Laureen L. Hill, M.D.; and Charl J. de Wet, M.B.B.Ch.*

This clinical elective offers practical experience in the postoperative management of cardiothoracic patients. The student will be fully integrated into the intensive care team and have the opportunity to contribute to the management of critically ill patients. Students will be afforded the opportunity to follow specific patients over the course of their stay on the ICU, during which time they will gain insight into holistic management of patients with multi-organ dysfunction. The CTICU environment is both challenging and exciting. Cardiorespiratory physiology and pharmacology will be demonstrated at the patients' bedside, an invaluable and unforgettable learning experience. Students will have numerous opportunities to assist with and learn procedures, such as central lines, chest tubes, bronchoscopy and pulmonary artery catheter insertion. Principles of management and resuscitation of hemodynamically unstable patients following surgery will be emphasized. At the conclusion of the rotation, the student will have a better understanding of shock, sepsis, multi-organ failure, organ system support and compassionate withdrawal of life support. An exciting teaching program will be prepared for the students. Students will be encouraged to present on their patient at morning ward rounds, during which constructive feedback and interactive teaching will occur. Students will present on a topic related to one of their patients at the end of the block. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 820 CRITICAL CARE

Instructor: *Walter A. Boyle III, M.D., 747-3581*
Coursemasters: *Timothy G. Buchman, Ph.D., M.D.; J. Perren Cobb, M.D.; Craig M. Coopersmith, M.D.; Alex S. Evers, M.D.; Eric Jacobsohn, M.B.B.Ch.; Laureen L. Hill, M.D.; Richard S. Hotchkiss, M.D.; George Tseng, M.D.; Omokhaye Higo, M.D.; John E. Mazuski, M.D., Ph.D.; and Douglas J.E. Schuerer, M.D.*

This clinical elective is designated to familiarize the student with the management of the critically ill patient. The setting is the 8400 surgical intensive care unit at Barnes-Jewish Hospital. The student will receive individualized training in critical care management including stabilization of the critically ill or injured patient, cardiovascular assessment and invasive hemodynamic monitoring, management of the airway and mechanical ventilator support, and other aggressive support as needed. The student will function as an integral member of the surgical intensive care unit team, which consists of physicians with specialty training in critical care; critical care fellows; house staff from surgery, anesthesiology, and other specialties; pharmacists; and nutrition experts. The student will actively participate in daily rounds with members of the team and will be actively involved in the management of critically ill patients from all the surgical specialties except cardiothoracic and neurosurgery. Practical experience will be gained in placement and interpretation of invasive and non-invasive cardiovascular monitors, the recognition and treatment of shock syndromes including trauma and burns, airway management and the use of mechanical ventilation, the diagnosis and treatment of renal insufficiency, management and treatment of infectious problems including septic shock, management of fluids and electrolytes, and nutrition. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 821 PAIN MANAGEMENT

Instructor: *Robert A. Swarm, M.D.*, 747-0101

Severe, uncontrolled pain is an all-too-often consequence of acute or chronic illness. Pain management students will be involved in the multidisciplinary management of acute and chronic pain, and master the treatment guidelines with which greater than 90 percent of cancer patients' pain can be successfully managed. This rotation is centered at Barnes-Jewish Hospital, but students also may be involved with patient care at St. Louis Children's Hospital. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 822 ANESTHESIA FOR NEUROSURGERY

Instructors: *René Tempelhoff, M.D.; Mary Ann Cheng, M.D.*, 362-2330

Challenging neurosurgical procedures. Student will become familiar with complex procedures for brain monitoring, cardiovascular support and airway management and will be exposed to all kinds of neurosurgical ailments. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 823 OBSTETRICAL ANESTHESIA

Instructor: *Barbara Leighton, M.D.*, 362-2356

The medical students will learn the different analgesia/anesthetic options for the labor patient. They will also learn how the physiological adaptations of pregnancy influence anesthetic management. They are actively involved in the participant's management, *i.e.*, starting an IV, placement of spinal, epidural or CSE (combined spinal epidural) and anesthetics. They will also attend the weekly OB anesthesia conferences and interview patients in labor (with an OB anesthesia attending). **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Faculty

HENRY ELIOT MALLINCKRODT PROFESSOR AND HEAD OF DEPARTMENT

Alex S. Evers, M.D., New York University, 1978. (See Department of Medicine and Department of Molecular Biology and Pharmacology.)

Professors Emeriti

Bernard C. DeLeo, M.D., St. Louis University, 1958.

Demetrios G. Lappas, M.D., Aristotelian University, 1961; Ph.D., 1966.

Albert Roos, M.D., University of Groningen, 1940. (See Department of Cell Biology and Physiology.)

C.R. Stephen, M.D., McGill University, 1940.

Professors

Timothy G. Buchman, Ph.D., The University of Chicago, 1978; M.D., 1980. (See Department of Medicine and Department of Surgery.)

Charles B. Hantler, M.D., University of Michigan, 1977.

Barbara Leighton, M.D., The Johns Hopkins School of Medicine, 1981. (See Department of Obstetrics and Gynecology.)

Christopher J. Lingle, Ph.D., University of Oregon, 1979. (See Department of Anatomy and Neurobiology.)

David J. Murray, M.D., College of Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, 1978.

William D. Owens, M.D., University of Michigan, 1965.

J. Julio Pérez-Fontán, M.D., Universidad de Santiago, 1977. (See Department of Pediatrics.)

Russell D. and Mary B. Shelden Professor

Joseph H. Steinbach, Ph.D., University of California, San Diego, 1973. (See Department of Anatomy and Neurobiology.)

René Tempelhoff, M.D., University of Lyon, 1974. (See Department of Neurological Surgery.)

Associate Professor Emeritus

Glenn R. Weygandt, M.D., Washington University, 1947.

Associate Professors

Nabil Abboud, M.D., St. Joseph's University, 1970.

Walter A. Boyle III, M.D., University of California, San Francisco, 1977. (See Department of Surgery.)

Jennifer W. Cole, M.D., Washington University, 1984.

Víctor G. Dávila-Román, M.D., F.A.C.C., University of Puerto Rico, 1981. (See Department of Medicine.)

Thomas Davis, M.D., University of Tennessee, Memphis, 1969.

George J. Despotis, M.D., St. Louis University, 1985. (See Department of Pathology and Immunology.)

Narasimhan Gautam, Ph.D., University of Bombay, 1985. (See Department of Genetics.)

Gary E. Hirshberg, M.D., Hannemann Medical College, 1972. (See Department of Pediatrics.)

Charles W. Hogue Jr., M.D., University of Illinois, 1986.

Barbel Holtmann, M.D., University of Missouri, 1968.

Richard S. Hotchkiss, M.D., University of Virginia, 1976. (See Department of Medicine and Department of Surgery.)

Eric Jacobsohn, M.B.Ch.B., University of Cape Town Medical School, Cape Town, South Africa, 1984. (See Department of Surgery.)

James J. Jenkins, M.D., University of North Carolina, 1970.

Barry P. Markovitz, M.D., University of Pennsylvania, 1983. (See Department of Pediatrics.)

John D. McAllister, M.D., University of Manitoba, 1980. (See Department of Pediatrics.)

Carl H. Nielsen, M.D., Copenhagen Medical School, 1979.

Necita L. Roa, M.D., University of the Philippines, 1969.

James M. Shear, M.D., University of Missouri, 1981.

Robert A. Swarm, M.D., Washington University, 1983.

G. Ram Volotzky, M.D., Sackler School of Medicine, 1979.

Min Zhuo, Ph.D., University of Iowa, 1992. (See Department of Anatomy and Neurobiology and Department of Psychiatry.)

Associate Professor (Clinical)

Milton L. Cobb, M.D., University of Texas, Southwestern, 1968.

Assistant Professors

Sirajuddin Agha, M.D., Liaquat Medical College, Jamshoro, SIND, Pakistan, 1969.

Sharma Anshuman, M.D., All India Institute of Medical Sciences, New Delhi, India, 1990.

Matthew S. Bodner, M.D., Washington University, 1980.

Laila Bottros, M.D., Ain Shams University, Egypt, 1978.

Zhou-Feng Chen, Ph.D., University of Texas, Houston, 1994. (See Department of Molecular Biology and Pharmacology and Department of Psychiatry.)

Mary Ann Cheng, M.D., University of Michigan, 1980.

Michael T. Connor, M.D., Wayne State University, 1974. (See Department of Pediatrics.)

Craig M. Coopersmith, M.D., University of Pennsylvania, 1991. (See Department of Surgery.)

Thomas E. Cox, M.D., University of Virginia, 1985.

C. Michael Crowder, M.D., Ph.D., Washington University, 1989. (See Department of Molecular Biology and Pharmacology.)

Bakul R. Dave, M.D., Gujarat University, India, 1984.

Charl J. de Wet, M.B.B.Ch., University of Pretoria, South Africa, 1990. (See Department of Surgery.)

Michael N. Diringer, M.D., University of Kentucky, 1982. (See Department of Neurological Surgery and Program in Occupational Therapy.)

Catherine M. Dunn, M.D., University of Missouri, 1982.

James J. Fehr III, M.D., University of Michigan, 1988. (See Department of Pediatrics.)

Barry A. Graff, M.D., St. Louis University, 1976.

Russell Groener, M.B.Ch.B., University of Cape Town, South Africa, 1983.

Anthony H. Guarino, M.D., University of Maryland, 1993.

Robert E. Herold, M.D., Washington University, 1974.

Omokhaye Higo, M.D., University of Ilorin Medical School, 1990.

Laureen L. Hill, M.D., University of California-Davis, 1992. (See Department of Surgery.)

Hawpeng S. Hsu, M.D., Taipei Medical College, Taipei, Taiwan, 1983.

Matthew Barry Jones, M.D., UMDNJ, Robert Wood Johnson Medical School, 1987.

Donna A.K. Kalauokalani, M.D., University of Hawaii, Honolulu, 1991. (See Department of Medicine and Department of Psychiatry.)

Ivan M. Kangrga, M.D., University of Belgrade, 1982; Ph.D., Iowa State University, 1991.

Shahrdad Khodamoradi, M.D., Washington University, 1990.

Joseph Kras, M.D., D.D.S., Hahnemann University, 1991.

Catherine P. Krucylak, M.D., UMDNJ, New Jersey Medical School, 1986.

Joan M. Niehoff, M.D., University of Missouri, Kansas City, 1982.

Mitchell R. Platin, M.D., Northeastern Ohio Universities, 1987.

Debra D. Pulley, M.D., St. Louis University, 1987.

Frank E. Robbins, M.D., Washington University, 1977.

Paula Rushing, M.D., University of Tennessee, Memphis, 1991.

Charles R. Schrock, M.D., University of Missouri, Columbia, 1991.

Raghu TerKonda, M.D., University of Missouri, 1987.

George Tseng, M.D., Boston University, 1992.

Lawrence S. Waldbaum, M.D., Washington University, 1973.

Brett D. Wolff, M.D., Washington University, 1991.

Ling-Gang Wu, Ph.D., Baylor College of Medicine, 1994. (See Department of Anatomy and Neurobiology.)

Julian Yepes, M.D., Universidad Pontifica Bolivariana Medellin, Colombia, South America, 1984.

Paul B. Zanaboni, Ph.D., M.D., St. Louis University, 1992.

Assistant Professor (Clinical)

Margaret M. Oakley, M.D., St. Louis University, 1959. (Shriners Hospital)

Instructors

Masood Ahmad, M.B.B.S., University of the Punjab, Lahore, 1993.

Gustav Akk, Ph.D., State University of New York at Buffalo, 1997.

Inaki Azpiazu, Ph.D., Royal Free Hospital School of Medicine, University of London, United Kingdom, 1993.

Brad Bernstein, M.D., St. Louis University, 1984.

Stefanie Bruemmer-Smith, M.D., Essen University, Germany, 1991.

Albert Cohen, M.D., Baylor College of Medicine, 1977.

Stefan Iantchoulev, M.D., Martin Luther Universitaet Halle-Wittenberg, Germany, 1991.

Catherine K. Ifune, M.D., Washington University, 1997; Ph.D., Washington University, 1990.

Selma E.H.O. Ishag, M.D., University of Khartoum, Khartoum, Sudan, 1987.

Nand Kodwani, M.D., Sind Medical College, University of Karachi, Pakistan, 1992.

Chris Lee, M.D., Ph.D., Hubei Medical University, Hubei, China, 1985; Ph.D., Beijing University, Beijing, 1991.

Qianjin Liu, M.D., Ph.D., Nanjing Medical University, 1983; Ph.D., St. Louis University, 1997.

Krishna Mantravadi, M.D., All India Institute of Medical Sciences, New Delhi, India, 1989.

Anthony J. Margherita, M.D., Georgetown University School of Medicine, 1985.

Sarah McMurry, M.B.Ch.B., University of Manchester, England, 1993.

David Moore, M.D., University of Louisville, 1992.

James Paintsil, M.B.Ch.B., University of Ghana Medical School, Ghana, 1992.

Rahul Rastogi, M.D., University of Rajasthan, Jaipur, India, 1992.

Jebadurai Ratnaraj, M.D., Medical Association of North Rhine Dusseldorf, West Germany, 1985.

Maurizio Renna, M.D., University of Palermo, Italy, 1984.

Ata Siddiqui, M.D., Sind Medical College, University of Karachi, Pakistan, 1988.

Thomas Smith, M.B.B.S., Monash University, Melbourne, Australia, 1990; M.D., University of Kiel, Kiel, Germany, 1995.

Akiko Taguchi, M.D., Tokyo Women's Medical College, 1986; Ph.D., Tokyo Women's Medical University, 1992.

Silvestre Tomeldan, M.D., Far Eastern University Institute of Medicine, Manilla, 1970.

Susan Watkins-Church, M.B.B.S., University of London, 1990.

Xiaoming Xia, Ph.D., Oregon Health Science University, Portland, Oregon, 1998.

Alexander H. Young, M.D., University of Arkansas, 1990.

DEPARTMENT OF BIOCHEMISTRY AND MOLECULAR BIOPHYSICS

The department participates in medical school teaching in the first year, as well as offering several specialized courses in the major fields of biochemistry and biophysics. Students in the School of Medicine or those in the Graduate School of Arts and Sciences may enroll in these courses and pursue research work under the direction of members of the faculty. The interests of the faculty, listed below, cover many aspects of biochemistry and biophysics with special emphasis on structure/function relationships in proteins and nucleic acids, enzymology, metabolic regulation, molecular biology of gene expression and protein biosynthesis, signal transduction and the dynamics of cytoskeletal structures.

FIRST YEAR

M15 502 MOLECULAR FOUNDATIONS OF MEDICINE

Instructor: *Linda J. Pike, Ph.D.*, 362-9502

This course is designed primarily for medical students and will cover fundamental aspects of biochemistry and cell biology. The course begins with a treatment of protein structure and the function of proteins in the cytoskeleton and cell motility. The principles of enzyme kinetics and regulation are then discussed and basic pathways for the synthesis and metabolism of carbohydrates and lipids are introduced. This leads into a discussion of membrane structure and the function of cellular organelles in biological processes, including energy production, protein degradation and protein trafficking. Special topics workshops presented by physicians serve to link the basic science to the clinic. Non-medical students should register under L41 (Bio) 5319.

FOURTH YEAR

Electives

Descriptions of the elective courses are listed under the Division of Biology and Biomedical Sciences. In some instances, these courses are offered in alternate years. The faculty member in charge of the course should be contacted for specific times.

L41 (Bio) 5312 MACROMOLECULAR INTERACTIONS

L41 (Bio) 5325 PROTEIN STRUCTURE AND FUNCTION

L41 (Bio) 5384 ADVANCED CELL BIOLOGY/ BIOCHEMISTRY OF MEMBRANES

L41 (Bio) 5456 ADVANCED CRYSTALLOGRAPHY

L41 (Bio) 5461 MOLECULAR RECOGNITION

L41 (Bio) 5464 COMPUTATIONAL BIOCHEMISTRY

L41 (Bio) 548 NUCLEIC ACID AND PROTEIN BIOSYNTHESIS

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

Research (M15 900)

Cross-listed with L41 (Bio) 590

Gary K. Ackers, Ph.D., 362-0260
Regulatory interactions in protein assemblies. Site-specific cooperativity mechanisms of human hemoglobin.

Nathan Baker, Ph.D., 362-2040
Computational biology: multiscale modeling of biological process, biomolecular solvation, protein structure and dynamics.

Wayne M. Barnes, Ph.D., 362-3351
Plant and DNA polymerase genetic engineering.

Peter M.J. Burgers, Ph.D., 362-3872
Molecular biology of yeast chromosomal DNA replication and DNA repair.

Peter T. Chivers, Ph.D., 362-1496
Cell growth, regulation and signal transduction.

David P. Cistola, M.D., Ph.D., 362-4382
Structural biology of lipid- and drug-binding proteins. NMR spectroscopy. Molecular recognition.

Enrico Di Cera, M.D., 362-4185
Molecular recognition. Structure and function of serine proteases.

Elliot L. Elson, Ph.D., 362-3346
Cellular mechanics and cytoskeletal structure and function.

William A. Frazier III, Ph.D., 362-3348
The role of the extracellular matrix protein thrombospondin in vascular biology.

Carl Frieden, Ph.D., 362-3344
Protein folding. Role of chaperones: Protein-protein interactions. Relationship of enzyme structure to function.

Kathleen B. Hall, Ph.D., 362-4196
RNA structure/function. RNA:protein interactions. NMR spectroscopy.

Jo Holt, Ph.D., 362-4406
Allosteric control mechanisms in human hemoglobin. Kinetics and thermodynamics.

Linda C. Kurz, Ph.D., 362-3401
Direct observation of enzymatic catalytic strategies.

Timothy M. Lohman, Ph.D., 362-4393
Biophysical chemistry of proteins, nucleic acids and their mechanisms of interaction. Helicases, helix destabilizing proteins. Polyelectrolyte properties of proteins and nucleic acids.

John E. Majors, Ph.D., 362-1135
Control of eukaryotic gene expression.

Garland R. Marshall, Ph.D., 362-1567
Molecular recognition, computer-aided drug design, peptidomimetics, protein structure prediction, signal transduction-GPCRs.

F. Scott Mathews, Ph.D., 362-1080
X-ray crystallographic studies of proteins and enzymes.

Linda J. Pike, Ph.D., 362-9502
Phosphoinositides and the role of caveolae/DIGs in signal transduction.

Jay W. Ponder, Ph.D., 362-4195
Computational modeling of protein structure and energetics. Protein engineering.

Gabriel Waksman, Ph.D., 362-4562
X-ray crystallographic studies of proteins involved in signal transduction, DNA replication and bacterial pathogenesis.

William R. Wikoff, Ph.D., 362-0727
Virus structure, assembly and maturation studied by X-ray crystallography and related biophysical techniques.

Faculty

RAYMOND H. WITTCOFF PROFESSOR OF BIOCHEMISTRY AND MOLECULAR BIOPHYSICS AND HEAD OF DEPARTMENT

Carl Frieden, Ph.D., University of Wisconsin, 1955.

Professors Emeriti

Barbara I. Brown, Ph.D., Yale University, 1950.

David H. Brown, Ph.D., California Institute of Technology, 1948.

George R. Drysdale, Ph.D., University of Wisconsin, 1952.

Professors

Gary K. Ackers, Ph.D., The Johns Hopkins University, 1964.

Peter M.J. Burgers, Ph.D., State University of Leiden, 1977.

Enrico Di Cera, M.D., Universitá Cattolica, 1985.

Sarah C.R. Elgin, Ph.D., California Institute of Technology, 1971. (Also Department of Biology)

Alumni Endowed Professor of Biochemistry and Molecular Biophysics

Elliot L. Elson, Ph.D., Stanford University, 1966.

William A. Frazier III, Ph.D., Washington University, 1973. (See Department of Cell Biology and Physiology.)

Stuart A. Kornfeld, M.D., Washington University, 1962. (See Department of Medicine.)

Marvin A. Brenneke Professor of Biological Chemistry

Timothy M. Lohman, Ph.D., University of Wisconsin, 1977.

Philip W. Majerus, M.D., Washington University, 1961. (See Department of Medicine.)

Garland R. Marshall, Ph.D., Rockefeller University, 1966. (See Department of Biomedical Engineering.)

F. Scott Mathews, Ph.D., University of Minnesota, 1959. (See Department of Cell Biology and Physiology.)

Joseph L. Roti Roti, Ph.D., University of Rochester, 1972. (See Department of Cell Biology and Physiology and Department of Radiation Oncology.)

J. Evan Sadler, Ph.D., Duke University, 1978; M.D., 1979. (See Department of Medicine.)

Roy and Diana Vagelos Professor of Biochemistry and Molecular Biophysics

Gabriel Waksman, Ph.D., University of Paris, 1982.

Associate Professor Emeritus

William F. Holmes, Ph.D., University of Pennsylvania, 1960.

Associate Professors

Wayne M. Barnes, Ph.D., University of Wisconsin, 1974.

Oscar P. Chilson, Ph.D., Florida State University, 1963. (See Department of Cell Biology and Physiology.)

David P. Cistola, M.D., Ph.D., Boston University, 1985.

Gregory I. Goldberg, Ph.D., Weizmann Institute of Science, 1977. (See Department of Medicine and Department of Molecular Microbiology.)

David I. Gottlieb, Ph.D., Washington University, 1971. (See Department of Anatomy and Neurobiology.)

Kathleen B. Hall, Ph.D., University of California, Berkeley, 1984.

Ellen Li, M.D., Ph.D., Washington University, 1980. (See Department of Medicine.)

John E. Majors, Ph.D., Harvard University, 1977.

Stephen M. Moerlein, Ph.D., Washington University, 1982. (See Department of Radiology.)

Linda J. Pike, Ph.D., Duke University, 1980.

Jay W. Ponder, Ph.D., Harvard University, 1984.

Mark B. Willard, Ph.D., University of Wisconsin, 1971. (See Department of Anatomy and Neurobiology.)

Research Associate Professor

Linda C. Kurz, Ph.D., Washington University, 1973.

Assistant Professors

Usha P. Andley, Ph.D., Jawaharlal Nehru University, 1977. (See Department of Ophthalmology and Visual Sciences.)

Nathan A. Baker, Ph.D., University of California, San Diego, 2001.

Peter T. Chivers, Ph.D., University of Wisconsin, Madison, 1996.

Lucian V. Del Priore, M.D., University of Rochester, 1982; Ph.D., Cornell University, 1984. (See Department of Ophthalmology and Visual Sciences.)

Daved H. Fremont, Ph.D., University of California, San Diego, 1993. (See Department of Pathology and Immunology.)

Katherine Parker Ponder, M.D., Washington University, 1983. (See Department of Medicine.)

Douglas M. Tollefsen, M.D., Ph.D., Washington University, 1977. (See Department of Medicine.)

William R. Wikoff, Ph.D., Purdue University, 1998.

Research Assistant Professors

Jo Holt, Ph.D., Colorado State University, 1982.

John Jean, Ph.D., University of Texas, 1987.

Changguo Tang, Ph.D., Massachusetts Institute of Technology, 1990.

Research Instructors

Judy Fee, Ph.D., University of California, Berkeley, 1973.

Sydney D. Hoeltzli, Ph.D., Washington University, 1997.

Alexander Kozlov, Ph.D., Moscow University, 1994.

DEPARTMENT OF CELL BIOLOGY AND PHYSIOLOGY

The department offers instruction to medical and graduate students. The Cell and Organ Systems course is designed to provide first-year medical students with a foundation for their further study of clinical and applied physiology. The Molecular Cell Biology course for first-year graduate students conveys an understanding of fundamental cell biology research strategies and principles. In addition, advanced courses open to medical and graduate students provide for more detailed study of specific areas of cell biology, physiology and cellular biophysics.

The research interests of our faculty, listed in more detail below, encompass a range of key fields within cell biology and physiology. Our research on the biology of cells focuses on apoptosis, cell cycle control, cytoskeleton, extracellular matrix, intracellular transport, ion channels, stem cell differentiation and yeast cell biology. Our physiology research emphasizes diabetes, epithelial transport, muscle contractile activation, peripheral circulation, prion disease biology, and cardiovascular, neuro-, renal, and respiration physiology.

FIRST YEAR

M75 503 CELL AND ORGAN SYSTEMS BIOLOGY

Instructor: *Robert S. Wilkinson, Ph.D.,* 362-2300

This course integrates and extends the basic principles of cell biology and physiology to the functions of the major organ systems of the body; *i.e.*, muscle, cardiovascular, renal, respiratory, gastrointestinal and endocrine. Limited space is available for non-medical students with instructor's permission. This course is cross-listed in Department of Anatomy and Neurobiology.

Selectives

M04 519 CASE PROBLEMS IN BIOCHEMISTRY AND CELL BIOLOGY

Instructors: *Thomas H. Steinberg, M.D.,* 362-9218; *Samuel L. Stanley Jr., M.D.,* 362-1070; *Ellen Li, M.D., Ph.D.,* 362-1072

In this elective, a problem-oriented approach will be used to explore the connections between basic science and clinical medicine. Each group of six to eight students will be confronted with clinical cases. Under the guidance of a faculty facilitator, the goal will be to understand the clinical aspects of the cases and to delve into the scientific issues that arise from them. No previous medical or surgical experience is required. This course is cross-listed in Department of Medicine.

M04 534A PROGRESSION OF KIDNEY DISEASE

Instructor: *Jeremiah J. Morrissey, Ph.D.,* 454-7464

Diabetes and hypertension are the leading initiating events that cause renal disease. Other immunologic and non-immunologic factors precipitate nephron loss. Once started, however, there is an inexorable deterioration of kidney function that culminates in renal replacement therapies. Dialysis and transplantation are expensive programs that also impact the quality of life of the patient. In this selective, we will compare and contrast molecular and cellular events in the progression of renal fibrosis to the pathophysiology of arteriosclerosis and stromal fibrosis that occurs in tumor formation within other organs. Pharmacologic interventions have been developed that only slow the progression of renal disease; however, newer treatments with growth factors show promise to blunt and possibly reverse fibrosis, thus preserving or enhancing renal function. Histologic examination and molecular/cell biologic approaches will be highlighted. For those students interested, visits to a dialysis clinic with an attending physician my be arranged.

M04 537 CARDIOVASCULAR CONTROL MECHANISMS

Instructors: *Jeffrey M. Gidday, Ph.D.,* 286-2795; *Dana R. Abendschein, Ph.D.,* 362-8925

A hands-on demonstration of various aspects of cardiovascular physiology in an anesthetized pig. Topics covered will include differences between left and right ventricular pressures, arterial pulse wave velocity, respiratory heart rate reflex, carotid sinus reflex, effects of drugs such as nitrates and alpha- and beta-receptor agonists on the heart and circulation, effects of vagal stimulation on cardiopulmonary dynamics, and responses to myocardial ischemia and infarction.

M04 561 BRAIN BLOOD VESSELS

Instructor: *Thomas A. Woolsey, M.D.,* 362-3600

This course considers structure, development, flow regulation and disease of cerebral blood vessels. Four general themes are: 1) the architecture of cerebral vessels, 2) regulation of cerebral blood flow during neural activity, 3) the blood-brain barrier, and 4) brain blood vessel development. Students select topics and papers for presentation from a menu. For the final session, students study a clinical problem and present their analysis to the rest of the group.

M04 5667 MICROCIRCULATION

Instructor: *Jeffrey M. Gidday, Ph.D.,* 286-2795

The homeostatic functions of the microcirculation include the active regulation of metabolic substrate delivery and waste product removal, and a multifaceted response to injury and disease. This elective is

an introduction to the normal and abnormal cell biology and physiology of the microcirculation. Four sessions will be organized around conceptual presentations and laboratory demonstrations by the instructor, and two-part, topic presentations by students following independent library research that focuses on basic physiology and clinically relevant pathophysiology. Basic physiology research topics might include: regulation of tissue blood flow and vascular tone, propagated vasodilation, hemodynamics and rheology of erythrocytes and leukocytes, cell biology of the endothelium, control of capillary permeability, and angiogenesis. Common disease entities involving microcirculatory dysfunction include: stroke and myocardial ischemia, diabetes, inflammation, tumor angiogenesis, retinopathy of prematurity, pulmonary edema, autoimmune disease, as well as the adaptive cardiovascular responses to exercise or high altitude. This selective is cross-listed in Department of Neurological Surgery.

M04 596 ION CHANNELS AND DISEASE

Instructor: *Colin G. Nichols, Ph.D.,* 362-6630

Ion channels are present in all cells and direct intracellular events by controlling the membrane electrical activity. Many widely used clinical drugs act by altering the behavior of ion channels, and it is now becoming clear that many diseases, including epilepsy, hyperinsulinism, certain cardiac arrhythmias and cystic fibrosis result directly from inherited ion channel mutations.

We will consider the basis of ion channel diseases and ion channel modulation therapies. Students will research a topic of choice in the library over two to three weeks and then present their findings to the whole class. After the initial course meeting, we will not meet formally for three weeks, and will then meet once per week for presentations.

FOURTH YEAR
Electives

Descriptions of the following courses may be found under Division of Biology and Biomedical Sciences.

L41 (Bio) 5062	**CENTRAL QUESTIONS IN CELL BIOLOGY**
L41 (Bio) 5068	**FUNDAMENTALS OF MOLECULAR CELL BIOLOGY**
L41 (Bio) 5122	**CELL-MATRIX INTERACTIONS**
L41 (Bio) 5132	**CELL MOTILITY AND CYTOSKELETON JOURNAL CLUB**

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences. See course descriptions in the Graduate Programs section of this catalog.

Research (M75 900)
Cross-listed with L41 (Bio) 590

Dana R. Abendschein, Ph.D., 362-8925
Responses of arteries to acute injury and coagulation mediators of arterial remodeling after injury.

Kendall J. Blumer, Ph.D., 362-1668
Hormone and neurotransmitter signaling by G proteins.

John A. Cooper, M.D., Ph.D., 362-3964
The roles of actin and microtubules in cell motility and the cell cycle.

Phyllis I. Hanson, M.D., Ph.D., 747-4233
Study of protein-protein and protein-membrane interactions involved in neuronal and synaptic membrane trafficking using biochemical, biophysical and cell biological techniques.

David A. Harris, M.D., Ph.D., 362-4690
Molecular and cellular biology of prion diseases.

John E. Heuser, M.D., 362-6948
Development of new methods for visualizing cells and molecules in three dimensions by means of electron microscopy, and for capturing macromolecular mechanisms through rapid freezing techniques.

James E. Huettner, Ph.D., 362-6628
Excitatory amino acid receptors and synaptic transmission in the central nervous system.

Maurine Linder, Ph.D., 362-6040
G-protein mediated signal transduction; protein palmitoylation in signal transduction and protein trafficking.

Robert P. Mecham, Ph.D., 362-2254
Understanding the complex process of extracellular matrix assembly and organization, including studying the intracellular pathways used to transport matrix components to the cell surface and identifying helper or accessory proteins that facilitate trafficking and matrix assembly. Cell-matrix interactions in development and cellular mechanisms associated with connective tissue remodeling in vascular disease and heritable diseases of connective tissues.

Robert W. Mercer, Ph.D., 362-6924
Structure and function of cation transport proteins. Molecular biology of the Na, K-ATPase. Polarized sorting of membrane proteins in cultured epithelial cells.

Michael M. Mueckler, Ph.D., 362-4160
Molecular biology of mammalian glucose transporters. Regulation of glucose transport by insulin and the mechanism of insulin signaling. Subcellular trafficking of the insulin-regulated glucose transporter. Structure and function relationships of

glucose transporters. Mechanism of insertion of complex polytopic proteins into the rough endoplasmic reticulum membrane.

Colin G. Nichols, Ph.D., 362-6630
The molecular mechanisms of potassium channel regulation and how potassium channels link metabolism to excitability in different physiological and disease states.

Helen M. Piwnica-Worms, Ph.D., 362-6812
Cell cycle- and checkpoint-control in normal and cancer cells.

Paul A. Schlesinger, M.D., Ph.D., 362-2223
Molecular mechanisms and regulation of intracellular channels for acidification of intracellular vesicles and the molecular pores formed in apoptosis.

Philip D. Stahl, Ph.D., 362-6950
Signal transduction, membrane trafficking events and the mechanism of endocytosis and phagocytosis including the role of low molecular weight GTPases Ras and Rab. Molecular cell biology of the mannose receptor family of endocytic/phagocytic and signal transducing receptors—structure, function and role of innate immunity.

Robert S. Wilkinson, Ph.D., 362-2300
Cellular physiology of nerve-muscle synapses, especially the regulation of synaptic strength and the role of vesicle processing in determining synaptic properties.

Faculty

EDWARD MALLINCKRODT, JR. PROFESSOR AND HEAD OF DEPARTMENT

Philip D. Stahl, Ph.D., West Virginia University, 1967.

Professors Emeriti

Carlton C. Hunt, M.D., Cornell University, 1942. (See Department of Neurological Surgery and Department of Neurology.)

Albert Roos, M.D., University of Groningen, Netherlands, 1940.

Carl M. Rovainen, Ph.D., Harvard University, 1967.

Professors

Jacques U. Baenziger, M.D., Ph.D., Washington University, 1975. (See Department of Pathology and Immunology.)

David C. Beebe, Ph.D., University of Virginia, 1974. (See Department of Ophthalmology and Visual Sciences.)

Kendall J. Blumer, Ph.D., Duke University, 1986.

George J. Broze Jr., M.D., University of Washington, 1972. (See Department of Medicine.)

Harold Burton, Ph.D., University of Wisconsin, 1968. (See Department of Anatomy and Neurobiology and Department of Radiology.)

Roberto Civitelli, M.D., University of Sienna, Italy, 1980. (See Department of Medicine.)

F. Sessions Cole, M.D., Yale University, 1973. (See Department of Pediatrics and Clinical Investigation Program.)

John A. Cooper, M.D., The Johns Hopkins University, 1982; Ph.D., 1983.

Susan K. Dutcher, Ph.D., University of Washington, 1980. (See Department of Genetics.)

William A. Frazier III, Ph.D., Washington University, 1973. (See Department of Biochemistry and Molecular Biophysics.)

Marc R. Hammerman, M.D., Washington University, 1972. (See Department of Medicine.)

David A. Harris, M.D., Ph.D., Columbia University, 1983.

John E. Heuser, M.D., Harvard University, 1969.

Michael J. Holtzman, M.D., Northwestern University, 1975. (See Department of Medicine.)

Keith A. Hruska, M.D., Creighton University, 1969. (See Department of Medicine.)

F. Scott Mathews, Ph.D., University of Minnesota, 1959. (See Department of Biochemistry and Molecular Biophysics.)

Alumni Endowed Professor of Cell Biology and Physiology

Robert P. Mecham, Ph.D., Boston University, 1976. (See Department of Medicine, Department of Pediatrics and Department of Biomedical Engineering.)

Robert W. Mercer, Ph.D., Syracuse University, 1980.

Michael M. Mueckler, Ph.D., University of Wisconsin, Madison, 1982.

Colin G. Nichols, Ph.D., University of Leeds, 1985.

William C. Parks, Ph.D., Medical College of Wisconsin, 1982. (See Department of Pediatrics.)

M. Alan Permutt, M.D., Washington University, 1965. (See Department of Medicine.)

Helen M. Piwnica-Worms, Ph.D., Duke University, 1984. (See Alvin J. Siteman Cancer Center.)

Kenneth S. Polonsky, M.D., University of The Witwatersrand, Johannesburg, South Africa, 1973. (See Department of Medicine.)

Joseph L. Roti Roti, Ph.D., University of Rochester, 1972. (See Department of Biochemistry and Molecular Biophysics and Department of Radiation Oncology.)

Shirley A. Sahrmann, Ph.D., Washington University, 1973. (See Program in Physical Therapy.)

Linda J. Sandell, Ph.D., Northwestern University, 1980. (See Department of Orthopaedic Surgery.)

Clay F. Semenkovich, M.D., Washington University, 1981. (See Department of Medicine.)

Robert M. Senior, M.D., George Washington University, 1961. (See Department of Medicine.)

Robert W. Thompson, M.D., University of Michigan, 1983. (See Department of Surgery.)

Robert S. Wilkinson, Ph.D., University of Texas, Austin, 1974.

Thomas A. Woolsey, M.D., The Johns Hopkins University, 1969. (See Department of Anatomy and Neurobiology, Department of Neurological Surgery and Department of Neurology.)

Associate Professors

Dana R. Abendschein, Ph.D., Purdue University, 1978. (See Department of Medicine and Clinical Investigation Program.)

Guojun Bu, Ph.D., Virginia Polytechnic Institute, 1990. (See Department of Pediatrics.)

Thomas W. Ferkol Jr., M.D., Ohio State University, 1985. (See Department of Pediatrics.)

J. William Harbour, M.D., The Johns Hopkins University, 1990. (See Department of Ophthalmology and Visual Sciences.)

James E. Huettner, Ph.D., Harvard University, 1987.

Sándor J. Kovács, Ph.D., California Institute of Technology, 1977; M.D., University of Miami, 1979. (See Department of Medicine and Department of Biomedical Engineering.) (Also Department of Physics)

Maurine Linder, Ph.D., University of Texas, Dallas, 1987.

Gregory D. Longmore, M.D., McGill University, 1983. (See Department of Medicine.)

Stanley Misler, Ph.D., New York University, 1977; M.D., 1978. (See Department of Medicine.)

Anthony J. Muslin, M.D., Harvard University, 1984. (See Department of Medicine.)

Yoel Sadovsky, M.D., Hebrew University, 1985. (See Department of Obstetrics and Gynecology.)

Paul A. Schlesinger, M.D., The University of Chicago, 1970; Ph.D., 1973.

Thomas H. Steinberg, M.D., New York University, 1978. (See Department of Medicine.)

Steven M. Strasberg, M.D., University of Toronto, 1963. (See Department of Surgery.)

Kevin E. Yarasheski, Ph.D., Kent State University, 1986. (See Department of Medicine.)

Research Associate Professor

Richard A. Pierce, Ph.D., Rutgers University, 1990. (See Department of Medicine.)

Assistant Professors

Yousef Abu-Amer, Ph.D., The Hebrew University, Jerusalem, 1993. (See Department of Orthopaedic Surgery.)

Steven Bassnett, Ph.D., University of East Anglia, England, 1987. (See Department of Ophthalmology and Visual Sciences.)

Perry E. Bickel, M.D., University of Texas, Southwestern, 1988. (See Department of Medicine.)

Janice E. Brunstrom, M.D., Medical College of Virginia, 1987. (See Department of Neurological Surgery and Department of Neurology.)

Jeffrey M. Gidday, Ph.D., University of Virginia, 1986. (See Department of Neurological Surgery and Department of Ophthalmology and Visual Sciences.)

Phyllis I. Hanson, M.D., Ph.D., Stanford University, 1993.

Hyunjung Jade Lim, Ph.D., University of Kansas, 1998. (See Department of Obstetrics and Gynecology.)

Beth Marshall, M.D., Vanderbilt University, 1986. (See Department of Pediatrics.)

Jeffrey H. Miner, Ph.D., California Institute of Technology, 1991. (See Department of Anatomy and Neurobiology.)

Kelle H. Moley, M.D., Yale University, 1988. (See Department of Obstetrics and Gynecology.)

Jeremiah J. Morrissey, Ph.D., St. Louis University, 1974. (See Department of Medicine.)

Daniel Ory, M.D., Harvard University, 1986. (See Department of Medicine.)

James M. Shipley, Ph.D., St. Louis University School of Medicine, 1992. (See Department of Medicine.)

Jason Weber, Ph.D., St. Louis University, 1997. (See Department of Medicine.)

Research Assistant Professors

M. Alejandro Barbieri, Ph.D., Universidad Nacional de San Luis, Argentina, 1992.

Richard Heil-Chapdelaine, Ph.D., Purdue University, 1995.

Richard C. Hresko, Ph.D., University of Virginia, 1986.

Joseph C. Koster, Ph.D., Washington University, 1996.

Instructors

Koong-Nah Chung, Ph.D., Washington University, 1986.

Decha Enkvetchakul, M.D., University of Columbia, 1993. (See Department of Medicine.)

Mitsuyoshi Saito, Ph.D., Nippon Dental University, 1986.

Assistant Research Scientist

Haibing Teng, Ph.D., University of Missouri, Columbia, 1991.

JAMES S. MCDONNELL DEPARTMENT OF GENETICS

The Department of Genetics is at the forefront in developing new methods for physical and genetic mapping of the human genome and for identifying and isolating genes that cause inherited disease or susceptibility to disease. The department supports a broad program of preclinical and graduate instruction in genetics, with research opportunities ranging from established experimental organisms to humans, and from molecular genetics to population genetics. A significant portion of the first-year course in basic medical sciences is devoted to human and clinical genetics, and particularly to the impact of new genetic technologies on the practice of medicine. Advanced training in clinical genetics and in genetic research is available from the faculty in the Department of Genetics and from geneticists with principal appointments in many other departments within the School of Medicine.

The Department of Genetics offers a broad range of training in virtually all major areas of modern genetics. Numbered among the faculty are world leaders in genetic mapping, new methods of DNA manipulation and cloning, computational biology, developmental genetics, neurogenetics, immunogenetics, human genetics, and population and evolutionary genetics. In addition to human genetics, research opportunities with experimental organisms include genetic studies with the mouse, fruit flies, nematodes, yeast, bacteria, chlamydomonas and zebrafish.

Advanced courses and seminars are offered that focus on such subjects as the genetics of inherited disease, gene expression, genetic mapping, molecular genetics, developmental genetics, microbial genetics, immunogenetics, and population and evolutionary genetics. Extraordinary opportunities for research training and experience are available in all of these areas and at all levels. The programs are tailored to meet the needs of medical students, graduate students, and both M.D. and Ph.D. postdoctoral students pursuing advanced training in biomedical research.

FIRST YEAR

M30 511 MEDICAL GENETICS
For full description, see Department of Pediatrics.

FOURTH YEAR

Electives

For complete descriptions, see Division of Biology and Biomedical Sciences.

L41 (Bio) 5488 GENOMICS
L41 (Bio) 5491 ADVANCED GENETICS
L41 (Bio) 5495 COMPUTATIONAL MOLECULAR BIOLOGY
L41 (Bio) 5911 CLASSICAL EXPERIMENTS IN MOLECULAR GENETICS

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

Research (M20 900)

Cross-listed with L41 (Bio 590)

Anne M. Bowcock, Ph.D., 747-3261
Molecular genetics of human diseases and cancer.

Barak Cohen, Ph.D., 362-3674
Functional Genomics in Yeast. The focus is on using genome-wide data (sequence, mRNA expression, protein expression) to understand biological processes in yeast. Using a combination of experimental and computational techniques, we are studying the evolution of complex traits, the structure of gene regulatory networks, and the mechanisms that regulate the concentrations of gene products in the cell.

Janet M. Connolly, Ph.D., 362-3958
Research in immunology. Thymic development and antigen specificity of T lymphocytes using transgenic mouse model systems.

Susan K. Dutcher, Ph.D., 362-2765
Studies on the role of centrioles and basal bodies in the assembly of cilia and cleavage furrows using molecular genetics and biochemical approaches.

Sean R. Eddy, Ph.D., 362-7666
Computational biology: RNA and protein structure prediction; genome analysis.

Warren R. Gish, Ph.D., 286-1826
Research and development of automated systems for gene prediction, identification and annotation. Emphasis is on combining biological knowledge with the use of rapid search methods and information theory.

Ted H. Hansen, Ph.D., 362-2716
Molecular immunology of antigen presentation. Intracellular antigen processing, peptide binding to MHC molecules and presentation to immune T cells.

Stephen L. Johnson, Ph.D., 362-0362
Growth control and morphogenesis in vertebrate development. Focus on genes and mechanisms affecting proportionate fin growth, fin regeneration and pigment stripe patterning in zebrafish.

H. Mark Johnston, Ph.D., 362-2735
Transcriptional control mechanisms in eukaryotic cells, diabetes in yeast and mechanisms of signal transduction.

Michael Lovett, Ph.D., 747-3261
The molecular basis of human genetic diseases, and the development of positional cloning technologies.

Elaine Mardis, Ph.D., 286-1805
Technology development for high-throughput genome sequencing with an emphasis on methods development and the implementation of robotics. Microarray-based studies of gene expression levels in organisms including *C. elegans* and human.

John D. McPherson, Ph.D., 286-1848
Genome mapping and analysis; development of novel technology for large-scale physical mapping and analysis of genomes including human, mouse and *A. thaliana.*

Tim B. Schedl, Ph.D., 362-6162
Germ cell development in the model organism *Caenorhabditis elegans.* The major focuses are: control of the decision to proliferate or enter the meiotic pathway, control and coordination of meiotic prophase progression and gametogenesis, and control of meiotic maturation and ovulation.

James B. Skeath, Ph.D., 362-0535
Identification of the genes and the elucidation of the molecular mechanisms that regulate the early events of *Drosophila* central neurogenesis; illumination of the mechanisms that form, pattern and specify the individual identities of the progenitor cells of the *Drosophila* embryonic CNS.

Gary D. Stormo, Ph.D., 747-5534
Computational biology of protein-DNA interactions, RNA folding, gene and promoter finding. Biochemical analysis of DNA-protein interactions and gene regulation.

Richard K. Wilson, Ph.D., 286-1804
Genome research. Large-scale DNA sequence analysis of genomes and expressed genes (cDNAs) from *H. sapiens*, mouse, *C. elegans, C. briggsae, A. thaliana* and *S. cerevisiae*. Development of novel technology for large-scale DNA sequence analysis and genetic analysis.

Tanya Wolff, Ph.D., 362-1509
Epithelial polarity and cell movement in the *Drosophila* eye. Major emphasis is placed on studying the genes and pathways required for the establishment, interpretation and transduction of the polarity signal.

Faculty

PROFESSOR AND INTERIM CHAIR OF THE DEPARTMENT

H. Mark Johnston, Ph.D., University of California, Berkeley, 1980.

Professors

Douglas E. Berg, Ph.D., University of Washington, 1969. (See Department of Molecular Microbiology.)

Anne M. Bowcock, Ph.D., University of The Witwatersrand, Johannesburg, South Africa, 1984. (See Department of Medicine, Department of Pediatrics and Clinical Investigation Program.)

James M. Cheverud, Ph.D., University of Wisconsin, 1979. (See Department of Anatomy and Neurobiology.)

C. Robert Cloninger, M.D., Washington University, 1970; M.D. (hon.), Umea University, 1983. (See Department of Psychiatry.)

Susan K. Dutcher, Ph.D., University of Washington, 1980.

Alison M. Goate, D.Phil., University of Oxford, 1983. (See Department of Psychiatry.)

Ted H. Hansen, Ph.D., University of Michigan, 1975.

George B. Johnson, Ph.D., Stanford University, 1972. (Also Faculty of Arts and Sciences)

Timothy J. Ley, M.D., Washington University, 1978. (See Department of Medicine and Alvin J. Siteman Cancer Center.)

Michael Lovett, Ph.D., University of London, 1981. (See Department of Pediatrics.)

J. Mark Petrash, Ph.D., University of Texas, Galveston, 1981. (See Department of Ophthalmology and Visual Sciences.)

Dabeeru C. Rao, Ph.D., Indian Statistical Institute, 1971. (See Division of Biostatistics.)

Theodore Reich, M.D., McGill University, 1963. (See Department of Psychiatry.)

John P. Rice, Ph.D., Washington University, 1975. (See Department of Psychiatry.)

Lawrence B. Salkoff, Ph.D., University of California, Berkeley, 1979. (See Department of Anatomy and Neurobiology.)

Stanley Sawyer, Ph.D., California Institute of Technology, 1964. (See Division of Biostatistics. (Also Faculty of Arts and Sciences)

Barbara A. Schaal, Ph.D., Yale University, 1974. (Also Faculty of Arts and Sciences)

Gary D. Stormo, Ph.D., University of Colorado, Boulder, 1981. (See Department of Biomedical Engineering.)

Alan R. Templeton, Ph.D., University of Michigan, 1972. (Also Faculty of Arts and Sciences)

Richard D. Todd, Ph.D., University of Texas, Dallas, 1977; M.D., University of Texas, San Antonio, 1981. (See Department of Psychiatry.)

Michael P. Whyte, M.D., State University of New York, Downstate, 1972. (See Department of Medicine.)

Richard K. Wilson, Ph.D., University of Oklahoma, 1986. (See Clinical Investigation Program.)

Associate Professors

Michael R. Brent, Ph.D., Massachusetts Institute of Technology, 1991. (Also Faculty of Engineering and Applied Science)

James P. Crane, M.D., Indiana University, 1970. (See Department of Obstetrics and Gynecology and Department of Radiology.)

Ian W. Duncan, Ph.D., University of Washington, 1978. (Also Faculty of Arts and Sciences)

Alvin Goldfarb Distinguished Professor of Computational Biology

Sean R. Eddy, Ph.D., University of Colorado, Boulder, 1991.

Paul J. Goodfellow, Ph.D., Queens University, 1985. (See Department of Surgery.)

David H. Gutmann, Ph.D., The University of Michigan, 1984; M.D., 1986. (See Department of Neurology.)

Andrew C. Heath, Ph.D., University of Oxford, 1983. (See Department of Psychiatry.)

Stephen L. Johnson, Ph.D., University of Washington, 1991.

Howard L. McLeod, Pharm. D., Philadelphia College of Pharmacy and Science, 1990. (See Department of Medicine and Alvin J. Siteman Cancer Center.)

John D. McPherson, Ph.D., Queen's University, Kingston, 1989.

Janet S. Rader, M.D., University of Missouri, 1983. (See Department of Obstetrics and Gynecology.)

Mark S. Sands, Ph.D., State University of New York, Stony Brook, 1990. (See Department of Medicine.)

Tim B. Schedl, Ph.D., University of Wisconsin, 1984.

James B. Skeath, Ph.D., University of Wisconsin, 1993.

Brian K. Suarez, Ph.D., University of California, Los Angeles, 1974. (See Department of Psychiatry.)

Weixiong Zhang, Ph.D., University of California, Los Angeles, 1994. (Also Engineering and Applied Science)

Research Associate Professors

Ingrid B. Borecki, Ph.D., University of Hawaii, 1981. (See Division of Biostatistics.)

Janet M. Connolly, Ph.D., George Washington University, 1979.

Assistant Professors

Jeremy D. Buhler, Ph.D., University of Washington, 2001. (Also Engineering and Applied Science)

Barak Cohen, Ph.D., Harvard University, 1998.

Narasimhan Gautam, Ph.D., University of Bombay, 1985. (See Department of Anesthesiology.)

Warren R. Gish, Ph.D., University of California, Berkeley, 1988.

Elaine Mardis, Ph.D., University of Oklahoma, 1989.

Robi Mitra, Ph.D., Massachusetts Institute of Technology, 2000.

Nancy L. Saccone, Ph.D., Brown University, 1993.

Steven B. Scholnick, Ph.D., Cornell University, 1982. (See Department of Otolaryngology.)

Alan Shiels, Ph.D., University of London, 1983. (See Department of Ophthalmology and Visual Sciences.)

Michael Tomasson, M.D., Stanford University, 1992. (See Department of Medicine.)

Tanya Wolff, Ph.D., Purdue University, 1992.

Research Assistant Professor

John G. Spieth, Ph.D., University of Washington, 1978.

Research Instructors

Sandra W. Clifton, Ph.D., University of Oklahoma, 1993.

Pamela E. Hoppe, Ph.D., Princeton University, 1989.

James P. McCarter, M.D., Ph.D., Washington University, 1998.

Elena Rivas, Ph.D., University of Zaragoza, Spain, 1990.

Michael C. Wendl, D.Sc., Washington University, 1994.

Senior Research Scientist

Ladeana Hillier, M.S., Northwestern University, 1988.

Assistant Research Scientist

Wesley Charles Warren, Ph.D., University of Missouri, 1990.

JOHN MILLIKEN DEPARTMENT OF MEDICINE

The Department of Medicine's general medicine teaching services at Barnes-Jewish Hospital and the Veterans Administration Medical Center (St. Louis) are under the following directors:

Barnes-Jewish Hospital, *Kenneth S. Polonsky, M.D.* (Chairman, Department of Medicine)
Veterans Administration Medical Center, *Lewis R. Chase, M.D.*

In addition, for the purposes of both teaching and research, the Department of Medicine is divided into specialty divisions and sections at Barnes-Jewish Hospital under the following chiefs:

Allergy and Clinical Immunology Diseases
H. James Wedner, M.D., Acting Chief
Bioorganic Chemistry and Molecular Pharmacology
Richard W. Gross, M.D., Ph.D., Chief
Bone and Mineral Diseases
Dwight A. Towler, M.D., Ph.D., Chief
Cardiology/Cardiovascular Diseases
Michael E. Cain, M.D., Chief
Center for Health Behavior Research
Edwin B. Fisher, Ph.D., Chief
Dermatology
Lynn A. Cornelius, M.D., Chief
Endocrinology/Metabolism/Lipid Research
Clay F. Semenkovich, M.D., Chief
Gastroenterology
Nicholas O. Davidson, M.B.B.S., Chief
General Medical Sciences
Bradley A. Evanoff, M.D., M.P.H.
Geriatrics and Nutritional Science
Samuel Klein, M.D., Chief
Hematology
Stuart A. Kornfeld, M.D.; Philip W. Majerus, M.D., Co-Chiefs
Infectious Diseases (Clinical)
Gerald Medoff, M.D., Acting Co-Chief
Infectious Diseases (Basic Science)
Daniel E. Goldberg, M.D., Ph.D., Co-Chief
Medical Education
Daniel M. Goodenberger, M.D., Chief
Oncology
John F. DiPersio, M.D., Ph.D., Chief
Pulmonary and Critical Care Medicine
Michael J. Holtzman, M.D., Chief
Renal Diseases
Marc R. Hammerman, M.D., Chief
Rheumatology
Wayne M. Yokoyama, M.D., Chief

Instruction in Medicine is provided during all four years of the medical curriculum, beginning with The Practice of Medicine I in the first year. Teaching in the second year has two main objectives: the correlation of the basic sciences with clinical aspects of disease and training in the technical methods of physical examination and laboratory diagnosis. By the beginning of the third year, the student is ready for supervised clinical study of individual patients. A clinical clerkship of 12 weeks, divided into three four-week periods, is served by third-year students on the medical services of the department. In the final year, students may elect a subinternship in general medicine and a series of elective courses in the medical specialties.

FIRST YEAR

M25 507 THE PRACTICE OF MEDICINE I

Instructor: *Robert J. Rothbaum, M.D.*, 454-2134

The Practice of Medicine is a wide-ranging course. TPM I is the first part of a three-year continuum that introduces the varied interpersonal and professional skills required of the practicing physician. The course is organized into six content areas.

Several lectures and small group meetings within TPM I work to employ and unify the concepts covered in concomitant basic science courses and the six content areas. These activities include:

1. Students attend multiple visits to the offices of primary care physicians to observe ongoing medical evaluations and care.

2. Integrative cases consist of presentation of a particular patient disorder, interview of the patient and family, and in-depth analysis of the basic science, clinical and humanistic aspects of the illness.

3. Additional lectures review the history of medicine and complex social and psychological issues.

Content Areas:

INTERPRETING ILLNESS

Content Area Leader: *Stephen S. Lefrak, M.D.*, 454-7116

Each patient presents with a particular set of symptoms and signs. The clinical manifestations of illness represent, however, only a limited portion of the patient's life story and experience. This content area focuses on development of an appreciation of how illness affects daily life, interpersonal relationships and future plans. Illness is analyzed from a variety of perspectives, including the patient's recounting of their medical history, descriptions of illness and its effects in literature resources, and the experience of a home visit with a family. In addition, the experience of illness in different cultural and ethnic groups is investigated.

HEALTH PROMOTION/DISEASE PREVENTION

Content Area Leader: *Bradley A. Evanoff, M.D., M.P.H.*, 454-8638

This overview of public health and preventative medicine combines theory and application so that students can interpret the scientific literature and develop an understanding of the social, political, and economic factors that might affect individual health status. The promise and difficulties of health promotion and preventative medicine are emphasized. Student presentations at a health symposium conclude the course.

SCIENTIFIC METHOD OF CLINICAL MEDICINE AND RESEARCH

Content Area Leader: *Jay F. Piccirillo, M.D.*, 362-7394

The current emphasis on evidence-based medicine requires an ability to analyze and interpret the medical literature. This content area focuses on developing expertise in medical statistics and clinical epidemiology. This ability is essential for the future analysis of clinical studies and evaluation of potential patient evaluation and therapies. Lectures and small group session delineate and explain statistical terminology and techniques. This knowledge is then applied to analysis of actual clinical studies.

CLINICAL SKILLS

Content Area Leader: *Katherine Henderson, M.D.*, 747-2729

This content area provides an introduction to history taking and physical examination. Students will learn to obtain a complete medical history and perform a thorough physical examination. Students will practice detailing these finding in written form.

PATIENT-PHYSICIAN COMMUNICATION

Content Area Leader: *Kellie L. Flood, M.D.*, 286-2700

Clear communication between patient and physician forms the foundation of a therapeutic partnership. First this content area focuses on obtaining information from the patient. The medical history contains information essential for formulating an accurate diagnosis. Thus, development of history-taking skills is a cornerstone of clinical medicine. Secondly, this content area develops skills for the physician to communicate information to the patient in a concise and clear manner. Effective communication is the basis for successful therapy. Students observe and perform patient interviews, work with standardized patients, and evaluate videotape examples during small group sessions.

ETHICS AND HEALTH POLICY

Content Area Leader: *Rebecca S. Dresser, J.D.*, 454-7116

This content area provides an introduction to ethical, social, and legal dilemmas that face physicians. Covered topics include the ethical responsibilities of medical students, the difficulties of facing errors, the challenges of working with supervising physicians and the responsibilities of power. Issues in clinical research and resource allocation are also reviewed.

Selectives

M04 514 CARDIOVASCULAR BIOPHYSICS

Instructor: *Sándor J. Kovács, Ph.D., M.D.*, 454-8146

This elective is intended for students with a background in the physical sciences: physics, mathematics, engineering, computer sciences and comparable fields. Topics covered vary according to the interest of the staff and the clinical spectrum encountered during the course of the elective. Included are quantitative cardiovascular physiology and pathophysiology, nonlinear dynamics and its application to physiology, biophysics, ultrasonics, biomechanics and biomedical engineering. The focus of the elective is the application of quantitative mathematical and engineering principles to solve real problems encountered in clinical practice. Participation in weekly seminars and familiarity with selected topics of current research are included. This course is offered in alternate years (2003-2004).

M04 519 CASE PROBLEMS IN BIOCHEMISTRY AND CELL BIOLOGY

Instructors: *Thomas H. Steinberg, M.D.*, 362-9218; *Samuel L. Stanley Jr., M.D.*, 362-1070; *Ellen Li, M.D., Ph.D.*, 362-1072

In this elective, the "problem-oriented" approach will be used to explore the connections between basic science and clinical medicine. Each group of six to eight students will be confronted with clinical cases. Under the guidance of a faculty "facilitator," the goal will be to understand the clinical aspects of the cases and to delve into the scientific issues that arise from them. No previous medical or surgical experience is required. This selective is cross-listed in Department of Cell Biology and Physiology.

M04 533 TROPICAL MEDICINE

Instructor: *Daniel E. Goldberg, M.D.*, 362-1514

Washington University School of Medicine has several faculty members who are actively researching diseases specific to developing countries. This elective is designed to bring these individuals together, in an informal discussion forum with students, to highlight the problems particular to geographical medicine. The elective will cover issues including eradication, prevention and treatment, immunology and vaccine development, as well as descriptions of the different disease syndromes. This selective is cross-listed in Department of Molecular Microbiology.

SECOND YEAR

Teaching by the Department of Medicine is designed to: 1) prepare students for the transition from the preclinical sciences to the study of the sick patient at

the bedside, 2) help them analyze the clinical manifestations of disease in terms of the responsible mechanisms, and 3) introduce them to the techniques of examination that are used regularly on all clinical services. This instruction is undertaken jointly with members of other clinical departments and is coordinated with subject matter presented by the Department of Pathology.

The major areas of clinical medicine are presented in detail to illustrate the application of biochemical, physiological and anatomical information to the understanding of pathological states. Cardiovascular, renal, neurological, gastrointestinal, pulmonary, hematological, metabolic, nutritional and developmental diseases are discussed. Emphasis is placed on the use of fundamental information in approaching clinical problems as a way of thinking that prepares the student for a lifetime of medicine, during which new information will constantly be acquired.

M25 607 THE PRACTICE OF MEDICINE II

Instructor: *Megan Wren, M.D.,* 362-8050

Content Area Leaders: *Stephen S. Lefrak, M.D.; Bradley A. Evanoff, M.D., M.P.H.; Jay F. Piccirillo, M.D.; Katherine Henderson, M.D.; Kellie L. Flood, M.D.; Rebecca S. Dresser, J.D.*

The goal of The Practice of Medicine (TPM) is to provide students with a set of knowledge, skills and attitudes essential to patient care regardless of specialty. TPM II is a continuation of TPM I and will build on concepts introduced during TPM I. TPM II will continue to address various interfaces between patients, physicians and society and will also introduce approaches to clinical thinking and decision-making in the context of today's socio-economic and cultural enviroment. The sections of TPM II include Advanced Physical Examination, Case Development, Communication, Ethics and Health Policy, Health Promotion/Disease Prevention, Interpreting Illness, Ophthalmology, Patient Sessions, Radiology and Scientific Methods. The learning objectives for each section of TPM II emphasize topics and skills utilized in all fields of medicine, and the majority of the coursework for TPM II will be taught in small groups or through clinical experiences. 77.5 clock hours.

M25 605A INFECTIOUS DISEASES AND MEDICAL MICROBIOLOGY

Instructor: *Nigar Kirmani, M.D.,* 454-8217

The infectious disease pathophysiology course emphasizes both organism-specific and organ-specific approaches to diseases caused by microbes. The course expands on material presented briefly in the first year concerning bacteria, viruses, fungi and parasites, and their involvement in human disease. Mechanisms of disease production, clinical manifestations and therapy are discussed, along with public health implications. In addition to lectures, small group case discussions enable students to apply the information they learn to clinical situations.

M25 606A RHEUMATOLOGY

Instructor: *Leslie E. Kahl, M.D.,* 454-7279

The rheumatology pathophysiology course begins with an overview of the structure, function and physiology of the normal joint. The pathophysiology of both localized joint disorders such as osteoarthritis and infectious arthritis are presented, along with systemic inflammatory disorders including rheumatoid arthritis, lupus and vasculitis. Diagnosis, pharmacologic management and rehabilitation of these conditions are included. In small group sessions, students interview patients and observe the characteristic physical findings of these disorders.

M25 611B CARDIOVASCULAR DISEASE

Instructor: *Dana R. Abendschein, Ph.D.,* 362-8909

The purpose of this course is to consider the mechanisms and manifestations of acquired and congenital cardiovascular disorders as well as their pharmacologic treatment. Lectures and group discussions that emphasize the major areas of cardiac pathophysiology and pharmacology are provided.

M25 612B PULMONARY DISEASE

Instructor: *Michael B. Lippmann, M.D.,* 289-6306

The objectives of the pulmonary pathophysiology course include review of normal pulmonary physiology as related to specific pulmonary disease states. The focus of the course will largely be upon presentations in lectures concerning pathophysiologic principles of abnormal lung structure and function. In addition, case study problems will be discussed.

M25 613B RENAL AND GENITOURINARY DISEASES

Instructor: *Stanley Misler, Ph.D., M.D.,* 454-7719; *David Windus, M.D.,* 362-7261

This course uses basic principles of renal physiology and ion homeostatis to understand commonly encountered fluid and electrolyte disorders (especially hyper/hypo-natremias, acidoses/alkaloses) and the action of diuretic drugs. It also applies basic principles of urinary system anatomy and physiology to the understanding of diseases affecting glomerular and/or tubular function, and micturition. Lectures and problem sessions focus special attention on: 1) how a working knowledge of fundamentals, a few simple diagnostic tests and a little arithmetic manipulation can have important predictive value; and 2) how the courses of acute and chronic renal failure are both adaptive and maladaptive for the organism. The course also introduces basic principles of dialysis and transplant through on-site visits to treatment centers.

M25 614 DERMATOLOGY

Instructor: *Jeffrey Petersen, M.D., 996-8810*

The Dermatology second-year course is designed to teach medical students how to describe skin lesions and the pathophysiological basis and clinical

characteristics of major dermatologic diseases. Major categories of clinical skin diseases and their most prominent constituents will be discussed, including papulosquamous diseases, blistering diseases, infectious diseases, and benign and malignant neoplasms.

M25 615A ENDOCRINOLOGY AND METABOLISM

Instructor: *William E. Clutter, M.D.*, 362-8067

This course aims to develop understanding of the pathophysiology, clinical manifestations and diagnosis of common endocrine disorders. History, physical examination and interpretation of diagnostic laboratory tests are emphasized. Principles of treatment of endocrine disorders and pharmacology of relevant drugs also are discussed. Students are expected to apply their knowledge in clinical case discussions.

M25 620A GASTROINTESTINAL AND LIVER DISEASES/NUTRITION

Instructor: *Deborah C. Rubin, M.D.*, 362-8935

This course discusses the pathophysiologic mechanisms related to the diseases of the gastrointestinal tract including esophagus, stomach, small and large intestines, liver, gallbladder and pancreas. The emphasis is on changes that occur in normal physiology, biochemistry, anatomy, immunology and cell biology that result in human gastroenterologic diseases. Included also are lectures on the pharmacology of gastrointestinal drugs and basics of human nutrition in clinical practice. Lectures are supplemented by group seminars that focus on clinical case presentations.

M25 625A HEMATOLOGY AND ONCOLOGY

Instructor: *Scot G. Hickman, M.D.*, 289-6308

The hematology and oncology pathophysiology course exposes students to common hematologic disorders and hematologic malignancies. The course utilizes lectures, clinical case discussions and practical sessions involving microscopy.

THIRD YEAR

M25 710 MEDICINE CLERKSHIP

Instructor: *Thomas M. De Fer, M.D.*, 362-8050

The medicine clerkship provides supervised study of patients in both inpatient and ambulatory settings. For the inpatient rotations, students are assigned as clinical clerks to patients admitted to the cardiology and general medical teaching services of Barnes-Jewish Hospital and Veterans Administration Medical Center. For the outpatient rotations, students rotate through the ambulatory general medicine clinics at Barnes-Jewish Hospital and a community-based internal medicine practice. Teaching is provided by the chief of service, attending physicians, house staff, consultants, chief residents and regularly scheduled conferences. Formal instruction is given regarding core internal medicine topics during the clerkship.

M25 714 AMBULATORY: EMERGENCY MEDICINE

Instructors: *Mark Levine, M.D.*, 362-6743; *Sandy Sineff, M.D.*, 362-7959

The WUMS III Ambulatory Care Rotation takes place in the main emergency department of Barnes-Jewish Hospital. Three to five students at a time are assigned to this four-week rotation. Students will spend their first day in an orientation session that will include a brief survival in the ED introduction, a suture lab, and an educational video on domestic violence. A course "text" will be provided for the students on orientation day and is theirs to keep. On day two, students will begin primarily evaluating non-emergent patients in the emergency department (EM 2) and report directly to an attending or senior resident. There are four hours of mandatory conferences per week: 8-10 a.m. on Tuesdays and 8-10 a.m. on Wednesdays. There will be an opportunity to participate in helicopter ride-alongs with ARCH Airmedical Services and EMS. Students can expect to gain a wide range of skills in evaluating a variety of complicated and non-complicated patients. At the end of their rotation, students should be familiar with the approach to complex medical conditions like heart attacks, undifferentiated abdominal pain, and complications of pregnancy as well as the "bread and butter" of complaints of ambulatory medicine such as lacerations, simple respiratory tract infections and minor trauma.

WUMS III will be graded on their ability to make a formal patient presentation during a shift, their clinical skills, and their conference attendance. There will be a written test on the last Friday of the rotation based entirely on the material provided to the students at the start of the rotation.

M26 713 AMBULATORY: FAMILY MEDICINE

Instructor: *Walton Sumner II, M.D.*, 454-8164

The family practice clerkship offered to third-year medical students is a preceptorship in which students work one-on-one with board-certified family physicians in St. Louis or outlying areas of Missouri and Illinois. Students may review preceptor profiles and comments that previous students made about preceptors. The clerkship makes every effort to accommodate student preferences for working with specific preceptors. Most students will work with a single preceptor for the duration of the four-week rotation. Some students will work with small groups, sometimes including family practice residents. The student will work closely with preceptors on a daily basis in the family physician's office. Students often accompany their preceptor on nursing home visits, hospital rounds, medical conferences and other educational activities at the discretion of the preceptor. Housing will be provided to students assigned to locations outside the immediate St. Louis vicinity. Weekend call schedules are arranged with the family practice preceptor: students assigned to out-of town locations for this clerkship usually return to St. Louis on the week-

ends. Each student will receive a description of the goals and objectives for the four-week rotation, physical copies of *Clinical Evidence* and the *Manual of Family Practice* textbooks, and handheld computers with additional commercial clinical reference materials to use during the rotation. Students maintain patient encounter logs on handheld computers, and receive two short e-mail assignments during this rotation. Grades are calculated from preceptors' subjective evaluations (normalized for the preceptor), essay responses, and an evaluation of students' attention to primary care issues, as evidenced by encounter logs.

M25 740 DERMATOLOGY CLERKSHIP

Instructor: *Lynn Cornelius, M.D.,* 454-8622

The goal of the dermatology clerkship is to provide a guide for the student to appreciate dermatology within the broader perspectives of medicine and biology. The student will develop familiarity with dermatologic vocabulary, learn to recognize and initiate therapy of common dermatologic disorders and become cognizant of uncommon or complicated dermatologic problems that require specialty care. Emphasis will be placed on careful history taking and physical examination. Students will always work under the direction of the resident physician and the attending physicians in the clinic setting.

The student will participate in outpatient care at the following hospitals and affiliated clinics: Barnes-Jewish Hospital, Children's Hospital, Barnes-Jewish West County Hospital, the Veterans Administration Medical Center and Homer G. Phillips Hospital. These hospital settings will provide the student with ample exposure to a diverse patient population. Students will attend all clinical teaching rounds and conferences in addition to the basic science and cutaneous histopathology conferences. Normal workday hours are 8 a.m. to 5 p.m. with no night or weekend on-call responsibilities. Each student is provided with copies of the two recommended textbooks, *Principles of Dermatology* by B. Looking and *The Color Atlas and Synopsis of Clinical Dermatology* by T. B. Fitzpatrick for use during the clerkship; the textbooks are returned to the clerkship coordinator at the end of the clerkship for use by other students rotating in the dermatology division.

The rotation attending physician and the resident physician will submit an evaluation based on the student's clinical skills, presentation, attitudes, overall performance and the end-of-rotation written exam score.

M25 750 GERIATRIC CLERKSHIP

Instructor: *David B. Carr, M.D.*, 286-2706

The primary goal of the four-week clerkship in Geriatrics is to provide an opportunity for students to gain proficiency in the principles of geriatric evaluation, including the medical, psychological, social and functional assessments of older adults. Direct, hands-on experience with patients is a major feature of the clerkship. Students are expected to participate in the evaluation of three to five patients per week, in a variety of settings including the hospital Acute Care for the Elderly (ACE) unit on 3200 North Campus, the Older Adult Outpatient Assessment Program (Storz Building) and the Long Term Care Setting (Barnes Extended Care in Clayton). Students attend hospice, geropsychiatry rounds, and the geriatric conferences while on the rotation.

Students are assigned to a variety of attendings to enhance the experience. There is no night call or call on weekends. Participation on the hospital consult service will occur depending on volume. The day normally begins at 8 a.m. and is usually finished by 5 p.m. There will be time to read the detailed syllabus/bibliography. Students will be asked to present a brief topic of their choice at the end of the rotation and demonstrate knowledge of the geriatric screens and assessments.

M25 730 PHYSICAL MEDICINE AND REHABILITATION

Coursemaster: *Oksana Volshteyn, M.D.,* 454-7757

Clerkship in PM&R for third-year medical students provides an opportunity to gain basic knowledge and clinical skills in evaluation and management of a wide range of neurological and musculoskeletal diseases and conditions that require specialized rehabilitative medical and therapeutic care. Students spend two weeks on the Spinal Cord Injury Unit (SCI) and two weeks on the Brain Injury (BI) and Stroke Unit at The Rehabilitation Institute of St. Louis. Students are expected to be a part of the rehabilitation team, follow two to three patients, participate in daily morning rounds, participate in performing consults, and attend team meetings and family conferences.

Students are required to attend several outpatient clinics such as SCI, BI, Amputee and Stroke. During the entire rotation, students work with PM&R residents and fellows, and under direct guidance of the NeuroRehabilitation faculty. The usual duty hours are 7-7:30 a.m. to 5 p.m. weekdays, and 8 a.m. to noon on Saturdays. There is no night call.

Students are required to attend all PM&R curriculum lectures and conferences.

On the first day of rotation, students meet with the PM&R program director to go over goals, objectives and schedules. Upon completion of the rotation, students are required to fill out the evaluation form to provide feedback regarding rotation experience.

Clinical Pathological Conference

The clinical course, laboratory and radiologic studies, and pathological findings of a patient are discussed using a problem-solving format at a weekly conference by members of the Departments of Medicine, Pathology and Radiology.

Daniel M. Goodenberger, M.D., chief residents and medical staff; Louis P. Dehner, M.D., and pathology staff

FOURTH YEAR
Electives

M25 801 HONORS MEDICINE—GENERAL MEDICINE

Instructor: *Thomas M. De Fer, M.D.,* 362-8050

The purpose of the "Honors Medicine" elective (subinternship) is the development of expertise in the care of hospitalized patients in a well-supervised teaching environment. Subinterns act as their patients' interns under the supervision of residents and attending physicians. Subinterns have the same on-call and admitting schedules as the interns on their teams and are assigned up to two new patients on each admitting day. Because of a lack of appropriate call rooms, subinterns are not required to spend call nights in the hospital. Except in emergencies, subinterns are the first individuals to evaluate patients admitted to medical service teams. A diagnostic and therapeutic approach to the patient is planned in consultation with the resident. Subinterns assume primary responsibility for the daily care of their patients, under the supervision of resident and attending physicians. This includes evaluation on daily rounds, scheduling and obtaining results of diagnostic studies, planning therapy, making arrangements for care after discharge and communicating with patients and their families. Subinterns attend the same conferences as the house staff. **Valid start weeks for 4-weeks blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 805 RHEUMATOLOGY

Instructor: *Richard D. Brasington, M.D.,* 454-7279

Students will be involved in the diagnostic work-up and management of patients with rheumatic illnesses including autoimmune diseases such as systemic lupus erythematosus and rheumatoid arthritis, inflammatory disorders such as vasculitis (polyarteritis, Wegener's, temporal arteritis), spondyloarthropathies (ankylosing spondylitis, Reiter's syndrome), common afflictions such as osteoarthritis, gout and regional musculoskeletal problems, and synovial fluid analysis. By working closely with a faculty member, fellows and medical residents, students become integral and active members of the rheumatology service for inpatient consultations and outpatient clinics at Barnes-Jewish Hospital. An emphasis is placed on the physical examination of joints and the musculoskeletal system. Students attend a rheumatology conference held weekly. An extensive collection of self-study materials, including reprints, textbooks, slides and CD-ROM discs is available. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 807 HONORS MEDICINE—VA MEDICAL CENTER

Instructor: *Lewis R. Chase, M.D.,* 289-7030

Subinternship in medicine offers practical experience in the care of patients. Subinterns are an integral part of the house staff team, working under the supervision of a resident and attending physician. Their responsibilities for patients assigned to them are similar to those of interns. Patients are followed by the subintern throughout all levels of care including ICU, telemetry, stepdown and general wards. Subinterns take night call with their team and participate in the teaching conferences of the Department of Medicine. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 809 HYPERBARIC MEDICINE AND PROBLEM WOUND MANAGEMENT

Instructor: *John D. Davidson, M.D., and staff,* 205-6818

The specialty of hyperbaric medicine centers on the use of oxygen under increased atmospheric pressure as a drug for the treatment of many disparate diseases and clinical problems. This elective allows a student to have an acquaintance with this technology, which has a definite role in a wide range of differing specialties including emergency medicine, otolaryngology, plastic and reconstructive surgery, military medicine, rheumatology, dermatology, oral surgery, radiation oncology, internal medicine, neurology and psychiatry, to name a few.

Since students going into these specialities do not need to learn about hyperbaric medicine in depth, but nevertheless would benefit by some exposure to it, we can arrange a mini-elective of one to two weeks' duration. This "exposure elective" can be tailored to a student's special field of interest just as we attempt to do in the usual four-week program. Please call the instructor for more information. **Valid start weeks for 2-week blocks are:** Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

M25 810 GERIATRIC MEDICINE

Instructor: *David B. Carr, M.D.,* 286-2700

Students will participate in care in the skilled nursing facility, the inpatient geriatric consultation service, the outpatient geriatric assessment center, the Acute Care for the Elderly (ACE) unit and the nursing home. Attendance at scheduled research and clinical conferences in geriatric medicine, memory and aging, geropsychiatry, and hospice is required. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 811 CLINICAL INTERNAL MEDICINE—HOSPITALIST

Instructor: *Mark Thoelke, M.D.*, 747-1499

This course allows the student to work one-on-one with hospitalist physicians on a patient care team. The student acts as the intern under the direct supervision of the attending physician. Daily responsibilities include admission history and physicals, daily notes and discharge summaries on assigned patients. S/he also will have the opportunity to perform indicated procedures on all patients on this service. Students are encouraged to participate in Department of Medicine conferences. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 814 CLINICAL EMERGENCY MEDICINE, BARNES-JEWISH HOSPITAL

Instructors: *Mark Levine, M.D.*, 362-6743; *Sanford Sineff, M.D.*, 362-7959

This rotation offers practical experience in the evaluation and management of acutely sick and injured patients. Students will function as subinterns, initially evaluating their assigned patients and developing a plan for further diagnostic studies and therapy. They will report to a senior level resident or an attending physician. The student can expect to get an opportunity to perform a wide variety of procedural skills such as suturing, splinting, peripheral and central venous access, and cardiopulmonary resuscitation. Shifts will be eight hours and students will rotate between day, evening and night shifts, including weekend shifts, in order to gain maximum exposure to all types of emergencies. A core content of lectures will be provided. Students are offered the opportunity to ride with EMS and/or Arch, though this is optional and not required or evaluated. Students desiring a letter of recommendation from Lawrence M. Lewis, M.D., Chief of Emergency Medicine, must take this WUMS IV Emergency Medicine rotation. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 821 INPATIENT CARDIOLOGY

Instructors: *Mark S. Weinfeld, M.D.*, 362-1291; *Craig K. Reiss, M.D.; Benico Barzilai, M.D.; Michael A. Beardslee, M.D.; Alan C. Braverman, M.D.; Charles C. Carey, M.D.; Keith Mankowitz, M.D.; Srihari Thanigaraj, M.D.; Suma A. Thomas, M.D.*

Students will participate as members of the Barnes-Jewish Cardiology at Washington University Consultative Team. They will be part of a team composed of faculty members, fellows, residents, and nurse specialists that sees a large population of cardiac patients and follows them through all aspects of their in-hospital care. Emphasis will be placed on physical examination and the interpretation of modern cardiac diagnostic tests in clinical decision making. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 822 HONORS MEDICINE—CARDIOLOGY

Instructor: *Thomas M. De Fer, M.D.*, 362-8050

The structure and functioning of the "Honors Medicine—Cardiology" elective (subinternship) is very similar to the general medicine subinternship (M25 801). The basic purpose is to develop expertise in the care of hospitalized patients in a well-supervised teaching environment. The majority of patients admitted to the service will have a cardiology diagnosis as the main reason for admission. Some general medical problems will also be seen. All attendings on the service are cardiology subspecialists. Cardiology fellows act as the chief resident for the service on a monthly basis. Subinterns act as their patients' interns under the supervision of residents and attending physicians. Subinterns have the same on-call and admitting schedules as the interns on their teams and are assigned up to two new patients on each admitting day. Because of a lack of appropriate call rooms, subinterns are not required to spend call nights in the hospital. Except in emergencies, subinterns are the first individuals to evaluate patients admitted to medical service teams. A diagnostic and therapeutic approach to the patient is planned in consultation with the resident. Subinterns assume primary responsibility for the daily care of their patients, under the supervision of resident and attending physicians. This includes evaluation on daily rounds, scheduling and obtaining results of diagnostic studies, planning therapy, making arrangements for care after discharge and communicating with patients and their families. Subinterns attend the same conferences as the internal medicine house staff. There are also several conferences specific to the cardiology service. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 823 CLINICAL CARDIOLOGY—VA HOSPITAL

Instructor: *H. Wade Martin III, M.D.*, 289-6329

The major purpose of this elective in clinical cardiology at the John Cochran VA Hospital is to improve evaluation and management skills for diagnosis and treatment of important cardiovascular conditions such as coronary artery disease including acute myocardial infarction, congestive heart failure, hypertension and valvular heart disease. The rotation is designed to be flexible enough to accommodate a wide variety of course objectives but includes the opportunity to participate in 1-3 outpatient clinics per week; 1-4 weeks of inpatient intensive care, telemetry or cardiology consultation rounds; and ECG, stress testing, nuclear imaging or echocardiographic reading sessions, cardiac catheterization and electrophysiologic procedures. The emphasis will be on improvement of the ability to diagnose and treat cardiovascular disease on the basis of information obtained from a thorough history and physical examination that is integrated with data from

appropriate highly targeted laboratory studies in a manner that optimizes patient outcome and minimizes risk and costs. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 825 CARDIAC ARRHYTHMIAS AND ELECTROPHYSIOLOGY

Instructor: *Bruce D. Lindsay, M.D.,* 454-7834

This elective provides the student with exposure and teaching in the diagnosis and treatment of complex cardiac rhythm disturbances. Specifically, the student is expected to evaluate patients referred for evaluation and treatment of complex or life-threatening rhythm disturbances, unexplained syncope or sudden cardiac death. Rounds are made daily on hospitalized patients, and students are welcome to observe electrophysiologic studies or implantation of pacemakers and defibrillators. This elective also provides an intensive opportunity to learn clinical electrocardiography and the systematic use of antiarrhythmic drugs. Finally, since patients with chronic, complex rhythm disturbances frequently have organic heart disease, a broad-based exposure to general cardiology is also part of this elective. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 827 HEART FAILURE/CARDIAC TRANSPLANTATION

Instructor: *Joseph G. Rogers, M.D.,* 454-7009

This rotation is intended to provide trainees with a comprehensive experience managing patients with advanced heart failure. In addition to daily rounds, trainees are invited to attend both heart failure and transplant clinics. Further, the curriculum is supplemented by a comprehensive syllabus that contains the critical literature pertinent to this patient population. The trainees will also have experience with the evaluation of patients for operative heart failure therapies and will have the opportunity to observe these surgical procedures. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 828 ADVANCED INTERNAL MEDICINE ACTING INTERNSHIP

Instructor: *Thomas M. De Fer, M.D.,* 362-8050

The Advanced Acting Internship is intended for motivated fourth-year students interested in a more traditional subinternship experience. The overall structure and goals are similar to Honors Medicine (M25 801). However, two students will *replace* one medicine intern on a ward team and will care for their patients under the direct supervision of the resident and attending. The students will stay on-call in the hospital every other call night. Because of scheduling issues, students will rotate on the same schedule as the Department of Medicine interns (*i.e.*, one week after the usual WUMS elective intervals). Students who complete this elective would be very competitive for the highest quality internal medicine residency programs. Interested students must contact the coursemaster before signing up for the elective. **Valid start weeks for 4-week blocks are:** Weeks 6, 11, 14 and 18.

M25 830 DERMATOLOGY

Instructor: *Dermatology staff,* 454-8622

The aim of this elective is to provide a guide for the student so that s/he is able to appreciate dermatology within the broader perspectives of medicine and biology. Emphasis will be placed on the dermatologic variations encountered in a normal physical examination of the skin, the identification of common skin diseases and dermatologic clues to systemic disease, as well as those dermatologic conditions that are life threatening. The student will participate in outpatient care at Barnes-Jewish Hospital and affiliated clinics. Students will attend all clinical teaching rounds and conferences in addition to the basic science and cutaneous histopathology conferences. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 831 PEDIATRIC DERMATOLOGY

Instructor: *Susan B. Mallory, M.D.,* 454-2714

This clinical rotation will be available to students interested in dermatology, pediatrics or both. Students will follow the dermatology rotation (M25 830) with an emphasis on pediatric dermatology by attending pediatric dermatology clinics, seeing consults, etc. Enthusiastic students will have an opportunity to write up a case report if they wish, but need to notify the instructor before the course. Students can take either this elective or M25 830—not both. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 836 CLINICAL GASTROENTEROLOGY AND HEPATOLOGY

Instructor: *Jeffrey S. Crippin, M.D.,* 454-8141

The GI Hepatology elective is integrated into a very active inpatient/outpatient and endoscopy service at Barnes-Jewish Hospital. Students will participate in the evaluation of inpatients and outpatients with a spectrum of gut and liver disorders, will make patient rounds with the faculty and fellows, and have responsibility for patients on whom consultations have been requested. In addition, they will observe biopsy, endoscopic and intubation techniques and participate in outpatient clinic and GI conferences. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 844 HEMATOLOGY AND HEMOSTASIS

Instructors: *Philip W. Majerus, M.D.; Morey A. Blinder, M.D.; Stuart A. Kornfeld, M.D.,* 362-8801

Activities planned include work-up of patients at Barnes-Jewish Hospital under the supervision of the hematology fellow and his staff consultant; atten-

dance at clinical rounds three to five hours weekly; participation in outpatient clinics; experience in various procedures, especially blood and bone marrow morphology and in interpretation of coagulation tests. Weekly student rounds with a senior staff person. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 847 BONE AND MINERAL DISEASES

Instructors: *Roberto Civitelli, M.D.; Michael P. Whyte, M.D.; Roberto Pacifici, M.D.; Reina Villareal, M.D.; Kathryn M. Diemer, M.D.; Dwight A. Towler, M.D.,* 454-8408

The course is designed to acquaint the student with the clinical, radiological and pathological manifestations of disorders of bone and mineral metabolism and their etiology and pathogenesis, and to expose him/her to current concepts of therapy. The student will see patients at Barnes-Jewish Hospital, St. Louis Children's Hospital and Shriners Hospital for Children.

Acquired and heritable bone diseases will be studied in the context of derangements of mineral homeostasis with emphasis on vitamin D and peptide hormone metabolism and skeletal formation and remodeling. The role of non-invasive methods for measuring bone mass in the diagnosis and management of skeletal diseases also will be stressed.

While students rotate through the Division of Bone and Mineral Metabolism, they will be asked to participate in the weekly divisional conferences. Faculty and medical students will present interesting cases for discussion or the students can present a pertinent topic they have researched during their rotation presenting the recent medical literature on topics related to bone metabolism, bone densitometry, and patient care issues involving osteoporosis, metabolic bone disease, Paget's disease, congenital bone diseases or other topics encountered during their clinical experience. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 850 HEMATOLOGY AND ONCOLOGY IV

Instructors: *Scot G. Hickman, M.D.; Ravi Vij, M.D.; Vorachart Auethavekiat, M.D.,* 289-6308

The student will have major inpatient and outpatient exposure to the management of the following: non-small cell and small cell lung cancer, carcinoma of the colon, prostate cancer, lymphoma and leukemia. A wide variety of more esoteric tumors and hematological pathology may be encountered. In addition to diagnosis, staging and management, general oncological topics such as pain management, hypercalcemia of malignancy and malignant effusions will be discussed. The weekly schedule includes morphology sessions, multidisciplinary conferences and tutorial sessions with the student alone, which will require prior literature review. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 855 CLINICAL INFECTIOUS DISEASES

Instructor: *Nigar Kirmani, M.D.,* 454-8214

Study of patients with infectious diseases. The elective is designed to teach students the fundamentals of evaluating clinical problems in infection and formulating plans for workup and therapy. Students see consultations in infectious diseases in every part of Barnes-Jewish Hospital under the supervision of a faculty member who rounds with them every day. They work closely with medical residents and infectious disease fellows, follow their own patients and play an important role in their management. They are expected to read the literature about their patients and participate in clinical conferences. They attend teaching rounds and conferences and lectures in infectious diseases. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 865 INTENSIVE CARE MEDICINE—BARNES-JEWISH NORTH

Instructor: *Stephen S. Lefrak, M.D., and staff,* 454-7116

This elective in intensive care is offered in the Intensive Care Unit at Barnes-Jewish Hospital, North Campus. This unit has 10 intensive care beds providing intensive nursing care and life-support technology. The patients represent a mixture of patients with primarily medical problems. Patient care responsibility includes night call. In addition to patient responsibility, there are regularly scheduled conferences and attending rounds. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 867 MEDICAL INTENSIVE CARE

Instructor: *Marin H. Kollef, M.D.,* 454-8764

This elective is offered as an opportunity to gain additional experience in acute, primary care medicine. The elective is an advanced course in patient care involving complex medical problems. Responsibilities involve working up new patients with the MICU team, case presentations and attendance at conferences. Conferences consist of attending rounds Monday through Saturday, radiology rounds Monday through Saturday, pulmonary conference and medical grand rounds on Thursday and critical care conference once each month. Call schedule is every third night. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 870 ENDOCRINONOLOGY, DIABETES AND METABOLISM

Instructor: *Clay F. Semenkovich, M.D., and staff.* 362-7617

Students taking this elective see patients with endocrine and metabolic diseases in the Outpatient Consultation office and inpatients at Barnes-Jewish Hospital and the General Clinical Research Center.

They will present these cases at formal rounds. They will also participate in informal rounds with the division and at divisional seminars. Extensive interaction with patients with diabetes and a diabetes education program are included, as is involvement with patients with thyroid, pituitary, adrenal, gonad and metabolic bone disease, as well as lipid disorders. Ample opportunities will be provided for discussions of patient problems with the members of the division. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 873 ONCOLOGY I

Instructor: *Ramaswamy Govindan, M.D.,* 362-4819

Students will gain experience in the initial treatment of newly diagnosed malignancies and the outpatient management of oncology patients. Participation in multidisciplinary tumor conferences will stress a combined-modality approach to management, incorporating chemotherapy, radiotherapy and surgery. Students will see patients with a variety of malignancies, including lymphoma, myeloma and tumors of the lung, breast and colon. Management of hypercalcemia and other paraneoplastic syndromes, as well as cancer pain management will be covered. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 875 EXERCISE IN HEALTH MAINTENANCE AND TREATMENT OF CAD AND DIABETES

Instructors: *John O. Holloszy, M.D.; Ali A. Ehsani, M.D.; Linda Peterson, M.D.,* 362-3506

Exercise testing, including exercise electrocardiography, exercise echocardiography, measurement of O_2 uptake capacity, noninvasive cardiac output measurement, radionuclide studies during exercise, body composition determination and evaluation of the degree of physical frailty in the elderly. Exercise training to reverse physical frailty in old people in danger of losing their independence and in the treatment of hypertension, obesity, osteoporosis and diabetes. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 876 EXERCISE PHYSIOLOGY

Instructor: *Ali A. Ehsani, M.D.,* 362-2395

Includes performing and interpretation of exercise testing, measurement of oxygen uptake and cardiac output. Students will participate in the management of patients undergoing exercise training. **Valid start dates for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 880 PULMONARY MEDICINE—BARNES-JEWISH HOSPITAL

Instructor: *Daniel Rosenbluth, M.D., and staff,* 454-8762

Students will acquire skills in the evaluation and management of patients with pulmonary diseases and in the interpretation of pulmonary function tests. They will gain experience in outpatient Lung Center and attend regular pulmonary and critical care medicine conferences. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 882 PULMONARY MEDICINE—VA HOSPITAL

Instructor: *Carlos C. Daughaday, M.D.,* 289-6306

Students will participate in several ambulatory care activities of the Pulmonary Section, including outpatient consultations of common respiratory disorders such as COPD, obstructive sleep apnea, lung cancer and tuberculosis, and follow-up of primary care patients with pulmonary disease. In addition, students will round in medical intensive care units, interpret pulmonary function tests, participate in bronchoscopy and attend scheduled teaching conferences of the Pulmonary Division. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 883 TRANSFUSION MEDICINE

Instructor: *Lawrence T. Goodnough, M.D.,* 362-1546

This elective is designed to introduce the student to the clinical aspects of blood banking and interventional hematology. The four-week elective will consist of regular didactic sessions with senior staff, teaching conferences, participation in daily clinical rounds and exposure to developing programs. The student will develop clinical skills in areas related to transfusion practice, blood conservation and evaluation of transfusion reactions. Complex hematologic diseases such as the coagulopathies and diseases that require apheresis will serve to instruct in current clinical practice along with evolving applications of interventional hematology, such as photopheresis and peripheral stem cell harvest for marrow transplantation. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 884 BONE MARROW TRANSPLANTATION AND STEM CELL BIOLOGY

Instructor: *John F. DiPersio, M.D., Ph.D.,* 362-9339

Intense four-week clinical rotation exposing interested fourth-year medical students to the clinical world of bone marrow transplantation and to the basic science of hematopoiesis and stem cell biology. Students will be primarily responsible for the care of autologous and allogeneic BMT recipients. In addition, they will be exposed to methods of stem cell harvest, cryopreservation and immunophenotyping. This rotation plans to provide motivated students with an ideal mix of clinical medicine and basic science. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 885 OCCUPATIONAL/ENVIRONMENTAL MEDICINE

Instructor: *Bradley A. Evanoff, M.D., M.P.H.,* 454-8638

This elective is designed to introduce students to both the clinical treatment and the prevention of work-related injuries and illnesses. Clinical activities will include the diagnosis and treatment of workers with illnesses due to chemical exposure and repetitive motion, as well as acute injuries. Preventive activities will include work site visits and intervention projects, as well as involvement with work site health promotion and policy making. Specific activities are flexible depending on the students' interests. Students are also urged to contact the instructor if they wish to participate in research projects concerning the epidemiology of work-related diseases.

Students may elect to participate in the Interdisciplinary Environmental Clinic at Washington University. Based in the law school, the clinic involves interdisciplinary teams of students (law, engineering, environmental science) taking principal responsibility, under faculty supervision, for cases and projects on behalf of environmental and community organizations. The medical student(s) would assist clinic students by evaluating the human health impacts involved in one or more of the clinic's cases, and presenting such information to the client organization(s) and others. Among the cases on which medical students might participate are: (1) air pollution associated with proposed cement plant upwind of the St Louis metropolitan area; (2) lead poisoning of children in the City of St. Louis; (3) lead poisoning of children and long-term exposure of adults to lead and possibly other metals in Herculaneum, Missouri; (4) air and water pollution caused by concentrated animal feeding operations (factory farms) in northern Missouri. Students choosing this option will work with the Environmental Clinic staff and with the instructor to evaluate and present evaluations of human health impacts of environmental exposures. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 887 CLINICAL CARDIOVASCULAR MEDICINE

Instructor: *Thomas F. Martin, M.D.,* (573) 308-1301

Clinical cardiology with some internal medicine in a rural setting. Room and board provided. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 25, 29, 33 and 37.

M25 890 CLINICAL NEPHROLOGY

Instructor: *Daniel W. Coyne, M.D.,* 362-7211

Students assist in both the inpatient and outpatient areas to diagnose patients with acute and chronic renal failure, glomerulonephritis, and electrolyte disorders. The student is a full member of the inpatient renal consult service, diagnosing and treating patients with acute and chronic renal disease and electrolyte disorders. Students will learn electrolyte management, drug dosing, dialysis procedures and complications, kidney biopsy reading and the management of acute and chronic renal failure. Students are also encouraged to spend three half-days in the outpatient center rotating to the General Renal Clinics, the Renal Stone Clinic and the Transplant Clinic. Throughout the rotation, students work closely with two attendings and two renal fellows. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 893 ADULT ALLERGY AND CLINICAL IMMUNOLOGY

Instructor: *H. James Wedner, M.D.,* 454-7937

Students will participate in the allergy consult service at Barnes-Jewish Hospital, North and South Campus. The student will serve as the primary allergy consult for inpatient and Emergency Room consultation and present each patient to the allergy fellows on call and the attending physician. Students will attend the Adult Allergy Clinic, Pediatric Allergy Clinic and the Asthma Center at Barnes-Jewish West County Hospital. Conferences on selected topics in allergy and clinical immunology will be held with the attending staff two to three afternoons a week. **Valid start weeks for 4-week blocks are:** 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 896 INTERDISCIPLINARY MUSCULO-SKELETAL MEDICINE

Instructor: *Leslie E. Kahl,* M.D., 454-7257

This elective will present interdisciplinary musculoskeletal medicine in an ambulatory setting. Students will attend clinics and selected conferences in adult rheumatology, pediatric rheumatology, sports medicine/orthopaedics, osteoporosis/bone health, and physical medicine. A reading list will be provided. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M80 809 AMBULATORY CARE—JACQUELINE MARITZ LUNG CENTER

Instructors: *Stephen S. Lefrak, M.D.; Daniel Rosenbluth, M.D.,* 454-7116

The Jacqueline Maritiz Lung Center houses the ambulatory care activities of the Divisions of Pulmonary Medicine, Thoracic Surgery and Allergy/ Immunology, as well as the pulmonary function laboratory. The student will rotate through (1) both general pulmonary and subspecialty clinics in Pulmonary Medicine (cystic fibrosis, transplantation, emphysema, etc.), (2) Thoracic Surgery new patient clinics, (3) Allergy/ Immunology clinic, and (4) interpretation of pulmonary function tests. Chest imaging is also emphasized in the evaluation process. The rotation can be streamlined to meet areas of emphasis desired by individual students. **Valid start weeks for 4-week blocks are:** Weeks 17, 21, 25, 29, 33, 37 and 41.

Research (M25 900)

Dana R. Abendschein, Ph.D., 362-8925
Research in this basic science laboratory is focused on responses of the arterial wall to injury and on mediators of coagulation that may contribute to acute rethrombosis after coronary fibrinolysis and accelerated restenosis after coronary angioplasty. Current studies are designed to define the time after vessel injury that the luminal surface remains procoagulant, to define the molecular expression of determinants of procoagulant activity associated with the site of injury and their changes with time, and to determine whether agents that inhibit the activity of procoagulant moieties can alter vascular remodeling leading to decreased acute thrombosis and subsequent restenosis in animal models of vascular injury. Students will be expected to observe procedures in experimental animals, to participate in analyses of procoagulant moieties and vascular wall proteins, and to participate in weekly laboratory meetings.

John P. Atkinson, M.D., 362-8391
A clinical research elective is offered in evaluation of patients with complement deficiency states and complex rheumatic disease syndromes.

Michael E. Cain, M.D., 747-3032
Delineation of mechanisms responsible for clinical arrhythmias, improved identification of patients at risk for developing sudden cardiac death, evaluation of new antiarrhythmic agents, evaluation of new antitachycardia pacing devices, signal-averaged ECGs and catheter ablation of arrhythmias.

Roberto Civitelli, M.D., 454-8408
The biology of cell-cell interactions and communication in bone via gap junctions and cell adhesion molecules. Function of connexins in transcriptional control of osteoblast differentiation, osteoclastogenesis, and mechanotransduction. Modulation of mesenchymal lineage allocation and osteogenic differentiation by cadherins and b-catenin signaling.

Philip E. Cryer, M.D., 362-7617
Studies of the physiology and pathophysiology of metabolic regulation in normal humans and patients with diabetes mellitus with a focus on hypoglycemia.

Nicholas O. Davidson, M.B.B.S., 362-2027
Fatty liver disease in patients with hepatitis C. Our laboratory is interested in the molecular mechanisms of hepatic steatosis, particularly in patients with hepatitis C. We work with cultured cell lines that express the viral polyprotein and with various genetically manipulated mouse strains that offer insights into the mechanisms of hepatic steatosis. The student would work as part of a team, designing and conducting experiments that will test hypotheses concerning HCV mediated steatosis. These studies could range from experiments examining the expression of candidate genes in liver samples from patients with HCV and steatosis to studies in cell lines and in experimental animals in which elements of hepatic lipid biosynthesis and secretion are examined more closely, using molecular and biochemical techniques. In addition we are using microarrays to study the spectrum of genetic changes that may predict the extent of hepatic lipid accumulation in patients with steatohepatitis. In particular, we are studying obese patients undergoing weight-loss surgery to determine the range of candidate genes that accompany different degrees of steatosis.

Thomas M. De Fer, M.D., tdefer@im.wustl.edu or defert@msnotes.wustl.edu, 362-8050
Special projects in medical education. Through special arrangement with and approval by the coursemaster, fourth-year students will participate in special projects in medical education. Typical projects will require approximately four weeks to complete. These four weeks can occur consecutively (preferred) or be spread out somewhat as needed. Medical education projects should be aimed at improving the curriculum, student experience, and/or administration of the Internal Medicine Clerkship or the Subinternship. Interested students should contact the coursemaster via phone or e-mail to discuss the proposed project. Those who are interested but would like guidance in designing a project should also contact the coursemaster.

Arthur Z. Eisen, M.D., 362-8180
Proteolytic degradation of the extracellular matrix. Behavior of fibroblasts in a collagen lattice (skin equivalent).

Bradley A. Evanoff, M.D., M.P.H., 454-8638
Occupational medicine epidemiology research. My research involves the use of epidemiology methods to characterize associations between diseases and work-related exposures. I am also doing studies that evaluate the detection and treatment of work-related musculoskeletal diseases. During an elective in occupational medicine epidemiology research, students will learn how to use epidemiologic methods to investigate disease processes by working on a mutually agreed-on topic of interest related to occupational diseases. Other activities can include work site visits and intervention projects, as well as involvement with work site health promotion and policy making. Elective length is variable depending on individual circumstances. Please contact Bradley A. Evanoff, M.D., M.P.H., to discuss this research.

Gregory I. Goldberg, Ph.D., 362-8172
Role of secreted extracellular matrix metalloproteases in tissue remodeling. Structure and function of the metalloproteases.

Mitchell H. Grayson, M.D., 454-7412
Dendritic cells in viral airway disease. Our laboratory is interested in understanding the recruitment of dendritic cells to murine airways and their subsequent effects on the immune response. In particular we are interested in the role that dendritic cells play

in the generation of an asthmatic phenotype after viral infection. We use a murine viral model (Sendai virus) that generates changes in murine lung consistent with that seen in human asthma. Ongoing investigations include examining the phenotypic changes in dendritic cells in the murine airway following viral infection and the mechanisms underlying the recruitment and trafficking of these dendritic cells. Participants in this elective will learn cell culture, animal model and flow cytometric techniques among others.

Richard W. Gross, M.D., Ph.D., 362-2690
Lipid mediators of signal transduction in the cardiovascular system. Characterization of regulatory mechanisms responsible for the liberation of lipid second messengers during cellular activation.

Marc R. Hammerman, M.D., 362-8233
Studies characterizing the transplantation of kidney and pancreatic anlage as a means to "grow new organs" in the settings of end-stage chronic renal failure and diabetes mellitus.

John O. Holloszy, M.D., 362-3506
The research in our laboratory deals with the roles of exercise in the prevention and reversal of abdominal obesity, insulin resistance and diabetes. Much of our research is directed to elucidation of the mechanisms by which exercise activates glucose transport and enhances insulin sensitivity in muscle. Our current research is focused on the signaling pathways by which exercise activates glucose transport and enhances insulin sensitivity in muscle.

Keith A. Hruska, M.D., 286-2772
The research in the laboratory focuses on new therapies for chronic kidney disease and its complications. The mechanisms of action of these therapies for nephropathy, vascular calcification and renal bone disease are being analyzed.

Stuart A. Kornfeld, M.D., 362-8803
Synthesis, processing and sorting of glycoproteins, including lysosomal enzymes. Intracellular protein trafficking.

Sándor J. Kovács, Ph.D., M.D., 454-8097
For students with math, physics and engineering background. Cardiovascular biophysics research elective concentrates on physiologic modeling and comparison of model predictions to *in vivo* human data. Minimum of eight weeks of elective time.

Jack H. Ladenson, Ph.D., 362-3186
Development of monoclonal and single-chain antibodies for use in research and in diagnostic testing.

Marc S. Levin, M.D.; Deborah C. Rubin, M.D., 362-8933, 362-8935
Students will be members of a collaborative research team headed by Marc S. Levin, M.D., and Deborah C. Rubin, M.D., (associate professors, Department of Medicine) investigating the mechanisms underlying the intestinal adaptive response that occurs to compensate for loss of functional small intestine. The student will have the opportunity to learn basic molecular biology and physiology as it relates to small intestinal growth, development and function. Examples of techniques that are used in these studies include small animal surgery (mice and rats), molecular biological techniques including PCR, Northern blotting, vector construction for production of transgenic and knockout mouse models, *in situ* hybridization and immunohistochemistry.

Lawrence M. Lewis, M.D., 362-4362
Emergency medicine research elective. This elective offers an opportunity to investigate a wide variety of clinical questions relevant to emergency medicine, such as prevention of injury and trauma, toxicology, outcomes and cost-containment research, and public policy issues as well as the prehospital care of sick or injured patients. A preceptor would assist the student with literature review, study design and data analysis. Students with original research ideas would be encouraged to complete their work to the point of abstract presentation or manuscript preparation. Interested students should contact the Emergency Medicine Division at 362-4362.

Philip W. Majerus, M.D., 362-8801
Biochemistry of platelets, regulation of lipid metabolism in tissue culture; mechanism of platelet thrombus formation.

Jeffrey D. Milbrandt, M.D., Ph.D., 362-4650
We have several ongoing projects in our laboratory. (1) The biological function of the GFL family of neurotrophic factors (GDNF, neurturin, persephin and artemin) that signal through a receptor complex containing the Ret tyrosine kinase. These factors promote survival of multiple neuronal populations including dopaminergic neurons, which degenerate in Parkinson's disease, motor neurons, which are affected in Lou Gehrig's disease and most neurons of the peripheral nervous system. (2) The biological roles of Egr2/Nab2 in regulating the Schwann cell myelination program and how abnormal function of these transcription factors result in peripheral neuropathies. (3) The development of prostate cancer, especially the role of Egr1 in regulating the PIN to invasive carcinoma transition and the role of the Nkx3.1 homeodomain protein in tumor initiation.

Stanley Misler, M.D., Ph.D., 454-7719
Stimulus-secretion coupling in endocrine cells (B-islet cells and adrenal chromaffin cells) examined using single-cell assays of secretion (capacitance measurements, amperometery).

Aubrey Morrison, M.D., 454-8495
Post transcriptional control of the cyclooxygenase gene(s) by the lymphokines IL-1 and TNF. Interactions of RNA-binding proteins with the 3'-UTR of cyclooxygenase 2 mRNA and their effects on mRNA stability and translational efficiency are evaluated.

Jeremiah J. Morrissey, Ph.D., 454-7464, morrisse@imgate.wustl.edu

During fibrotic kidney disease and during the subtle fibrosis of the kidney with age there is the activation and inhibition of genes traditionally associated with tumor initiation and metastatic growth. In order to gain more global information concerning gene expression during renal disease progression and treatment, gene array analysis will be employed. Results will be integrated with known information in the progression and treatment of arthrosclerotic disease and fibrotic disease of other organ systems.

Linda M. Mundy, M.D., 454-8354

HIV and women's health. Students can select to participate in a variety of clinical investigations:

- Hands-on participation in antiretroviral therapy (ART) adherence research.
- Analysis of ART adherence research.
- Analysis of the clinical utility of the Transtheoretical Model of Health Behavior Change for ART adherence.
- Research topic related to our health services research and health outcomes at the Helena Hatch Special Care Center (**hhscc.wustl.edu**).
- Participation in *Faith in Action Coalition* (partnership with St. Louis community congregations); sponsored by a Robert Wood Johnson Foundation grant.
- Reading elective about women with HIV infection.
- Observation of clinical care.

Richard E. Ostlund, M.D., 362-8286

Our laboratory focuses on the prevention and treatment of coronary heart disease by studying cholesterol absorption, detoxification and elimination from the body. Direct patient studies that use new stable isotopic cholesterol tracers and mass spectrometry techniques complement *in vitro* work on the biochemistry of cholesterol transport in cultured cells.

Curtis A. Parvin, Ph.D., 454-8436

The application of biostatistical theory to data analysis issues in laboratory medicine, with particular emphasis on statistical approaches to characterizing the performance and quality of laboratory tests.

M. Alan Permutt, M.D., 362-8680

Studies of genetic susceptibility to diabetes in humans and experimental animal models through use of recombinant DNA techniques. Families with multiple diabetic members are being characterized clinically, and diabetes genes are being mapped. Collaborative genetic studies are under way in the U.S., Israel and Japan. Islet cDNA genes are being cloned and sequenced to define genes involved in insulin secretion. Mutations in genes are being defined with hereditary disorders of insulin secretion. A new Islet B-cell Functional Genomics Center is being established in the lab to study global gene expression profiles in health and disease.

Katherine Parker Ponder, M.D., 362-5188

Gene therapy for genetic diseases. Our laboratory is interested in using gene therapy to treat genetic deficiencies such as lysosomal storage diseases and hemophilia B. We have developed a retroviral vector that can be efficiently delivered to the liver of mice and dogs, and results in expression that is sufficient to reduce most of the clinical manifestations of hemophilia B and Mucopolysaccharidosis VII. Current studies focus on assessing the immunological consequences of gene therapy, and devising ways to block immune responses to the therapeutic gene when and if they occur. In addition, we are further testing the clinical effect of this gene therapy approach in these and other models of disease.

Samuel A. Santoro, M.D., Ph.D., 362-3110

Research is aimed at defining the molecular mechanisms of cell-cell and cell-substrate adhesion. Investigations are centered on the structure, function and regulation of adhesion receptor molecules in platelet function, development and malignancy.

Gustav Schonfeld, M.D., 362-7038

Molecular genetics and pathophysiology of low LDL syndromes. Studies employ human families, genome scans, positional cloning, genetically altered cells and mice.

Daniel P. Schuster, M.D., 362-3776

Positron emission tomographic studies of the lung. Students will be introduced to murine and other animal models of lung injury and inflammation, techniques involving positron emission tomography and nuclear medicine, mathematical modeling and pulmonary physiology. Specific projects involving questions relevant to pulmonary edema, neutrophilic inflammatory lung disease, or pulmonary gene expression imaging will be assigned according to the student's individual interests. Students with any expertise in bioengineering or computer science are especially invited to apply.

Clay F. Semenkovich, M.D., 362-4454

Biochemistry and molecular biology of enzymes involved in fatty acid metabolism, specifically, lipoprotein lipase and fatty acid synthase. Regulation of gene expression in human skeletal muscle by exercise. Characterization of RNA-binding proteins involved in mRNA stability. The role of fatty acids and triglycerides in atherogenesis. Uncoupling proteins and obesity.

Samuel L. Stanley, Jr., M.D., 362-1071

This lab studies the protozoan parasite *Entamoeba histolytica*, the cause of amebic dysentery and amebic liver abscess. Work in the laboratory has focused on developing models to better understand the immunopathogenesis of amebic infection, and the design and evaluation of recombinant-antigen based vaccines to stimulate mucosal and parenteral immune responses against the parasite.

Thomas H. Steinberg, M.D., 362-9218
We study cell-cell communication mediated by gap junction proteins and P2 (purinergic) receptors. Specific models include bone cells (osteoblasts and osteoclasts), pancreatic islet cells, and macrophages. In addition we are investigating the mechanisms by which gap junction proteins and P2 receptors are involved in the coordination of calcium signaling among cells.

Douglas M. Tollefsen, M.D., Ph.D., 362-8830
Biochemical and physiologic studies of the interactions of plasma protease inhibitors with coagulation proteases. The student will become acquainted with standard biochemical techniques, such as column chromatography, absorption spectroscopy and radioisotope methods, as well as *in vivo* thrombosis models in mice. Minimum of 12 weeks required.

Dwight A. Towler, M.D., and Kathryn M. Diemer, M.D., 454-7765
Bone cell differentiation, growth and metabolism in tissue culture cell-cell communication in bone via intercellular junctions and soluble factors, with emphasis on cytokines and their regulation by hormones and local factors.

John W. Turk, M.D., Ph.D., 362-8190
Phospholipid signaling mechanisms in pancreatic islets. Experience in mass spectrometric analysis of complex lipids is available.

Herbert W. Virgin, M.D., Ph.D., 362-9223
We work on issues at the interface of virology and immunology by analyzing aspects of viral immunity, viral pathogenesis, and viral genetics that contribute to virulence and disease. We focus on latency and pathogenesis of herpes viruses.

H. James Wedner, M.D., 454-7937
Asthma care in the inner city. Students will participate in ongoing studies of the delivery of asthma care to inner-city children and adults. The emphasis will be on direct contact between the asthmatic patients and the student along with an asthma counselor.

H. James Wedner, M.D., 454-7937
Biology of pollen and fungal allergens. Our laboratory has been characterizing the important allergenic proteins from molds and pollen. The allergens are identified using skin test sensitive individuals, and the proteins are isolated and characterized by a combination of physiochemical and molecular biological techniques. These studies should lead to better forms of allergy immunotherapy. Students will participate in the isolation, characterization and modification of major allergens from a number of molds including *Epicoccum nigrum* and several pollens including those from white oak and *Parthenium hysterophoros*, a newly recognized allergen.

Samuel A. Wickline, M.D., 454-8635
Both clinical and basic research programs are offered in the area of cardiovascular bioengineering in association with the new Institute for Biological and Medical Engineering at Washington University. The Institute sponsors a graduate program in biomedical engineering, which is conducted as a joint venture between the medical school and the School of Engineering and Applied Science. Advanced imaging projects are available in: (1) cardiovascular magnetic resonance (Samuel Wickline, M.D., director of Cardiovascular Magnetic Resonance Laboratory, 454-7459); (2) ultrasonics/physical acoustics (Samuel A. Wickline, M.D., co-director of Cardiovascular Division and Director of Medical Ultrasonics Laboratory, 454-8635); and (3) cardiovascular biophysics (Sandor Kovacs, Ph.D., M.D., director of Cardiovascular Biophysics Laboratory, 454-8097). These laboratories feature quantitative approaches to determine the structure, organization and function of cardiovascular tissues with direct clinical applications in magnetic resonance imaging and echocardiography. The program in magnetic resonance imaging comprises assessment of cardiac function, flow, perfusion, angiography and mathematical modeling of stress-strain relationships. The ultrasound and acoustics program comprises ultrasonic tissue characterization of the structure and composition of heart and vascular tissues that reflect fundamental physical properties of materials. The cardiovascular biophysics program is concerned with development of noninvasive techniques useful for mathematical modeling of heart function. In each venue, clinical correlation and case studies are presented and clinical research with direct patient contact is stressed.

Faculty

ADOLPHUS BUSCH PROFESSOR AND CHAIRMAN OF DEPARTMENT

Kenneth S. Polonsky, M.D., University of The Witwatersrand, Johannesburg, South Africa, 1973. (See Department of Cell Biology and Physiology and Clinical Investigation Program.)

Professors Emeriti

Elmer B. Brown, M.D., Washington University, 1950.

Hugh Chaplin Jr., M.D., Columbia University, 1947. (See Department of Pathology and Immunology.)

William H. Daughaday, M.D., Harvard University, 1943.

M. Kenton King, M.D., Vanderbilt University, 1951. (Also formerly Danforth Professor of Preventive Medicine and Public Health)

George S. Kobayashi, Ph.D., Tulane University, 1963. (Microbiology)

J. Russell Little Jr., M.D., University of Rochester, 1956. (See Department of Molecular Microbiology.)

Charles W. Parker, M.D., Washington University, 1953. (See Department of Molecular Microbiology.)

John A. Pierce, M.D., University of Arkansas, 1948.

Mabel L. Purkerson, M.D., Medical College of South Carolina, 1956. (See Department of Pediatrics.)

Professors

William B. Kountz Professor of Medicine

David H. Alpers, M.D., Harvard University, 1960.

Samuel B. Grant Professor of Medicine

John P. Atkinson, M.D., University of Kansas, 1969. (See Department of Molecular Microbiology.)

John P. Boineau, M.D., Duke University, 1959. (See Department of Surgery.)

Anne M. Bowcock, Ph.D., University of The Witwatersrand, 1984. (See Department of Genetics, Department of Pediatrics and Clinical Investigation Program.)

George J. Broze Jr., M.D., Washington University, 1972.

Timothy G. Buchman, Ph.D., The University of Chicago, 1978; M.D., University of Chicago, 1980. (See Department of Anesthesiology and Department of Surgery.)

Tobias and Hortense Lewin Professor of Cardiovascular Diseases

Michael E. Cain, M.D., George Washington University, 1975.

Lewis R. Chase, M.D., Harvard University, 1964. (Chief, Washington University Medical Services, Veterans Administration Medical Center)

Roberto Civitelli, M.D., Siena University, 1980. (See Department of Cell Biology and Physiology.)

Ray E. Clouse, M.D., Indiana University, 1976. (See Department of Psychiatry.)

Marco Colonna, M.D., Parma University School of Medicine, 1983. (See Department of Pathology and Immunology.)

Irene E. and Michael M. Karl Professor of Endocrinology and Metabolism

Philip E. Cryer, M.D., Northwestern University, 1965. (Clinical Research Center) (See Clinical Investigation Program.)

William H. Danforth, M.D., Harvard University, 1951. (See Administration.)

Nicholas O. Davidson, M.B.B.S., University of London, 1974. (See Department of Molecular Biology and Pharmacology.)

Douglas C. Dean, Ph.D., University of Kansas, 1983. (See Department of Cell Biology and Physiology.)

James A. Delmez, M.D., University of Rochester, 1973.

Lewis T. and Rosalind B. Apple Professor of Medicine

John F. DiPersio, M.D., Ph.D., University of Rochester, 1980. (See Department of Pathology and Immunology, Department of Pediatrics and Alvin J. Siteman Cancer Center.)

Rebecca Susan Dresser, M.S., Indiana University, 1975.

William Michael Dunne Jr., Ph.D., Medical College of Wisconsin, 1981. (See Department of Molecular Microbiology and Department of Pathology and Immunology.)

Ali A. Ehsani, M.D., Tehran University, 1965.

The Winfred A. and Emma R. Showman Professor of Dermatology

Arthur Z. Eisen, M.D., University of Pennsylvania, 1957. (Dermatology)

Seth A. Eisen, M.D., Washington University, 1966.

Alex S. Evers, M.D., New York University, 1978. (See Department of Anesthesiology and Department of Molecular Biology and Pharmacology.)

Victoria Fraser, M.D., University of Missouri, 1983.

Edward M. Geltman, M.D., New York University, 1971. (See Department of Radiology.)

Daniel E. Goldberg, M.D., Ph.D., Washington University, 1985. (Howard Hughes Medical Institute Assistant Investigator) (See Department of Molecular Microbiology.)

Gregory I. Goldberg, Ph.D., Weizmann Institute of Science, 1977. (Dermatology) (See Department of Biochemistry and Molecular Biophysics.)

Daniel M. Goodenberger, M.D., Duke University, 1974.

Lawrence T. Goodnough, M.D., University of Pennsylvania, 1975. (See Department of Pathology and Immunology.)

Jeffrey I. Gordon, M.D., The University of Chicago, 1973. (See Department of Molecular Biology and Pharmacology.)

Gregory A. Grant, Ph.D., University of Wisconsin, 1975. (Dermatology) (See Department of Molecular Biology and Pharmacology.)

Michael L. Gross, Ph.D., University of Minnesota, 1966. (See Department of Pathology and Immunology.) (Also Department of Chemistry)

Richard W. Gross, M.D., New York University, 1976; Ph.D., Washington University, 1982. (See Department of Molecular Biology and Pharmacology.) (Also Department of Chemistry)

Chromalloy Professor of Renal Diseases in Medicine

Marc R. Hammerman, M.D., Washington University, 1972. (See Department of Cell Biology and Physiology.)

Scot G. Hickman, M.D., Washington University, 1970.

John O. Holloszy, M.D., Washington University, 1957.

Selma and Herman Seldin Professor of Medicine

Michael J. Holtzman, M.D., Northwestern University, 1975. (See Department of Cell Biology and Physiology.)

Richard S. Hotchkiss, M.D., University of Virginia, 1976. (See Department of Anesthesiology and Department of Surgery.)

Ira M. Lang Professor of Nephrology

Keith A. Hruska, M.D., Creighton University, 1969. (See Department of Cell Biology and Physiology.)

Daniel P. Kelly, M.D., University of Illinois, 1982. (See Department of Molecular Biology and Pharmacology and Department of Pediatrics.)

Distinguished University Professor of Medicine

David M. Kipnis, M.D., University of Maryland, 1951. (See Department of Molecular Biology and Pharmacology.)

John E. and Adaline Simon Professor of Medicine

Saulo Klahr, M.D., Universidad Nacional de Colombia, 1959.

Robert E. Kleiger, M.D., Harvard University, 1960.

Danforth Professor of Medicine and Nutritional Science

Samuel Klein, M.D., Temple University, 1979. (See Clinical Investigation Program.)

David C. and Betty Farrell Distinguished Professor of Medicine

Stuart A. Kornfeld, M.D., Washington University, 1962. (See Department of Biochemistry and Molecular Biophysics.)

Ronald J. Krone, M.D., The University of Chicago, 1966. (John E. Simon Scholar in Medicine)

Jack H. Ladenson, Ph.D., University of Maryland, 1971. (Clinical Chemistry) (See Department of Pathology and Immunology.)

Stephen S. Lefrak, M.D., State University of New York, Downstate, 1965. (See Administration.)

Alan A. and Edith L. Wolff Professor in Medicine

Timothy J. Ley, M.D., Washington University, 1978. (See Department of Genetics, Clinical Investigation Program and Alvin J. Siteman Cancer Center.)

Ellen Li, M.D., Ph.D., Washington University, 1980. (See Department of Biochemistry and Molecular Biophysics.)

Philip A. Ludbrook, M.B.B.S., University of Adelaide, 1963. (See Department of Radiology and Clinical Investigation Program.)

Kenneth Ludmerer, M.D., The Johns Hopkins University, 1973.

Philip W. Majerus, M.D., Washington University, 1961. (See Department of Biochemistry and Molecular Biophysics.)

Susan B. Mallory, M.D., University of Texas, Galveston, 1974. (Dermatology) (See Department of Pediatrics.)

Robert P. Mecham, Ph.D., Boston University, 1976. (See Department of Cell Biology and Physiology, Department of Pediatrics and Department of Biomedical Engineering.)

Senior Adviser to the Chairman

Gerald Medoff, M.D., Washington University, 1962. (See Department of Molecular Microbiology.)

Jeffrey D. Milbrandt, M.D., Washington University, 1978; Ph.D., University of Virginia, 1983. (See Department of Pathology and Immunology.)

Joseph P. Miletich, M.D., Ph.D., Washington University, 1979.

James G. Miller, Ph.D., Washington University, 1969. (Also Faculty of Arts and Sciences)

Thalachallour Mohanakumar, Ph.D., Duke University, 1974. (See Department of Pathology and Immunology and Department of Surgery.)

Aubrey R. Morrison, M.B.B.S., University of London, 1970. (See Department of Molecular Biology and Pharmacology.)

Anthony J. Muslin, M.D., Harvard University, 1984. (See Department of Cell Biology and Physiology.)

Scott M. Nordlicht, M.D., State University of New York, Downstate, 1973.

Richard E. Ostlund Jr., M.D., University of Utah, 1970.

Roberto Pacifici, M.D., Perugia University, 1981. (See Department of Radiology.)

Alan A. and Edith L. Wolff Distinguished Professor

William A. Peck, M.D., University of Rochester, 1960. (See Administration.)

Julio E. Perez, M.D., University of Puerto Rico, 1973.

M. Alan Permutt, M.D., Washington University, 1965. (See Department of Cell Biology and Physiology.)

Helen Piwnica-Worms, Ph.D., Duke University, 1984. (See Department of Cell Biology and Physiology and Alvin J. Siteman Cancer Center.)

William G. Powderly, M.B.B.Ch., B.A.O., National University of Ireland, 1979.

Lee Ratner, M.D., Ph.D., Yale University, 1979. (See Department of Molecular Microbiology.)

J. Evan Sadler, Ph.D., Duke University, 1978; M.D., 1979. (Howard Hughes Medical Institute Associate Investigator in Medicine) (See Department of Biochemistry and Molecular Biophysics.)

Jeffrey E. Saffitz, Ph.D., Case Western Reserve University, 1977; M.D., 1978. (See Department of Pathology and Immunology.)

Samuel A. Santoro, M.D., Ph.D., Vanderbilt University, 1979. (See Department of Pathology and Immunology.)

Samuel E. Schechter Professorship in Medicine

Gustav Schonfeld, M.D., Washington University, 1960.

Daniel P. Schuster, M.D., Yale University, 1976. (See Clinical Investigation Program.)

Clay F. Semenkovich, M.D., Washington University, 1981. (See Department of Cell Biology and Physiology.)

Dorothy R. and Hubert C. Moog Professor in Pulmonary Medicine

Robert M. Senior, M.D., George Washington University, 1961.

Barry A. Siegel, M.D., Washington University, 1969. (See Department of Radiology, Alvin J. Siteman Cancer Center and Clinical Investigation Program.)

Joseph Friedman Professor of Renal Diseases in Medicine

Eduardo Slatopolsky, M.D., University of Buenos Aires, 1959.

Samuel L. Stanley Jr., M.D., Harvard University, 1980. (See Department of Molecular Microbiology.)

William F. Stenson, M.D., Washington University, 1971.

Gregory A. Storch, M.D., New York University, 1973. (See Department of Molecular Microbiology and Department of Pediatrics.)

Douglas M. Tollefsen, M.D., Ph.D., Washington University, 1977. (See Department of Biochemistry and Molecular Biophysics.)

Rosemary and I.J. Flance Professor in Pulmonary Medicine

Elbert P. Trulock III, M.D., Emory University, 1978.

John W. Turk, M.D., Ph.D., Washington University, 1976. (See Department of Pathology and Immunology.)

H. James Wedner, M.D., Cornell University, 1967.

Gary J. Weil, M.D., Harvard University, 1975. (See Department of Molecular Microbiology.)

Alan N. Weiss, M.D., Ohio State University, 1966.

Neil Harris White, M.D., Albert Einstein College, 1975. (See Department of Pediatrics and Clinical Investigation Program.)

Michael P. Whyte, M.D., State University of New York, Downstate, 1972.

Samuel A. Wickline, M.D., University of Hawaii, 1980. (Also Department of Physics)

Frank Chi-Pong Yin, Ph.D., University of California, San Diego, 1970; M.D., 1973. (See Department of Biomedical Engineering.)

Sam J. Levin and Audrey Loew Levin Professor of Research in Arthritis

Wayne M. Yokoyama, M.D., University of Hawaii, 1978. (Howard Hughes Medical Institute Investigator) (See Department of Pathology and Immunology.)

Research Professors

Joseph J.H. Ackerman, Ph.D., Colorado State University, 1977. (Chemistry)

Thomas G. Cole, M.D., University of Missouri, 1974; Ph.D., 1980. (See Department of Biochemistry and Molecular Biophysics.)

Edwin B. Fisher, Ph.D., State University of New York, 1972. (Psychology) (See Alvin J. Siteman Cancer Center and Clinical Investigation Program.) (Also Department of Psychology)

Fong Fu Hsu, Ph.D., University of Utah, 1986.

Irene E. Karl, Ph.D., University of Wisconsin, 1940.

Jeremiah J. Morrissey, Ph.D., St. Louis University, 1974.

Professors Emeriti (Clinical)

Ralph V. Gieselman, M.D., Washington University, 1947.

Neville Grant, M.D., Columbia University, 1954.

Harold J. Joseph, M.D., University of Texas, 1950.

Norman P. Knowlton, M.D., Harvard University, 1945.

Virgil Loeb, M.D., Washington University, 1944.

Morris D. Marcus, M.D., Washington University, 1934. (Dermatology)

Charles C. Norland, M.D., Washington University, 1959.

Ernest T. Rouse Jr., M.D., Washington University, 1943.

Llewellyn Sale Jr., M.D., Washington University, 1940.

Professors (Clinical)

Elliot E. Abbey, M.D., New York University, 1975. (Clinical Academic)

Benjamin A. Borowsky, M.D., Washington University, 1958.

J. William Campbell, M.D., Washington University, 1977.

John D. Davidson, M.D., Washington University, 1952.

I.J. Flance, M.D., Washington University, 1935.

Bernard T. Garfinkel, M.D., Washington University, 1948.

James N. Heins, M.D., University of Louisville, 1961.

Michael M. Karl, M.D., University of Louisville, 1938.

Robert S. Karsh, M.D., Washington University, 1952.

Charles Kilo, M.D., Washington University, 1959.

Phillip E. Korenblat, M.D., University of Arkansas, 1960.

Marvin E. Levin, M.D., Washington University, 1951.

Joseph Levitt, M.D., Washington University, 1949.

Paul A. Mennes, M.D., Washington University, 1970.
Samuel Nussbaum, M.D., Mt. Sinai School of Medicine, 1973.
G. Charles Oliver, M.D., Harvard University, 1957.
Robert C. Packman, M.D., Washington University, 1956.
Robert Paine, M.D., Harvard University, 1944.
Lester T. Reese, M.D., Tulane University, 1966. (Dermatology)
Shabbir H. Safdar, M.D., Nishtar Medical College, 1961.
Benjamin Schwartz, M.D., Ph.D., Albert Einstein College of Medicine, 1972.
Burton A. Shatz, M.D., Washington University, 1943.
Bernard L. Shore, M.D., Washington University, 1977.
Alvin S. Wenneker, M.D., Washington University, 1953.

Professors (Adjunct)

Ismail Kola, Ph.D., University of Cape Town, 1985.
Susumu Seino, M.D., Kobe University of Medicine, 1974; Ph.D., Kyoto University of Medicine, 1982.

Associate Professors

Dana R. Abendschein, Ph.D., Purdue University, 1978. (See Department of Cell Biology and Physiology and Clinical Investigation Program.)
Douglas R. Adkins, M.D., Wright State University, 1986.
Amir Arsham Amini, Ph.D., University of Michigan, 1990.
Richard G. Bach, M.D., New York University, 1983.
Thomas C. Bailey, M.D., Washington University, 1984.
Bhaskar Banerjee, M.D., University of London, 1983.
Nancy L. Bartlett, M.D., Washington University, 1986.
Benico Barzilai, M.D., University of Illinois, 1978.
Joseph J. Billadello, M.D., Georgetown University, 1978.
Stanley J. Birge Jr., M.D., Washington University, 1963.
Morey A. Blinder, M.D., St. Louis University, 1981. (See Department of Pathology and Immunology.)
Richard D. Brasington, M.D., Duke University, 1980.
Alan C. Braverman, M.D., University of Missouri, 1985.
Daniel C. Brennan, M.D., University of Iowa, 1985.
Steven Brody, M.D., University of Michigan, 1980.
David B. Carr, M.D., University of Missouri, 1985.
Mario Castro, M.D., University of Missouri, Kansas City, 1988. (See Clinical Investigation Program.)
Andrew C. Chan, M.D., Ph.D., Washington University, 1986. (Howard Hughes Medical Institute Associate Investigator) (See Department of Pathology and Immunology.)
Mary F. Chan, M.D., University of Alabama, 1986.
Dane M. Chapman, Ph.D., Brigham Young University, 1985; M.D., University of Michigan, 1985.
William E. Clutter, M.D., Ohio State University, 1975. (See Clinical Investigation Program.)
Philip T. Cohen, Ph.D., Brandeis University, 1967; M.D., University of California, 1975.
Lynn A. Cornelius, M.D., University of Missouri, 1980. (Dermatology)
Daniel W. Coyne, M.D., Case Western Reserve University, 1983.
Jeffery S. Crippen, M.D., University of Kansas, 1987.
Carlos C. Daughaday, M.D., Washington University, 1971.
Víctor G. Dávila-Román, M.D., University of Puerto Rico, 1981. (See Department of Radiology.)
Alexander E. Denes, M.D., University of Missouri, 1973.
Laura L. Dugan, M.D., Ohio State University, 1987. (See Department of Neurology.)
William C. Dunagan, M.D., Washington University, 1983.
Charles S. Eby, M.D., Vanderbilt University, 1981. (See Department of Pathology and Immunology.)
Steven Edmundowicz, M.D., Jefferson Medical College, 1983.

Richard and Elizabeth Henby Sutter Professor of Occupational, Industrial and Environmental Medicine

Bradley A. Evanoff, M.D., M.P.H., Washington University, 1986. (See Clinical Investigation Program.)
Paula M. Fracasso, M.D., Ph.D., Yale University, 1984. (See Alvin J. Siteman Cancer Center.)
Lawrence D. Gelb, M.D., Harvard University, 1967. (See Department of Molecular Microbiology.)
Stephen J. Giddings, Ph.D., Dartmouth College, 1973; M.D., University of Rochester, 1976.
Anne C. Goldberg, M.D., University of Maryland, 1977.
Robert J. Gropler, M.D., University of Cincinnati, 1981. (See Department of Radiology.)
Daniel L. Hamilos, M.D., Northwestern University, 1979.
Barry Hong, Ph.D., St. Louis University, 1982. (Medical Psychology) (See Department of Psychiatry.) (Also Department of Psychology)
Randall Jotte, M.D., Harvard University, 1987.
Leslie E. Kahl, M.D., Albany Medical College, 1978.
Joseph L. Kenzora, M.D., University of New Mexico, 1975.
Nigar Kirmani, M.D., King Edward Medical College, 1973.
Marin H. Kollef, M.D., University of Rochester, 1983.
Raphael Kopan, Ph.D., The University of Chicago, 1989. (See Molecular Biology and Pharmacology.)
Sándor J. Kovács, Ph.D., California Institute of Technology, 1977; M.D., University of Miami, 1979. (See Department of Biomedical Engineering and Department of Cell Biology and Physiology.) (Also Department of Physics)
Anthony Kulczycki Jr., M.D., Harvard University, 1970. (See Department of Molecular Microbiology.)

Howard I. Kurz, M.D., New York Medical College, 1984.

John M. Lasala, Ph.D., St. Louis University, 1979; M.D., University of Connecticut, 1983.

Marc S. Levin, M.D., Columbia University, 1981.

Lawrence M. Lewis, M.D., University of Miami, 1976.

Bruce D. Lindsay, M.D., Jefferson Medical College, 1977.

Michael B. Lippmann, M.D., State University of New York, 1977.

Mauricio Lisker-Melman, M.D., Universidad Nacional Autonoma, Mexico, 1980.

Gregory D. Longmore, M.D., McGill University, 1983. (See Department of Cell Biology and Physiology.)

Douglas M. Lublin, Ph.D., Stanford University, 1976; M.D., University of California, Los Angeles, 1982. (See Department of Pathology and Immunology.)

John P. Lynch, M.D., Georgetown University, 1989.

Wade H. Martin III, M.D., University of Kansas, 1977.

Janet B. McGill, M.D., Michigan State University, 1979. (See Department of Pediatrics and Clinical Investigation Program.)

Howard L. McLeod, Pharm.D., Philadelphia College of Pharmacy and Science, 1990. (See Molecular Biology and Pharmacology and Alvin J. Siteman Cancer Center.)

Steven B. Miller, M.D., University of Missouri, Kansas City, 1983.

Jeffrey H. Miner, Ph.D., California Institute of Technology, 1991.

Stanley Misler, M.D., Ph.D., New York University, 1977. (See Department of Cell Biology and Physiology.)

Jan A. Nolta, Ph.D., University of Southern California, 1997.

William C. Parks, Ph.D., Medical College of Wisconsin, 1982. (See Department of Pediatrics.)

Curtis A. Parvin, Ph.D., University of Minnesota, 1980. (Clinical, Computer Science) (See Department of Pathology and Immunology and Division of Biostatistics.)

Jay F. Piccirillo, M.D., University of Vermont, 1985. (See Department of Otolaryngology and Program in Occupational Therapy.)

Joel Picus, M.D., Harvard University, 1984.

Katherine Parker Ponder, M.D., Washington University, 1983. (See Department of Biochemistry and Molecular Biophysics.)

Craig K. Reiss, M.D., University of Missouri, Kansas City, 1983.

Michael W. Rich, M.D., University of Illinois, 1979.

Robert D. Rifkin, M.D., New York University, 1972.

Joseph G. Rogers, M.D., University of Nebraska, 1988.

Daniel Rosenbluth, M.D., Mt. Sinai School of Medicine, 1985.

Marcos Rothstein, M.D., University of Zulia, 1974.

Deborah C. Rubin, M.D., Albert Einstein College of Medicine, 1981.

Brent Ruoff, M.D., St. Louis University, 1981.

Mark S. Sands, Ph.D., State University of New York, 1990.

Dan Schuller, M.D., University Nacional Autonoma de Medicine, Mexico, 1985.

David R. Sinacore, Ph.D., West Virginia University, 1992.

Thomas H. Steinberg, M.D., New York University, 1978. (See Department of Cell Biology and Physiology.)

Bradley Stoner, M.D., Ph.D., Indiana University, 1987.

Walton Sumner II, M.D., University of Texas, Southwestern, 1985.

Alan J. Tiefenbrunn, M.D., Washington University, 1974. (See Department of Radiology.)

Dwight A. Towler, M.D., Ph.D., Washington University, 1989. (See Department of Molecular Biology and Pharmacology.)

Robert Townsend, M.D., Tulane University, 1976; Ph.D., The Johns Hopkins University, 1982.

Sergey M. Troyanovsky, Ph.D., All-Union Cancer Research Centre, 1981. (Dermatology) (See Department of Molecular Biology and Pharmacology.)

Peter G. Tuteur, M.D., University of Illinois, 1966.

Alison J. Whelan, M.D., Washington University, 1986. (See Department of Pediatrics and Alvin J. Siteman Cancer Center.)

Lynn K. White, M.D., Harvard University, 1984.

Denise Wilfley, Ph.D., University of Missouri, 1989.

David Windus, M.D., Creighton University, 1978.

Robert S. Woodward, Ph.D., Washington University, 1972.

Kevin E. Yarasheski, Ph.D., Kent State University, 1986. (See Clinical Investigation Program.)

Gary R. Zuckerman, D.O., Kansas City College of Osteopathic Medicine, 1963.

Research Associate Professors Emeriti

Janina M. Brajtburg, Ph.D., University of Lodz, 1968.

Norma Fletcher, Ph.D., University of Copenhagen, 1965.

Research Associate Professors

Alex J. Brown, Ph.D., University of Tennessee, 1982.

Adriana Dusso, Ph.D., University of Rosari, 1985.

Dennis E. Hourcade, Ph.D., Harvard University, 1978.

Michael S. Hughes, M.A., Washington University, 1982.

Osami Kanagawa, M.D., Okayama University, 1974; Ph.D., 1978. (See Department of Pathology and Immunology.)

Bruce W. Patterson, Ph.D., University of Illinois, 1980. (See Clinical Investigation Program.)

Richard A. Pierce, Ph.D., Rutgers University, 1990. (Dermatology)

Kenneth B. Schechtman, Ph.D., Washington University, 1978. (See Division of Biostatistics and Clinical Investigation Program.)
Kathryn A. Yamada, Ph.D., Georgetown University, 1982.

Associate Professors Emeriti (Clinical)

Gail G. Ahumada, M.D., Stanford University, 1972.
William G. Juergens Jr., M.D., Washington University, 1961.
Morton A. Levy, M.D., Washington University, 1961.
David M. Lieberman, M.D., Vanderbilt University, 1949.
Mary L. Parker, M.D., Washington University, 1953.
James C. Sisk, M.D., Washington University, 1946. (Dermatology)
Ross B. Sommer, M.D., Cornell University, 1949.

Associate Professors (Clinical)

William G. Bowen, M.D., University of North Carolina, 1974.
Robert M. Bruce, M.D., University of Minnesota, 1968.
Patricia L. Cole, M.D., Harvard University, 1981.
Stephen R. Crespin, M.D., Harvard University, 1965.
John S. Daniels, M.D., University of Arkansas, 1974.
Rand E. Dankner, M.D., Baylor College of Medicine, 1978.
Russell E. Eggebrecht, M.D., Washington University, 1971.
Lewis C. Fischbein, M.D., Washington University, 1974.
Arthur H. Gale, M.D., University of Missouri, 1959.
Siddhesh Gowda, M.B.B.S., Medical College Bellary Mysore, 1970.
Sidney Jick, M.D., Washington University, 1949.
John J. Kelly, M.D., St. Louis University, 1963.
Micki Klearman, M.D., Washington University, 1981.
Harvey Liebhaber, M.D., New York University, 1957.
Herbert Lubowitz, M.D., Washington University, 1958.
Alan P. Lyss, M.D., Washington University, 1976.
William E. Magee, M.D., Duke University, 1950.
Robert S. Mendelsohn, M.D., Washington University, 1954.
Matthew J. Orland, M.D., University of Miami, 1979.
Deborah L. Parks, M.D., University of Louisville, 1982.
MaryBeth Pereira, M.D., University of California, 1978.
Daniel Potts, M.D., Washington University, 1972.
Gary A. Ratkin, M.D., Washington University, 1967. (See Department of Radiology.)
Joseph F. Ruwitch Jr., M.D., Washington University, 1966.
Scott R. Sale, M.D., St. Louis University, 1976.
Robert Saltman, M.D., Washington University, 1980.
Robert B. Shuman, M.D., University of Missouri, 1981.
Sherry E. Shuman, M.D., Wayne State University, 1982.
Donald A. Skor, M.D., Rush University, 1978.
Rand W. Sommer, M.D., Washington University, 1980.
Paul M. Stein, M.D., St. Louis University, 1971.
Kongsak Tanphaichitr, M.D., Siraraj Hospital Medical School, 1970.
J. Allen Thiel, M.D., St. Louis University, 1960.
Jeffrey Tillinghast, M.D., Washington University, 1980.
Stanley M. Wald, M.D., Washington University, 1946.
Leonard B. Weinstock, M.D., University of Rochester, 1981.
John A. Wood, M.D., University of Oklahoma, 1968.

Associate Professors (Adjunct)

Elaine S. Krul, Ph.D., McGill University, 1982.
Robert F. Nease Jr., Ph.D., Stanford University, 1989. (See Clinical Investigation Program.)

Assistant Professor Emeritus

Allen P. Klippel, M.D., St. Louis University, 1946.

Assistant Professors

Judith Aberg, M.D., Pennsylvania State University, 1990.
Robert Arch, Ph.D., University of Wurzburg, Germany, 1994. (See Department of Pathology and Immunology.)
Phillip Asaro, M.D., St. Louis University, 1981.
Thomas J. Baranski, M.D., Ph.D., Washington University, 1992. (See Department of Molecular Biology and Pharmacology.)
Michael A. Beardslee, M.D., St. Louis University, 1991.
Abderr Azzaq Belaaouaj, Ph.D., University of Paris, 1992.
Monica Bessler, M.D., Ph.D., University of London, 1994.
Perry E. Bickel, M.D., University of Texas, Southwestern, 1988. (See Department of Cell Biology and Physiology.)
Ellen F. Binder, M.D., Washington University, 1981. (See Program in Occupational Therapy.)
Thomas M. Birkenmeier, M.D., Washington University, 1982.
Melvin S. Blanchard, M.D., University of Tennessee, 1994.
Lawrence Brown, M.D., Washington University, 1990.
John S. Burr, M.D., University of Pennsylvania, 1989.
Greta Camel, M.D., University of Wisconsin, 1949.
Charles C. Carey, M.D., University of Missouri, Kansas City, 1991.
Douglas M. Char, M.D., University of Hawaii, 1989.
Jane Chen, M.D., Washington University School of Medicine, 1993.
Zhouji Chen, Ph.D., Michigan State University, 1994.
Alec M. Cheng, Ph.D., Washington University, 1993. (See Department of Pathology and Immunology.)
Sharon Cresci, M.D., New York University, 1986.

Thomas M. De Fer, M.D., University of Missouri, 1989.

Teresa Deshields, Ph.D., University of Georgia, 1985. (See Clinical Investigation Program.)

Robert H. Deusinger, Ph.D., University of Iowa, 1981. (See Department of Biomedical Engineering and Program in Physical Therapy.)

Brian Dieckgraefe, Ph.D., Washington University, 1987; M.D., 1988.

Kathryn M. Diemer, M.D., University of Missouri, 1985.

William Dribben, M.D., University of North Carolina, 1990.

Gregory A. Ewald, M.D., Northwestern University, 1989.

Mitchell N. Faddis, M.D., Ph.D., Washington University, 1993.

Marc A. Fallah, M.D., Tufts University, 1994.

Larry E. Fields, M.D., Harvard University, 1980. (See Department of Pathology and Immunology.)

Brian F. Gage, M.D., University of California, 1988. (See Clinical Investigation Program.)

Gary L. Gambill, M.D., University of Oregon, 1974.

Marye J. Gleva, M.D., University of Washington, 1988.

Jason S. Goldfeder, M.D., The Johns Hopkins University, 1995.

Ramaswamy Govindan, M.D., Stanley Medical College, 1987.

Timothy A. Graubert, M.D., Harvard University, 1988. (See Department of Pathology and Immunology.)

Jonathan M. Green, M.D., Wayne State University, 1986. (See Department of Pathology and Immunology.)

Austin Arthur Halle III, M.D., University of Tennessee, 1982.

Xianlin Han, Ph.D., Washington University, 1990.

James William Harbour, M.D., The Johns Hopkins University, 1990. (See Department of Cell Biology and Physiology and Department of Ophthalmology and Visual Sciences.)

Michael P. Heffernan, M.D., University of Michigan, 1993. (Dermatology)

Elizabeth Hilliker, M.D., Washington University, 1970.

Ian Kerst Hornstra, M.D., University of Missouri, 1986; Ph.D., University of Florida, Gainesville, 1993.

Courtney Houchen, M.D., Temple University, 1990.

Randall Howell, D.O., Kansas City College of Osteopathic Medicine, 1978.

Shin-Ichiro Imai, M.D., Keio University, 1989; Ph.D., 1995.

Sreeni Jonnalagadda, M.D., University of Bombay, India, 1988.

Amy Joseph, M.D., Vanderbilt University, 1986.

Donna Kalauokalani, M.D., University of Hawaii, 1991. (See Department of Anesthesiology and Department of Psychiatry.)

Yoon Kang, M.D., Washington University, 1995.

Andrew M. Kates, M.D., Tufts University, 1994.

Hanna J. Khoury, M.D., Universite Catholique de Louvain, Brussels, Belgium, 1992.

Joshua Korzenik, M.D., Albert Einstein College of Medicine, 1987.

Attila Kovacs, M.D., Semmelweis University, Budapest, Hungary, 1985.

Gregory M. Lanza, M.D., Ph.D., University of Georgia, 1981. (See Department of Biomedical Engineering.)

Gerald P. Linette, Ph.D., M.D., Georgetown University, 1990. (See Department of Pathology and Immunology.)

Daniel C. Link, M.D., University of Wisconsin, 1985. (See Department of Pathology and Immunology.)

Keith Mankowitz, M.D., University of The Witwatersrand, 1989.

Caroline Mann, M.D., Indiana University, 1993.

Ann Martin, M.D., Case Western Reserve University, 1981. (Dermatology)

Thomas F. Martin, M.D., St. Louis University, 1965.

Timothy J. Martin, M.D., St. Louis University, 1991.

Brent W. Miller, M.D., Washington University, 1990.

Scott D. Minor, Ph.D., University of Iowa, 1987.

Hector D. Molina-Vicenty, M.D., University of Puerto Rico, 1985. (See Department of Pathology and Immunology.)

Michael E. Mullins, M.D., Hahnemann University, 1987.

Linda M. Mundy, M.D., The Johns Hopkins University, 1988.

Michael J. Naughton, M.D., SUNY at Buffalo, 1993.

Rosanne Naunheim, M.D., The University of Chicago, 1978.

Rodney Newberry, M.D., Washington University, 1980.

Daniel S. Ory, M.D., Harvard University, 1986. (See Clinical Investigation Program.)

Jeffrey Peterson, M.D., University of Indiana, 1995.

Linda Peterson, M.D., Washington University, 1990.

Christine Pham, M.D., University of Florida, 1985. (See Department of Pathology and Immunology.)

Louis Polish, M.D., University of Vermont, 1981.

Chandra Prakash, M.D., University of Calicut, South India, 1990.

Joseph Primrose, M.D., University of Illinois, 1968.

Susan B. Racette, Ph.D., University of Chicago, 1994.

Michael I. Rauchman, M.D., McGill University, 1984.

William R. Reinus, M.D., New York University, 1979.

Morton R. Rinder, M.D., University of Maryland, 1992.

Will R. Ross, M.D., Washington University, 1984.

Jean E. Schaffer, M.D., Harvard University, 1986. (See Department of Molecular Biology and Pharmacology.)

Mario Schootman, Ph.D., University of Iowa, 1993. (See Clinical Investigation Program.)

David B. Schwartz, Ph.D., Washington University, 1986; M.D., 1987.

Roberta Sengelmann, M.D., New York Medical College, 1993.

William D. Shannon, Ph.D., University of Pittsburgh, 1995. (See Alvin J. Siteman Cancer Center, Division of Biostatistics and Clinical Investigation Program.)

David M. Sheinbein, M.D., St. Louis University, 1995.

James M. Shipley, Ph.D., St. Louis University, 1992.

Jasvindar Singh, M.D., University of the South Pacific, 1988.

Timothy W. Smith, Ph.D., University of Oxford, England, 1989; M.D., Duke University, 1993.

Javier Szwarcberg, M.D., University of Buenos Aires, 1993.

Benjamin R. Tan, M.D., University of Philippines, 1990.

Megumi Taniuchi, M.D., Ph.D., Washington University, 1988.

Pablo Tebas, M.D., Universidad Autonoma, Madrid, Spain, 1985.

Mark Thoelke, M.D., Ph.D., University of Illinois, Urbana, 1990.

Suma A. Thomas, M.D., University of Iowa, 1993.

Michael Tomasson, M.D., Stanford University, 1992.

Anitha Vijayan, M.D., University of West Indies, Jamaica, 1990.

Dennis T. Villareal, M.D., Cebu Institute of Medicine, Philippines, 1982.

Reina Villareal, M.D., Cebu Institute of Medicine, Philippines, 1980.

Herbert W. Virgin IV, M.D., Ph.D., Harvard University, 1985. (See Department of Molecular Microbiology and Department of Pathology and Immunology.)

Oksana Volshteyn, M.D., Minsk State Medical Institute, 1976. (See Department of Neurology.)

Michael J. Walter, M.D., St. Louis University, 1990.

Jason Weber, Ph.D., St. Louis University, 1997.

Katherine N. Weilbaecher, M.D., Stanford University, 1992. (See Department of Pathology and Immunology.)

Mark S. Weinfeld, M.D., Harvard University, 1991.

Cynthia Wichelman, M.D., Stanford University School of Medicine, 1988.

Consuelo Wilkins, M.D., Howard University, 1992.

Karen Winters, M.D., Southern Illinois University, 1983.

Megan Wren, M.D., Washington University, 1985.

Roger D. Yusen, M.D., University of Illinois, 1990.

Research Assistant Professor (Emerita)

Ida K. Mariz, A.B., Washington University, 1940.

Research Assistant Professors

Shrikant Anant, Ph.D., University of Illinois, 1993.

Grigori A. Bannikov, Ph.D., All-Union Cancer Research Centre, 1973. (Dermatology)

Kenneth R. Boschert, D.V.M., Mississippi State University, 1984. (Comparative Medicine)

Su-Li Cheng, Ph.D., University of Louisville, 1978.

Ivan E. Collier, Ph.D., Florida State University, 1980. (Dermatology)

Michael R. Courtois, M.A., University of Missouri, 1979.

Dong Ho Han, Ph.D., Brigham Young University, 1994.

Donna B. Jeffe, Ph.D., Washington University, 1993.

Malgorzata Krych, Ph.D., Polish Academy of Sciences, 1982.

Ben Wen Li, M.D., Zhonshan Medical University, 1975.

Raymond D. Miller, Ph.D., University of California, Davis, 1977. (Dermatology)

Steven Mumm, Ph.D., St. Louis University, 1992.

Elizabeth Newberry, Ph.D., Washington University, 1995.

William L. Nowatzke, Ph.D., Indiana University, Bloomington, 1996.

Sasanka Ramanadham, Ph.D., Texas Tech University, 1985.

U. Ramakrishna Rao, Ph.D., University of Bombay, 1987.

Leonard Rifas, M.S., University of Missouri, 1973.

Mitchell G. Scott, Ph.D., Washington University, 1982. (Clinical) (See Department of Pathology and Immunology.)

Phyllis K. Stein, Ph.D., University of Virginia, 1990.

Alan D. Waggoner, M.H.S., Washington University, 1996.

Burton M. Wice, Ph.D., Washington University, 1992.

Monita Elaine Wilson, Ph.D., Brandeis University, 1992.

Hong Xian, Ph.D., Washington University, 1994.

Shaosang Zhang, M.D., Ph.D., Harbin Medical University, China, 1982.

Research Assistant Professor (Adjunct)

Gabriel Mbalaviele, Ph.D., University of Paris, 1992.

Assistant Professors Emeriti (Clinical)

Morris Alex, M.D., Washington University, 1943.

Benje Boonshaft, M.D., Washington University, 1961.

Duane E. Cozart, M.D., Medical College of Virginia, 1959.

William K. Hall, M.D., Washington University, 1942. (Dermatology)

Robert C. Kingsland, M.D., Washington University, 1937.

Warren Lonergan, M.D., Vanderbilt University, 1941.

J. Roger Nelson, M.D., Washington University, 1953.

Harold K. Roberts, M.D., Ohio State University, 1939.

Samuel Schechter, M.D., Washington University, 1941.

Assistant Professors (Clinical)

Charles C. Abel, M.D., Washington University, 1956.

Ann C. Agnew, M.D., University of Missouri, 1989.

Ingrid R. Albert, M.D., Albert Einstein College of Medicine, 1971. (Dermatology)

Jerome M. Aronberg, M.D., Washington University, 1971. (Dermatology)

James G. Avery, M.D., University of Tennessee, 1990.

Om P. Bahl, M.B.B.S., Punjab University, 1957.

Fred J. Balis, M.D., Washington University, 1989.

Frederick D. Bauschard, M.D., University of Pittsburgh, 1968. (Dermatology)

Michael Bavlsik, M.D., Robert Wood Johnson Medical School, 1991.

Susan S. Berdy, M.D., St. Louis University, 1984.

Michael A. Berk, M.D., Indiana University, 1979.

Aaron M. Bernstein, M.D., Chicago Medical School, 1952.

Aaron Birenbaum, M.D., Washington University, 1948.

Clifford A. Birge, M.D., Washington University, 1961.

Matthew S. Bosner, M.D., University of Texas, 1983.

Lilibeth M. Cayabyab-Loe, M.D., University of Missouri, 1990.

Susan Colbert-Threats, M.D., University of Illinois, Chicago, 1991.

Philip Comens, M.D., Washington University, 1951.

Ralph Copp Jr., M.D., Washington University, 1952.

Vincent R. DeMello, M.D., Bombay University, 1969.

Irl J. Don, M.D., Washington University, 1972.

John T. Ellena, M.D., Southern Illinois University, 1983.

Norman Fishman, M.D., Columbia College, New York, 1974.

Michael P. Fuller, M.D., University of Utah, 1994.

Daniel Gaitan, M.D., University of Mississippi, 1986.

Arnold M. Goldman, M.D., Washington University, 1959.

Benjamin M. Goldstein, M.D., Washington University, 1964.

David A. Goran, M.D., Washington University, 1976.

Charlene Gottlieb, M.D., Washington University, 1972.

Guner B. Gulmen, M.D., Hacettepe University, 1969.

Paul F. Hintze, M.D., University of Utah, 1978.

Bruce J. Hookerman, M.D., St. Louis University, 1968. (Dermatology)

Morris Joftus, M.D., University of Illinois, 1967.

Robert L. Kaufman, M.D., Washington University, 1963.

Charlotte J. Kennedy, M.D., Ph.D., Washington University, 1992.

Mary Kiehl, M.D., University of California, San Diego, 1990.

Donald K. King, M.D., The Johns Hopkins University, 1970.

John H. Kissel, M.D., Harvard University, 1971.

Kevin L. Konzen, M.D., University of Illinois, 1984.

Ralph F. Kuhlman, M.D., University of Illinois, 1964. (Student Health Service)

Steven A. Lauter, M.D., Wayne State University, 1971.

Carl A. Lyss, M.D., Washington University, 1956.

Sarah K. Margolis, M.D., State University of New York, Brooklyn, 1989.

Jay M. Marion, M.D., Vanderbilt University, 1977.

Jay P. Marshall II, M.D., University of Missouri, 1972.

Joan A. Mass, M.D., Temple University, 1977.

Anthony J.P. Mattaline, D.O., Kirksville College of Osteopathic Medicine, 1985.

Charles W. Miller, M.D., Washington University, 1972. (Dermatology)

Robert F. Onder Jr., M.D., Washington University, 1987.

David W. Ortbals, M.D., Washington University, 1970.

David A. Parks, M.D., St. Louis University, 1994.

William J. Phillips, M.D., Washington University, 1963.

Lee S. Portnoff, M.D., Washington University, 1978. (Dermatology)

John A. Powell, M.D., University of Michigan, 1971. (Dermatology)

Simeon Prager, M.D., University of California, 1991.

David Prelutsky, M.D., St. Louis University, 1979.

Paul Arthur Robiolio, M.D., Washington University, 1989.

Lisa R. Ross, M.D., University of Michigan, 1983.

Robert J. Schneider, M.D., The Johns Hopkins University, 1976.

Jay R. Seltzer, M.D., University of Missouri, 1987.

Gerald S. Shatz, M.D., Washington University, 1974.

Gary Singer, M.D., University of Toronto, 1987.

Hani Charles Soudah, M.D., University of Hamburg, 1988.

William F. Southworth, M.D., Washington University, 1975.

Alan R. Spivack, M.D., St. Louis University, 1964.

Erik P. Thyssen, M.D., University of Copenhagen, 1984.

Garry S. Tobin, M.D., Washington University, 1985.

Jason Trobaugh, Ph.D., Washington University, 2000.

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John H. Uhlemann, M.D., Washington University, 1971. (Dermatology)

Albert L. Van Amburg III, M.D., Washington University, 1972.

James W. Walsh, M.D., Washington University, 1954.

George A. Williams III, M.D., Medical College of Wisconsin, 1972.

R. Jerome Williams Jr., M.D., Duke University, 1977.

Gerald Wolff, M.D., Washington University, 1961.

Michelle Woodley, M.D., SUNY, Stony Brook, 1986.

Jeffrey M. Wright, M.D., Washington University, 1979. (See Department of Pediatrics.)

Robert E. Ziegler, Ph.D., Duke University, 1980; M.D., 1986. (Dermatology)

Herbert B. Zimmerman, M.D., Washington University, 1951.

Assistant Professor (Adjunct)

Tammy Lin, M.D., University of Michigan, 1997.

Instructors

Salma Ahmad, M.D., F.J. Medical College, Pakistan, 1970.

Chandra Aubin, M.D., University of Missouri, 1983.

Vorachart Auethavekiat, M.D., Ramathibodi Medical School, Mahidol University, Bangkok, Thailand, 1983.

Hilary Babcock, M.D., University of Texas, Southwestern, 1994.

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Laura A. Bayer, Ph.D., Virginia Commonwealth University, 1997. (See Clinical Investigation Program.)

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Angela L. Brown, M.D., Washington University, 1992.

Geoffrey Cislo, M.D., University of Michigan Medical School, 1996.

Martin Docherty, M.D., St. Louis University, 1989.

Decha Enkvetchakul, M.D., University of Columbia, 1993.

Edward Ferguson, M.D., University of Missouri, 1993.

Sean Fitzmaurice, M.D., St. Louis University, 1995.

Kellie L. Flood, M.D., University of Texas, Southwestern, 1996.

Jacob Gandlmayr, M.D., University of Innsbruck, Austria, 1951.

Jane M. Garbutt, M.B., Ch.B., Bristol University, England, 1977.

Joseph H. Gatewood, M.D., The University of Chicago, 1970. (See Department of Surgery.)

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Richard Groger, Ph.D., Case Western Reserve University, 1990; M.D., 1992.

Katherine Henderson, M.D., University of Minnesota, Minneapolis, 1998.

Gabrielle Highstein, Ph.D., University of Rhode Island, 1995.

Irmantus Juknevicius, M.D., Kauna Medical Institute, Lithuania, 1989.

Eric Katz, M.D., Albert Einstein College, 1995.

James G. Laing, Ph.D., Michigan State University, 1992.

Michael E. Lazarus, M.B.B.Ch., University of The Witwatersrand, 1993.

Mark Levine, M.D., New York University, 1993.

Anne C. Lind, M.D., Creighton University, 1989. (See Department of Pathology and Immunology.)

Margaret S. Lohre, M.D., University of Louisville, 1978.

Esther H. Lum, M.D., University of Illinois, Rockford, 1994.

Robert John Mahoney, M.D., Washington University, 1997.

Natasha Muckova, M.D., University of Rochester School of Medicine, 1995.

Subramaniam Pennathur, M.B.B.S., Tirunelveli Medicine College, India, 1991.

Gregory Polites, M.D., University of Illinois, 1996.

Prabha Ranganathan, M.B.B.S., University of Madras, India, 1990.

Christopher Richter, M.D., St. Louis University, 1997.

Jason Rothschild, M.D., University of North Carolina, Chapel Hill, 1998.

Myra Rubio, M.D., Indiana University, 1998.

Mai Sharaf, M.D., University of Arkansas, 1997.

Labras Sidossis, Ph.D., University of Texas Medical Branch, 1994.

Sanford Sineff, M.D., Brown University, 1996.

Shanthi Srinivasan, M.D., Wayne State University, 1992.

Christian D. Stone, M.D., University of California, Irvine, 1995.

David Tan, M.D., Loma Linda University, 1997.

Srihari Thanigaraj, M.D., University of Madras, India, 1993.

Mariette Varvarikos, M.D., University of Montreal, 1995.

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David Warren, M.D., University of Pittsburgh, 1994.

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Research Instructors

May Mei Chen, B.S., Baker University, 1963.

Lloyd Coleman, Ph.D., Iowa State University, 1984.

Michael K. Klebert, M.S.N., University of Texas, 1987.

David M. Kurtz, D.V.M., University of Tennessee, 1989; Ph.D., University of Alabama, Birmingham, 1998.

Wang Sik Lee, Ph.D., Korea University, 1990.

David John Mancuso, Ph.D., University of Pittsburgh, 1982.

Daniel R. Martin, M.S., University of Missouri, St. Louis, 1985.

Bettina Mittendorfer, Ph.D., University of Texas, 1999.

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Terrence E. Riehl, Ph.D., Ohio University, 1980.

Sharon A. Rogers, M.S., Southern Illinois University, 1983.

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Instructors Emeriti (Clinical)

David Feldman, M.D., Washington University, 1943.

Axel R. Gronau, M.D., University of Naples, 1935.

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J. Ted Jean, M.D., Washington University, 1928.

Richard W. Maxwell, M.D., The University of Chicago, 1937.

Lamar H. Ochs, M.D., Washington University, 1944.

Robert F. Owen, M.D., Yale University, 1952.

Hugh R. Waters, M.D., Washington University, 1945.

Instructors (Clinical)

Barry K. Abramson, M.D., University of Miami, 1985.

Susan R. Adams, M.D., University of Missouri, 1989.

Jorge M. Alegre, M.D., San Marcos University, 1965.

Muhammad Ali, M.D., Dow Medical School, 1985.

Frank K. Anderson, M.D., Northwestern University, 1980. (Dermatology)

Scott J. Anderson, Ph.D., Duke University, 1981; M.D., 1982.

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William W. Benedict, M.D., Washington University, 1975.

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Danita L. Cole, M.D., University of Missouri, Kansas City, 1991.

John Costello, M.D., St. Louis University, 1977.

Johnetta M. Craig, M.D., University of Iowa, 1986.

Charles Crecelius, Ph.D., M.D., St. Louis University, 1984.

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Mary Hastings, M.D., University of Missouri, Kansas City, 1984.

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Barbra A. Horn, M.D., Washington University, 1982.

Raymond Hu, M.D., University of Missouri, 1982.

John W. Hubert, M.D., Washington University, 1975.

Mark Albert Hurt, M.D., University of Missouri, Columbia, 1982.

Richard G. Ihnat, M.D., Yale University, 1991.

Daryl L. Jacobs, M.D., Washington University, 1983.

Myron H. Jacobs, M.D., Louisiana State University, 1969.

Steven Jacobson, M.D., St. Louis University, 1985.

Poonam Jain, M.D., University of Iowa, 1988.

Daniel R. Jasper, M.D., St. Louis University, 1994.

David Jick, M.D., Washington University, 1982.

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David A. Katzman, M.D., St. Louis University, 1991.

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Thomas Kernan-Kuciejczyk, M.D., St. Louis University, 1986.

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Linda M. Klutho, M.D., University of Missouri, 1984.

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Alex H. Kosloff, M.D., St. Louis University, 1980.

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Daniel K. Lane, M.D., Washington University, 1959. (Dermatology)

Kim Lynette Lee, M.D., St. Louis University, 1983.

Robert B. Lehman, M.D., Texas Tech University, 1982.

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Beverly A. Logan-Morrison, M.D., Washington University, 1982.

Jane Loitman, M.D., University of Minnesota, 1992.

James F. Loomis Jr., M.D., University of Arkansas, 1985.

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Christopher R. Maret, M.D., Washington University, 1979.

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Jerald Maslanko, M.D., Emory University, 1975.

Mary Vest Mason, M.D., Washington University, 1994.

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Michael E. McCadden, M.D., Vanderbilt University, 1982. (Dermatology)

Christopher E. McCarthy, M.D., St. Louis University, 1979.

Donte McClary, M.D., Meharry Medical College, 1998.

Oliver McKee, M.D., Royal College for Surgeons, 1981. (Dermatology)

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Clark R. McKenzie, M.D., University of Missouri, 1989.

Frances T. McKinney, Ph.D., University of Colorado, Boulder, 1975; M.D., University of Missouri, 1979.

Gary Meltz, M.D.,
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Ronald L. Mera, M.D.,
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Austin F. Montgomery, M.D.,
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Burton M. Needles, M.D.,
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Vani Pachalla, M.D.,
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Inna Lee Park, M.D.,
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Amanullah K. Pathan, M.D.,
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Susan E. Pearson, Ph.D.,
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Laurence F. Perlstein, M.D.,
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Stephen J. Pieper, M.D.,
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Doug Pogue, M.D.,
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John David Radke, M.D.,
St. Louis University, 1962.

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Daniel S. Ring, M.D.,
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Felice A. Rolnick, M.D.,
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Ernest T. Rouse III, M.D.,
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Jeremy Rower, M.D.,
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Kenneth J. Rybicki, M.D., Ph.D.,
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Mehrdad Saeed-Vafa, M.D.,
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Daniel Jose Santa Cruz, M.D.,
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Lawrence R. Schacht, M.D.,
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Richard Schamp, M.D.,
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Mark Scheperle, M.D.,
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Alvin K. Schergen, M.D.,
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Tania Schmid, M.D.,
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Susan I. Schneider, M.D.,
Yale University, 1977.

Alexander Schuetz, M.D.,
St. Louis University, 1996.

Paul Schultz, M.D.,
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Jeremy M. Segal, M.B.B.Ch.,
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James F. Sertl, M.D.,
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Medical College of India, 1980.

John B. Shapleigh II, M.D.,
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Vidal T. Sheen, M.D.,
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Mounir M. Shenouda, M.B.B.Ch.,
Alexandria University Faculty of Medicine, 1984.

Randy Silverstein, M.D.,
University of Missouri, 1982.

Robert Sindel, M.D.,
Washington University, 1975.

Raymond Smith, M.D.,
University of Virginia, 1984.

Allen D. Soffer, M.D.,
University of Missouri, 1983.

David Sosnovik, M.D.,
University of The Witwatersrand, Johannesburg, South Africa, 1993.

Michael L. Spearman, M.D.,
Kansas State University, 1982.

Erik Stabell, M.D.,
Rush University, 1983.

James Stokes, M.D.,
University of Missouri, 1984.

Steven Storfer, M.D.,
Medical University of South Carolina, 1986.

Rudee Suwannasri, M.D.,
Chiangmai University, Thailand, 1973.

Arnold S. Tepper, M.D.,
University of Missouri, 1970.

Wanda T. Terrell, M.D.,
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Sharon F. Tiefenbrunn, M.D.,
Washington University, 1975. (Dermatology)

Lawrence S. Tierney, M.D.,
University of Illinois, 1988.

Elizabeth A. Tracy, M.D., Medical College of Wisconsin, 1986.

Cynthia Troiano, D.O., Chicago College of Osteopathic Medicine, 1986.

Alice W. Trotter, M.D., Washington University, 1969.

David J. Tucker, M.D., St. Louis University, 1981.

Emmanuel A. Venkatesan, M.B.B.S., Christian Medical College, India, 1989.

Stanley G. Vriezelaar, M.D., University of Iowa, 1981.

David J. Waddell, M.D., Ohio State University, 1986.

Harry Lee Wadsworth, M.D., Texas Tech University, 1983.

David Wallace, M.D., St. Louis University, 1984.

David A. Walls, M.D., Southern Illinois School of Medicine, 1982.

Richard C. Walters, M.D., Washington University, 1973. (Dermatology)

Scott P. Wasserstrom, M.D., Washington University, 1995.

Peter Weiss, M.D., Case Western Reserve University, 1980.

Darren E. Wethers, M.D., Northwestern University, 1988.

John Wiedner, M.D., Rush University Medical College, 1985.

Deborah Wienski, M.D., Tufts University, 1983.

Nancy J. Williams, M.D., University of Kansas, 1987.

Wendell Williams, M.D., Baylor Medical College, 1982.

Christine E. Wilmsen, M.D., University of Missouri, 1996.

Edward M. Wolfe, M.D., Washington University, 1960. (Dermatology)

Lingfei Xu, M.S., Chinese Academy of Sciences, 1999.

Joel L. Zefrin, M.D., St. Louis University, 1952.

Deborah Zimmerman, M.D., University of Missouri, 1983.

John Michael Zylka, Ph.D., University of Minnesota, 1976; M.D., University Autonoma de Guadalajara, 1981.

Instructors (Adjunct)

Robert M. Taxman, M.D., Washington University, 1964.

Michael P. Williams, Ph.D., University of Chicago, 1995.

Research Scientist

Mary Kathryn Liszewski, B.A., University of Missouri, St. Louis, 1971.

EDWARD MALLINCKRODT DEPARTMENT OF MOLECULAR BIOLOGY AND PHARMACOLOGY

Principles of pharmacology are taught as part of the second-year curriculum of medical school. This course elaborates essential concepts in pharmacology that provide the basis for understanding the mechanisms of drug action for individual classes of drugs discussed elsewhere in different blocks of a newly integrated second-year curriculum.

Research in the department emphasizes application of the tools of genetics, molecular and cell biology, genomics and bio-organic chemistry to define mechanisms that regulate cell fate, differentiation and senescence, and to devise ways of modulating these processes *in vivo*. A principal focus is on developmental biology using a series of genetically manipulable model organisms. Students participate with the staff in a series of weekly journal clubs discussing recent papers in the literature as well as their own work and that of their colleagues.

SECOND YEAR

M70 670A PRINCIPLES OF PHARMACOLOGY

Instructor: *Douglas F. Covey, Ph.D.*, 362-1726

The purpose of this course is to provide basic information relating to the underlying principles that apply to pharmacology. Topics addressed include: mechanisms of receptor-mediated drug action, pharmacokinetics, drug metabolism, toxicology, developmental pharmacology and the autonomic nervous system. Students who have not completed the first year of the medical school curriculum must have permission from the coursemaster to enroll in this course.

FOURTH YEAR

Research (M70 900)

Cross-listed with L41 (Bio) 590

Irving Boime, Ph.D., 362-2556
Regulated expression of human placental and pituitary glycoprotein hormone genes.

Ross L. Cagan, Ph.D., 362-7796
Cell fate specification, including initiation and programmed cell death, in the developing *Drosophila* retina.

Douglas F. Covey, Ph.D., 362-1726
Medicinal chemistry of steroids.

George W. Gokel, Ph.D., 362-9297
Novel synthetic organic compounds for use as model systems for biological processes, especially pore formation in bilayers, membrane structure and interactions, and alkali metal cation-pi interactions.

Jeffrey I. Gordon, M.D., 362-7243
Gut development; host-microbial interactions in the mouse gastrointestinal ecosystem.

Gregory A. Grant, Ph.D., 362-3367
Mechanism of allosteric regulation in enzymes.

Eugene M. Johnson Jr., Ph.D., 362-3926
Biology of neurotrophic factors and mechanisms of neuronal programmed cell death.

Kerry Kornfeld, M.D., Ph.D., 747-1480
Signal transduction during development. Aging.

Jeanne M. Nerbonne, Ph.D., 362-2564
Regulation of membrane excitability; structure, function and regulation of voltage-dependent ion channels.

David M. Ornitz, M.D., Ph.D., 362-3908
Regulation of organogenesis in the mouse by members of the fibroblast growth factor family. Genes involved in the development of the vestibular system.

John H. Russell, Ph.D., 362-2558
Mechanisms of cell death in the regulation and function of lymphocyte response and pathogenesis in models of multiple sclerosis.

Faculty

DR. ROBERT J. GLASER DISTINGUISHED UNIVERSITY PROFESSOR AND HEAD OF DEPARTMENT

Jeffrey I. Gordon, M.D., The University of Chicago, 1973. (See Department of Medicine.)

Distinguished University Professor

David M. Kipnis, M.D., University of Maryland, 1951. (See Department of Medicine.)

Professor Emeritus

F. Edmund Hunter Jr., Ph.D., University of Rochester, 1941.

Professors

Irving Boime, Ph.D., Washington University, 1970. (See Department of Obstetrics and Gynecology.)

Richard A. Chole, M.D., University of Southern California, 1969; Ph.D., University of Minnesota, 1977.

Nicholas O. Davidson, M.B.B.S., University of London, 1974. (See Department of Medicine.)

Jeffrey A. Drebin, M.D., Ph.D., Harvard University, 1987. (See Department of Surgery.)

Alex S. Evers, M.D., New York University, 1978. (See Department of Anesthesiology.)

Gregory A. Grant, Ph.D., University of Wisconsin, 1975. (See Department of Medicine.)

David M. Holtzman, M.D., Northwestern University, 1985. (See Department of Neurology.)

Eugene M. Johnson Jr., Ph.D., University of Maryland, 1970. (See Department of Neurology.)

Daniel P. Kelly, M.D., University of Illinois, 1982. (See Department of Medicine and Department of Pediatrics.)

Aubrey R. Morrison, M.B.B.S., University of London, 1970. (Burroughs Wellcome Clinical Pharmacology Scholar) (See Department of Medicine.)

Alumni Endowed Professor of Molecular Biology and Pharmacology

Jeanne M. Nerbonne, Ph.D., Georgetown University, 1978.

Arthur H. Neufeld, Ph.D., New York University, 1970. (See Department of Ophthalmology and Visual Sciences.)

Alumni Endowed Professor of Molecular Biology and Pharmacology

David M. Ornitz, Ph.D., University of Washington, 1987; M.D., 1988. (See Alvin J. Siteman Cancer Center.)

John H. Russell, Ph.D., Washington University, 1974.

Alan L. Schwartz, Ph.D., Case Western Reserve, 1974; M.D., 1976. (See Department of Pediatrics.)

Professor (Adjunct)

Philip Needleman, Ph.D., University of Maryland, 1964.

Associate Professors

Monica Bessler, M.D., University of Basel, Switzerland, 1984; Ph.D., University of London, 1994. (See Department of Medicine.)

Walter A. Boyle III, M.D., University of California, San Francisco, 1977. (See Department of Anesthesiology.)

Ross L. Cagan, Ph.D., Princeton University, 1989.

Richard S. Hotchkiss, M.D., University of Virginia, Charlottesville, 1976. (See Department of Anesthesiology.)

Raphael Kopan, Ph.D., The University of Chicago, 1989. (See Department of Medicine.)

Kerry Kornfeld, M.D., Ph.D., Stanford University, 1991.

Mark E. Lowe, Ph.D., University of Pennsylvania, 1977; M.D., University of Miami, 1984. (See Department of Pediatrics.)

Louis J. Muglia, Ph.D., The University of Chicago, 1986; M.D., 1988. (See Department of Pediatrics and Clinical Investigation Program.)

Jean E. Schaffer, M.D., Harvard University, 1986. (See Department of Medicine.) (Cardiovascular Division)

Dwight A. Towler, M.D., Ph.D., Washington University, 1989. (See Department of Medicine.)

Sergey M. Troyanovsky, Ph.D., Academy of Medical Sciences, Moscow, 1981. (See Department of Medicine.)

David B. Wilson, M.D., Ph.D., Washington University, 1986. (See Department of Pediatrics and Clinical Investigation Program.)

Jane Y. Wu, M.B., Shanghai Medical University, 1986; Ph.D., Stanford University, 1991. (See Department of Pediatrics.)

Associate Professor (Adjunct)

Per Falk, M.D., University of Gothenburg, 1986; Ph.D., 1991.

Assistant Professors

Thomas J. Baranski, M.D., Ph.D., Washington University, 1992. (See Department of Medicine.)

Zhou-Feng Chen, Ph.D., University of Texas, 1994. (See Department of Anesthesiology and Department of Psychiatry.)

C. Michael Crowder, M.D., Ph.D., Washington University, 1989. (See Department of Anesthesiology.)

Aaron DiAntonio, Ph.D., M.D., Stanford University, 1995.

Robert O. Heuckeroth, M.D., Ph.D., Washington University, 1990. (See Department of Pediatrics.)

Shin-ichiro Imai, M.D., Ph.D., Keio University School of Medicine, Tokyo, Japan, 1995. (See Department of Medicine.)

Kristen Kroll, Ph.D., University of California, Berkeley, 1994.

Scott Saunders, M.D., Ph.D., Stanford University, 1990. (See Department of Pediatrics and Clinical Investigation Program.)

Theodore C. Simon, Ph.D., George Washington University, 1990. (See Department of Pediatrics.)

Russell N. Van Gelder, M.D., Ph.D., Stanford University, 1994. (See Department of Ophthalmology and Visual Sciences.)

Research Instructor

Shiming Chen, Ph.D., SUNY Health Science Center, Syracuse, 1992. (See Department of Ophthalmology and Visual Sciences.)

Division of Bioorganic Chemistry

Professor and Head

George W. Gokel, Ph.D., University of Southern California, 1971. (Also Department of Chemistry.)

Professors

Douglas F. Covey, Ph.D., The Johns Hopkins University, 1973.

Richard W. Gross, M.D., New York University, 1976; Ph.D., Washington University, 1982. (See Department of Medicine.) (Also Department of Chemistry)

Jay W. Heinecke, M.D., Washington University, 1981. (See Department of Medicine.)

David R. Piwnica-Worms, M.D., Ph.D., Duke University, 1984. (See Department of Radiology.)

Michael J. Welch, Ph.D., University of London, 1965. (See Department of Biomedical Engineering, Department of Radiology and Alvin J. Siteman Cancer Center.)

Associate Professors

Carolyn J. Anderson, Ph.D., Florida State University, 1990. (See Department of Radiology.)

Howard L. McLeod, Pharm.D., Philadelphia College of Pharmacy, 1990. (See Department of Genetics and Alvin J. Siteman Cancer Center.)

DEPARTMENT OF MOLECULAR MICROBIOLOGY

The Department of Molecular Microbiology teaches introductory courses in microbiology and pathogenic microorganisms for first-year medical students and graduate students. The department also offers a number of advanced courses, primarily designed for graduate students, but open to medical students. Advanced elective research activities are offered by faculty in the department.

FIRST YEAR

M30 526 MICROBES AND PATHOGENESIS
Instructor: *Henry V. Huang, Ph.D.,* 362-2755

The challenge of this course is to emphasize the importance of understanding molecular and cellular paradigms of how pathogenic microbes interact with their hosts and cause disease. Selected pathogenic microbes, including bacteria, viruses, parasites and fungi, will be utilized as models to explain general principles of host-pathogen interactions and their consequences. Mechanisms by which microbes evade host defenses to cause acute and chronic infections will be highlighted. Problems facing the medical community in the 21st century such as rising antibiotic resistance and tropical diseases will be addressed. The main objective of this course is to teach students how to think about microbial pathogenesis in a way that will provide them a conceptual framework that relates mechanisms of pathogenesis to symptomology and pathophysiology.

Selectives

M04 526 NEW DISEASES, NEW PATHOGENS
Instructor: *David B. Haslam, M.D.,* 454-6050

This selective will focus on the process by which new etiologic agents of disease have been discovered. Special attention will be paid to the logical process by which a causative role is attributed to a newly discovered pathogen. This selective will also focus on understanding the process of identification and characterization of virulence determinants. Examples will be taken from bacterial, protozoan, viral and fungal pathogens.

M04 533 TROPICAL MEDICINE
Instructor: *Daniel E. Goldberg, M.D., Ph.D.,* 362-1514

Washington University has several faculty members who are actively researching diseases specific to developing countries. This elective is designed to bring these individuals together, in an informal discussion forum with students, to highlight the problems particular to geographical medicine. The elective will cover issues including eradication, prevention and treatment, immunology and vaccine development, as well as description of the different disease syndromes themselves. This selective is cross-listed in Department of Medicine.

FOURTH YEAR

Electives

At present, the primary enrollees in the following courses are students working for a Ph.D. degree in one of the basic sciences. However, these courses are recommended for interested medical students, especially those who may be considering a career in medical research, such as MSTP students. Emphasis is placed on the organization and function of living systems at the molecular level. The courses combine formal lectures with student-directed seminars. Course descriptions are presented under Division of Biology and Biomedical Sciences.

L41 (Bio) 5217 SPECIAL TOPICS IN MICROBIAL PATHOGENESIS
L41 (Bio) 5392 MOLECULAR MICROBIOLOGY AND PATHOGENESIS

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

Research (M30 900)
Cross-listed with L41 (Bio) 590

John P. Atkinson, M.D., 362-8391
Binding to and signaling by microbes to human complement receptors and regulatory proteins (lab-based project) or chart-based analysis of a group of patients with retroperitoneal fibrosis (clinical project).

Douglas E. Berg, Ph.D., 362-2772
Helicobacter pylori: mechanisms of gastric colonization and disease; bacterial genetic diversity and individual host specificity; mechanisms and evolutionary costs of drug resistance; molecular epidemiology and evolution.

Stephen M. Beverley, Ph.D., 747-2630
Molecular genetics of protozoan parasites; genomics, virulence and drug resistance.

Michael G. Caparon, Ph.D., 362-1485
Molecular genetics and pathogenicity of the streptococci and other pathogenic gram positive bacteria.

Josephine E. Clark-Curtiss, Ph.D., 935-6869
Genetics and molecular studies on the pathogenesis of *Mycobacterium tuberculosis* and *Mycobacterium avium*.

Michael S. Diamond, M.D., Ph.D., 362-2842
The research in our laboratory focuses on the interface between viral pathogenesis and the host immune response. Two globally important mosquito-borne RNA viruses are studied—the West Nile encephalitis and Dengue hemorrhagic fever viruses. Studies with Dengue virus (DV) have focused on identifying the host and viral factors that modulate the severity of an infection. A new direction for the laboratory is the investigation of the pathogenesis of West Nile virus infection (WNV) and the immune system response that prevents dissemination in the central nervous system. By infecting genetically and functionally immunodeficient mice with WNV, cells and molecules of the immune system are identified that are essential to the resolution of viral infection.

Tamara L. Doering, M.D., Ph.D., 747-5597
Biology of the opportunistic fungal pathogen, *Cryptococcus neoformans*.

M. Wayne Flye, M.D., Ph.D., 362-7145
Biochemical and gene regulation of local and systemic immune responses by the environment and cells of the liver and gastrointestional tract with particular attention to the Kupffer cell.

Daniel E. Goldberg, M.D., Ph.D., 362-1514
Biochemistry of malaria.

William E. Goldman, Ph.D., 362-2742
Molecular basis of pathogenicity of *Histoplasma capsulatum* and *Bordetella pertussis*. *In vitro* models of respiratory tract infections and toxin effects. Biochemical analysis and genetic manipulation of virulence-related phenotypes.

Eduardo A. Groisman, Ph.D., 362-3692
Signal transduction and regulation of gene expression. Molecular biology of bacteria-host interactions. Evolutionary origins of virulence.

David B. Haslam, M.D., 286-2888
Our laboratory is investigating the trafficking of shiga toxin within human cells. In particular, we are examining the role of chaperones in the endoplasmic reticulum in toxin transport into the cytoplasm.

Henry V. Huang, Ph.D., 362-2755
RNA virus evolution. Molecular biology of alphaviruses. Alphavirus gene expression vectors. Antiviral drug design.

Scott J. Hultgren, Ph.D., 362-6772
Molecular basis of bacterial pathogenesis. Host-pathogen interactions and consequences. Urinary tract infections. Intracellular bacterial biofilms in infections. Pathogenic fiber formation and function in disease. Structural basis of chaperone/usher pathway, nucleation/precipitation pathway, amyloid, curli and pili. Vaccine development and drug design.

David A. Leib, Ph.D., 362-2689
Molecular biology and latency of herpes simplex virus.

Hsiu-san Lin, M.D., Ph.D., 362-8566
Differentiation and function of mononuclear phagocytes.

Virginia L. Miller, Ph.D., 286-2891
Molecular basis of pathogenicity of the enteric pathogens *Yersinia enterocolitica* and *Salmonella typhmurium*.

Andrew S. Pekosz, Ph.D., 747-2132
Virology; molecular biology and pathogenesis of influenza virus infection.

Lee Ratner, M.D., Ph.D., 362-8836
Structure and function of human retroviruses, including HTLV-I, a cause of leukemia, and HIV, the cause of AIDS. The major focus is in studying the regulation of virus infectivity, replication, assembly and pathogenicity.

Robert D. Schreiber, Ph.D., 362-8747
Biochemistry and biology of cytokines and their receptors. Elucidation of the signal transduction mechanisms used by interferon-gamma and tumor necrosis factor. Definition of the physiologic roles of cytokines *in vivo* especially with respect to host responses to tumors, and microbial pathogens.

L. David Sibley, Ph.D., 362-8873
Cell and molecular biology of invasion and intracellular survival by the protozoan *Toxoplasma gondii*.

Samuel L. Stanley Jr., M.D., 362-1070
We study the protozoan parasite *Entamoeba* histolytica, the cause of amebic dysentery and amebic liver abscess, focusing on developing models to better understand the pathogenesis of amebic infection, novel targets for anti-amebic drug design, and the design and evaluation of recombinant antigen based vaccines to stimulate mucosal and parenteral immune responses against the parasite.

Joseph W. St. Geme, M.D., 286-2887
The molecular mechanism of *Haemophilus influenzae* pathogenicity. *H. influenzae* is an important cause of human respiratory tract and systemic diseases and a source of substantial morbidity. We are principally interested in characterizing the bacterial and host cell determinants of *H. influenzae* interaction with respiratory epithelium, an essential early step in the pathogenesis of disease. We anticipate that these studies will assist efforts to develop a strategy for the universal

prevention of *Haemophilus* disease and provide insights into other mucosal pathogens.

Gregory A. Storch, M.D., 454-6079
In this elective, the student will participate in a research project involving the application of techniques of molecular biology, especially the polymerase chain reaction and nucleotide sequencing, to the diagnosis of the infectious diseases. Infectious agents currently under investigation include human cytomegalovirus, Epstein-Barr virus, BK polyoma virus, Ehrlichia, *Mycoplasma pneumoniae* and Borrelia. Studies are also directed at molecular detection and analysis of resistance to antimicrobial agents.

Patrick M. Stuart, Ph.D., 362-6774
Virology. Investigate the role viral-induced immune responses play in corneal pathology seen in both primary and recurrent herpetic keratitis. Also to develop and characterize anti-herpetic vaccines that are effective in preventing recurrent herpetic keratitis.

Transplantation. Investigate the role that the interaction of Fas with Fas ligand plays in corneal allograft acceptance and neovascularization of the cornea. In addition, we are studying the role that this interaction plays in the development of immune tolerance that allows the immune system to ignore transplantation antigens leading to allograft acceptance.

Herbert W. Virgin IV, M.D., Ph.D., 362-9223
We work on issues at the interface of virology and immunology by analyzing aspects of immunity that control infection and aspects of viral structure/genetics that contribute to virulence, disease and oncogenesis. We study the pathogenesis and latency of the dsDNA enveloped murine cytomegalovirus and gammaherpesvirus 68.

Joseph P. Vogel, Ph.D., 747-1029
Legionella pneumophila, the causative agent of Legionnaires' pneumonia, replicates inside alveolar macrophages by preventing phagosome-lysosome fusion.

Faculty

MARVIN A. BRENNECKE PROFESSOR OF MOLECULAR MICROBIOLOGY AND HEAD OF DEPARTMENT

Stephen M. Beverley, Ph.D., University of California, Berkeley, 1979.

Professors Emeriti

David E. Kennell, Ph.D., University of California, Berkeley, 1959.

J. Russell Little Jr., M.D., University of Rochester, 1956. (See Department of Medicine.)

Milton J. Schlesinger, Ph.D., University of Michigan, 1959.

Sondra Schlesinger, Ph.D., University of Michigan, 1960.

Professors

John P. Atkinson, M.D., University of Kansas, 1969. (See Department of Medicine.)

Alumni Professor in Molecular Microbiology

Douglas E. Berg, Ph.D., University of Washington, 1969. (See Department of Genetics.)

Michael G. Caparon, Ph.D., University of Iowa, 1985.

M. Wayne Flye, M.D., University of North Carolina, 1967; Ph.D., Duke University, 1980. (See Department of Surgery.)

Daniel E. Goldberg, M.D., Ph.D., Washington University, 1985. (See Department of Medicine.)

William E. Goldman, Ph.D., University of North Carolina, 1980.

Eduardo A. Groisman, Ph.D., The University of Chicago, 1986.

Helen Lebbrink Stoever Professor of Molecular Microbiology

Scott J. Hultgren, Ph.D., Northwestern University, 1988.

Gerald Medoff, M.D., Washington University, 1962. (See Department of Medicine.)

Virginia L. Miller, Ph.D., Harvard University, 1985. (See Department of Pediatrics.)

Lee Ratner, M.D., Ph.D., Yale University, 1979. (See Department of Medicine.)

Robert D. Schreiber, Ph.D., State University of New York, 1973. (See Department of Pathology and Immunology.)

L. David Sibley, Ph.D., Louisiana State University, 1985.

Joseph W. St. Geme, M.D., Harvard University, 1984. (See Department of Pediatrics.)

Gregory A. Storch, M.D., New York University, 1973. (See Department of Medicine and Department of Pediatrics.)

Phillip I. Tarr, M.D., Yale University, 1980. (See Department of Pediatrics.)

Professors (Adjunct)

Susan E. Cullen, Ph.D., Albert Einstein College of Medicine, 1971.

Charles M. Rice, Ph.D., California Institute of Technology, 1981.

Associate Professor Emeritus

Julian B. Fleischman, Ph.D., Harvard University, 1960.

Associate Professors

William Michael Dunne Jr., Ph.D., Medical College of Wisconsin, 1981. (See Department of Medicine and Department of Pathology and Immunology.)

Lawrence D. Gelb, M.D., Harvard University, 1967. (See Department of Medicine.)

Henry V. Huang, Ph.D., California Institute of Technology, 1977.

Anthony Kulczycki Jr., M.D., Harvard University, 1970. (See Department of Medicine.)

David A. Leib, Ph.D., University of Liverpool, 1986. (See Department of Ophthalmology and Visual Sciences.)

Hsiu-san Lin, M.D., National Taiwan University, 1960; Ph.D., The University of Chicago, 1968. (See Department of Radiation Oncology.)

Samuel L. Stanley Jr., M.D., Harvard University, 1980. (See Department of Medicine.)

Herbert W. Virgin IV, M.D., Ph.D., Harvard University, 1985. (See Department of Pathology and Immunology.)

Gary J. Weil, M.D., Harvard University, 1975. (See Department of Medicine.)

Richard K. Wilson, Ph.D., University of Oklahoma, 1986. (See Department of Genetics.)

Research Associate Professors

Josephine E. Clark-Curtiss, Ph.D., Medical College of Georgia, 1974.

Deborah E. Dobson, Ph.D., University of California, Berkeley, 1981.

Assistant Professors

Abderr Azzaq Belaaouaj, Ph.D., University of Paris, 1991. (See Department of Medicine.)

Keril J. Blight, Ph.D., University of Adelaide, Australia, 1994.

Michael S. Diamond, M.D., Ph.D., Harvard University, 1994. (See Department of Medicine.)

Tamara L. Doering, M.D., Ph.D., The Johns Hopkins University, 1991.

David B. Haslam, M.D., University of Calgary, 1987. (See Department of Pediatrics.)

Elaine R. Mardis, Ph.D., University of Oklahoma, 1989. (See Department of Genetics.)

Andrew S. Pekosz, Ph.D., University of Pennsylvania, 1996. (See Department of Pathology and Immunology.)

Joseph P. Vogel, Ph.D., Princeton University, 1993.

William R. Wikoff, Ph.D., Purdue University, 1998. (See Department of Biochemistry and Molecular Biophysics.)

Research Assistant Professor

Patrick M. Stuart, Ph.D., Northwestern University, 1985. (See Department of Ophthalmology and Visual Sciences.)

Assistant Professor (Adjunct)

Paul D. Olivo, M.D., Ph.D., University of Florida, 1982.

Instructor

Linda G. Eissenberg, Ph.D., University of North Carolina, 1982.

Research Instructor

Wandy Beatty, Ph.D., University of Wisconsin, 1989.

DEPARTMENT OF NEUROLOGICAL SURGERY

Instruction in neurological surgery begins with an introduction to the anatomy and physiology of the nervous system presented in the first-year course in neural sciences directed by the Department of Anatomy and Neurobiology with participation of the neurosurgery faculty. In the second year, the Department of Neurological Surgery presents the course in Diseases of the Nervous System in conjunction with the Departments of Neurology, Pathology, Molecular Biology and Pharmacology, Medicine and Pediatrics. The course emphasizes how knowledge derived from basic or clinical investigations leads to improvements in clinical care. In the third year, students participate in a four-week clerkship in Neurology, which introduces students to the clinical care of patients with diseases of the nervous system. Neurosurgical faculty members also work with the neurologists in providing lectures, demonstrations and teaching exercises in patients with neurological diagnoses as part of the Clinical Medicine course. Some students may elect to fulfill their neurology requirement by rotating on the neurosurgery service. Neurosurgical diagnosis, critical care, operative treatment and ethical issues in patient management are emphasized. In the fourth year, students may choose from several advanced electives including clinical externships in neurosurgery and experiences in basic or clinical/translational research.

The Divisions within Neurological Surgery are:

The James L. O'Leary Division of Experimental Neurology and Neurological Surgery: *Thomas A. Woolsey, M.D.* (Director)

The Division of Pediatric Neurosurgery: *Jeffrey G. Ojemann, M.D.; Tae Sung Park, M.D.*

The Center for the Study of Nervous System Injury is based in the Department of Neurology with participation by neurosurgery faculty members, *Ralph G. Dacey Jr., M.D.; Jeffrey M. Gidday, Ph.D.;Tae Sung Park, M.D.*

The Center for Spinal Cord Injury (with Neurology)

Areas of Neurosurgical specialization include:

Epilepsy Surgery: *Joshua L. Dowling, M.D.; Jeffrey G. Ojemann, M.D.*

Cranial Base Surgery: *Michael R. Chicoine, M.D.; Robert L. Grubb Jr., M.D.*

Pituitary Surgery: *Michael R. Chicoine, M.D.; Ralph G. Dacey Jr., M.D.*

Neuro-Oncology: *Michael R. Chicoine, M.D.; Ralph G. Dacey Jr., M.D.; Keith M. Rich, M.D.*

Pediatric Neurosurgery: *Jeffrey G. Ojemann, M.D.; Tae Sung Park, M.D.*

Cerebrovascular Surgery: *Michael R. Chicoine, M.D.; Ralph G. Dacey Jr., M.D.; Robert L. Grubb Jr., M.D.; Keith M. Rich, M.D.*

Spinal Neurosurgery: *Neill M. Wright, M.D.*

Stereotactic Radiosurgery: *Michael R. Chicoine, M.D.; Ralph G. Dacey Jr., M.D.; Joshua L. Dowling, M.D.; Keith M. Rich, M.D.*

Surgical Management of Pain: *Joshua L. Dowling, M.D.*

FIRST YEAR
Selectives

M04 5667 MICROCIRCULATION

Instructor: *Jeffrey M. Gidday, Ph.D.*, 286-2795

The homeostatic functions of the microcirculation include the active regulation of metabolic substrate delivery and waste product removal, and a multifaceted response to injury and disease. This elective is an introduction to the normal and abnormal cell biology and physiology of the microcirculation. Four sessions will be organized around conceptual presentations and laboratory demonstrations by the instructor, and two-part, topic presentations by students following independent library research that focuses on basic physiology and clinically relevant pathophysiology. Basic physiology research topics might include: Regulation of tissue blood flow and vascular tone, propagated vasodilation, hemodynamics and rheology of erythrocytes and leukocytes, cell biology of the endothelium, control of capillary permeability, and angiogenesis. Common disease entities involving microcirculatory dysfunction include: stroke and myocardial ischemia, diabetes, inflammation, tumor angiogenesis, retinopathy of prematurity, pulmonary edema and autoimmune disease, as well as the adaptive cardiovascular responses to exercise or high altitude. (This selective is cross-listed in the Department of Cell Biology and Physiology.)

THIRD YEAR

THIRD YEAR CLERKSHIP OPPORTUNITIES

Up to two students may elect to obtain their neurology clerkship experience on the neurosurgery service or they can choose neurosurgery as part of the surgical specialty rotations. Third-year students participate with the residents and attendings on hospital rounds, evaluate patients in the neurosurgery outpatient department and participate in the neurosurgical operating room. The main objectives of the rotation include: 1) the evaluation of comatose or head-injured patients; 2) clinical presentation, diagnostic work-up and treatment of cervical and lumbar disc disease; and 3) evaluation and treatment of patients with hemorrhagic and ischemic stroke.

FOURTH YEAR
Elective

M40 805 NEUROSURGERY

Instructor: *Ralph G. Dacey Jr., M.D.,* 362-3571

The goal is to provide an overview of neurological surgery. Responsibilities will include patient workup, pre-, intra- and postoperative care, diagnostic procedures, daily resident and weekly grand rounds, clinics, Saturday morning lectures for Junior class, and weekly combined Neurology, Neurosurgery and Neuropathology conferences. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M40 900)

Michael R. Chicoine, M.D., 362-3414

The biology of brain tumors. One area of research focuses on the aggressive nature of certain meningiomas, including their tendency to invade the parenchyma of the brain, cranial nerves, cerebral arteries, dura and bone. The second area of research focuses on the invasive behavior of gliomas. Both of these research topics are investigated using human brain tumor tissue obtained at the time of neurosurgical operations.

Ralph G. Dacey Jr., M.D., 362-3571

Research on the cerebral microcirculation: Our studies focus on examination of molecular mechanisms in the endothelial cells and smooth muscle cells in the intracerebral microcirculation. *In vitro* techniques for studying isolated perfused microvessels are used to examine questions centered on endothelial smooth muscle cell integration of cerebral blood flow responses.

Jeffrey M. Gidday, M.D., 286-2795

Research in our laboratory is aimed at understanding the mechanisms responsible for vascular dysfunction in brain, retina and spinal cord in the setting of ischemia, episodic hypoxia, trauma and diabetes. Our studies employ videomicroscopic methods in transgenic mice and other animals to directly visualize oxidative, inflammatory and proteolytic injury processes in the CNS microcirculation. Cerebral and retinal endothelial cell cultures are also used concomitantly as *in vitro* models of microvascular injury. Another interest in the laboratory is developing models for, and elucidating the mechanisms of, robust neuroprotection in CNS tissues by sublethal hypoxic or ischemic stress, a process called preconditioning.

Robert L. Grubb Jr., M.D., 362-3567

Research on cerebral circulation and metabolism, utilizing short-lived cyclotron produced isotopes of oxygen, carbon and nitrogen is performed in humans. Positron emission tomography is used to measure cerebral circulation and metabolism in patients with severe head injuries, intra-cerebral hemorrhages and atherosclerotic carotid artery occlusive disease. Opportunities exist for the application of computer systems to biological modeling and data processing.

Jeffrey G. Ojemann, M.D., 454-4454

Research focuses on functional imaging and cognition, especially as it relates to patients undergoing surgical treatment of intractable epilepsy. Functional MRI of memory encoding before and after temporal lobectomy will be correlated with patient's memory performance and outcome. Preoperative language mapping is compared to intraoperative stimulation findings in patients who require awake craniotomies, *e.g.*, for cerebral tumors.

Tae Sung Park, M.D., 454-2811

Chemical and molecular mechanisms of neutrophil-mediated microvascular injury following ischemia in the brain. Neutrophil-endothelial adherence and consequent endothelial cell injury are studied in hypoxia-reperfusion models of whole animals and cultured endothelial cells. The role of nitric oxide, peroxynitrite, elastase and myeloperoxidase products on neutrophil and endothelial cells in neutrophil-endothelial interactions is under investigation. Clinical outcome of selective dorsal rhizotomies for treatment of spastic cerebral palsy, and selective amygdalohippocampectomy for treatment of intractable mesial temporal lobe epilepsy in childhood.

Keith M. Rich, M.D., 362-3566

Research on neuronal and glioma cellular apoptosis after treatment with DNA-damaging agents. Techniques include growing human brain tumor cells in culture, bioassay for apoptosis with fluorescent staining, protein immunoblotting and PCR.

Thomas A. Woolsey, M.D., 362-3600

Woolsey studies structure, function, development, plasticity and blood flow in the central nervous system. The somatosensory system of rodents is the model system where each whisker has discrete and easily recognizable groups of neurons and projections at each central station from the brainstem to the cerebral cortex. Currently under study are: (1) mechanisms of dynamic changes in the cerebral microcirculation with neuronal activity; (2) pattern formation in central neural pathways including the roles of functional activity growth factor; (3) brain function changes in models of stroke, tumors and seizures; (4) interactions of groups of neurons for processing of sensory information.

Faculty

EDITH R. AND HENRY G. SCHWARTZ PROFESSOR AND CHAIRMAN OF DEPARTMENT

Ralph G. Dacey Jr., M.D., University of Virginia, 1974.

Professors Emeriti

William S. Coxe, M.D., The Johns Hopkins University, 1948.

Sidney Goldring, M.D., Washington University, 1947.

Professors

Mokhtar Gado, M.D., Cairo University, 1960. (See Department of Radiology.)

Herbert Lourie Professor of Neurological Surgery

Robert L. Grubb Jr., M.D., University of North Carolina, 1965. (See Department of Radiology.)

Shi H. Huang Professor of Neurological Surgery

Tae Sung Park, M.D., Yonsei University, 1971. (See Department of Anatomy and Neurobiology and Department of Pediatrics.)

William J. Powers, M.D., Cornell University, 1975. (See Department of Neurology, Department of Radiology and Clinical Investigation Program.)

René Tempelhoff, M.D., University of Lyon, 1984. (See Department of Anesthesiology.)

Richard D. Wetzel, Ph.D., St. Louis University, 1974. (See Department of Neurology and Department of Psychiatry.)

Thomas A. Woolsey, M.D., The Johns Hopkins University, 1969. (George H. and Ethel R. Bishop Scholar in Neuroscience) (See Department of Anatomy and Neurobiology, Department of Cell Biology and Physiology and Department of Neurology.)

Associate Professors

Andreas H. Burkhalter, Ph.D., University of Zurich, 1977. (See Department of Anatomy and Neurobiology.)

Robert E. Drzymala, Ph.D., University of Oklahoma, 1977. (See Department of Radiation Oncology.)

Jeffrey M. Gidday, Ph.D., University of Virginia, 1986. (See Department of Cell Biology and Physiology and Department of Ophthalmology and Visual Sciences.)

Frank G. Gilliam, M.D., University of Louisville, 1987. (See Department of Neurology.)

Steven E. Petersen, Ph.D., California Institute of Technology, 1981. (See Department of Anatomy and Neurobiology, Department of Neurology and Department of Radiology.)

Keith M. Rich, M.D., Indiana University, 1977. (See Department of Anatomy and Neurobiology and Department of Radiation Oncology.)

Research Associate Professor

Jack R. Engsberg, Ph.D., University of Iowa, 1985. (See Program in Occupational Therapy and Department of Biomedical Engineering.)

Assistant Professors

Venkatesh Aiyagari, M.B.B.S., Calcutta University, India, 1986; D.M., National Institute of Mental Health and Neurosciences, Bangalore, India, 1992. (See Department of Neurology.)

Michael R. Chicoine, M.D., University of California, Los Angeles, 1990.

Ellen M. Deibert, M.D., Temple University, 1993. (See Department of Neurology.)

Michael N. Diringer, M.D., University of Kentucky, 1982. (See Department of Neurology and Program in Occupational Therapy.)

Joshua L. Dowling, M.D., Tulane University, 1989.

John W. McDonald III, M.D., Ph.D., University of Michigan, 1992. (See Department of Neurology.)

Jeffrey G. Ojemann, M.D., Washington University, 1992. (See Department of Anatomy and Neurobiology and Department of Pediatrics.) (Also Psychology)

Neill M. Wright, M.D., University of California, Los Angeles, 1993.

Research Assistant Professors

Hans H. Dietrich, Ph.D., Max Planck Institute, Germany, 1986.

Bradley Miller, Ph.D., Cornell University, 1991.

Assistant Professors (Adjunct)

Matthew A. Howard, M.D., University of Cincinnati, 1984.

John Perl II, M.D., University of North Carolina, 1987.

Research Scientists

Gary W. Harding, M.S.E., University of Washington, 1983. (See Department of Otolaryngology.)

Gordon L. Shulman, Ph.D., University of Oregon, 1979. (Neuropsychology) (See Department of Neurology.) (Also Department of Psychology)

DEPARTMENT OF NEUROLOGY

Neurology concerns itself with the diseases of brain, spinal cord, peripheral nerves and muscles. An introduction to the anatomy and physiology of the nervous system is presented in the first-year course in neural sciences directed by the Department of Anatomy and Neurobiology, with participation of faculty from Neurology. In the second year, the Department of Neurology presents the course in Diseases of the Nervous System in conjunction with the Departments of Pathology, Molecular Biology and Pharmacology, Medicine, Neurosurgery and Pediatrics. The course emphasizes how knowledge derived from basic or clinical investigations leads to improvements in clinical care. The departments also participate in the Clinical Medicine course, providing lectures, demonstrations and teaching exercises with patients in neurological physical diagnosis. In the third year, a four-week clerkship in Neurology introduces students to the clinical care of patients with diseases of the nervous system. Questions pertaining to neurosurgical treatment, neurorehabilitation and ethical issues in management also are addressed. In the fourth year, opportunities exist for many varieties of advanced clinical or research experience. A four-year residency program prepares medical graduates for specialization in neurology. Subspecialty fellowship programs routinely provide additional training in epilepsy; electrophysiology; EMG; sleep medicine; cerebrovascular disease and stroke; neuroimmunology; neurological critical care; neuromuscular disease; neuropsychology; and movement disorders.

Several divisions exist within Neurology:

Division of Neuropsychology: *Steven E. Petersen, Ph.D.* (Division Chief), *Maurizio Corbetta, M.D., Francis Miezin, M.S., Gordon L. Shulman, Ph.D.*

Division of Pediatric Neurology and Development: *Steven M. Rothman, M.D.* (Division Chief), *Susan T. Arnold, M.D., Janice E. Brunstrom, M.D., Anne M. Connolly, M.D., Philip R. Dodge, M.D., W. Edwin Dodson, M.D., Jeffrey J. Neil, M.D., Ph.D., Michael J. Noetzel, M.D., Jean H. Thurston, M.D., Edwin Trevathan III, M.D., Kelvin A. Yamada, M.D.*

In addition, several groups of faculty members are established for specialized research and teaching purposes. They include:

Alzheimer's Disease Research Center: *Virginia D. Buckles, Ph.D.* (Executive Director), *Eugene M. Johnson Jr., Ph.D., John C. Morris, M.D.* (Co-Directors), *M. Carolyn Baum, Ph.D., Mary A. Coats, B.S.N., Alexander W. Dromerick, M.D., Laura L. Dugan, M.D., Dorothy F. Edwards, Ph.D., James E. Galvin, M.D., David M. Holtzman, M.D., Terri L. Hosto, M.S.W., Thomas M. Meuser, Ph.D., B. Joy Snider, M.D., Ph.D., Martha Storandt, Ph.D.*

Center for the Study of Nervous System Injury: *David B. Clifford, M.D.* (Director), *C. Robert Almli, Ph.D., D. Anne Cross, M.D., Ralph G. Dacey Jr., M.D., Gabriel A. de Erausquin, M.D., Ph.D., Michael N. Diringer, M.D., Laura L. Dugan, M.D., Anne Fagan-Niven, Ph.D., Jeffrey M. Gidday, Ph.D., Mark P. Goldberg, M.D., David I. Gottlieb, Ph.D., David H. Gutmann, M.D., Ph.D., David M. Holtzman, M.D., Chung Y. Hsu, M.D., Ph.D., Mark F. Jacquin, Ph.D., Eugene M. Johnson Jr., Ph.D., Jin-Moo Lee, M.D., Ph.D., John W. McDonald, M.D., Ph.D., Jeffrey J. Neil, M.D., Ph.D., Tae Sung Park, M.D., Alexander Parsadanian, Ph.D., William J. Powers, M.D., Steven M. Rothman, M.D., Christian Sheline, Ph.D., B. Joy Snider, M.D., Ph.D., Ling Wei, M.D., Jian Xu, Ph.D., Kelvin A. Yamada, M.D.*

Cerebrovascular Disease Section: *William J. Powers, M.D.* (Section Head), *Mark P. Goldberg, M.D.* (Co-Head), *Janice E. Brunstrom, M.D., Maurizio Corbetta, M.D., Michael N. Diringer, M.D., Alexander W. Dromerick, M.D., Laura L. Dugan, M.D., Dorothy F. Edwards, Ph.D., Robert Fucetola, Ph.D., David M. Holtzman, M.D., Chung Y. Hsu, M.D., Ph.D., Jin-Moo Lee, M.D., Ph.D., Abdullah Nassief, M.D., Jeffrey J. Neil, M.D., Ph.D., Michael J. Noetzel, M.D., Marcus E. Raichle, M.D., Steven M. Rothman, M.D., Bradley L. Schlaggar, M.D., Ph.D., Kelvin A. Yamada, M.D., Allyson Zazulia, M.D.*

Clinical Neurophysiology Section: *Muhammad T. Al-Lozi, M.D., Frank G. Gilliam, M.D., Edwin Trevathan III, M.D.* (Section Heads), *Susan T. Arnold, M.D., Anne M. Connolly, M.D., Stephen P. Duntley, M.D., Glenn Lopate, M.D., Liu Lin Thio, M.D., Ph.D., Michael Wong, M.D., Kelvin A. Yamada, M.D.*

Sleep Section: *Stephen P. Duntley, M.D., A. James Fessler III, M.D.*

Epilepsy Section: *Frank G. Gilliam, M.D., Edwin Trevathan III, M.D.* (Section Co-Heads), *Susan T. Arnold, M.D., Stephen P. Duntley, M.D., A. James Fessler III, M.D., Liu Lin Thio, M.D., Ph.D., Michael Wong, M.D., Kelvin A. Yamada, M.D.*

Neuroimaging Section: *William J. Powers, M.D.* (Section Head), *Juanita Carl, M.A., Maurizio Corbetta, M.D., Francis Miezin, M.S., Joel S. Perlmutter, M.D., Steven E. Petersen, Ph.D., Gordon L. Shulman, Ph.D., Tom O. Videen, Ph.D., Allyson Zazulia, M.D.*

Movement Disorders Section: *Joel S. Perlmutter, M.D.* (Director), *Kevin J. Black, M.D., William M. Landau, M.D., Brad A. Racette, M.D., W. Thomas Thach Jr., M.D.*

Neuroimmunology Section: *D. Anne Cross, M.D.; Jeri A. Lyons, Ph.D., Becky J. Parks, M.D.*

Neurological Critical Care Section: *Michael N. Diringer, M.D.* (Section Head/Director—NNICU), *Venkatesh Aiyagari, M.B.B.S., D.M., Edgar Garcia-Morales, M.D.*

Neuromuscular Diseases Section: *Alan Pestronk, M.D.* (Director), *Muhammad T. Al-Lozi, M.D., Anne M. Connolly, M.D., Julaine M. Florence, P.T., Glenn Lopate, M.D.*

FIRST YEAR
Selectives

M04 5017-01 CLINICAL CORRELATIONS IN NEUROSCIENCE

Instructor: *Allyson Zazulia, M.D.,* 362-7241

Clinical faculty for this selective are members of the Departments of Neurology, Pediatric Neurology, Neurosurgery, Neuro ICU, Radiology, Pathology and Psychiatry. Students will shadow physicians, attend rounds, and meet for seminars and demonstrations to discuss particular patient cases and research studies. Teaching Objective—to gain exposure to medical career options involving neuroscience.

SECOND YEAR

M35 632 DISEASES OF THE NERVOUS SYSTEM

Instructor: *Allyson Zazulia, M.D.,* 362-7241

The goal of this course is to provide an introduction to diseases of the central and peripheral nervous systems, including their clinical manifestations, pathology, pathophysiology and pharmacotherapy. The course includes reading assignments, lectures, laboratories, conferences and clinical presentations.

THIRD YEAR

M35 720 NEUROLOGY CLERKSHIP

Instructor: *Mark P. Goldberg, M.D.,* 362-3296

A full-time, four-week clerkship is provided on the inpatient neurology services at Barnes-Jewish Hospital south. Patients are assigned to students who evaluate and follow them with the resident staff and discuss them regularly in conferences with the senior neurological staff. Students also work in the neurology clinic under staff supervision and attend a series of lectures on neurosurgical problems. The goal of this rotation is to gain expertise in the evaluation and treatment of patients with neurologic diseases.

Up to two students may elect to obtain their clerkship experience on the neurosurgery service. Up to two students may elect a two-week experience in outpatient pediatric neurology. Students participate in the neurology specialty clinics at Children's Hospital, working under the supervision of pediatric neurology fellows and senior staff.

M25 730 PHYSICAL MEDICINE AND REHABILITATION CLERKSHIP

Instructor: *Oksana Volshteyn, M.D.,* 454-7757

Clerkship in PM&R for third-year medical students provides an opportunity to gain basic knowledge and clinical skills in evaluation and management of wide range of neurological and musculoskeletal diseases and conditions that require specialized rehabilitative medical and therapeutic care. Students spend two weeks on Spinal Cord Injury Unit (SCI) and two weeks on Brain Injury (BI) and Stroke Unit at The Rehabilitation Institute of St. Louis. Students are expected to be a part of the rehabilitation team, follow two to three patients, participate in daily morning rounds, participate in performing consults, attend team meetings and family conferences.

Students are required to attend several outpatient clinics such as SCI, BI, Amputee and Stroke. During the entire rotation, students work together with PM&R residents and fellows, and under direct guidance of the NeuroRehabilitation faculty. The usual duty hours are 7-7:30 a.m. to 5 p.m. on weekdays and 8 a.m. to noon on Saturdays. There is no night call.

Students are required to attend all PM&R curriculum lectures and conferences. On the first day of rotation, students meet with the PM&R program director to go over goals, objectives and schedules. Upon completion of the rotation, students are required to fill out the evaluation form to provide feedback regarding rotation experience.

FOURTH YEAR
Electives

M35 815 CONSULT NEUROLOGY

Instructor: *Mark P. Goldberg, M.D.,* 362-3296

The student will evaluate patients with neurological manifestations of medical, surgical and psychiatric diseases and participate in their care under the supervision of the consult resident and attending physician. The student also will attend weekly

clinical conferences, including Neurology Grand Rounds. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M35 840 NEUROREHABILITATION

Instructor: *Maurizio Corbetta, M.D.*, 362-4530

This is a clinical elective which will lead to greater knowledge and understanding in the principles of rehabilitation. The student will participate in the clinical care of patients with strokes, traumatic brain injury, and spinal cord injury. Students will make rounds with the clinical care team, attend outpatient clinics in stroke and traumatic brain injury rehabilitation, and participate in didactic teaching conferences within the PM&R residency. This rotation is particularly useful for people considering careers in rehabilitation, neurology, geriatrics or neurosurgery. The goals of this rotation are to gain greater understanding of neurological disease and its treatment and to gain introduction to the basic principles of rehabilitation. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M35 851 CLINICAL ASPECTS OF AGING AND DEMENTIA

Instructors: *John C. Morris, M.D.; James E. Galvin, M.D.*, 286-2683

This elective focuses on the distinction of dementia from healthy aging and on the differential diagnosis of dementia, including Alzheimer's disease, dementia with Lewy bodies, frontotemporal dementias, cerebrovascular disorders and affective disorders. The student will gain proficiency in interviewing techniques and in the neurologic examination of the geriatric patient, be introduced to neuropsychological, neuropathological, radiologic and other biomedical procedures important in the diagnostic evaluation of the aged, and consider clinical trials of experimental agents used in memory disorders and practical aspects of the management of the demented patient and his or her family. **Valid start weeks for 4-week blocks are:** Weeks 9, 13, 33 and 37.

M35 860 PEDIATRIC NEUROLOGY

Instructor: *Steven M. Rothman, M.D.*, 454-6042

We offer two senior electives: (1) On our Inpatient Elective the student participates as a full member of the neurology ward team and is directly responsible for a proportion of patients on the service under the direction of the senior pediatric neurology resident. The student may take night call every third or fourth night, during which time s/he is responsible for the medical care of the entire ward, as well as for emergency admissions under supervision of a pediatric resident. Formal teaching rounds with the attending pediatric neurologist are held three times a week, and informal teaching rounds are held daily with the senior residents. (2) On our Outpatient Elective the student will attend daily outpatient clinics, during which time s/he will be able to evaluate outpatient problems under faculty guidance. There are pediatric neurology clinics five days a week, in addition to teaching conferences. This elective allows students to see many new and return patients in a tutorial type of setting since patients are immediately reviewed with senior faculty. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M35 861 NEUROLOGY/NEUROSURGERY ICU

Instructor: *Michael N. Diringer, M.D.*, 362-2999

The student will be integrated into the Critical Care Team that provides care in the Neurology/Neurosurgery ICU. Diseases frequently encountered include intracerebral hemorrhage, head trauma, subarachnoid hemorrhage and stroke. The student will follow patients, participate in rounds and perform some procedures under supervision. Daily didactic sessions will be provided as conferences or lectures from the ICU attending. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M35 870 EPILEPTOLOGY

Instructor: *Frank G. Gilliam, M.D.*, 362-3888

Students will be involved, mainly as observers, in diagnosing and managing both surgical and medical patients with epileptic disorders. The patients are in outpatient and inpatient settings. They are also required to do one patient write-up each and one talk on a topic relevant to epilepsy. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 29, 33, 37 and 41.

Research (M35 900)

David B. Clifford, M.D., 362-9731

Clinical treatment of neurologic manifestations of AIDS, including peripheral neuropathy, AIDS Dementia and progressive multifocal leukoencephalopathy. Quantitative virologic correlations are a particular area of concentration with current studies.

Maurizio Corbetta, M.D., 747-0426

The elective will provide hands-on experience in using functional neuroimaging (PET and fMRI) to map regions of the human brain responsible for vision and attention, and to study recovery of function in patients with cognitive deficits (aphasia, neglect) and brain injury.

D. Anne Cross, M.D., 362-3293

Understanding interactions of the immune system with the central nervous system as it relates to multiple sclerosis and other neuroimmunological disorders. Our goal is to understand how immune cells cross the blood-brain barrier and initiate the cascade of events leading to lesions of multiple sclerosis.

Mark P. Goldberg, M.D., 362-3258

Web-based neurology education. The student will select a topic and target audience, then develop

web-based materials to teach the topic. Target audiences may include medical students, patients or family members, or allied health professionals. Most topics will be related to stroke. Completed projects will appear on the Internet Stroke Center web site (**www.strokecenter.org**) or the education web site of the Department of Neurology. Web development skills are welcome but NOT required.

David H. Gutmann, M.D., Ph.D., 362-7149

Neuro-oncology research. Our laboratory is interested in the **molecular pathogenesis of human nervous system tumors**. We are approaching this problem by determining the function of several relevant nervous system tumor suppressor genes *in vitro* as well as by developing animal models in which these genes and their downstream signaling partners have been genetically altered *in vivo*. In addition, we have several studies ongoing to identify novel genes associated with tumor formation and malignant progression. The studies ongoing in my laboratory are focused on understanding the basic molecular biological alterations critical for the development and progression of nervous system cancers in an effort to ultimately identify potential targets for future cancer therapies as well as to define genetic markers for improved tumor classification and prognostic stratification.

Individuals affected with the neurofibromatosis 1 (NF1) and tuberous sclerosis complex (TSC) cancer predisposition syndromes develop brain tumors (*astrocytomas*) at an increased frequency. Our laboratory is studying the function of the NF1 and TSC tumor suppressor gene products in the regulation of astrocyte proliferation both *in vitro* and *in vivo*. Mouse models for NF1 and TSC astrocytomas have been developed and are presently being characterized. In addition, our laboratory has been actively involved in the development and characterization of specific mouse models for sporadic human astrocytomas. We have generated several transgenic and conditional knockout mouse strains for studies aimed at better understanding the molecular pathogenesis of astrocytomas.

Individuals with the neurofibromatosis 2 (NF2) inherited cancer predisposition syndrome develop *meningiomas* at an increased frequency. The NF2 gene product, merlin, belongs to the Protein 4.1 family of molecules that link the actin cytoskeleton to cell surface glycoproteins. Studies in our laboratory have focused on the mechanism(s) by which merlin regulates cell proliferation and tumor growth. In addition, we have identified a second Protein 4.1 tumor suppressor that we have shown is also important in the pathogenesis of meningiomas. Studies on these novel Protein 4.1 tumor suppressors will likely expand our understanding about the signaling processes involved in contact inhibition growth arrest.

John W. McDonald, M.D., Ph.D., 454-8663

Spinal cord injury regeneration. Mechanisms of spinal cord injury and regeneration with emphasis on embryonic stem cell transplantation and remyelination.

Steven E. Petersen, Ph.D., 362-3319

This lab is interested in the functional localization of higher brain processes, particularly those processes related to language, memory and visual attention. Our main approach to these issues is the use of PET and fMRI activation, but we also study task performance in normal and selected patient populations.

Marcus E. Raichle, M.D., 362-6907

In vivo brain hemodynamic, metabolic and functional studies of human cognition and emotion using cyclotron-produced isotopes and emission tomography (PET) as well as functional magnetic resonance imaging (fMRI) in humans. See also Steven E. Petersen, Ph.D.

Kelvin A. Yamada, M.D., 362-3533, 454-6120

Research on mechanisms modulating synaptic transmission in the central nervous system using electrophysiological techniques in neuronal cell cultures, in brain slices, and in live rodents. Studies are relevant to epilepsy, neonatal brain injury and stroke.

Faculty

SEAY PROFESSOR OF CLINICAL NEUROPHARMACOLOGY IN NEUROLOGY AND HEAD OF DEPARTMENT

David B. Clifford, M.D., Washington University, 1975.

Professors Emeriti

Leonard Berg, M.D., Washington University, 1949.

Margaret H. Clare, M.A., Washington University, 1951. (Neurophysiology)

Philip R. Dodge, M.D., University of Rochester, 1948. (See Department of Pediatrics.)

Sven G. Eliasson, Ph.D., University of Lund, 1952; M.D., 1954.

Alan L. Pearlman, M.D., Washington University, 1961. (See Department of Cell Biology and Physiology.)

Arthur L. Prensky, M.D., New York University, 1955. (See Department of Pediatrics.)

Jean H. Thurston, M.D., University of Alberta, 1941. (Neurochemistry) (See Department of Pediatrics.)

Edward F. Vastola, M.D., Columbia University, 1947.

Professors

David A. Balota, Ph.D., University of South Carolina, 1981. (Also Department of Psychology)

D. Anne Cross, M.D., University of Alabama, 1980.

W. Edwin Dodson, M.D., Duke University, 1967. (See Department of Pediatrics.)

Donald O. Schnuck Family Chair in Neurology for Neurofibromatosis Research

David H. Gutmann, M.D., Ph.D., University of Michigan, 1986. (See Department of Genetics and Department of Pediatrics.)

Charlotte and Paul Hagemann Professor of Neurology

David M. Holtzman, M.D., Northwestern University, 1985. (See Department of Molecular Biology and Pharmacology.)

Elliot H. Stein Professor of Neurology

Chung Y. Hsu, M.D., Ph.D., National Taiwan University, 1970.

Norman J. Stupp Professor of Neurology

Eugene M. Johnson Jr., Ph.D., University of Maryland, 1970. (See Department of Molecular Biology and Pharmacology.)

William M. Landau, M.D., Washington University, 1947.

Harvey A. and Dorismae Hacker Friedman Distinguished Professor of Neurology

John C. Morris, M.D., University of Rochester, 1974. (See Department of Pathology and Immunology.)

Michael J. Noetzel, M.D., University of Virginia, 1977. (See Department of Pediatrics.)

Joel S. Perlmutter, M.D., University of Missouri, 1979. (See Department of Anatomy and Neurobiology and Department of Radiology.)

Alan Pestronk, M.D., The Johns Hopkins University, 1970. (See Department of Pathology and Immunology.)

James S. McDonnell Professor of Cognitive Neuroscience

Steven E. Petersen, Ph.D., California Institute of Technology, 1981. (Neuropsychology) (See Department of Anatomy and Neurobiology, Department of Neurological Surgery and Department of Radiology.) (Also Department of Psychology)

William J. Powers, M.D., Cornell University, 1975. (See Department of Neurological Surgery, Department of Radiology and Clinical Investigation Program.)

Marcus E. Raichle, M.D., University of Washington, 1964. (See Department of Radiology.)

Herbert E. Rosenbaum, M.D., University of Oregon, 1949.

Ernest and Jane G. Stein Professor of Developmental Neurology

Steven M. Rothman, M.D., State University of New York, Upstate, 1973. (See Department of Anatomy and Neurobiology and Department of Pediatrics.)

Shirley A. Sahrmann, Ph.D., Washington University, 1973. (Neurophysiology) (See Department of Cell Biology and Physiology and Program in Physical Therapy.)

Martha Storandt, Ph.D., Washington University, 1966. (Psychology) (Also Department of Psychology)

W. Thomas Thach Jr., M.D., Harvard University, 1964. (See Department of Anatomy and Neurobiology and Program in Physical Therapy.)

Richard D. Wetzel, Ph.D., St. Louis University, 1974. (Medical Psychology) (See Department of Neurological Surgery and Department of Psychiatry.)

Thomas A. Woolsey, M.D., The Johns Hopkins University, 1969. (George H. and Ethel R. Bishop Scholar in Neuroscience) (Neuroscience) (See Department of Anatomy and Neurobiology, Department of Cell Biology and Physiology and Department of Neurological Surgery.)

Research Professor

Mark F. Jacquin, Ph.D., City University of New York, 1980.

Professors (Clinical)

Joseph T. Black, M.D., State University of New York, Upstate, 1965.

E. Robert Schultz, M.D., Washington University, 1955. (See Department of Psychiatry.)

Stuart Weiss, M.D., Washington University, 1954.

Professor (Adjunct)

Dennis W. Choi, M.D., Ph.D., Harvard University, 1978.

Associate Professor Emeritus

Lawrence A. Coben, M.D., Case Western Reserve University, 1954.

Associate Professors

Muhammad T. Al-Lozi, M.D., King Edward Medical College, 1980.

C. Robert Almli, Ph.D., Michigan State University, 1970. (See Program in Occupational Therapy.)

M. Carolyn Baum, Ph.D., Washington University, 1993. (See Program in Occupational Therapy.)

Anne M. Connolly, M.D., Indiana University, 1984. (See Department of Pediatrics.)

Maurizio Corbetta, M.D., University of Pavia, 1985. (See Department of Anatomy and Neurobiology and Department of Radiology.)

Susan S. Deusinger, Ph.D., Washington University, 1987. (See Program in Physical Therapy.)

Michael N. Diringer, M.D., University of Kentucky, 1982. (See Department of Anesthesiology, Department of Neurological Surgery and Program in Occupational Therapy.)

Alexander W. Dromerick, M.D., University of Maryland, 1986. (See Program in Occupational Therapy.)

Laura L. Dugan, M.D., Ohio State University, 1987. (See Department of Medicine.)

Stephen P. Duntley, M.D., University of Washington, 1988.

Frank G. Gilliam, M.D., University of Louisville, 1987. (See Department of Neurological Surgery.)

Mark P. Goldberg, M.D., Columbia University, 1984. (See Department of Anatomy and Neurobiology.)

Jeffrey J. Neil, M.D., Ph.D., Washington University, 1984. (See Department of Anatomy and Neurobiology, Department of Pediatrics, Department of Radiology and Clinical Investigation Program.)

Yvette I. Sheline, M.D., Boston University, 1979. (See Department of Psychiatry and Department of Radiology.)

Richard S. Sohn, M.D., The University of Chicago, 1968.

Edwin Trevathan III, M.D., Emory University, 1982. (See Department of Pediatrics.)

Oksana Volshteyn, M.D., Minsk State Medical Institute, 1976. (See Department of Medicine.)

Kelvin A. Yamada, M.D., Baylor College of Medicine, 1983. (See Department of Pediatrics.)

Research Associate Professors

Diane L. Damiano, Ph.D., P.T., University of Virginia, 1993.

Anne Fagan-Niven, Ph.D., University of California, San Diego, 1992.

Tom O. Videen, Ph.D., University of Washington, 1981. (Neurophysiology) (See Department of Radiology.)

Jian Xu, Ph.D., Shanghai Institute of Materia Medica, 1991.

Associate Professor Emeritus (Clinical)

Joseph M. Dooley Jr., M.D., St. Louis University, 1958.

Associate Professors (Clinical)

Denis I. Altman, M.B., B.Ch., University of The Witwatersrand, 1975. (See Department of Pediatrics.)

Sylvia Awadalla, M.D., Ohio State University, 1985.

Garrett C. Burris, M.D., University of Southwestern Louisiana, 1968. (See Department of Pediatrics.)

J. Michael Hatlelid, M.D., Washington University, 1977.

Richard T. Katz, M.D., Case Western Reserve University, 1981.

Walter Lemann, M.D., Tulane University, 1979.

John F. Mantovani, M.D., University of Missouri, 1974. (See Department of Pediatrics.)

James R. Rohrbaugh, M.D., Ohio State University, 1974. (See Department of Pediatrics.)

Eli R. Shuter, M.D., Washington University, 1960.

Associate Professors (Adjunct)

Terrie Inder, M.D., M.B.Ch.B., University of Otago, New Zealand, 1997.

Warren E. Lux, M.D., New York University, 1970.

Assistant Professors

Venkatesh Aiyagari, M.B.B.S., Calcutta University, India, 1986; D.M., National Institute of Mental Health and Neurosciences, Bangalore, India, 1992. (See Department of Neurological Surgery.)

Susan T. Arnold, M.D., Cornell University, 1988. (See Department of Pediatrics.)

Janet Duchek Balota, Ph.D., University of South Carolina, 1982. (See Program in Occupational Therapy.)

Kevin J. Black, M.D., Duke University, 1990. (See Department of Psychiatry.)

Janice E. Brunstrom, M.D., Medical College of Virginia, 1987. (See Department of Cell Biology and Physiology and Department of Pediatrics.)

Gabriel A. de Erausquin, M.D., Ph.D.,Universidad de Buenos Aires, 1986. (See Department of Psychiatry.)

Dorothy F. Edwards, Ph.D., Washington University, 1980. (See Program in Occupational Therapy.)

A. James Fessler III, M.D., Vanderbilt University, 1995.

Robert P. Fucetola, Ph.D., Washington University, 1997.

James E. Galvin, M.D., UMDNJ—New Jersey Medical School, 1992.

Jin-Moo Lee, M.D., Ph.D., Cornell University, 1993.

Glenn Lopate, M.D., Ohio State University, 1987.

John W. McDonald III, M.D., Ph.D., University of Michigan, 1992. (See Department of Neurological Surgery.)

Abdullah Nassief, M.D., King Saud University, Riyadh, Saudi Arabia, 1990.

Becky J. Parks, M.D., Loma Linda University, 1987.

Karen J. Pentella, M.D., Ohio State University, 1979.

Brad A. Racette, M.D., Northwestern University, 1992.

Rimma Ruvinskaya, M.D., Leningrad Institute, USSR, 1985.

Cristina Sadowsky, M.D., Institute of Medicine and Pharmacy, Bucharest, Romania, 1989.

Bradley L. Schlaggar, M.D., Ph.D., Washington University, 1994. (See Department of Pediatrics.)

Helena W. Schotland, M.D., Albert Einstein College of Medicine, 1988. (See Department of Medicine.)

B. Joy Snider, M.D., Ph.D., University of Texas, Southwestern, 1986.

Jennifer S. Stith, Ph.D., Washington University, 1994. (See Program in Physical Therapy.)

Samer D. Tabbal, M.D., American University of Beirut, Lebanon, 1993.

Liu-Lin Thio, M.D., Ph.D., Washington University, 1992.

Allyson Zazulia, M.D., Georgetown University, 1994.

Research Assistant Professors

Virginia D. Buckles, Ph.D., University of Wisconsin, Madison, 1981.

Julaine M. Florence, M.H.S., Washington University, 1983.

Jeri A. Lyons, Ph.D., Medical College of Wisconsin, 1997.

Thomas M. Meuser, Ph.D., University of Missouri, St. Louis, 1997.

Yannan Ouyang, Ph.D., University of California, San Diego, 1995.

Alexander Parsadanian, Ph.D., Institute of Molecular Biology, Moscow, Russia, 1984.

Christian Sheline, Ph.D., University of California, Los Angeles, 1989.

Xiao-feng Yang, M.D., Beijing Medical University, 1983.

Assistant Professors Emeriti (Clinical)

William B. Hardin, M.D., University of Texas, Galveston, 1957.

David Mendelson, M.D., Indiana University, 1948.

Assistant Professors (Clinical)

Lynn B. Blackburn, Ph.D., Indiana University, 1972.

David J. Callahan, M.D., Washington University, 1986. (See Department of Pediatrics.)

Juan Escandon, M.D., Colombian School of Medicine, Bogota, Colombia, 1989.

Royal G. Grueneich, Ph.D., University of Minnesota, 1978.

Joseph Hanaway, M.D., McGill University, 1960.

Robert P. Margolis, M.D., St. Louis University, 1975.

Daniel Phillips, M.D., Washington University, 1980.

David M. Reisler, M.D., Washington University, 1961.

Barry Singer, M.D., Columbia University College of Physicians and Surgeons, 1992.

Howard I. Weiss, M.D., Tulane University, 1972.

Instructor Emerita

In-Sook Sunwoo, M.D., Woo Sok University, 1992.

Instructors

Linda M. Schultz, Ph.D., University of Wisconsin-Milwaukee, 1992.

Michael Wong, M.D., Ph.D., University of Texas, Southwestern, 1995.

John Zempel, M.D., Ph.D., Washington University, 1995.

Research Instructors

Angela L. Berry, M.S.N., University of Missouri, Kansas City, 1992.

Juanita Carl, M.A., Washington University, 1962.

Maria B. Carroll, M.S.N., St. Louis University, 1994.

Mary A. Coats, B.S.N., Southern Illinois University, 1980.

Terri L. Hosto, M.S.W., University of Michigan, 1986.

Michael Howard, Ph.D., University of Miami, 1998.

Krzysztof Hyrc, Ph.D., Jagiellonian University, Poland, 1987.

Lori McGee-Minnich, B.S.N., University of Missouri, Columbia, 1984.

Pamela E. Millsap, M.S.N., University of Texas, Arlington, 1989. (Gerontology)

Sally J. Muich, M.S.N., St. Louis University, 1995.

Janice L. Palmer, M.S.N., University of Missouri, St. Louis, 1994. (Gerontology)

Stacy Stiening, M.S.N., St. Louis University, 2000.

Christy M. Tomlinson, M.S.N., University of Hawaii, 1981.

Instructors (Clinical)

Aninda B. Acharya, M.D., University of Kansas, 1996.

Lizette Alvarez-Montero, M.D., Ponce School of Medicine, Puerto Rico, 1991.

Max Benzaquen, M.D., Ph.D., San Marcos University, 1978.

James S. Bonner, M.D., University of Missouri, 1980. (See Department of Pediatrics.)

Russell Cantrell, M.D., University of Tennessee, 1989.

Bennett D. Frank, M.D., Ph.D., Baylor College of Medicine, 1988.

James M. Goldring, Ph.D., Washington University, 1977; M.D., 1986.

Stephen M. Kanne, Ph.D., Washington University, 1999.

Syed Khader, M.D., Madras Medical College, 1993.

Ashok Kumar, M.D., Dow Medical College, University of Karachi, Pakistan, 1985.

David Peeples, M.D.,
The University of Chicago, 1986.
Tara Spevak, Ph.D.,
University of Florida, Gainesville, 1997.
Sandra L. Tate, M.D.,
Southern Illinois University, 1987.
Andrew M. Wayne, M.D.,
University of Missouri, Columbia, 1993.

Instructors (Fellows)

Lawrence N. Eisenman, M.D.,
Northwestern University, 1997.
Kevin C. Ess, M.D.,
University of Cincinnati, 1998.
Francisco Gondim, M.D.,
Universidade Federal do Ceara, Fortaleza, Brazil, 1997.
Timothy M. Lynch, M.D.,
Brown University, 1998.
Irina Ramneantu, M.D.,
University of Medicine and Pharmacy (Carol Davila), Bucharest, Romania, 1997.
Mikula K. Stambuk, M.D.,
Washington University, 1998.
Waqar Waheed, M.D.,
King Edward Medical College, Lahore, Pakistan, 1993.
John F. Zurasky, M.D.,
Indiana University School of Medicine, 1998.

Research Instructors (Fellows)

Michaela Livia Bajenaru, Ph.D.,
St. Louis University, 1998.
Robert Brendza, Ph.D.,
Indiana University, 1999.
Ebru Erbayat-Altay, M.D.,
Ankara University Medical School, Turkey, 1991.
Chul-Sang Lee, Ph.D.,
Seoul University, 1996.
Jennifer L. Stark, Ph.D.,
Ohio State University, 2001.
Kejie Yin, M.D.,
Yangzhou University Medical College, 1983; Ph.D., Shanghai Medical University, 1998.

Research Scientists

Francis Miezin, M.S.,
University of Wisconsin, 1972.
Gordon L. Shulman, Ph.D.,
University of Oregon, 1979. (Neuropsychology) (See Department of Neurological Surgery.) (Also Department of Psychology)
Abraham Z. Snyder, Ph.D.,
Rockefeller University, 1977; M.D., State University of New York, Buffalo, 1981. (See Department of Radiology.)

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

The Department of Obstetrics and Gynecology has clinical teaching services located at Barnes-Jewish Hospital and Missouri Baptist Hospital under the following director:

James R. Schreiber, M.D.,
Professor and Head, Department of Obstetrics and Gynecology

In addition, for the purposes of teaching, clinical care and research, the Department of Obstetrics and Gynecology is divided into subspecialty divisions under the following directors:

Gynecologic Oncology: David G. Mutch, M.D.
Maternal-Fetal Medicine: Yoel Sadovsky, M.D.
Reproductive Endocrinology and Infertility: Randall R. Odem, M.D.
Gynecology: Rebecca P. McAlister, M.D.
Research: D. Michael Nelson, M.D., Ph.D.

Instruction in Obstetrics and Gynecology is provided during all four years of the medical curriculum, beginning with an introductory course in the first year as a component of Clinical Medicine. Teaching in the second year is designed to correlate basic science with the physiologic basis of normal pregnancy and parturition, reproductive biology and gynecologic malignancies. All third-year medical students participate in a 12-week clinical clerkship in Women's and Children's Health. This is divided into three four-week components of pediatrics, maternal-infant health and gynecology. In the fourth year, students may elect a subinternship in the listed clinical subspecialties or a research elective.

FIRST YEAR

As a component of the course in Clinical Medicine offered by the Department of Medicine, the student is introduced to the essentials in the medical history and examination for the gynecological evaluation of the adult woman patient.

SECOND YEAR

Second-year students are introduced to obstetrics and gynecology with lectures in reproductive biology that apply and expand upon pelvic anatomy and gynecologic and obstetric physiologic principles taught in the first year.

M45 635B OBSTETRICS AND GYNECOLOGY

Instructor: *Andrea L.P. Stephens, M.D.,* 362-3126

The obstetrical component of this course emphasizes the physiologic basis of normal pregnancy, parturition, and labor and delivery, and adaptations of other organ systems to pregnancy. Pathophysiology of pregnancy and deviations from normal labor will also be introduced. The gynecologic component of the course reviews embryology and includes the topics pediatric and adolescent gynecology, amenorrhea, abnormal uterine bleeding, menopause, surgical anatomy, and diagnosis and treatment of gynecologic neoplasms.

THIRD YEAR

M45 730 OB/GYN CLERKSHIP

Instructor: *Andrea L.P. Stephens, M.D.,* 362-3126

Comprehensive study of the reproductive health needs of women is the focus of the curriculum. Opportunity for supervised active participation is emphasized in outpatient clinics, routine and high-risk obstetrics, care of the infertile and oncology patient, including surgical case management. Students are assigned as clinical clerks to rotations at Barnes-Jewish Hospital and Missouri Baptist Hospital. Faculty, house staff and nurse practitioners provide teaching for this rotation. Students participate in all teaching conferences offered by the department; core curriculum topics are presented in a seminar series and in small group sessions with faculty preceptors.

FOURTH YEAR

Fourth-year students wishing to take an externship or research elective can choose from a variety of courses.

Electives

M45 804 OB/GYN OUTPATIENT CARE SUBINTERNSHIP

Instructor: *Andrea L.P. Stephens, M.D.,* 362-4211

This experience is designed to acquaint the student with the diagnosis and care of outpatients. While primarily located in the Gynecology Clinic and Outpatient Surgery unit, it should provide a more general overview of how to evaluate, diagnose and provide definitive treatment (both medical and surgical) without hospital admission. The subintern will spend three to four half days weekly participating in outpatient surgery under the supervision of attendings and house staff, and five to six additional half days in clinic and private offices. Students will receive a better understanding of mechanisms utilized in providing surgical care to outpatients and an introduction to both the style and substance of office care. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M45 810 OB/GYN ENDOCRINOLOGY—INFERTILITY SUBINTERNSHIP

Instructor: *Randall R. Odem, M.D.,* 286-2421

The subintern will participate (in the office and hospital) in the study and treatment of women with reproductive endocrine disorders and infertility. S/he will attend and present in conferences, attend surgery, observe assisted reproductive technology procedures, have assigned reading and be an integral part of the reproductive endocrine service. Opportunities for clinical research projects in reproductive endocrinology are also available. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M45 825 GYNECOLOGY ACROSS A WOMAN'S LIFE SPAN

Instructor: *Diane F. Merritt, M.D.,* 362-1016

This clinical experience is designed to acquaint the student with outpatient gynecology as it impacts the patient at various times in her lifespan (infancy, adolescence, reproductive years, peri- and post-menopause). Sexuality and sexual dysfunction, congenital anomalies of the reproductive tract, contraception, hormone replacement therapy, pediatric and adolescent gynecology, and outpatient management are the focus of this elective. (Obstetrics is not.) The student will spend five half-days a week in clinic seeing patients with the instructor. The student will also attend departmental conferences and be responsible for independent reading assignments in outpatient gynecology. **Valid start weeks for 4-week blocks are:** Weeks 1, 13, 17, 21, 25, 29, 33, 37 and 41. (Individual student must discuss with instructor if Weeks 5-8 are desired.)

M45 830 GYN ONCOLOGY SUBINTERNSHIP

Instructor: *David G. Mutch, M.D.,* 362-3181

The subintern will take part in the work-up of tumor patients prior to surgery and/or radiotherapy, assist in pelvic operations, help render postoperative care and review pathology specimens and slides. S/he will participate in GYN Tumor Clinic sessions, make hospital rounds with house staff, provide consultations and attend OB-GYN conferences. Opportunities for clinical or basic research project in gynecologic malignancy are also available. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M45 840 MATERNAL-FETAL MEDICINE SUBINTERNSHIP

Instructor: *Gilad A. Gross, M.D.,* 747-0739

Subinterns will participate in the antepartum management of high-risk hospitalized patients as well as complicated outpatients through the High-Risk Obstetrics Clinics and the Center for Diabetes in Pregnancy. Examples include diabetes, hypertension, renal disease, hematologic abnormalities, preterm labor and others. Antepartum evaluation and monitoring of the pregnant woman and her fetus are emphasized. Supervision is by the antepartum chief resident and a maternal-fetal medicine faculty member. An opportunity for intense labor and delivery experience with the Night Team is also encouraged. Students will spend time observing both genetic counseling and diagnostic obstetric ultrasound examinations. The student will prepare a brief talk on a topic of his/her interest during the course of the rotation. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M45 856 OB/GYN ULTRASOUND GENETICS

Instructor: *Jeffrey M. Dicke, M.D.,* 454-8135

The student will learn the principles and techniques of noninvasive screening for fetal disorders, observe the performance of invasive prenatal diagnostic procedures and learn the standards and guidelines for performance of the antepartum obstetrical ultrasound examination and female pelvic examination. The student will also gain experience in pedigree analysis and familial risk factor assessment working with genetic counselors. Opportunities for participation in clinical research are also available. **Valid start weeks for 2-week blocks are:** Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

M65 833 SPECIAL TOPICS IN REPRODUCTIVE HEALTH

Instructor: *F. Sessions Cole, M.D.,* 454-6148

Students will participate in clinical experiences in four clinical modules: contraception, sexually transmitted diseases, abortion and special topics (HIV infection and adolescence). Required reading will include relevant review articles. Clinical experiences will be primarily ambulatory. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M45 900)

Irving Boime, Ph.D., 362-2556

Our laboratory is concerned with the biosynthesis of the gonadotropin hormones in the placenta and pituitary. Specifically, these interests can be divided into two general categories: (1) Structure-function studies that deal with the determinants for secretion, sorting and biological activity of these hormones. Such work includes the design of analogs for potential clinical use. (2) Factors governing expression of several placental and pituitary hormone genes. The approaches to these problems involve the use of site-directed mutagenesis and transgenic animals.

Kelle H. Moley, M.D., 362-1765

Preimplantation Embryogenesis and Glucose Transporter Biology. From animal and human studies it is clear that mammalian embryos are vulnerable to injury during the preimplantation stage of development. Glucose transport and metabolism are critical for blastocyst formation and further development. The primary focus of our laboratory is how early preimplantation glucose transport and metabolism affects the outcome of pregnancy at a molecular level. An elective in our lab would allow exposure to bench work in reproductive biology.

Glucose enters the blastocyst via one of four facilitative glucose transporters, GLUTI-3, and the novel insulin-regulated transporter we recently cloned, GLUT8. We have shown that murine maternal hyperglycemia leads to down regulation of GLUTI-3 at the blastocyst stage and that this event triggers apoptosis via pathways involving BAX, p53 and caspases. In the murine diabetic model, this increase in apoptosis results in fetal resorption or malformation. Both these adverse pregnancy outcomes are more common in diabetic women. One focus of our lab is how decreased intracellular glucose triggers apoptosis and how this manifests as pregnancy loss or malformation.

We have also demonstrated that hyperinsulinemia and high IGF-1 levels, associated with polycystic ovary syndrome, lead to decreased insulin-stimulated glucose transport and increased apoptosis at a blastocyst stage. We are interested in how GLUT8 and the insulin signalling pathways are involved in apoptosis, blastocyst development and metabolism. Dysregulaton of this transporter is responsible for the apoptosis at this stage and thus may be related to the increased miscarriage rate experienced by these women. Projects in the lab are also investigating mechanisms responsible for GLUT8 translocation and fusion with the plasma membrane involving v- and t-SNARE proteins. Visit our web site at **www.obgyn.wustl.edu/moleylab/index.asp**.

Yoel Sadovsky, M.D., 747-0937

In our laboratory we focus on reproductive development and function. First, we study the mechanisms that determine placental differentiation and function during human pregnancy. This process proceeds from mononucleated cytotrophoblast to a terminally differentiated syncytiotrophoblast, and may be disrupted by diverse insults such as hypoxia and malnutrition, which lead to fetal growth restriction. We focus on genes that modulate trophoblast differentiation and function. Using DNA micro-arrays and real time expression analysis we correlate phenotypic changes with alterations in gene expression. We analyze the expression and activity of proteins that play a central role in trophoblast function, such as the PPAR family of proteins and their role in feto-placental differentiation and uptake of fatty acids.

Our lab also dissects the molecular mechanisms underlying gonadal function. We focus on the nuclear receptor steroidogenic factor 1 (SF-1). This "orphan" member of the nuclear receptor superfamily of transcriptional regulators is essential for reproductive and endocrine homeostasis, and required for intact development of both female and male gonads, as well as the adrenal gland. Although the significance of SF-1 to reproduction has been clearly demonstrated, its mechanism of action is poorly understood. We utilize molecular and genetic approaches to dissect the transcriptional regulatory functions of SF-1 and their modulation by co-activators and co-repressors. We have identified a synergistic regulation of luteinizing hormone (LH)-beta by SF-1 and early growth response-1 (Egr-1), and currently analyze the mechanism and significance of this synergy *in vitro* and in transgenic mice. Visit our web site at **www.sadovsky.wustl.edu**.

Faculty

ELAINE AND MITCHELL YANOW PROFESSOR AND HEAD OF DEPARTMENT

James R. Schreiber, M.D., The Johns Hopkins University, 1972.

Professors Emeriti

H. Marvin Camel, M.D., Creighton University, 1950.

Ernst R. Friedrich, M.D., University of Heidelberg, 1954.

James C. Warren, M.D., University of Kansas, 1954; Ph.D., University of Nebraska, 1961. (See Department of Biochemistry and Molecular Biophysics.)

Walter G. Wiest, Ph.D., University of Wisconsin, 1952.

Professors

Irving Boime, Ph.D., Washington University, 1970. (See Department of Molecular Biology and Pharmacology.)

James P. Crane, M.D., Indiana University, 1970. (See Department of Genetics and Department of Radiology.)

Paul J. Goodfellow, Ph.D., Queen's University, 1985. (See Department of Surgery and Alvin J. Siteman Cancer Center.)

Diane F. Merritt, M.D., New York University, 1975.

Ira C. and Judith Gall Professor in Obstetrics and Gynecology

David G. Mutch, M.D., Washington University, 1980.

Virginia S. Lang Professor in Obstetrics and Gynecology

D. Michael Nelson, M.D., Ph.D., Washington University, 1977.

Randall R. Odem, M.D., University of Iowa, 1981.

Frederick Sweet, Ph.D., University of Alberta, 1968.

Professors Emeriti (Clinical)

Robert Burstein, M.D., Washington University, 1948.

S. Michael Freiman, M.D., Washington University, 1955.

Marvin Rennard, M.D., Washington University, 1952.

Professors (Clinical)

Andrew E. Galakatos, M.D., University of Missouri, 1965.

Ira C. Gall, M.D., University of Cincinnati, 1951.

Professor (Adjunct)

Frederick T. Kraus, M.D., Washington University, 1955.

Associate Professor (Emeritus)

Asko I. Kivikoski, M.D., University of Turku, 1958; D.Sc., 1967.

Associate Professors

Ronald J. Chod, M.D., University of Texas, 1983.

Jeffrey M. Dicke, M.D., Ohio State University, 1978.

Diana L. Gray, M.D., University of Illinois, 1981. (See Department of Radiology.)

Thomas J. Herzog, M.D., University of Cincinnati, 1986.

Phyllis C. Huettner, M.D., University of Pennsylvania, 1985. (See Department of Pathology and Immunology.)

Susan E. Lanzendorf, Ph.D., Old Dominion University/Eastern Virginia Medical School, 1987.

Rebecca P. McAlister, M.D., University of Kentucky, 1979.

Michael J. Paul, M.D., Northwestern University, 1980.

John D. Pfeifer, M.D., Ph.D., University of California, San Diego, 1988. (See Department of Pathology and Immunology.)

Janet S. Rader, M.D., University of Missouri, 1983.

Yoel Sadovsky, M.D., Hebrew University, 1985. (See Department of Cell Biology and Physiology.)

L. Lewis Wall, M.D., D.Phil., Oxford University, 1981; M.D., University of Kansas, 1983.

Associate Professors Emeriti (Clinical)

Robert S. Goell, M.D., Washington University, 1960.

Godofredo M. Herzog, M.D., Washington University, 1957.

J. Barlow Martin, M.D., Washington University, 1955.

Klaus J. Staisch, M.D., Free University of Berlin, 1966.

Associate Professors (Clinical)

Joe E. Belew, M.D., St. Louis University, 1957.

Shih-Chung Chang, M.D., Chung-Shan Medical College, 1968.

Richard A. Hartman, M.D., University of Missouri, 1978.

Jacob Klein, M.D., Jefferson Medical College, 1968.

Nathaniel H. Murdock, M.D., Meharry Medical College, 1963.

Lee A. Rigg, M.D., Washington University, 1971.

Chotchai Srisuro, M.D., Siriraj Faculty of Medical Sciences, 1967.

David L. Weinstein, M.D., St. Louis University, 1985.

Associate Professor (Adjunct)

Jeffrey D. Bloss, M.D., Jefferson Medical College, 1982.

Assistant Professors

Lisa M. Bernhard, M.D., Louisiana State University, 1985.

Randall K. Gibb, M.D., Loyola University, 1991.

Ann M. Gronowski, Ph.D., University of Wisconsin, Madison, 1992. (See Department of Pathology and Immunology.)

Gilad A. Gross, M.D., St. Louis University, 1992.

M. Katherine Jahnige, M.D., Harvard University, 1994.

Hyunjung Jade Lim, Ph.D., University of Kansas, 1998. (See Department of Cell Biology and Physiology.)

Sara J. Marder, M.D., Medical College of Pennsylvania, 1991.

Kimberly A. Martin, M.D., University of Western Ontario, Canada, 1990.

Kelle H. Moley, M.D., Yale University, 1988. (See Department of Cell Biology and Physiology.)

Louis J. Muglia, Ph.D., The University of Chicago, 1986; M.D., 1988. (See Department of Molecular Biology and Pharmacology and Department of Pediatrics.)

Valerie S. Ratts, M.D., The Johns Hopkins University, 1987.

Joseph B. Shumway, M.D., Columbia College of Physicians and Surgeons, 1988.

Andrea L.P. Stephens, M.D., University of California, Los Angeles, 1987.

Assistant Professors Emeriti (Clinical)

Robert S. Cohen, M.D., State University of New York, 1962.

J. Leslie Walker, M.D., University of Tennessee, 1960.

Assistant Professors (Clinical)

Robert L. Becker, M.D., Washington University, 1969.

Robert J. Brown, M.D., Washington University, 1983.

Bruce L. Bryan, M.D., Washington University, 1977.

Vicente M. Colon-Alcaraz, M.D., Ponce School of Medicine, Puerto Rico, 1982.

Catherine L. Dean, M.D., University of Missouri, Kansas City, 1983.

Cathleen R. Faris, M.D., University of Kansas, 1982.

C. Richard Gulick, M.D., University of Rochester, 1971.

Randall L. Heller Jr., Ph.D., University of Missouri, 1968; M.D., University of Texas, 1976.

Mark J. Jostes, M.D., University of Missouri, 1981.

Carolyn M. Martin, M.D., Washington University, 1976.

Darryl N. McKinney, M.D., Washington University, 1980.

Jorge Pineda, M.D., National University of Honduras, 1972.

Jodie Rai, M.D., University of Illinois, 1988.

Jonathan R. Reed, M.D., Meharry Medical College, 1965.

Chinda Rojanasathit, M.D., Siriraj Medical School, 1967.

Jerome D. Sachar, M.D., University of Missouri, 1979.

M. Bryant Thompson, M.D., University of California, 1961.

Albro C. Tobey, M.D., University of Dublin, 1972.

Randall W. Tobler, M.D., Washington University, 1984.

Gary M. Wasserman, M.D., University of Missouri, Kansas City, 1980.

Instructors

Sarah L. Keller, M.D., Southern Illinois University, 1989.

Kay LeChien, M.S., University of Pittsburgh School of Public Health, 1992.

Matthew A. Powell, M.D., Michigan State University, 1995.

Mitul B. Shah, M.D., University of Illinois, Chicago, 1996.

Research Instructors

Liyi Pang, M.D., Shandong University School of Medicine, 1986.

W. Timothy Schaiff, Ph.D., University of Iowa, 1988.

Instructors Emeriti (Clinical)

Theodore Merrims, M.D., Washington University, 1954.

Parker H. Word, M.D., Howard University, 1944.

Instructors (Clinical)

John K. Appelbaum, M.D., Washington University, 1984.

James E. Belcher, M.D., Washington University, 1976.

Scott W. Biest, M.D., University of Missouri, Kansas City, 1989.

Kathryn L. Botney, M.D., Washington University, 1984.

Lawrence V. Boveri, M.D., University of Missouri, Kansas City, 1988.

Jane R. Brady, M.D., George Washington University, 1992.

Igor Brondz, M.D., Vinnitsa Medical Institute, Russia, 1978.

Arthur L. Casey, M.D., University of Missouri, 1977.

Francine L. Cosner, M.D., University of Cincinnati, 1992.

Michelle R. de Vera, M.D., Washington University, 1989.

Russell B. Dieterich, M.D., University of Illinois, 1970.

Lakshmi V. Dundoo, M.D., Deccan College of Medical Sciences, 1993.

Kevin O. Easley, M.D., University of North Carolina, 1983.

Josiah O. Ekunno, M.D., University of Ibadan, Nigeria, 1971.

Alaa A. Elbendary, M.D., Loyola University/Stritch School of Medicine, 1989.

Renee D. Ewing, M.D., Southern Illinois University, 1984.

Marsha N. Fisher, M.D., University of Missouri, 1992.

Gordon M. Goldman, M.D., St. Louis University, 1966.

Hoosna Haque, M.D., Baylor College of Medicine, 1996.

Joseph Hazan, M.D., Ege University, 1971.

Kathleen M. Hogan, M.D., University of Missouri, 1989.

William E. Houck, M.D., University of Cincinnati, 1981.

David H. Hua, D.O., University of Health Sciences, 1995.

Laura R. Hulbert, M.D., Washington University, 1981.

Jade D. James, M.D., Fisk University, 1997.

Michael K. Johnson, M.D., St. Louis University, 1975.

Vernon L. Johnson, M.D., St. Louis University, 1985.

Lauri Klabi, M.D., University of Missouri, 1991.

Claudia C. Krasnoff, M.D., University of Maryland, 1994.

Koteswara R. Kunda, M.D., University of Missouri, 1991.

Christine M. Ladd, M.D., University of Missouri, 1990.

Tony C. Lam, M.D., Albert Einstein College of Medicine, 1983.

Gary G. Lee, D.O., Kirksville College of Osteopathic Medicine, 1976.

Fanee J. Lekkas, M.D., St. Louis University, 1991.

Edward S. Levy, M.D., Washington University, 1991.

Mary E. Mani, M.D., St. Louis University, 1990.

Margaret McCarthy, M.D., Washington University, 1988.

Daniel S. McDonald, M.D., University of Missouri, 1989.

Denise A. Meckler, M.D., Ohio State University, 1992.

Jerry N. Middleton, M.D., Washington University, 1963.

Tehmpton S. Mistry, M.D., Grant Medical College, 1968.

Alvaro Mora, M.D., Antioquia University, 1975.

Jeffrey S. Mormol, M.D., Washington University, 1991.

Helen I. Mussemann, M.D., Baylor College of Medicine, 1996.

James L. Ottolini, M.D., St. Louis University, 1965.

Allen S. Palmer, D.O., Kansas City College of Osteopathy, 1967.

Meera R. Patel, M.D., University of Missouri, Kansas City, 1996.

Anthony C. Pearlstone, M.D., Washington University, 1985.

Diane M. Petersen, M.D., Wayne State University, 1998.

Timothy C. Philpott, M.D., Washington University, 1994.

Aaron J. Pile, M.D., Eastern Virginia Medical School, 1983.

Amy J. Ravin, M.D., The University of Chicago, 1996.

Ann Marie S. Rockamann, M.D., St. Louis University, 1991.

Sudha R. Saha, M.D., Calcutta University, 1962.

Kevin B. Schaberg, M.D., Washington University, 1966.

Daniel J. Semenoff, M.D., St. Louis University, 1963.

D. Elan Simckes, M.D., Hebrew University, 1989.

Serene S. Srouji, M.D., The Johns Hopkins University, 1998.

John A. Stopple, M.D., University of Wisconsin, 1969.

Jean A. Thomas, M.D., Faculte de Medecine et de Pharmacie d'Haiti, 1972.

Jeffrey B. Thompson, M.D., University of Missouri, 1993.

Jacqueline S. Turner, M.D., Tulane University, 1983.

Daniel G. Wagner, M.D., St. Louis University, 1989.

Mark S. Wasserman, M.D., University of Missouri, Kansas City, 1984.

Anna C. Wolaniuk, M.D., Medical Academy of Lodz, 1975.

Heather E. Wuebker, M.D., University of Missouri, Kansas City, 1998.

Sandya Yanamadala, M.D., Guntur Medical College, 1997.

Haifaa T. Younis, M.D., Baghdad Medical School, 1984.

Instructors (Adjunct)

Nancy Cibulka, N.P., University of Missouri, St. Louis, 1997.

Sandra Forney, N.P., University of Illinois, Chicago, 1994.

Mary Alice Grady, N.M., University of Illinois, Chicago, 1994.

Patricia Lazaroff, C.N.M., St. Louis University, 1974.

Clayton D. Skaggs, D.C., Logan College of Chiropractic, 1987.

DEPARTMENT OF OPHTHALMOLOGY AND VISUAL SCIENCES

Instruction begins in the first year with examination of the eye and a lecture on various aspects of ocular disease. During the second year, all students receive (via e-mail) the "Ophthalmology Case of the Week." During the third year, students are given the opportunity during the surgery block to spend four weeks on the ophthalmology services. In addition, during the third year there are lectures given to students during the Internal Medicine and Surgery rotations. All students work on the American Academy of Ophthalmology's "Case Studies for Medical Students." The emphasis is on ocular manifestations of common systemic diseases, ocular trauma, and common eye diseases such as cataract and glaucoma. In the fourth year, four-week clinical or research electives are offered.

FIRST YEAR

Introduction to clinical ophthalmology begins in the first year with a lecture and practicum (peer exam) on taking an ocular history and performing an ocular exam. Emphasis is on ophthalmoscopy.
Morton E. Smith, M.D.; Carla J. Siegfried, M.D.; staff

SECOND YEAR

During the second year, all students receive (via e-mail) the "Ophthalmology Case of the Week." All students are expected to review each case and submit a diagnosis (via reply e-mail). Toward the end of the second year (April) all students convene for a "feedback/oral quiz" session with Morton E. Smith, M.D.

THIRD YEAR

THIRD YEAR CLERKSHIP OPPORTUNITIES

In the third year, students are given the opportunity to spend four weeks of their surgery rotation on the ophthalmology service. The students work closely with the ophthalmology residents and review the differential diagnosis of the "red eye," how to interpret an ophthalmologic consult note, and how to handle an ocular emergency in the emergency room. During this rotation, there is again emphasis on the use of the ophthalmoscope. All third-year students must complete the American Academy of Ophthalmology's "Case Studies in Ophthalmology for Medical Students" and attend the periodic "feedback/oral exam" session with Morton E. Smith, M.D.

FOURTH YEAR
Electives

M50 801 OPHTHALMOLOGY

Instructors: *Morton E. Smith, M.D., Carla J. Siegfried, M.D.,* 362-5722

This elective is for senior students who plan to apply for a residency in ophthalmology. The student rotates through one or more specific clinics including the general eye clinic at Barnes-Jewish Hospital and/or the subspecialty clinics of full-time faculty of the Washington University Medical School Department of Ophthalmology and Visual Sciences (*e.g.* pediatric ophthalmology clinic at St. Louis Children's Hospital, neuro-ophthalmology service, cornea/external disease service, etc.). The student's responsibilities progress from observation (including observing surgery) to complete eye exam to presentation of patients to the director of that particular service. Several cases must be presented to Morton E. Smith, M.D. (co-coursemaster). The student must also work on the "Case Studies in Ophthalmology for Medical Students" (from the American Academy of Ophthalmology) and present the answers to these cases in the form of an oral exam to Smith. The students must attend all conferences as well as Grand Rounds, Wednesday Night Seminar for residents, and spend one night a week (until 9 p.m.) with the ophthalmology resident on call for emergencies. By the end of the four-week rotation, the student is expected to be proficient in taking an ocular history and performing a complete eye exam including slit lamp biomicroscopy and indirect ophthalmoscopy. **All students interested in this senior elective must meet with Morton E. Smith, M.D., in March of year WUMS III.** The final grade of the student is determined by the narrative input from the director of the particular service(s) through which the student rotated, plus the case presentations to Smith, plus the oral quiz on the "Case Studies" book. The grades at Washington University are Honors, High Pass, Pass, Fail. **Valid start weeks for 4-week blocks are:** Weeks 1, 9, 13.

Research (M50 900)

Usha P. Andley, Ph.D., 362-7167

Crystallins and lens cell biology. Crystallins play an essential refractive role and maintain lens transparency. However, the role of the molecular chaperone α-crystallin is still poorly understood. Recently, this laboratory has shown that αA or αB-crystallin expression alters the regulation of lens epithelial cell growth, and protects cells from stress-induced death. Mutations in these proteins are the basis of several inherited cataracts. Using genetic approaches, the laboratory is now focusing on visualizing DNA

synthesizing cells *in vivo* in the αA and αB knockout mice, and the interaction of αA and αB with cell cycle proteins. These studies use confocal microscopy, flow cytometric and biochemical techniques to study the role of α-crystallin in the cell cycle. Time-lapse video microscopy is being used to visualize the protein in living cells. Other studies focus on the role of αA in the cross talk between cell proliferation and apoptosis in the lens epithelium.

Steven Bassnett, Ph.D., 362-1604

Currently, we are using advanced microscopic techniques to elucidate the cellular basis of accommodation and presbyopia.

David C. Beebe, Ph.D., 362-1621

My laboratory is interested in the molecular and cellular mechanisms that regulate the development of the anterior segment of the eye (the lens and cornea) and the mechanisms responsible for the formation of maturity-onset cataracts.

For our studies of eye development, we are using tissue-specific gene targeting to demonstrate the importance of signaling by specific growth factors for the normal formation and function of the lens and cornea. This powerful new approach allows us to delete genes that are essential for normal cell function and differentiation in only one or a few tissues in the eye. Coupled with the gene targeting approach, we are using high density "gene chip" microarrays to follow changes in the expression of > 10,000 genes in a single experiment. Combining these approaches has allowed us to reveal the mechanisms underlying eye development and function with a sensitivity and specificity not previously attainable. Our gene chip studies have uncovered several unexpected patterns of gene expression in the lens. Several projects are available in the laboratory to follow up on these findings and to extend our work on the lens to the development and renewal of the corneal epithelium.

Cataracts are the leading cause of blindness worldwide and cataract surgery is the most expensive procedure in the U.S. Medicare budget. We recently provided evidence that changes in the eye with aging (specifically, degeneration of the vitreous body and separation of the vitreous body from the surface of the retina) cause the lens to be exposed to higher levels of oxygen and that oxygen toxicity is the cause of the most common type of age-related cataracts. One or two clinically related projects are available to confirm and extend these observations.

Shiming Chen, Ph.D., 747-4350

Molecular basis of retinal specific gene expression and hereditary retinal degeneration. This elective is for students who are interested in gaining research experience in molecular vision and retinal diseases. The research will mainly focus on transcription factors that are expressed in the retinal photoreceptor cells and required for the normal development of photoreceptor function and/or linked to photoreceptor degenerative diseases. Students will learn basic molecular and biochemical approaches commonly used for (1) studying target genes and regulatory network for tissue-specific transcription factors, (2) *in vitro* functional analysis of mutated factors carrying genetically identified mutations as a tool to find phenotype and genotype correlations, and (3) how to apply the above knowledge to develop early diagnosis and therapeutic interventions to the photoreceptor diseases. Both hands-on experience and experimental design skills will be covered during the course. A small project will be assigned to each student. By the end of the course, each student will give an oral presentation on the progress of the project in a lab meeting and/or a departmental seminar setting.

Thomas A. Ferguson, Ph.D., 362-3745

Cellular and molecular regulation of the ocular immune response.

Mae Etsuko Gordon, Ph.D., 362-3716

1. Multicenter randomized clinical trial to determine if medical treatment of ocular hypertension prevents or delays glaucomatous optic nerve damage.
2. Quality-of-life assessment.
3. Multicenter epidemiological study of keratoconus.

J. William Harbour, M.D., 747-1738

Tumorigenesis and regulation of cell growth, treatment of ocular tumors.

M. Rosario Hernandez, D.D.S., 747-1448

Molecular and cellular mechanisms underlying glaucomatous optic neuropathy in humans. The broad objective of our research is to demonstrate the role of reactive astrocytes in the specific changes that occur in the optic nerve head in glaucoma. Elevated intraocular pressure is the major risk factor in glaucoma, a common blinding disease. The mechanisms of retinal ganglion cell loss are unknown, but most evidence points to the optic nerve head as the site of injury to the axons.

Our laboratory investigates cellular and molecular mechanisms involved in intraocular pressure-related axon degeneration and in optic nerve head remodeling in human glaucoma. We are focused on the role of astrocytes in the pathogenesis of glaucoma and on defining astrocyte responses to elevated intraocular pressure compared with other forms of cellular stress. These studies are conducted in human optic nerve heads with glaucoma using morphological and molecular techniques adapted for our samples. The findings in human tissues are further tested in a primate model of experimental glaucoma and in acute axonal damage in optic nerve transection.

We have developed several *in vitro* models using cultured human optic nerve astrocytes to test the effects of elevated pressure and to compare with other mediators of neural degeneration. Using microarrays, we have identified molecular pathways that may be involved in the transition of quiescent

astrocytes to the reactive phenotype in response to elevated pressure that are promising targets to test in the future.

David A. Leib, Ph.D., 362-3826
Latency, pathogenesis and molecular genetics of herpes simplex virus.

Peter D. Lukasiewicz, Ph.D., 362-4284
Roles of receptors for inhibitory and excitatory amino acids in retina. Neurobiology of the vertebrate retina.

Arthur H. Neufeld, Ph.D., 747-1487
Pharmacologic neuroprotection of the optic nerve in glaucoma.

J. Mark Petrash, Ph.D., 362-3335
Molecular biology of inherited vision diseases. A senior elective is available for medical students who wish to participate in ongoing research on mechanisms of cataract and diabetic eye disease. Candidates will utilize laboratory procedures such as real time PCR and confocal microscopy, and assist with characterization of transgenic animal models of inherited eye diseases.

V Nathan Ravi, M.D., Ph.D., 747-4458
Development of biomaterials for ophthalmic applications.

Carmelo Romano, Ph.D., 362-2676
Role of receptors for excitatory amino acids (EAAs) in the vertebrate retina.

Alan Shiels, Ph.D., 362-1637
Genetics of cataract and refractive disorders.

Patrick M. Stuart, Ph.D., 362-6774
Virology. Investigate the role viral-induced immune responses play in corneal pathology seen in recurrent herpetic keratitis. Also study the role that *Yersinia enterocolitica*-produced superantigen plays in both the pathogenesis of this organism as well as its possible connection to the development of the autoimmune disease Reiter's Syndrome.

Patrick M. Stuart, Ph.D., 362-9336
1. Mechanisms of corneal allograft and responses.
2. Mechanisms of microbial-lymphocyte interactions.

Lawrence Tychsen, M.D., 454-6026
Pediatric Ophthalmology:
1. Development of the visual brain and eye alignment.
2. Visual cortex development, ocular alignment, strabismus.

Russell N. Van Gelder, M.D., Ph.D., 362-4286
1. Molecular biology of circadian photoreception.
2. Uveitis and ocular inflammation.
3. Polymerase chain reaction diagnosis and discovery of uveitis pathogens.

Faculty

CHAIR OF DEPARTMENT AND PROFESSOR

Michael A. Kass, M.D., Northwestern University, 1966.

Professors Emeriti

Bernard Becker, M.D., Harvard University, 1944.

Morton E. Smith, M.D., University of Maryland, 1960.

Professors

Janet and Bernard Becker Professor

David C. Beebe, Ph.D., University of Virginia, 1974. (See Department of Cell Biology and Physiology.)

Philip L. Custer, M.D., Vanderbilt University, 1978.

Mae Etsuko Gordon, Ph.D., University of Wisconsin, 1978. (See Division of Biostatistics.)

William M. Hart Jr., Ph.D., University of Maryland, 1970; M.D., 1970.

M. Rosario Hernandez, D.D.S., University of Chile, 1973. (See Department of Anatomy and Neurobiology.)

Bernard Becker Professor

Arthur H. Neufeld, Ph.D., New York University, 1970. (See Department of Molecular Biology and Pharmacology.)

J. Mark Petrash, Ph.D., University of Texas, Galveston, 1981. (See Department of Genetics.)

Lawrence Tychsen, M.D., Georgetown University, 1979. (See Department of Anatomy and Neurobiology and Department of Pediatrics.)

Martin B. Wax, M.D., University of Southern California, 1978.

Professors Emeriti (Clinical)

Robert C. Drews, M.D., Washington University, 1955.

Benjamin Milder, M.D., Washington University, 1939.

James E. Miller, M.D., Medical College of Alabama, 1949. (See Department of Pediatrics.)

Edward Okun, M.D., University of Vermont, 1956.

Professors (Clinical)

James C. Bobrow, M.D., The Johns Hopkins University, 1970.

George M. Bohigian, M.D., St. Louis University, 1965.

Isaac Boniuk, M.D., Dalhousie University, Nova Scotia, 1962.

Dean B. Burgess, M.D., University of California, 1967.
Robert M. Feibel, M.D., Harvard University, 1969.
M. Gilbert Grand, M.D., Yale University, 1968.
Jack Hartstein, M.D., University of Cincinnati, 1955.
Jack Kayes, M.D., Washington University, 1957.
Harry L.S. Knopf, M.D., Harvard Medical School, 1967.
Allan E. Kolker, M.D., Washington University, 1957.
Jay S. Pepose, Ph.D., University of California, Los Angeles, 1980; M.D., 1982.
Stephen R. Waltman, M.D., Yale University, 1964.

Associate Professors

Usha P. Andley, Ph.D., Jawaharlal Nehru University, 1977. (See Department of Biochemistry and Molecular Biophysics.)
Steven Bassnett, Ph.D., University of East Anglia, 1987. (See Department of Cell Biology and Physiology.)
Thomas A. Ferguson, Ph.D., University of Cincinnati, 1982. (See Department of Pathology and Immunology.)
J. William Harbour, M.D., The Johns Hopkins University, 1990. (See Department of Cell Biology and Physiology and Department of Medicine, Molecular Oncology.)
Cynthia Z. Kenneally, M.D., University of Missouri, 1982.
David A. Leib, Ph.D., The University of Liverpool, 1986. (See Department of Molecular Microbiology.)
Anthony J. Lubniewski, M.D., University of Florida, 1985.
Gregg T. Lueder, M.D., University of Iowa, 1985. (See Department of Pediatrics.)
Peter D. Lukasiewicz, Ph.D., University of Michigan, 1984. (See Department of Anatomy and Neurobiology.)
V Nathan Ravi, Ph.D., Virginia Tech, 1980; M.D., University of Miami, 1988.
Carmelo Romano, Ph.D., Stanford University, 1981. (See Department of Anatomy and Neurobiology.)
Mitchel L. Wolf, M.D., Albert Einstein College of Medicine, 1968.

Associate Professors Emeriti (Clinical)

Neva P. Arribas, M.D., Manila Central University, 1954.
Glen P. Johnston, M.D., Washington University, 1956.

Associate Professors (Clinical)

Nancy Melberg Holekamp, M.D., The Johns Hopkins University, 1989.
Stephen A. Kamenetzky, M.D., Washington University, 1970.
Louis J. Rosenbaum, M.D., Washington University, 1963.
Matthew A. Thomas, M.D., Harvard University, 1981.
Stephen A. Wexler, M.D., University of Michigan, 1982.

Assistant Professors

Edward M. Barnett, M.D., Ph.D., University of Iowa, 1995.
Shiming Chen, Ph.D., SUNY Health Science Center, 1992. (See Department of Molecular Biology and Pharmacology.)
Michael S. Conners, M.D., Ph.D., New York Medical College, 1996.
Jeffrey M. Gidday, Ph.D., University of Virginia, 1986. (See Department of Neurological Surgery.)
P. Kumar Rao, M.D., University of Southern California, 1995.
Alan Shiels, Ph.D., University of London, 1983. (See Department of Genetics.)
Carla J. Siegfried, M.D., University of Missouri, Kansas City, 1989.
Linda M. Tsai, M.D., Northwestern University, 1995.
Russell N. Van Gelder, Ph.D., M.D., Stanford University, 1994. (See Department of Molecular Biology and Pharmacology.)
Richard H. Wieder, M.D., University of Illinois, 1986.

Research Assistant Professors

Judith Mosinger Ogilvie, Ph.D., Harvard University, 1983.
Patrick M. Stuart, Ph.D., Northwestern University, 1985. (See Department of Molecular Microbiology.)

Assistant Professors Emeriti (Clinical)

James M. Gordon, M.D., University of Minnesota, 1966.
William Steven Joffe, M.D., Washington University, 1963.
Matthew Newman, M.D., Columbia University, 1959.
F. Thomas Ott, M.D., Washington University, 1965.
Arthur W. Stickle Jr., M.D., University of Oklahoma, 1943.

Assistant Professors (Clinical)

Navinkumar J. Amin, M.B.B.S., Bombay University, 1966.
Stanley C. Becker, Ph.D., Washington University, 1951; M.D., Chicago Medical School, 1955.
William L. Becker, M.D., Washington University, 1987.
Edward F. Berg, M.D., Washington University, 1964.
Ronald C. Bilchik, M.D., Washington University, 1967.
Kevin J. Blinder, M.D., University of Missouri, Kansas City, 1985.
Samuel A. Canaan Jr., M.D., Meharry Medical College, 1954.
Bruce H. Cohen, M.D., The Johns Hopkins University, 1980.
Nicholas N. Colosi, M.D., St. Louis University, 1968.
Lawrence A. Gans, M.D., Case Western Reserve University, 1977.
Kenneth O. Green, M.D., University of Missouri, 1960.

Michael J. Isserman, M.D., Washington University, 1975.

Daniel P. Joseph, Ph.D., University of California, Berkeley, 1988; M.D., Wayne State University, 1992.

Michael S. Korenfeld, M.D., Washington University, 1986.

Robert L. Lamberg, M.D., Washington University, 1976.

Barry D. Milder, M.D., Washington University, 1973.

Duane L. Mitzel, M.D., Washington University, 1977.

Paul F. Nichols III, M.D., University of California, 1982.

John C. Perlmutter, M.D., Cornell University, 1971.

Michael B. Rumelt, M.D., Washington University, 1966.

Gaurav K. Shah, M.D., University of Illinois, 1993.

Steven M. Shields, M.D., Washington University, 1986.

William L. Walter, M.D., Ohio State University, 1954.

Assistant Professor (Adjunct)

Agnes Ming-Fong Wong, M.D., McGill University, 1994; Ph.D., University of Toronto, 2001.

Instructor Emeritus

Walter R. Stafford, M.D., St. Louis University, 1957.

Instructors

Carrie S. Gaines, O.D., University of Missouri, 1988.

Kyle Alison Jolley, C.O., University of Florida, 1985.

Tammie Lee Keadle, Ph.D., Louisiana State University, 1992.

Mary Migneco, O.D., University of Missouri, 1991.

Mark S. Rallo, O.D., University of Missouri, 1990.

Tracy Smith, D.V.M., University of California, Davis, 1994.

Research Instructor

Steven M. Kymes, Ph.D., St. Louis University, 2001.

Instructors Emeriti (Clinical)

Ruth S. Freedman, M.D., Washington University, 1942.

Mickey L. Salmon, M.D., Louisiana State University, 1959.

Instructors (Clinical)

Gregg J. Berdy, M.D., St. Louis University, 1983.

Andrew N. Blatt, M.D., Washington University, 1992.

Rebekah A. Braslow, M.D., Yale University, 1987.

John J. DeGuire, M.D., University of Illinois, 1988.

Bruce S. Frank, M.D., Washington University, 1976.

Kwang S. Kim, M.D., Ph.D., University of Iowa, 1997.

Steven F. Lee, M.D., University of Maryland, 1987.

Ranjan P. Malhotra, M.D., University of Missouri, Kansas City, 1995.

Robert F. Munsch, M.D., St. Louis University, 1977.

Mujtaba A. Qazi, M.D., New York University, 1997.

Mark A. Rothstein, M.D., University of Utah, 1991.

Howard N. Short, M.D., St. Louis University, 1978.

Mark H. Spurrier, M.D., Washington University, 1980.

Paul M. Tesser, M.D., State University of New York, Stony Brook, 1991.

Shilpa A. Thornton, M.D., University of Missouri, Kansas City, 1994.

Susan H. Yang, M.D., Washington University, 1997.

Instructors (Adjunct)

Henry W. Allhoff, O.D., Illinois College of Optometry, 1981.

P. Douglas Becherer, O.D., Southern College of Optometry, 1975.

Paul M. Bernier, O.D., University of Missouri, St. Louis, 1987.

Frank J. Bier, O.D., University of Missouri, 1984.

Mark G. Birkmann, O.D., University of Missouri, 1992.

Bernita Born-Wolf, O.D., University of Missouri, St. Louis, 1987.

Paul J. Botelho, O.D., Boston University, 1992.

Larry G. Brokering, O.D., Illinois College of Optometry, 1972.

Marc R. Brown, O.D., Southern College, 1980.

Carmen Frank Castellano, O.D., Illinois College of Optometry, 1982.

Earl S. Changar, O.D., Southern College of Optometry, 1958.

Pamela A. Coslic-Fada, O.D., University of Missouri, 1987.

John B. Crane, O.D., University of Missouri, St. Louis, 1991.

David L. Davidson, O.D., Southern College of Optometry, 1964.

James A. DeClue, O.D., Illinois College of Optometry, 1949.

Paul E. Diehl, O.D., Illinois College of Optometry, 1959.

John R. Eigenbrodt, O.D., University of Missouri, 1988.

Lawrence V. Ernst, O.D., University of Missouri, 1990.

Raymond F. Fada Jr., O.D., University of Missouri, 1989.

Kurt W. Finklang, O.D., State University of New York, 1981.

Frank D. Fontana, O.D., Illinois College of Optometry, 1950.

Stephen M. Garnett, O.D., Indiana University, 1980.

N. Rex Ghormley, O.D., Southern California College of Optometry, 1964.

Alexander D. Harris, O.D., University of Missouri, 1986.

William L. Herbold, O.D., Southern College of Optometry, 1967.

Douglas L. Huff, O.D., Southern California College of Optometry, 1981.

Jeffrey H. Jacob, O.D., Southern California College of Optometry, 1980.

Deborah L. Kerber, O.D., University of Missouri, 1992.

William F. Kiefer Jr., O.D., Illinois College of Optometry, 1975.

Mark A. Kleindorfer, O.D., Indiana University, 1979.

Vivian M. Kloke, O.D., University of Missouri, 1990.

Ronald J. Knox, O.D., Southern College of Optometry, 1956.

Thomas E. Kraemer, O.D., Indiana University School of Optometry, 1972.

Paul A. LaPoint, O.D., Southern College of Optometry, 1963.

Scott W. Lewis, O.D., Southern California College of Optometry, 1977.

James W. Lieber, O.D., Illinois College of Optometry, 1981.

Lisa M. Mackey, O.D., University of Missouri, 1993.

Eugene J. Mobley, O.D., Northern Illinois College of Optometry, 1950.

Robert L. Mobley, O.D., Illinois College of Optometry, 1958.

Raymond I. Myers, O.D., Indiana University School of Optometry, 1970.

Michael D. Rohde, O.D., University of Missouri, 1987.

Frederick W. Schwager, O.D., Illinois College of Optometry, 1957.

Christopher G. Seep, O.D., University of Missouri, 1984.

David B. Seibel, O.D., University of Missouri, 1987.

Charles D. Signorelli, O.D., Southern College of Optometry, 1957.

Claud R. Snowden, O.D., Illinois College of Optometry, 1974.

Craig H. Sorce, O.D., University of Missouri, 1992.

James F. Strieter, O.D., Chicago College of Optometry, 1954.

Brian P. Sumner, O.D., Illinois College of Optometry, 1978.

Gary L. Vogel, O.D., Ohio State University, 1977.

James J. Wachter, O.D., Illinois College of Optometry, 1991.

Donald E. Walter Jr., O.D., University of Houston, 1972.

Michael L. Wolf, O.D., University of Missouri, 1987.

DEPARTMENT OF ORTHOPAEDIC SURGERY

The Department of Orthopaedic Surgery has educational activities at several affiliated hospitals including Barnes-Jewish Hospital, St. Louis Children's Hospital, Shriners Hospital for Children, Barnes-Jewish West County Hospital and the Veterans Administration Medical Center. Students have the opportunity to gain experience on the following services: Hand; Shoulder and Elbow; Spine; Sports Medicine; Trauma; Foot and Ankle, Physiatry (Rehab); and Pediatric Orthopaedic Surgery. It is anticipated that students will assist in the care of patients in the surgical wards, scrub in on operative procedures, attend outpatient clinics and participate in the coverage of the Emergency Room while working with orthopaedic house staff and attending surgeons. All students on Orthopaedic Surgery also participate in program-wide conferences on Tuesday, Wednesday and Thursday mornings in addition to service conferences at each of the individual hospitals.

THIRD YEAR

The third-year student rotations are four weeks in length. Because of the popularity of the specialty, several rotations have been established within the third-year clerkship, *M95 790 Integrated Surgical Disciplines*. These include: Pediatric Orthopaedic Surgery at Shriners Hospital with Perry L. Schoenecker, M.D.; Pediatric Orthopaedic Surgery at St. Louis Children's Hospital with J. Eric Gordon, M.D., Scott J. Luhmann, M.D., and Matthew B. Dobbs, M.D.; General Orthopaedic Surgery at the Veterans Adminstration Medical Center with Gary A. Miller, M.D.; Sports Medicine at Barnes-Jewish West County campus with Matthew J. Matava, M.D.; Orthopaedic Surgery at Barnes-Jewish Hospital north campus with Martin I. Boyer, M.D., and Brett A. Taylor, M.D., an all-clinical orthopaedic elective; and a Physical Medicine and Rehabilitation elective with Heidi Prather, D.O., and John P. Metzler, M.D. In addition to operative and clinical experience, students participate in weekly tutorials on orthopaedic physical examination with faculty members.

FOURTH YEAR
Electives

M95 840 ORTHOPAEDIC SURGERY — FOOT/ANKLE

Instructor: *Jeffrey E. Johnson, M.D.*, 747-2543

This clinical elective is available for four weeks, during which the student participates in orthopaedic conferences, outpatient clinics, surgical cases and patient rounds. The medical students electing this clerkship will serve as an active and integral part of the orthopaedic team. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 842A ORTHOPAEDIC SHOULDER/ELBOW SURGERY

Instructor: *Ken Yamaguchi, M.D.*, 747-2543

Clinical elective available, during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated attending office hours, attendance at designated orthopaedic conferences and dissection of upper-extremity anatomical specimens. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 842B ORTHOPAEDIC SHOULDER/ELBOW SURGERY

Instructor: *Leesa Galatz, M.D.*, 747-2543

Clinical elective available, during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated attending office hours, attendance at designated orthopaedic conferences and dissection of upper-extremity anatomical specimens. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 845A ORTHOPAEDIC HAND AND UPPER EXTREMITY SURGERY

Instructors: *Martin I. Boyer, M.D.; Richard H. Gelberman, M.D.*, 747-2543

Clinical elective available, during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated attending office hours, attendance at designated orthopaedic conferences and dissection of upper-extremity anatomical specimens. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 845B ORTHOPAEDIC HAND AND UPPER EXTREMITY SURGERY

Instructors: *Charles A. Goldfarb, M.D.; Paul R. Manske, M.D.*, 747-2543

Clinical elective available, during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated attending office hours, attendance at designated orthopaedic conferences and dissection of upper-extremity anatomical

specimens. Please note that the hand/upper extremity fellow assigned to Manske's service will also participate in the instruction of students choosing this elective. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 846 ORTHOPAEDIC TRAUMA

Instructors: *Joseph Borrelli Jr., M.D.; William M. Ricci, M.D.,* 747-2543

Clinical elective available for a four-week period, during which time the student will work in orthopaedic trauma at Barnes-Jewish Hospital. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated orthopaedic conferences and participation in ongoing research projects. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 847 ORTHOPAEDIC SPINE SURGERY

Instructor: *Keith H. Bridwell, M.D.,* 747-2543

This clinical elective is available for four weeks, during which time the student will work with attending surgeon at Barnes-Jewish Hospital observing and assisting when appropriate in outpatient and inpatient care. To be included are activities in the OR, ER and outpatient clinics. Attendance at and participation in the weekly pediatric orthopaedic conference activities is required. The spine fellow assigned to this service will serve as a primary contributor to the student's education experience on this rotation. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 848 ORTHOPAEDIC PEDIATRIC SURGERY

Instructor: *J. Eric Gordon, M.D.,* 747-2543

Clinical elective available for four weeks, during which time the student will work with attending surgeon primarily at St. Louis Children's Hospital observing and assisting in outpatient and inpatient care. To be included are activities in the OR, ER and outpatient clinics. Attendance at and participation in the weekly pediatric orthopaedic conference activities required. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 849 ORTHOPAEDIC SPINE SURGERY IN ADULT PATIENTS

Instructor: *Brett A. Taylor, M.D.,* 747-2543

This clinical elective is available for four weeks, during which time the student will work with the attending surgeon at Barnes-Jewish Hospital and Barnes-Jewish West County Hospital observing and assisting when appropriate in outpatient and inpatient care. To be included are activities in the OR, ER and outpatient clinics. Attendance at and participation in the weekly orthopaedic conference activities is required. The spine fellow assigned to this service will serve as a primary contributor to the student's education experience on this rotation. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 853 ORTHOPAEDIC SURGERY — SPORTS

Instructor: *George A. Paletta Jr., M.D.,* 747-2543

This clinical elective is available for four weeks during which time the student will participate in orthopaedic conferences, outpatient clinics, surgical cases and patient rounds. The medical students electing this clerkship will serve as an active and integral part of the orthopaedic team. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 854 ORTHOPAEDIC SPINE SURGERY WITH EMPHASIS ON CERVICAL SPINE

Instructor: *K. Daniel Riew, M.D.,* 747-2543

Clinical elective available for four weeks during which time the student will work with attending surgeons primarily at Barnes-Jewish and St. Louis Children's hospitals observing and assisting in outpatient and inpatient care. To be included in the OR and outpatient clinics. Attendance at and participation in the weekly orthopaedic and spinal conference activities is suggested. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 8991 ORTHOPAEDIC SURGERY EXTERNSHIP (VISITING STUDENTS ONLY)

Instructor: *Martin I. Boyer, M.D.*

Students rotate on Orthopaedic Services for two- or four-week blocks. Students may choose from hand, sports medicine, trauma, cervical spine, shoulder/elbow, foot/ankle, pediatric and research rotations depending upon availability. Please contact Donna DePond in the Orthopaedic Education Office for further information: *depondd@msnotes.wustl.edu*. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Please contact the Orthopaedic Surgery Education Office at 747-2543 for further information.

Research (M95 900)

Various Orthopaedic Surgery research opportunities are available with the following faculty attendings. If interested, please contact the Education Office at 747-2543, *orthsurg@msnotes.wustl.edu* or contact the faculty member directly.

Yousef Abu-Amer, Ph.D.

Joseph Borrelli Jr., M.D.

Martin I. Boyer, M.D.

John C. Clohisy, M.D.

Leesa Galatz, M.D.

Richard H. Gelberman, M.D.

J. Eric Gordon, M.D.

Jeffrey E. Johnson, M.D.

Lawrence G. Lenke, M.D.

Scott J. Luhmann, M.D.

Matthew J. Matava, M.D.

George A. Paletta Jr., M.D.

William M. Ricci, M.D.

K. Daniel Riew, M.D.

Timothy M. Ritty, Ph.D.

Linda J. Sandell, Ph.D.

Matthew J. Silva, Ph.D.

Rick W. Wright, M.D.

Ken Yamaguchi, M.D.

Faculty

FRED C. REYNOLDS PROFESSOR OF ORTHOPAEDIC SURGERY AND HEAD OF DEPARTMENT

Richard H. Gelberman, M.D., University of Tennessee, 1969.

Professors Emeriti

Lee T. Ford, M.D., University of Tennessee, 1940.

Jerome J. Gilden, M.D., Washington University, 1952.

Professors

Dr. Asa C. and Dorothy Jones Professor of Orthopaedic Surgery

Keith H. Bridwell, M.D., Washington University, 1977.

Jerome J. Gilden, M.D., Endowed Professor

Lawrence G. Lenke, M.D., Northwestern University, 1986.

Charles F. and Joanne Knight Distinguished Professor in Orthopaedic Surgery

William J. Maloney III, M.D., Columbia University, 1983.

Paul R. Manske, M.D., Washington University, 1964.

Douglas J. McDonald, M.D., University of Minnesota, Minneapolis, 1982.

Linda J. Sandell, Ph.D., Northwestern University, 1980. (See Department of Medicine.)

Perry L. Schoenecker, M.D., University of Wisconsin, 1968.

Associate Professors

Jeffrey E. Johnson, M.D., Georgetown University, 1980.

Gary A. Miller, M.D., Jefferson Medical College, 1977.

George A. Paletta Jr., M.D., The Johns Hopkins University, 1988.

K. Daniel Riew, M.D., Case Western Reserve University, 1984.

Matthew J. Silva, Ph.D., Massachusetts Institute of Technology, 1996. (See Department of Biomedical Engineering.)

Ken Yamaguchi, M.D., George Washington University, 1989.

Associate Professors Emeriti (Clinical)

Marshall B. Conrad, M.D., Washington University, 1945.

Harry C. Morgan, M.D., Harvard University, 1953.

Assistant Professor Emeritus

J. Otto Lottes, M.D., University of Louisville, 1937.

Assistant Professors

Yousef Abu-Amer, Ph.D., The Hebrew University, 1993.

Joseph Borrelli Jr., M.D., University of South Florida, 1988.

Martin I. Boyer, M.D., University of Toronto, 1988.

John C. Clohisy, M.D., Northwestern University, 1989.

Matthew B. Dobbs, M.D., University of Iowa, 1995.

Leesa Galatz, M.D., George Washington University, 1993.

Charles A. Goldfarb, M.D., University of Alabama, 1996.

J. Eric Gordon, M.D., University of California, 1988.

Matthew J. Matava, M.D., University of Missouri, Kansas City, 1987.

Heidi Prather, D.O., University of Health Sciences College of Osteopathic Medicine, Kansas City, 1991.

William M. Ricci, M.D., Duke University, 1992.

Timothy M. Ritty, Ph.D., University of Texas, Houston, 1997.

Robert A. Shively, M.D., University of Illinois, 1969.

Brett A. Taylor, M.D., Harvard University Medical School, 1992.

Rick W. Wright, M.D., University of Missouri, 1988.

Research Assistant Professors

Zhengmin Huang, Ph.D., University of Tennessee, 1992.

Jueren Lou, M.D., Ph.D., Kiangi Medical College, 1983.

Assistant Professor Emeritus (Clinical)

Robert E. Kuhlman, M.D., Washington University School of Medicine, 1956.

Instructors

Scott J. Luhmann, M.D., University of Minnesota, 1991.

John P. Metzler, M.D., University of Texas, Medical Branch, Galveston, 1995.

Research Instructors

John Long, D.V.M., Louisiana State University, 1997.

Yong Zhu, M.D., Second Military Medical University, Shanghai, China, 1985.

Instructor Emeritus (Clinical)

W. Edward Lansche, M.D., Washington University, 1952.

DEPARTMENT OF OTOLARYNGOLOGY

Otolaryngology is presented to students in the first-, second-, third- and fourth-year classes. Physical diagnosis skills are taught in the first year. Clinically oriented lectures and a physical diagnosis workshop are presented to second-year students. In the third year of the medical curriculum, two-week elective rotations on one of the services in East Pavilion, the Veterans Administration Medical Center or St. Louis Children's Hospital are offered. During this period, there is teaching at the bedside, in the operating room and in the clinic, supplemented by daily afternoon lectures, Grand Rounds on Wednesdays, and an introduction to audiology.

Fourth-year students interested in ENT as a specialty may take a four- to six-week elective designed to give them exposure to patient care, both in the outpatient clinic and the operating room and postoperative setting. An additional four-week elective that provides comprehensive ambulatory experience is offered to students headed for primary care.

The postgraduate program in Otolaryngology at Washington University consists of one year of general surgery and four years of otolaryngology. A two-year research position is offered for two selected candidates from each class. During the clinical years of training, residents rotate on various services, which include the Head and Neck Surgery Service at Barnes-Jewish Hospital, the ENT Clinic, Otology, the Veterans Administration Medical Center, St. Louis Children's Hospital and Facial Plastic and Reconstruction. During that time, the resident serves in all aspects of patient care, including the outpatient clinic, inpatient hospital care and the operating room, as well as the various ENT diagnostic laboratories, such as vestibular and audiology. An increasing degree of responsibility is given to residents as they proceed during the training program, depending upon the year in training and the resident's professional development during this time. Didactic teaching consists of a basic science course during the first year of clinical residency and a two-year rotating core curriculum lecture series throughout the residency. There is also a temporal bone otology course, as well as a head and neck dissection course. Additional conferences include Grand Rounds, Morbidity and Mortality Conference, Journal Club, Otology Conference and Joint Tumor Conference. During the clinical years, residents are expected to participate in clinical and/or basic research and to publish papers in peer-reviewed journals, and they are expected to make presentations at the lectures or Grand Rounds. They are encouraged to submit papers and to make presentations at regional and national otolaryngology meetings. There is a national course consisting of literature given by the American Academy of Otolaryngology in which residents are expected to participate throughout the year. There is also an In-Training Examination given by the American Academy of Otolaryngology that all residents must take on a yearly basis. Throughout their residency, residents receive training in all aspects of otolaryngology, including general otolaryngology; head and neck cancer surgery; microvascular reconstructive techniques; facial plastic surgery; trauma; otology and neurotology; pediatric otolaryngology, including pediatric endoscopy; and allergy and endoscopic nasal sinus surgery.

FIRST YEAR

OTOLARYNGOLOGY CLINICAL SKILLS

Introductory lecture and group sessions pertaining to the complete head and neck examination. After the one-hour lecture, students will be divided into small groups to learn the otoscopic, nasal, oral cavity and neck examination to be proctored by physicians from the ENT department.

SECOND YEAR

M55 660B CLINICAL TOPICS IN OTOLARYNGOLOGY

Instructors: *James M. Hartman, M.D.,* 362-8641; *Joel A. Goebel, M.D.,* 747-0553

This course consists of six introductory lectures on common diseases of the head and neck, including head and neck carcinoma, hearing loss and dizziness, otitis media, sinusitis and otolaryngologic emergencies. Each lecture is highlighted by case presentations and treatment options in addition to pathophysiology. This course follows the physical examination practicum given earlier in the academic year.

FOURTH YEAR
Electives

M55 801 OTOLARYNGOLOGY

Instructor: *Joel A. Goebel, M.D.,* 747-0553

Four-week rotation includes evaluation of ENT problems presented to specialist for diagnosis and treatment. The student participates in the clinic, hospital and operating room. This also includes time on the Pediatric ENT Service, Audiology Voice Laboratory and Vestibular Evaluation Laboratory. Option of rotation on the ENT Service at Veterans Administration Medical Center is available. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M55 802 GENERAL OTOLARYNGOLOGY

Instructor: *Joel A. Goebel, M.D.,* 747-0553

This two-week elective is an extremely flexible program consisting of several options:

General Ear, Nose and Throat Service: Student functions as a junior resident at either Barnes-Jewish Hospital or the Veterans Administration Medical Center. At Barnes-Jewish Hospital, participation in clinic, hospital inpatient and operating room settings would expose student to a broad spectrum of patients. At the Veterans Hospital, the emphasis would be on head and neck tumors.

Head and Neck Service—Barnes-Jewish Hospital: Student functions as junior resident on ENT hospital floor with great deal of exposure to head and neck surgery.

Pediatric Otolaryngology—St. Louis Children's Hospital: Student participates as a junior resident, involved in pre- and postoperative surgical care as well as outpatient medical care.

Preceptorships: Student is assigned to a private practitioner's office, functioning in his/her office as well as hospital service.

Other options can be entertained and formulated according to the student's particular needs. Students participating in this elective will be required to spend an afternoon or morning in the Audiology/Vestibular Laboratory learning fundamentals of audiological and vestibular evaluation. Attendance at Monday afternoon conferences as well as Grand Rounds on Wednesday mornings are expected. **Valid start weeks for 2-week blocks are:** Weeks 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

M55 803 PEDIATRIC OTOLARYNGOLOGY

Instructor: *David W. Molter,* M.D., 454-6162

The student will actively participate in the clinical office, inpatient consultations, and surgery with the attending staff at St. Louis Children's Hospital. Care would be taken to provide experience in the common problems one would see in primary care pediatrics or family practice. Participation in subspecialty/multidisciplinary clinics such as the Cleft and Craniofacial clinic is encouraged. Opportunity will be provided to learn the fundamentals of audiological evaluation. Students participating in this elective will attend academic conferences in both the pediatric and adult divisions. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M55 820 PRACTICUM IN ADULT CLINICAL AUDIOLOGY

Instructor: *Michael Valente, Ph.D.,* 362-7489

Guidance provided in the administration and interpretation of audiometric tests. Emphasis on defining the severity of auditory dysfunction in addition to identifying sites of pathological processes. Theoretical bases of acoustics, anatomy and physiology, and electronics reviewed as they relate to auditory assessment. Modification of conventional test paradigms and hearing aid procedures covered according to each student's interests and needs. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M55 831 NEUROTOLOGY

Instructor: *Joel A. Goebel, M.D.,* 747-0553

Active student participation in the physical exam, advanced testing and management of patients with balance dysfunction. Attend patient clinic two days a week and test patients on ENG, rotary chair and computerized platform three days a week. Research participation welcome with prior arrangements. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M55 832 OTOLOGY/NEUROTOLOGY/BASE SKULL SURGERY

Instructor: *J. Gail Neely, M.D.,* 362-7344

The students will be active participants in the clinical office and in surgery with Neely concentrating on medicine and surgery of the ear and skull base in adults and children. They also will have access to and be expected to dissect in the temporal bone surgical dissection laboratory. The hospitals used are Barnes-Jewish, St. Louis Children's, and Veterans Administration. The days begin at 7 a.m. and end at 6 p.m. The purpose of this elective is to use the milieu of a surgical practice to learn to efficiently identify dangerous and/or correctable lesions affecting the hearing, balance and facial nerve function and to develop experiences and concepts of applied basic and clinical science to the practice of medicine in order to stimulate scientific physicians. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M55 833 AMBULATORY OTOLARYNGOLOGY FOR THE PRIMARY CARE PHYSICIAN

Instructor: *Joel A. Goebel, M.D.,* 747-0553

This course offers a four-week exposure to ambulatory care of patients with diseases of the head and neck. Eight half-day sessions per week will be offered in attending clinics for general otolaryngology, head and neck cancer, otology and pediatric otolaryngology. Two half-day sessions are reserved for audiology, vestibular lab and voice lab experience. Surgical exposure is available for selected cases as identified by the student and attending physician, but the main goal of this rotation is outpatient diagnosis and management. **Valid start weeks for 4-week blocks are:** Weeks 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M55 900)

The type of research will depend upon the current phase of the research program in each laboratory. Students should contact the director of each laboratory to negotiate.

Barbara A. Bohne, Ph.D.; Gary W. Harding, M.S.E., 362-7497

Studies of structure and function of the abnormal cochlea. The structure and function of the normal and damaged cochlea are studied in this laboratory.

Several projects utilize the chinchilla for determining mechanisms of cell degeneration in the hearing organ following exposure to different ototoxicants such as noise. The chinchilla is excellent for these studies because its hearing is similar to that of humans, it is free of spontaneous middle ear disease and it is feasible to perform surgery on its middle and inner ears, including survival surgery. Current projects with chinchillas involve: (a) injecting an inert tracer particle into the endolymphatic space to determine if, when and for how long the boundaries of the space are disrupted after a particular experimental treatment; and (b) using a novel histological preservation technique termed "survival-fixation" to identify changes in the coupling of the tectorial membrane to the hair-cell stereocilia in animals that have sustained a temporary or a permanent loss of hearing. Certain inbred mice have hereditary hearing losses or develop early age-related hearing loss. Therefore, mice are being used to identify some of the genetic bases for variations in susceptibility to ototoxicants and the age of onset of presbycusis.

Joel A. Goebel, M.D., 747-0553
Clinical research testing of posture and ocular motor control. Projects include headshake testing of the vestibulo-ocular reflex (VOR), interlaboratory rotary chair studies, dynamic posturography and outcome research in dizzy patients.

Bruce H. Haughey, M.D., 362-0365
Work in progress is investigating the functional results of allotransplantation of the canine hemitongue. Successful recovery has been observed in five chronic animals, but inhibited in some cases by allograft rejection, despite immunosuppression. Much scope exists for further study of the immunosuppression of tongue tissue and its functional recovery. A new primate study is now approved. Also in progress are clinical studies of rehabilitation following reconstructive surgery of head and neck cancer resections, as well as a clinical database and a study of outcomes of treatment for recurrent head and neck cancer.

Stephen M. Highstein, M.D., Ph.D., 362-1012
The gain of the vestibulo-ocular reflex (VOR) in alert squirrel monkeys can be plastically adapted either acutely over 4-5 hours or chronically over weeks by employing visual/vestibular interactive stimulation. We study the neural substratum of motor learning and memory for this behavior with, (a) intracellular and extracellular recording, (b) neuroanatomical techniques for marking single neurons and (c) chemical block of selected CNS sites. The patterns of response of single and multiple neurons have led us to construct mathematical models of the neural circuits involved. Brain sites implicated include the brainstem and cerebellum.

We also study the determinants of the response dynamics (phase and gain) of the vestibular horizontal semicircular canal by (a) recording intracellularly from hair cells *in situ* in different regions of the crista, (b) patch-clamping hair cells isolated from defined regions of the crista, (c) measuring the motion of the cupula of the canal using laser interferometry and/or video microscopy, (d) injecting identified primary afferents with tracer to elucidate their peripheral origins and central projections, and (e) recording chronically in natural settings, from primary afferents and efferents that have regenerated through a multichannel sieve recording electrode. We have arrived at a general theory of the contributions of the biomechanical and neural factors that shape the responses of the canal nerve.

Judith E.C. Lieu, M.D., 454-2138
Clinical Outcomes Research in Pediatric Otolaryngology. The Clinical Outcomes Research office performs clinical epidemiology and health services research. (Please reference the elective offered by Jay F. Piccirillo, M.D., in this department for more details.) These techniques and methodologies are used to investigate clinical problems seen in pediatric otolaryngology. Projects include the follow-up and evaluation of newborn hearing screening programs, progression of hearing loss in children, and evaluation of unilateral hearing loss. Other projects of the student's choosing that would utilize these research techniques may also be pursued.

J. Gail Neely, M.D., 362-7344
Facial Motion Analysis Laboratory: Clinical research application of subtracted digitized image light reflectance. The student(s) will participate in videotaping normal subjects and patients with facial paralysis and synkinesis, in using a unique computer program to analyze dynamic surface deformations during facial expression, and using spreadsheet and statistical applications to quantitatively define outcomes during treatments of disorders of the facial nerve.

Jay F. Piccirillo, M.D., 362-7394
The Clinical Outcomes Research Office of the Division of Research performs basic and applied clinical epidemiology and health services research. Clinical epidemiology is the study of the diagnosis, prognosis and evaluation of treatment. The scientific methodology of clinical epidemiology is based on the architecture of clinical research, biostatistics and data processing. Part of this methodology is borrowed from public health epidemiology and is applied to the uniquely clinical situations that clinicians face. Clinical epidemiology, therefore, is a methodology that can be applied to the study of any and all human disease and illness. Health services research can be defined as efforts to determine how the health system functions so that its performance can be improved. This definition makes the field essentially activist in nature.

Steven B. Scholnick, Ph.D., 362-7549
scholnis@msnotes.wustl.edu
Molecular genetics of head and neck tumors. Our goals are twofold: to reach a better understanding of

the biology of head and neck cancer and to use that understanding to develop better clinical markers for the assessment of tumor behavior and patient prognosis. To achieve these goals we are using molecular genetic techniques to identify tumor suppressor genes whose inactivation is correlated with poor outcome. Our data suggest that one such gene maps to a small interval within band p23.2 of chromosome 8. In our efforts to clone this gene, we have assembled a BAC contig of this interval as well as a detailed transcript map. We are now analyzing potential candidates for the putative suppressor.

A variety of potential projects will be available ranging from molecular genetic techniques which detect inactivation of these genes, through cell biological investigation of their function as a tumor suppressor, to investigation of their use as a clinical tool for predicting patient prognosis and selecting appropriate treatments.

Faculty

LINDBURG PROFESSOR AND HEAD OF DEPARTMENT

Richard A. Chole, M.D., University of Southern California, 1969; Ph.D., University of Minnesota, 1977.

Professors Emeriti

John M. Fredrickson, M.D., University of British Columbia, 1957; F.R.C.S.(C), 1963; Ph.D., (hon.), Sweden, 1975.

Colin Painter, Ph.D., University of London, 1969.

Donald G. Sessions, M.D., Washington University, 1962.

S. Richard Silverman, Ph.D., Washington University, 1942. (Audiology) (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

Malcolm H. Stroud, M.D., Ch.B., University of Birmingham, 1945; L.R.C.P., M.R.C.S., 1946; F.R.C.S., 1949.

Ruediger Thalmann, M.D., University of Vienna, 1954.

Professors

Barbara A. Bohne, Ph.D., Washington University, 1971.

Joel A. Goebel, M.D., Washington University, 1980.

Stephen M. Highstein, M.D., University of Maryland, 1965; Ph.D., University of Tokyo Faculty of Medicine, 1976. (See Department of Anatomy and Neurobiology.)

J. Gail Neely, M.D., University of Oklahoma, 1965.

Alec N. Salt, Ph.D., University of Birmingham, 1977.

Margaret W. Skinner, Ph.D., Washington University, 1976.

Gershon J. Spector, M.D., University of Maryland, 1964.

Michael Valente, Ph.D., University of Illinois, 1975. (Audiology)

Research Professor Emeritus and Lecturer

Donald H. Eldredge, M.D., Harvard University, 1946. (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

Research Professors

Ira J. Hirsh, Ph.D., Harvard University, 1948. (Audiology) (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

James D. Miller, Ph.D., Indiana University, 1957. (Also Central Institute for the Deaf)

Isolde Thalmann, Ph.D., California Western University, 1982.

Professor Emeritus (Clinical)

Benard C. Adler, M.D., Washington University, 1937.

Professors (Clinical)

Susan E. Mackinnon, M.D., Queen's University, Kingston, Ontario, 1975. (See Department of Surgery and Program in Occupational Therapy.)

Allen Sclaroff, D.D.S., Temple University, 1972.

Professor (Clinical) (Adjunct)

Gerald Popelka, Ph.D., University of Wisconsin, 1975.

Associate Professors

Randall A. Clary, M.D., University of Illinois, 1984. (See Department of Pediatrics.)

W. Donald Gay, D.D.S., University of Tennessee, 1966.

Bruce H. Haughey, M.B., Ch.B., University of Auckland, 1977.

Randal C. Paniello, M.D., University of Illinois, 1984.

Jay F. Piccirillo, M.D., University of Vermont, 1985. (See Department of Medicine and Program in Occupational Therapy.)

Steven B. Scholnick, Ph.D., Cornell University, 1982.

Stanley E. Thawley, M.D., University of Texas Medical Branch, 1967.

Research Associate Professors

Richard A. Baird, Ph.D., University of California, Berkeley, 1981.

J. David Dickman, Ph.D., University of Wyoming, 1985.

A. Maynard Engebretson, D.Sc., Washington University, 1970.

Dwayne D. Simmons, Ph.D., Harvard University, 1986.

Research Associate Professor (Adjunct)

Roanne G. Karzon, Ph.D., Washington University, 1982. (Audiology)

Associate Professors (Clinical)

Samir K. El-Mofty, Ph.D., Temple University, 1975. (See Department of Pathology and Immunology.)

Laurence A. Levine, M.D., Albany Medical College, 1971.
Philip L. Martin, M.D., St. Louis University, 1968.
Wayne A. Viers, M.D., University of Oklahoma, 1956.

Assistant Professors

James W. Forsen Jr., M.D., Washington University, 1988.
James M. Hartman, M.D., University of Missouri, Kansas City, 1988.
David W. Molter, M.D., Duke University, 1988.
Brian Nussenbaum, M.D., New York University, 1994.
Brock D. Ridenour, M.D., Tulane University, 1985.
Ravindra Uppaluri, M.D., Ph.D., University of Minnesota, 1995.

Assistant Professors Emeriti (Clinical)

Louis S. Altshuler, D.D.S., Ohio State University, 1945.
Donald R. Ingram, M.D., University of Illinois, 1956.
Herbert M. Smit, M.D., St. Louis University, 1933.

Assistant Professors (Clinical)

Sheldon Davis, M.D., University of Michigan, 1973.
Norman S. Druck, M.D., University of Illinois, 1970.
Jeffrey Fierstein, M.D., Albert Einstein College of Medicine, 1971.
Jacques A. Herzog, M.D., University of Missouri, Kansas City, 1980.
Dee Jay Hubbard, Ph.D., University of Iowa, 1967. (Speech Pathology)
Timothy N. Kaiser, M.D., Harvard University, 1982.
George Robert Kletzker, M.D., University of Missouri, 1984.
Claire Matthews, Ph.D., University of Kansas, 1980. (Speech Pathology)
Supote Phipatanakul, M.D., Chulalongkorn Hospital Medical School, 1965.
Albert F. Ruehl, M.D., St. Louis University, 1973.
Peter G. Smith, Ph.D., Purdue University, 1972; M.D., Medical University of South Carolina, 1976.
Lloyd Thompson, M.D., Howard University, 1964.

Assistant Professor (Clinical) (Adjunct)

Margaret G. Peak, Ph.D., Columbia University, 1975. (Audiology)

Research Assistant Professors

Jianxin Bao, Ph.D., University of Florida, 1992.
Pablo Blazquez, Ph.D., University of Seville, 1992.
Brian T. Faddis, Ph.D., University of California, Davis, 1994.
Kevin K. Ohlemiller, Ph.D., Northwestern University, 1990.
Mark E. Warchol, Ph.D., Northwestern University, 1989.

Instructors

Carl F. Ehrlich, M.D., University of Missouri, 1965.
Judith E.C. Lieu, M.D., Washington University, 1992.

Instructors (Clinical)

Marc B. Abrams, D.D.S., University of Missouri, 1972.
Nawal Mona Ahmed, D.M.D., Washington University, 1990.
Murray H. Appelbaum, D.M.D., Washington University, 1983.
Sean B. Bailey, M.D., Tulane University, 1987.
Perry J. Bartels, D.D.S., Marquette University, 1991.
Douglas A. Carano, D.D.S., University of Iowa, 1984.
Phadung Chadaratana, M.D., Mahidol University, 1964.
Gene C. Cohen, D.D.S., University of Kansas City, 1975.
Sheldon C. Cohen, D.M.D., Southern Illinois University, 1976.
William Cohen, D.M.D., University of North Carolina, 1991.
J. Michael Conoyer, M.D., Vanderbilt University, 1975.
John David Dahm, M.D., University of Texas Health Sciences Center, San Antonio, 1990.
Richard Davidson, D.M.D., Washington University, 1978.
Tamara K. Ehlert, M.D., University of Wisconsin, 1983.
James A. Fernandez, M.D., St. Louis University, 1981.
Debra F. Fink, D.M.D., Washington University, 1988.
Richard I. Goldberg, D.M.D., Washington University, 1988.
Barry S. Goldenberg, D.M.D., Washington University, 1982.
James D. Gould, M.D., Medical College of Virginia, 199
Jason M. Hanson, M.D., Northwestern University, 1992.
Jay F. Hauser, D.D.S., University of Iowa, 1988.
Lawrence M. Hoffman, D.M.D., Washington University, 1976.
Arnold S. Jacobson, D.M.D., Washington University, 1976.
Eugenia Kardaris, D.D.S., Loyola University Dental School, 1991.
Andrew M. Kim, D.M.D., Washington University, 1984.
June Kleinfeld, D.M.D., Washington University, 1985.
Kenneth E. Kram, D.M.D., Washington University, 1981.
Michael P. Lillmars, D.D.S., Northwestern University, 1984.
Robert D. Lowe, D.M.D., Washington University, 1982.
Richard Maack, M.D., University of Maryland, 1985.
Robert R. MacDonald III, M.D., Washington University, 1993.
Kamlesh Makwana, D.D.S., Marquette University School of Dentistry, 1996.
Marshall S. Manne, D.D.S., Washington University, 1960.
Alicia Matayoshi, D.M.D., University of Pennsylvania, 199
Scott A. McClain, D.D.S., University of Missouri, Kansas City, 1991.
Murray D. McGrady, M.D., University of Illinois, 1986.

Stewart E. Mooreland, D.M.D., Washington University, 1983.
Michael J. Pernoud, D.D.S., University of Missouri, Kansas City, 1975.
Julie L. Ring, D.D.S., University of Missouri, Kansas City, 1994.
Robert V. Rivlin, D.M.D., Washington University, 1979.
Gunter Schmidt, D.D.S., Washington University, 1937.
Harold R. Schreiber, D.D.S., University of Missouri, 1977.
Richard E. Schrick, M.D., University of Missouri, 1977.
Karl E. Shanker, D.D.S., University of Missouri, Kansas City, 1978.
Jules M. Snitzer, D.D.S., Washington University, 1955.
Herman Turner, D.D.S., Georgetown University, 1951.
Thomas J. Veraldi, D.M.D., Washington University, 1979.
Calvin H. Weiss, D.D.S., St. Louis University, 1946.
Alan P.K. Wild, M.D., Tulane University, 1983.

Research Instructor

Carmen Larimore, Ph.D., University of Missouri, Columbia, 2001.

Research Scientists

Gary W. Harding, M.S.E., University of Washington, 1983. (See Department of Neurological Surgery.)
Laura K. Holden, M.A., University of Illinois, Champaign, 1986.
Timothy A. Holden, B.S.E., University of Iowa, 1984.

DEPARTMENT OF PATHOLOGY AND IMMUNOLOGY

The department is responsible through its Pathology divisions for studying the pathogenesis and the biochemical and anatomical basis of diseases. Pathologists do research on disease processes using molecular, genetic and structural analysis. Pathologists have the responsibility for the cytological and anatomical diagnosis of diseases, and for developing novel chemical and histological approaches for the analysis of them, particularly early cancers and infectious diseases. The Divisions of Anatomic Pathology (with Louis P. Dehner, M.D., as director and Jeffrey E. Saffitz, Ph.D., M.D., heading its Autopsy Service), Laboratory Medicine (headed by Samuel A. Santoro, M.D., Ph.D.) and Neuropathology (with Robert E. Schmidt, M.D., Ph.D.) have faculty involved in teaching, clinical service and research. Prominent areas of research include experimental diabetes, experimental hematology, bone pathophysiology, cancer, and cardiac and vascular pathology.

The department teaches an extensive course in the second year of the curriculum and presents a number of conferences that third- and fourth-year students can attend, plus offering a number of clerkships. The coursemaster of the second-year Pathology course is Erika C. Crouch, Ph.D., M.D. Students can take clerkships in Autopsy Pathology, Surgical Pathology and Laboratory Medicine, or participate in the research activities of the faculty (see Saffitz for guidance on these).

The Section of Immunology integrates immunology activities in the School. It is responsible for the teaching of immunology in the first year of the curriculum (Andrey S. Shaw, M.D., is the coursemaster), and in conducting basic research in immunology and in the immunological basis of disease.

Many faculty in the department are involved in graduate teaching and participate in the various programs offered by the Division of Biology and Biomedical Sciences. The department has strong participation in the Immunology Graduate Program, which is headed by Robert D. Schreiber, Ph.D.

FIRST YEAR

M30 523 IMMUNOLOGY

Instructors: *Andrey S. Shaw, M.D.*, 362-4614; *Emil R. Unanue, M.D.*, 362-7440; *John P. Atkinson, M.D.*, 362-8391; *Robert D. Schreiber, Ph.D.*, 362-8748; *Barry P. Sleckman, M.D., Ph.D.*, 747-8235; *Herbert W. Virgin IV, M.D., Ph.D.*, 362-9223

This course consists of laboratories, laboratory exercises and small group discussions. It covers all aspects of the immune response—general properties of the immune system, immunologic effector mechanisms and the role of immunology in disease. The Immunology course requires a strong background in biochemistry, genetics and cell biology. Some of the basic concepts from these fields should be reviewed during the course. There are two laboratory exercises that consist of POPS (Patient Oriented Problem-Solving System in Immunology). The POPS consist of workbooks that contain a clinical problem that is analyzed and solved during the session. There are five hours of small group discussions. In these sessions, students meet with physicians to discuss the role of immunology and a particular human disease. *Basic Immunology: Functions and Disorders of the Immune System* by Abbas and Lichtman is used. For the small group discussion, the textbook *Case Studies in Immunology: A Clinical Companion* (third edition) by Rosen and Geha will be used. There will be two exams consisting of multiple choice and true and false questions on the topics described in the lectures and in the laboratory sessions. This course is restricted to medical students only.

SECOND YEAR

M60 665 PATHOLOGY

Instructor: *Erika C. Crouch, Ph.D., M.D.*, 454-8462

This course provides a comprehensive survey of the biology and morphology of human disease through a combination of lectures and laboratory sessions. The year begins with a review of basic disease mechanisms at the cellular and molecular level. Subsequently, the pathogenesis and characteristics of important diseases involving each organ system of the body are presented. During the year, students will become familiar with the methods of contemporary pathologic analysis. They also will learn how the results of pathologic studies are used in the clinical setting to establish diagnoses, to assess prognosis and response to therapy, and to evaluate the quality of patient care.

THIRD YEAR

CONFERENCES

Clinical Pathological Conference

The clinical history and treatment of patients who have died are discussed before the class by the physicians and surgeons of the departments concerned. These conferences afford students an opportunity to interpret the clinical observations in light of the postmortem findings. One hour per week during the year. *Staff*

Tumor Conference

One hour each week for 12 weeks during the Surgery and Obstetrics and Gynecology clerkships.

Problem cases are presented for illustration and discussion of all aspects of neoplastic disease. *Staff*

FOURTH YEAR
Electives

M60 805 AUTOPSY PATHOLOGY

Instructors: *Jeffrey E. Saffitz, M.D., Ph.D., and staff,* 362-7728

A full-time elective. Students will assist in performing autopsies and participate fully in Autopsy Service activities with the first-year house staff under the direction of senior pathology faculty. Students will be encouraged to learn as much gross pathology as possible, and will participate in brain cutting, specialty microscopic conferences and weekly autopsy case conferences. **Valid start weeks for 4-week blocks are:** Weeks 1, 13, 17, 21, 25, 29, 33, 37 and 41.

M60 815 OB-GYN PATHOLOGY SUBINTERNSHIP

Instructor: *Phyllis C. Huettner, M.D.*, 362-0118

The elective stresses the principles of anatomic pathology when applied to operative material in obstetrics and gynecology. The subintern will examine gross and microscopic specimens in the Ob-Gyn Pathology Lab and review pertinent literature with a senior pathologist. Ample time will be available for attending regular conferences in ob-gyn and pathology. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M60 820 SURGICAL PATHOLOGY — BARNES-JEWISH HOSPITAL

Instructors: *Louis P. Dehner, M.D., and surgical pathology staff,* 362-0150

Surgical pathology offers an elective for a four-week period under Surgical Pathology I. Students participate fully in activities of the Division of Surgical Pathology, and they are responsible for dissection and description of gross specimens and microscopic diagnosis under supervision of the senior staff of the division. Students attend morning conferences with the faculty, surgical and medical grand rounds, and a variety of subspecialty conferences in which the division participates. In addition, Surgical Pathology II includes rotations through selected subspecialties: neuropathology, hematopathology, dermatopathology, ENT pathology, and gynecologic pathology. Dehner and staff. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M60 825 INTRODUCTION TO NEUROPATHOLOGY

Instructor: *Robert E. Schmidt, M.D., Ph.D.,* 362-7426

The course is structured to give the student a full-time immersion in the specialty of neuropathology. There are daily didactic sessions that cover the spectrum of neurological diseases, review neuroanatomy, discuss approaches to the diagnosis of nervous system disease, and point out the interrelationships of research to clinical problems. Multiple clinical conferences and diagnostic working sessions complement the reading and project work. Time: 35 to 40 hours per week. **Valid start weeks for 4-week blocks are:** Weeks 13, 17, 21, 29, 33, 37 and 41.

M60 841 PEDIATRIC PATHOLOGY

Instructor: *Frances V. White, M.D.*, 362-0101

This four-week elective offers an experience in pediatric pathology involving material from both the Pediatric Autopsy Service and the Division of Surgical Pathology based on cases from St. Louis Children's Hospital and Barnes-Jewish Hospital. In Surgical Pathology, students will have the opportunity to review current cases with senior staff. They will assist residents on the Pediatric Autopsy Service with gross and microscopic diagnosis under supervision of senior staff. Conferences, slide review and possible independent research projects are included. **Valid start weeks for this rotation should be arranged with Frances V. White, M.D.**

M60 850 SURGICAL PATHOLOGY — BARNES-JEWISH HOSPITAL

Instructor: *Jon R. Ritter, M.D., and staff,* 362-0104

This elective is designed to acquaint the students with the discipline of surgical pathology and to permit them to develop basic skills in histopathological interpretation. This elective will be offered to only one student per period in order to permit maximum interaction with the surgical pathology staff and house staff. During the course of the elective, the student will be taught to function as junior house staff. The student will participate in the examination and dissection of gross specimens, observe frozen section diagnosis, and formulate histopathological diagnoses, all in conjunction with residents and members of the senior staff. Since the Laboratory of Surgical Pathology at Barnes-Jewish Hospital processes a broad range of medical biopsy material as well as specimens derived from busy surgical subspecialty practice, the elective is considered desirable for students who plan careers in internal medicine, surgery and radiology as well as for those who intend to enter the field of pathology. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M60 860 CLINICAL LABORATORY MEDICINE — BARNES-JEWISH HOSPITAL

Instructor: *Samuel A. Santoro, M.D., Ph.D.,* 362-3110

This elective is designed to teach the student how the vast array of clinical assays are used in the diagnosis of disease and how the tests are actually performed in the clinical laboratory. The four-week elective includes rotations through laboratories in clinical chemistry, clinical microbiology, DNA-based diagnostics, hematology, coagulation, clinical

immunology, histocompatibility and blood bank. During the elective the student will have a carefully planned daily schedule, which includes regular didactic sessions with senior staff and house staff. Particularly useful clinical skills to be acquired include analysis of peripheral blood smears and coagulation tests, interpretation of cardiac enzyme and serum protein electrophoresis patterns and appropriate use of blood component therapy. Students will be given the opportunity to present and lead case discussions during this elective. **Valid start weeks for 4-week blocks are:** 13, 17, 21, 29 and 33.

M25 883 TRANSFUSION MEDICINE

Instructor: *Lawrence T. Goodnough, M.D.,* 362-1546

This elective is designed to introduce the student to the clinical aspects of blood banking and interventional hematology. The four-week elective will consist of regular didactic sessions with senior staff, teaching conferences, participation in daily clinical rounds and exposure to developing programs. The student will develop clinical skills in areas related to transfusion practice, blood conservation and evaluation of transfusion reactions. Complex hematologic diseases such as the coagulopathies and diseases that require apheresis will serve to instruct in current clinical practice along with evolving applications of interventional hematology, such as photopheresis and peripheral stem cell harvest for marrow transplantation. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

In addition to the above, the department offers several advanced courses in the Division of Biology and Biomedical Sciences. These courses are listed below, but are described in the offerings of the Division of Biology and Biomedical Sciences.

L41 (Bio) 5051	**FOUNDATIONS IN IMMUNOLOGY**
L41 (Bio) 5171	**MEDICAL IMMUNOLOGY**
L41 (Bio) 5261	**MOLECULAR MECHANISMS OF DISEASE**
L41 (Bio) 5272	**ADVANCED TOPICS IN MOLECULAR IMMUNOLOGY**

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

Research (M60 900)

Paul M. Allen, Ph.D., 362-8758

Research in immunology. The recognition of antigen by T cells. The studies include the use of model antigens to study the structure/function of the TCR. *In vivo* studies involve the physiology of tumor rejection by tumor-specific T cells and an autoimmune mouse model of rheumatoid arthritis.

Jacques U. Baenziger, M.D., Ph.D., 362-8730

Glycobiology, informational role of carbohydrates in protein targeting and reproductive endocrinology.

Erika C. Crouch, Ph.D., M.D., 454-8462

The structure and function of collagenous carbohydrate bindings' proteins known as collectins. We are actively investigating the structure, function, synthesis, assembly and secretion of SP-D—a lung surfactant associated collectin that contributes to the innate pulmonary host defense against a wide variety of important bacterial, fungal, and viral pathogens. The laboratory is studying the human SP-D promoter and using site-directed mutagenesis to examine the structural requirements for assembly, secretion and biologic activity.

Jack H. Ladenson, Ph.D., 454-8436

Development and use of monoclonal antibodies including single-chain antibodies and antibody libraries.

Michael L. McDaniel, Ph.D., 362-7435

A major focus of this laboratory is to elucidate the cellular mechanisms responsible for destruction of the pancreatic β-cell associated with Type I diabetes mellitus, with emphasis on proinflammatory cytokines, the free radical nitric oxide and possible therapeutic interventions in acute, chronic and immunologically mediated inflammation. An additional focus is to identify specific signal transduction pathways that mediate abnormal insulin secretory responses by β-cells associated with Type II diabetes mellitus and to identify the mitogenic signaling pathways in growth factor and nutrient-mediated β-cell growth. An understanding of the role of the mTOR signaling pathway to initiate protein translation, cell cycle progression and cell proliferation will provide important new insights to enhance the ability of growth factors and nutrients to stimulate β-cell growth. Current projects involve molecular and biochemical approaches to study either focus area.

Daniel W. McKeel Jr., M.D., 362-7421

This laboratory is investigating the pathogenesis and neuropathology of Alzheimer's and other dementias in relation to normal aging. There is close collaboration with the Memory and Aging Project (MAP) research team and the Laboratory of Neuroimaging (LONI). Emphasis is on mapping the distribution and severity of early lesions and the derivation of neuritic plaques and neurofibrillary tangles, and defining their relationship to cerebrovascular amyloid and cytoskeletal components.

Current research focuses on developing silver stains and immunochemical probes to assist computer imaging and quantification of plaques, tangles and neurons. Projects include: (1) lesion quantification in brains of the very aged (over 80 years); (2) correlation of lesion severity with precise clinical measurements of cognitive deficits; (3) interactive

and automated computer-assisted quantification of neuritic plaque subtypes; and (4) a multicenter study (CERAD) to validate pathologic criteria for diagnosing Alzheimer's disease.

Jeffrey D. Milbrandt, M.D., Ph.D., 362-4650
We have several ongoing projects in our laboratory. (1) The biological function of the GFL family of neurotrophic factors (GDNF, neurturin, persephin and artemin) that signal through a receptor complex containing the Ret tyrosine kinase. These factors promote survival of multiple neuronal populations including dopaminergic neurons, which degenerate in Parkinson's disease, motor neurons, which are affected in Lou Gehrig's disease and most neurons of the peripheral nervous system. (2) The biological roles of Egr2/Nab2 in regulating the Schwann cell myelination program and how abnormal function of these transcription factors result in peripheral neuropathies. (3) The development of prostate cancer, especially the role of Egr1 in regulating the PIN to invasive carcinoma transition and the role of the Nkx3.1 homeodomain protein in tumor initiation.

Curtis A. Parvin, Ph.D., 454-8436
The application of biostatistical theory to data analysis issues in laboratory medicine, with particular emphasis on statistical approaches to characterizing the performance and quality of laboratory tests.

Jeffrey E. Saffitz, M.D., Ph.D., 362-7728
Experimental cardiovascular pathology research. Areas of research: cellular and molecular mechanisms of sudden cardiac death and the biology and pathobiology of intercellular communication in the heart.

Samuel A. Santoro, M.D., Ph.D., 362-3110
Research is aimed at defining the molecular mechanisms of cell-cell and cell-substrate adhesion. Investigations are centered on the structure, function and regulation of adhesion receptor molecules in platelet function, development and malignancy.

Robert E. Schmidt, M.D., Ph.D., 362-7429
Areas of research interest in this laboratory include: (1) the development and characterization of an experimental model of diabetic autonomic neuropathy in streptozotocin diabetic rats; (2) human sympathetic nervous system in aging and diabetes; (3) susceptibility of subpopulations of sympathetic neurons to experimental injury; (4) the role of oxidative stress in the pathogenesis of experimental diabetic autonomic and age-related neuropathy.

Robert D. Schreiber, Ph.D., 362-8747
Research on cytokine signal transduction and definition of the molecular roles of interferon-gamma, tumor necrosis factor and interleukin-10 in promoting host responses to tumors and microbial pathogens.

Andrey S. Shaw, M.D., 362-4614
Signal transduction in lymphocytes. Genetic basis of renal disease.

Barry Sleckman, M.D., Ph.D., 747-8235
Cellular immunology; molecular basis of T cell receptor assembly.

Carl H. Smith, M.D., 454-6029
Placental transport and surface membrane structure and function.

Steven L. Teitelbaum, M.D., 454-8463
Cellular and molecular mechanisms of bone remodeling with particular emphasis on osteoclast biology as relates to pathogenesis and prevention of diseases, such as osteoporosis. We focus on integrin and cytokine biology, utilizing a variety of genetically-manipulated mice.

John W. Turk, M.D., Ph.D., 362-8190
Studies focus on the role of phospholipase A_2 (PLA_2) enzymes in the regulation of insulin secretion from pancreatic islet beta cells. A novel PLA_2 that does not require calcium ions has been cloned from rat and human islets that appears to participate in beta cell secretion and proliferation. Further studies of the role of this enzyme in these processes, its post translational modifications, and its interactions with other proteins involve molecular biologic manipulation of expression of the enzyme in cultured beta cells and intact mice. Mass Spectrometric characterization of complex lipids and proteins is an important tool in these studies.

Emil R. Unanue, M.D., 362-7440
Research in immunobiology/immunopathology. Examination of cellular interactions resulting in immune induction and cellular immunity. These cellular interactions are being studied in normal, in infectious processes, and in autoimmune diseases. The focus is to identify the proteins responsible for activation of lymphocytes in type 1 diabetes as well as in infection with the intracellular pathogen *Listeria monocytogenes.*

Herbert W. Virgin IV, M.D., Ph.D., 362-9223
We work on issues at the interface of virology and immunology by analyzing aspects of viral immunity, viral pathogenesis and viral genetics that contribute to virulence and disease. We focus on latency and pathogenesis of herpes viruses.

Mark A. Watson, M.D., 454-7919
Our laboratory is interested in defining gene transcriptional programs associated with the early progression of human breast cancer. The experimental approach utilizes histopathological review and laser capture microdissection of tumor tissue from patient biopsies coupled with state-of-the-art quantitative RT-PCR, DNA expression microarray, and tissue microarray technologies. Using bioinformatics and statistical analysis of microarray data, we are defining gene expression profiles associated with breast tumor progression, from cellular atypia to invasive disease. Individual genes and signaling pathways identified will be used to better under-

stand the biology of breast cancer, to identify novel diagnostic markers, and to develop strategies for new, targeted therapies. Similar approaches using DNA microarrays and bioinformatics are being applied to molecularly classify several other types of inherited and sporadic solid tumor neoplasms.

Mary M. Zutter, M.D., 362-0114

Division of Anatomic Pathology. Our laboratory focuses on the interactions between cells and the extracellular matrix with particular attention to the $\alpha_2\beta_1$ integrin. The $\alpha_2\beta_1$ integrin functions as a collagen/laminin receptor on platelets, fibroblasts, endothelial cells and epithelial cell types. The $\alpha_2\beta_1$ integrin has been implicated in a variety of a complex biologic processes. We have demonstrated using *in vitro* models of renal, pulmonary and breast epithelium that signals downstream of $\alpha_2\beta_1$ integrin ligation contribute to branching morphogenesis. We demonstrated that the α_2 integrin subunit cytoplasmic domain is necessary for epidermal growth factor-stimulated chemotactic migration and insulin-dependent entry into S-phase by mammary epithelial cells adherent to Type I collagen. A series of mutational and deletional studies defined specific residues within the α_2 integrin subunit cytoplasmic domain that mediated either cell migration or cell cycle progression via distinct MAPK pathways.

To better define the role of the $\alpha_2\beta_1$ integrin *in vivo*, we recently created a genetically engineered mouse in which expression of the $\alpha_2\beta_1$ integrin was eliminated. Mice deficient in the $\alpha_2\beta_1$ integrin are viable, fertile and develop normally with no excess lethality. Platelets from α_2-null mice failed to adhere to Type I collagen under either static or shear stress conditions when compared to platelets from wild type littermates. The α_2-deficient animals also show defects in mammary gland morphogenesis. In addition, we have recently demonstrated that the $\alpha_2\beta_1$ integrin deficient mice have surprising defects in the innate immune response to bacterial and viral pathogens.

Ongoing studies in the laboratory are focusing on evaluating the role of the $\alpha_2\beta_1$ integrin in immunity, development and cancer.

Faculty

EDWARD MALLINCKRODT PROFESSOR AND HEAD OF DEPARTMENT

Emil R. Unanue, M.D., University of Havana, 1960.

Professors Emeriti

Hugh Chaplin Jr., M.D., Columbia University, 1947. (See Department of Medicine.)

Paul E. Lacy, M.D., Ohio State University, 1948; Ph.D., University of Minnesota, 1955.

Professors

Robert L. Kroc Professor

Paul M. Allen, Ph.D., University of Michigan, 1981.

Jacques U. Baenziger, M.D., Ph.D., Washington University, 1975. (See Department of Cell Biology and Physiology.)

Talal A. Chatila, M.D., American University, 1984. (See Department of Pediatrics.)

Marco Colonna, M.D., Parma University, 1983. (See Department of Medicine.)

Erika C. Crouch, Ph.D., University of Washington, 1978; M.D., 1979.

Louis P. Dehner, M.D., Washington University, 1966. (See Department of Pediatrics.)

William Michael Dunne Jr., Ph.D., Medical College of Wisconsin, 1981. (See Department of Medicine and Department of Molecular Microbiology.)

Timothy J. Eberlein, M.D., University of Pittsburgh, 1977. (See Department of Surgery and Alvin J. Siteman Cancer Center.)

Jonathan D. Gitlin, M.D., University of Pittsburgh, 1978. (See Department of Pediatrics and Clinical Investigation Program.)

Lawrence T. Goodnough, M.D., University of Pennsylvania, 1975. (See Department of Medicine.)

Michael L. Gross, Ph.D., University of Minnesota, 1966. (See Department of Medicine.) (Also Department of Chemistry)

Peter A. Humphrey, M.D., Ph.D., University of Kansas, 1984. (See Department of Surgery.)

John M. Kissane, M.D., Washington University, 1952.

Michael Kyriakos, M.D., Albert Einstein College of Medicine, 1962.

Oree M. Carroll and Lillian B. Ladenson Professor of Clinical Chemistry

Jack H. Ladenson, Ph.D., University of Maryland, 1971. (See Department of Medicine.)

Michael L. McDaniel, Ph.D., St. Louis University, 1970.

Jeffrey D. Milbrandt, M.D., Washington University, 1978; Ph.D., University of Virginia, 1983. (See Department of Medicine.)

Thalachallour Mohanakumar, Ph.D., Duke University, 1974. (See Department of Medicine and Department of Surgery.)

John C. Morris, M.D., University of Rochester, 1974. (See Department of Neurology.)

Kenneth M. Murphy, Ph.D., The Johns Hopkins University, 1982; M.D., 1984.

John W. Olney, M.D., University of Iowa, 1963. (See Department of Psychiatry.)

Alan Pestronk, M.D., The Johns Hopkins University, 1970. (See Department of Neurology.)

Paul E. Lacy and Ellen Lacy Professor

Jeffrey E. Saffitz, Ph.D., Case Western Reserve University, 1977; M.D., 1978. (See Department of Medicine and Clinical Investigation Program.)

Conan Professor in Laboratory Medicine

Samuel A. Santoro, M.D., Ph.D., Vanderbilt University, 1979. (See Department of Medicine.)

Robert E. Schmidt, M.D., Ph.D., Washington University, 1976.

Alumni Professor

Robert D. Schreiber, Ph.D., State University of New York, 1973. (See Department of Molecular Microbiology and Alvin J. Siteman Cancer Center.)

Andrey S. Shaw, M.D., Columbia University, 1984.

Carl H. Smith, M.D., Yale University, 1959. (See Department of Pediatrics.)

Wilma and Roswell Messing Professor

Steven L. Teitelbaum, M.D., Washington University, 1964.

John W. Turk, M.D., Ph.D., Washington University, 1976. (See Department of Medicine.)

Herbert W. Virgin IV, M.D., Ph.D., Harvard University, 1985. (See Department of Medicine and Department of Molecular Microbiology.)

Wayne M. Yokoyama, M.D., University of Hawaii, 1978. (See Department of Medicine.)

Mary M. Zutter, M.D., Tulane University, 1981. (See Clinical Investigation Program.)

Research Professor

Frederick P. Ross, Ph.D., University of Warwick, 1976.

Associate Professors

Rosa Maria Davila, M.D., University of Puerto Rico, 1981.

George J. Despotis, M.D., St. Louis University, 1985. (See Department of Anesthesiology.)

John F. DiPersio, M.D., Ph.D., University of Rochester, 1980. (See Department of Medicine, Department of Pediatrics and Alvin J. Siteman Cancer Center.)

Charles S. Eby, M.D., Vanderbilt University, 1981. (See Department of Medicine.)

Samir K. El-Mofty, Ph.D., Temple University, 1975. (See Department of Otolaryngology.)

Thomas A. Ferguson, Ph.D., University of Cincinnati, 1982. (See Department of Ophthalmology and Visual Sciences.)

Phyllis C. Huettner, M.D., University of Pennsylvania, 1985. (See Department of Obstetrics and Gynecology.)

Osami Kanagawa, M.D., Okayama University, 1974; Ph.D., 1978. (See Department of Medicine.)

Helen Liapis, M.D., University of Athens, 1974.

Douglas M. Lublin, Ph.D., Stanford University, 1976; M.D., University of California, Los Angeles, 1982. (See Department of Medicine.)

Daniel W. McKeel Jr., M.D., University of Virginia, 1966.

Jan A. Nolta, Ph.D., University of Southern California, 1994. (See Department of Medicine.)

John D. Pfeifer, Ph.D., University of California, San Diego, 1987; M.D., 1988. (See Department of Obstetrics and Gynecology.)

Mitchell G. Scott, Ph.D., Washington University, 1982. (See Department of Medicine.)

Barbara A. Zehnbauer, Ph.D., The University of Chicago, 1979. (See Department of Pediatrics and Alvin J. Siteman Cancer Center.)

Research Associate Professor

Marina Cella, M.D., University of Genova, 1989.

Associate Professor (Clinical)

Steven L. Leary, D.V.M., Iowa State University, 1971. (Also Division of Comparative Medicine)

Research Associate Professor (Clinical)

Curtis A. Parvin, Ph.D., University of Minnesota, 1980. (See Department of Medicine and Division of Biostatistics.)

Assistant Professors

Robert Arch, Ph.D., University of Wurzburg, Germany, 1994. (See Department of Medicine.)

Morey A. Blinder, M.D., St. Louis University, 1981. (See Department of Medicine.)

Alec M. Cheng, Ph.D., Washington University, 1993. (See Department of Medicine.)

Kyunghee Choi, Ph.D., University of Illinois, 1988.

Thomas G. Diacovo, M.D., McGill University, 1988. (See Department of Pediatrics.)

Larry E. Fields, M.D., Harvard University, 1980. (See Department of Medicine.)

Daved H. Fremont, Ph.D., University of California, San Diego, 1993. (See Department of Biochemistry and Molecular Biophysics.)

Timothy A. Graubert, M.D., Harvard University, 1988. (See Department of Medicine.)

Jonathan M. Green, M.D., Wayne State University, 1986. (See Department of Medicine.)

Ann M. Gronowski, Ph.D., University of Wisconsin, 1992. (See Department of Obstetrics and Gynecology.)

D. Ashley Hill, M.D., Washington University, 1994.

Anne C. Lind, M.D., Creighton University, 1989. (See Department of Medicine.)

Daniel C. Link, M.D., University of Wisconsin, 1985. (See Department of Medicine.)

Danielle W. Lu, M.D., University of Medicine and Pharmacy, Romania, 1995.

Horacio M. Maluf, M.D., National University of Cordoba, Argentina, 1984.

Hector D. Molina-Vicenty, M.D., University of Puerto Rico, 1985. (See Department of Medicine.)

Andrew S. Pekosz, Ph.D., University of Pennsylvania, 1996. (See Department of Molecular Microbiology.)

Stanford Lee-Yu Peng, Ph.D., Yale University, 1996; M.D., 1997. (See Department of Medicine.)

Arie Perry, M.D., University of Texas, 1990.

Christine Pham, M.D., University of Florida, 1985. (See Department of Medicine.)

Jon R. Ritter, M.D., University of Minnesota, 1988.

Barry P. Sleckman, M.D., Ph.D., Harvard University, 1989.

Wojciech A. Swat, Ph.D., Polish Academy of Sciences, 1992.

Hanlin Wang, M.D., Wuhan University, China, 1982; Ph.D., Mayo Clinic, 1992.

Mark A. Watson, M.D., Ph.D., Washington University, 1992. (See Alvin J. Siteman Cancer Center and Clinical Investigation Program.)

Katherine N. Weilbaecher, M.D., Stanford University, 1992. (See Department of Medicine.)

Frances V. White, M.D., University of North Carolina, 1978.

Lijuan Zhang, Ph.D., University of Alabama, 1995.

Xiao-Feng S. Zheng, Ph.D., Harvard University, 1993.

Research Assistant Professors

Toshiyuki Araki, M.D., Osaka University, 1989; Ph.D., 1993.

Theresa L. Murphy, Ph.D., The Johns Hopkins University, 1983.

Kathleen C. Sheehan, Ph.D., St. Louis University, 1986. (See Master of Science in Clinical Investigation Program.)

Research Assistant Professor (Adjunct)

Terry Woodford-Thomas, Ph.D., Virginia Polytech, 1982.

Instructors

W. Richard Burack, Ph.D., University of Virginia, 1994; M.D., 1995.

S. Kent Dickeson, Ph.D., University of Kansas, 1991.

Rakesh Nagarajan, M.D., Ph.D., Washington University, 2002.

Deborah J. Novack, M.D., Ph.D., Washington University, 1995. (See Department of Medicine.)

Saha Sadeghi, M.D., University of Chicago, 1995.

Lourdes R. Ylagan, M.D., Ohio State University, 1993.

Research Instructors

Dorothy J. Fiete, B.S., Marymount College, 1966.

Susan Gilfillan, Ph.D., Stanford University, 1990.

Guim Kwon, Ph.D., University of Michigan, 1992.

Yvonne Landt, M.S., University of Illinois, 1972.

Christopher A. Nelson, Ph.D., Washington University, 1995.

Lecturer

Morton E. Smith, M.D., University of Maryland, 1960. (See Department of Opthalmology and Visual Sciences.)

EDWARD MALLINCKRODT DEPARTMENT OF PEDIATRICS

The primary aim of the teaching program of the Department of Pediatrics is to stimulate interest in developmental biology, especially human growth and development, and to provide the student with a foundation sufficiently comprehensive so that he or she will have an appreciation of clinical pediatric problems regardless of his or her future career choice in medicine.

The major clinical and research facilities are in St. Louis Children's Hospital and the newborn services are at Barnes-Jewish Hospital. St. Louis Children's Hospital is a facility with 235 beds that accepts patients through 21 years of age with all types of medical and surgical problems. Hospital admissions average 11,000 annually. Pediatric medical ambulatory activity, including subspecialty and emergency visits, averages about 90,000 visits a year. Nearly 5,000 infants are born annually in the Medical Center.

FIRST YEAR

M30 511 MEDICAL GENETICS

Instructors: *Jeffrey I. Gordon, M.D.*, 362-7243; *Alison J. Whelan, M.D.*, 362-7800

The course is divided into halves. The first half focuses on the mechanisms of regulation of gene expression in eukaryotes. This includes discussions of the structure of DNA and its means of replication, the organization and packaging of eukaryotic genomes, chromatin structure and the nucleosome, the organization of polymerase II class genes, the processing of their primary transcripts, and the molecular basis for transcriptional and translational regulation including the use of transgenic mice to study cell-specific gene regulation. The second half focuses on how these concepts can be applied to an understanding of medical genetics. Topics covered include principles of Mendelian genetics, the molecular basis for various inborn errors of metabolism, their diagnosis and prenatal screening, the genetics of cancer, and finally, current strategies for mapping and characterizing the human genome. This course is referenced in Department of Genetics and is cross-listed with L41 (Bio) 550.

Selectives

M04 526 NEW DISEASES, NEW PATHOGENS

For full description, see Department of Molecular Microbiology.

SECOND YEAR

Students are introduced to pediatrics and to the faculty through a series of lectures and symposia designed to acquaint them with the concepts of human growth and development and the effects of age and maturity on reactions to injury and disease. The unique aspects of the physical examination of the infant and child are presented in the Introduction to Clinical Medicine course. Members of the faculty are active participants in the second-year Pathophysiology course.

THIRD YEAR

M65 760 PEDIATRIC CLERKSHIP

Instructors: *Kathleen A. McGann, M.D.; Angela M. Sharkey, M.D.* (both: 454-6299)

This six-week curriculum, which is a component of the 12-week Women's and Children's Health Clerkship, emphasizes pediatric pathophysiology and normal growth and development from birth through adolescence. Two weeks will be spent assessing newborns in the regular or special care nurseries at Barnes-Jewish or Christian Northwest hospitals or spent seeing patients in the pediatric emergency department. Four weeks will be spent at St. Louis Children's Hospital on an inpatient service. Emphasis is on performing a pediatric history and physical examination and developing an appropriate differential diagnosis. Daily rounds with house staff and attending physicians, as well as weekly case management conferences and grand rounds, further this emphasis. A weekly core lecture series also is offered during this 12-week combined clerkship (Women's and Children's Health) with Ob/Gyn.

FOURTH YEAR

Electives

M65 801 GENERAL PEDIATRIC SUBINTERSHIP — ST. LOUIS CHILDREN'S HOSPITAL

Instructors: *Kathleen A. McGann, M.D.; Angela M. Sharkey, M.D.; Alan L. Schwartz, M.D., Ph.D.; Andrew J. White, M.D.*, 454-6299

This is the general pediatric subinternship. The student will be assigned patients on one of three inpatient pediatric floors (7East, 9East or 12West) for initial evaluation and continuing care. The student works as an extern and is expected to take call every fourth night. Students work directly under the supervision of the senior resident, and teaching rounds are conducted by the faculty. The elective will provide experience in the management of many pediatric medical conditions (variable depending on floor) including a wide variety of infectious diseases, failure to thrive, acute asthma, poisonings, immune deficiency diseases, along with pulmonary, gastro-

intestinal, renal and neurologic disorders. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 808 PEDIATRIC ASTHMA AND ALLERGY

Instructors: *Leonard B. Bacharier, M.D.; Robert C. Strunk, M.D.*, 454-2694

In predominantly an outpatient setting, students will evaluate patients with a wide variety of allergic disorders including asthma, allergic rhinitis, anaphylaxis, food allergy, atopic dermatitis and urticaria/angioedema. Goals include: (1) the extension of history-taking skills to include environmental exposures, (2) the recognition of physical findings suggestive of allergic disease, (3) understanding the indications and interpretation of diagnostic testing including skin testing and assessment of pulmonary function, and (4) application of appropriate therapeutic strategies to these disorders. Weekly didactic conferences and inpatient consultations provide additional educational opportunities. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 811 PEDIATRIC CRITICAL CARE MEDICINE

Instructor: *J. Julio Pérez Fontán, M.D.*, 454-2527

This elective is designed to familiarize the student with the diagnosis and treatment of critical illness in infants and children. To this end, each student is made responsible for a small number of assigned cases under the direct supervision of pediatric residents, pediatric critical care fellows, and faculty. The teaching activities emphasize the understanding of pathophysiological processes that lead to respiratory, cardiocirculatory, and central nervous system dysfunction and their therapy in the developing subject. Students are expected to participate in all the daily activities of the Pediatric Intensive Care Unit at St. Louis Children's Hospital and be on occasional call after hours. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 813 PEDIATRIC CARDIAC CATHETERIZATION

Instructors: *David T. Balzer, M.D.; Russel Hirsch, M.D.*, 454-6095

Elective will focus on interpretation of hemodynamic and angiographic data acquired in the cardiac catheterization laboratory. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 818 PEDIATRIC CARDIOLOGY—INPATIENT SERVICE

Instructors: *Angela M. Sharkey, M.D.; Charles E. Canter, M.D.; Mark R. Grady, M.D.; Mark C. Johnson, M.D.; David T. Balzer, M.D.*, 454-6095

The student works as a subintern and is assigned selected patients on the pediatric cardiology ward. Patients admitted to the cardiology service include those being evaluated for surgical intervention, patients with significant congestive heart failure, and those for cardiac catheterization/intervention. The student has an opportunity to follow patients through these procedures. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 819 PEDIATRIC CARDIOLOGY—OUTPATIENT SERVICE

Instructors: *Angela M. Sharkey, M.D.; Charles E. Canter, M.D.; Mark R. Grady, M.D.; Mark C. Johnson, M.D.; David T. Balzer, M.D.; Jill Ibrahim, M.D.; Edward K. Rhee, M.D.*, 454-6095

Students will independently evaluate outpatients referred for evaluation of cardiac murmurs, chest pain and arrhythmia and report findings to the attending physician. Clinics are held at St. Louis Children's Hospital, Missouri Baptist Hospital and many outreach sites. The student will review with the attending all EGGs, holter monitors and echocardiograms performed. Participation in weekly surgical conference and journal club is expected. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 825 CLINICAL GENETICS

Instructor: *Rick A. Martin, M.D.*, 454-6093

The goal of the Senior Medical Student elective in Clinical Genetics is to familiarize the student with the role of the Clinical Geneticist and Genetic Counselor in the diagnosis and management of birth defects and genetic disease. Attainment of this goal will be accomplished by a myriad of clinical experiences through established weekly genetics clinics in the Department of Pediatrics, Medicine and Neurology and on the pediatric genetics inpatient consultation service at St. Louis Children's Hospital and Barnes-Jewish Hospital. The primary student role will be clinical evaluation of patients with various genetic diseases and syndromes under supervision of a clinical geneticist and/or a genetic counselor. Through this exposure the student will be expected to leave the elective not only with a more thorough understanding of basic genetic principles but also of the role of genetics in health care and the impact genetic disease has on the patient, their family and society. **Valid start weeks for 4-week blocks are**: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 827 SUBINTERNSHIP IN PEDIATRIC HEMATOLOGY/ONCOLOGY

Instructor: *David B. Wilson, M.D., Ph.D.*, 454-2717

Students will assume the responsibilities of a pediatric resident on the inpatient Hematology/Oncology service at St. Louis Children's Hospital. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 833 SPECIAL TOPICS IN REPRODUCTIVE HEALTH

Instructor: *E Sessions Cole, M.D.,* 454-6148

Students will participate in clinical experiences in four clinical modules: contraception, sexually transmitted diseases, abortion and special topics (HIV infection and adolescence). Required reading will include relevant review articles. Clinical experiences will be primarily ambulatory. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 835 PEDIATRIC IMMUNOLOGY AND RHEUMATOLOGY

Instructors: *Jonathan D. Gitlin, M.D.,*454-6124; *Talal A Chatila, M.D.; Andrew J. White, M.D.*

Opportunities are available to care for children with a variety of immunologic and rheumatologic disorders. Students will see patients in outpatient clinics and inpatient consultations. An in-depth approach to evaluating disorders of the immunologic system will be provided. Students will participate in evaluation of new patients with a variety of rheumatologic diseases including JRA, SLE and scleroderma at both SLCH and Shriners Hospital clinics. Students may elect to participate in conferences and seminars. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 840 PEDIATRIC INFECTIOUS DISEASES

Instructors: *Joseph W. St. Geme, M.D.; Gregory A. Storch, M.D.; Kathleen A. McGann, M.D.; David B. Haslam, M.D.; Alexis M. Elward, M.D.; David A. Hunstad, M.D.; Jeffrey McKinney, M.D., Ph.D.,* 454-6050

This elective is designed to introduce students to the clinical aspects of infectious diseases in children. Students will consult on both inpatients and outpatients. Regular daily activities will include evaluation of new patients, work rounds on inpatient consults, microbiology teaching rounds in the bacteriology lab, and teaching rounds with the infectious disease attending. Formal teaching sessions include a weekly pediatric infectious disease case conference, a weekly joint clinical conference with the adult infectious disease group, a weekly pediatric infectious disease research conference and a monthly journal club. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 841 CARE OF THE HIV-INFECTED PATIENT

Instructors: *Kathleen A. McGann, M.D.,* 454-6050; *Judy Aberg, M.D.; Linda M. Mundy, M.D.; Gregory A. Storch, M.D.; and staff*

This elective is designed to introduce students to the care of HIV-infected individuals (adults, adolescents and children) and of HIV-exposed infants. Care of the HIV-infected patient encompasses not only the medical aspects of care, but also the psychosocial aspects. The elective will involve rotation through several clinics including the maternal-HIV clinic, pediatric and adolescent HIV clinics, and several adult HIV clinics, along with participation in community-wide social service meetings, home visits, and exposure to the Retrovirus laboratory and the AIDS Clinical Trials unit. In addition, the student will spend part of his/her time rotating in the general ambulatory infectious diseases clinics (pediatric and adult ID, and the STD clinic). **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 845 PEDIATRIC EMERGENCY MEDICINE

Instructor: *David M. Jaffe, M.D.,* 454-2341

The goal of this elective is to provide the senior medical student with a broad introductory clinical experience in pediatric emergency medicine. Functioning as a subintern in the Emergency Unit of St. Louis Children's Hospital, the student will have the opportunity to evaluate and manage patients with a wide variety of emergent and urgent medical and surgical problems. Examples include: respiratory distress, abdominal pain, lacerations, bone injuries, rashes, fever, etc.

Students will work either a day shift (7:30 a.m.-3 p.m.) or an evening shift (3 p.m.-11 p.m.) in rotation. Daily teaching conferences are provided by the attending staff. A weekly meeting of the students and senior faculty will occur to review interesting cases. Also, attending staff and senior pediatric residents provide 24-hour on-site supervision. Each medical student will be asked to prepare a 20-minute presentation on a topic of his/her choosing. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 850 PEDIATRIC ENDOCRINOLOGY AND METABOLISM

Instructors: *Neil H. White, M.D.; Abby L. Hollander, M.D.; Bess Marshall, M.D.; Louis J. Muglia, M.D., Ph.D.; Rebecca Green, M.D., Ph.D.; Paul Hruz, M.D., Ph.D.; Kathleen E. Bethin, M.D., Ph.D.,* 286-1157

This elective is designed to include broad clinical experience in pediatric endocrinology and diabetes. The student will have an opportunity to evaluate both patients admitted to St. Louis Children's Hospital and patients referred for consultation in our three outpatient clinics each week. In addition to a divisional conference to review referred patients, several joint conferences with the adult Endocrinology and Metabolism Division (clinical rounds, journal club/research seminar, case conference) are held weekly. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 851 CLINICAL PEDIATRIC GI ELECTIVE

Instructor: *Mark E. Lowe, M.D., Ph.D.,* 286-2857

The rotation in Pediatric gastroenterology, hepatology and nutrition provides broad exposure to

specialized and common pediatric problems. Gastroenterology patients are seen in both the outpatient suites and in the hospital. Students will see outpatients with common pediatric complaints like chronic abdominal pain, constipation and poor growth, which are frequently encountered in a general pediatrics practice. Additionally, students will experience the ongoing outpatient care of patients with chronic liver disease, inflammatory bowel disease, short-gut syndrome, celiac disease and a variety of rare disorders. The inpatient service provides experience in caring for patients with acute illnesses such as gastrointestinal bleeding, malnutrition, liver failure, complications of inflammatory bowel disease, and pancreatitis. Students can participate in diagnostic and therapeutic endoscopic procedures. Weekly divisional conferences review pathology slides from current cases and discuss difficult patient problems and topics of interest, presented by fellows and attendings. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 852 CLINICAL PEDIATRIC PULMONARY MEDICINE

Instructors: *Robert C. Strunk, M.D.; Leonard B. Bacharier, M.D.; Maite de la Morena, M.D.; Thomas W. Ferkol Jr., M.D.; Pamela M. Schuler, M.D.; Steven D. Shapiro, M.D.; Stuart C. Sweet, M.D.; Elizabeth Chan Uong, M.D.*, 454-2694

This elective provides an opportunity for students to be exposed to the full scope of respiratory diseases in infants and children. Pediatric referrals will be seen in both an inpatient and outpatient setting. Goals include: (1) to learn the importance of the physical exam using inspection, percussion and auscultation; (2) indications and interpretation of diagnostic tests, such as CXR, chest CT, VQ scan, pulmonary function testing, and bronchoscopy with biopsy and lavage; (3) therapeutic interventions and the use of bronchodilators, anti-inflammatory agents, et al. Unique aspects of this rotation include a broad exposure to children with congenital lung defects, life-threatening asthma, cystic fibrosis and end-stage cardiopulmonary diseases referred for transplantation. Weekly didactic sessions as well as weekly divisional patient care sections are an opportunity to further learn and practice presentational skills. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 861 NEWBORN MEDICINE

Instructor: *F. Sessions Cole, M.D.*, 454-6148

The goal of this course is to provide students with responsibility for caring for newborn infants who range from normal to acutely ill to chronically ill and for their families. The physiology of the transition from fetal to extrauterine existence, the pathophysiology of specific diseases, and primary accountability of the student for patient management decisions and procedures will be emphasized. In addition, collaboration with nursing staff and other health care providers in decision-making (especially concerning the viability of individual infants) and family management will be regularly required.

Students during each rotation will have the option to rotate through the Neonatal Intensive Care Unit at St. Louis Children's Hospital and/or the labor and delivery services at Barnes-Jewish Hospital. Students assigned to the Neonatal Intensive Care Unit at St. Louis Children's Hospital also will have the opportunity to become involved in the transport of acutely ill infants, while those on the Labor and Delivery Service will routinely be involved in normal newborn care and delivery room management. The student will be expected to rotate patient responsibilities every fourth night. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 875 PEDIATRIC RENAL DISEASE

Instructors: *Keith A. Hruska, M.D.; Anne M. Beck, M.D.; S. Paul Hmiel, M.D., Ph.D.*, 454-6043

This course is designed to provide the student with a wide exposure to all aspects of pediatric renal disease and an opportunity to explore a desired aspect of the field in-depth. The student will be an integral part of the Renal Team and as such will see both inpatients and outpatients. Students will have an opportunity to follow the courses of patients with acute renal disease as well as those with more chronic problems and will help to plan the evaluation and therapeutic management of these patients. Discussions and rounds with the attending staff and fellows emphasize the relationship between clinical problems and the pathophysiology of the underlying disease. These informal teaching sessions are supplemented by more formal sessions. These include renal attending rounds, renal research rounds and grand rounds, which are conducted weekly in conjunction with the Renal Division of Barnes-Jewish Hospital. Renal biopsy material is reviewed with the renal pathologists. Attendance at the weekly pediatric grand rounds and pediatric case conferences is encouraged. Opportunities in clinical and translational research projects will be discussed with interested students. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 876 PEDIATRIC LUNG TRANSPLANTATION

Instructors: *Stuart C. Sweet, M.D.; Maite de la Morena, M.D.*, 454-2694

St. Louis Children's Hospital has the largest pediatric lung transplant program in North America. This unique clinical rotation will enable students to be exposed to the process of transplantation from referral and listing to the actual surgery and post-operative care. Both inpatient and twice weekly outpatient clinics will be available for participation and learning. The use of diagnostic tests, such as flexible fiberoptic bronchoscopy with biopsies, the

histopathology of infection and graft rejection, and the complexities of immunosuppression will all be explored. Weekly transplant meetings with our multidisciplinary team, as well as didactic/psychosocial and ethical and divisional care meetings will all be available. Our patient referral base is worldwide, and the primary cardiopulmonary disease states include: cystic fibrosis, pulmonary hypertension, complex congenital heart defects and alveolar proteinosis. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 878 CLERKSHIP IN RURAL PRIMARY CARE PEDIATRICS

Instructors: *Angela M. Sharkey, M.D.; Kathleen A. McGann, M.D.*

Site Instructors: *Kevin Blanton, M.D., in Sikeston; Claudia Preuschoff, M.D., in Poplar Bluff*

The clerkship in rural primary care pediatrics is designed to provide the student with first-hand experience in general pediatric practice in a rural community setting. Students will have the opportunity to see patients in a private office, participate in delivery room resuscitation, evaluate patients in the emergency department and provide pediatric consultation to family practitioners, obstetricians and surgeons. The objective of this elective is to provide the student with the experience of serving as a general pediatrician providing comprehensive health services in a rural community. Students assume responsibility for ongoing care of patients and have opportunities to perform procedures. Housing is available through SEMA ADHEC/Southeast Missouri Health Network at no cost to the student. However, reservations must be made early. Two-week or four-week blocks are available. **Valid start weeks for 2-week blocks are:** Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41,and 43. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 831 PEDIATRIC DERMATOLOGY

Instructor: *Susan B. Mallory, M.D.*, 454-2714

This clinical rotation will be available to students interested in dermatology, pediatrics or both. Students will follow the dermatology rotation (M25 830) with an emphasis on pediatric dermatology by attending pediatric dermatology clinics, seeing consults, etc. Enthusiastic students will have an opportunity to write up a case report if they wish, but need to notify Mallory before the course. Students can take either this elective or M25 830—not both. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

M80 870 CLERKSHIP IN PRIMARY CARE IN GENERAL PEDIATRCS

Instructors: *Paul S. Simons, M.D.; Jay S. Epstein, M.D.*, 535-7855

The Clerkship in Primary Care in General Pediatrics is designed to provide the student with first-hand experience in general pediatric practice in a model ambulatory care setting at the Forest Park Pediatrics office on the medical campus. The major component of the clerkship is direct patient care under the supervision of the senior physicians who are members of the group.

Students will join individual pediatricians as colleagues caring for pediatric patients under supervision. The broad spectrum of general ambulatory pediatrics including behavioral pediatrics, developmental pediatrics, preventive medicine and acute care aspects of pediatric practice will be emphasized. The objective of this elective is to provide the student with the actual experience of serving as a general pediatrician providing comprehensive health services to the families of a typical broadly based population receiving care through different insurance systems. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M65 900)

Charles E. Canter, M.D., 454-6095

Clinical studies on cardiac transplantation in infants and children.

F. Sessions Cole, M.D., 454-6148

Using population-based databases, investigation priorities include: (1) impact of surfactant replacement therapy on racial disparities in infant mortality; and (2) understanding molecular epidemiology of surfactant protein B deficiency.

Michael R. DeBaun, M.D., 454-4177

Research interests include: (1) clinical investigation of the natural history of stroke in sickle cell disease; and (2) genotype/phenotype analysis in pediatric syndromes associated with cancer.

Thomas G. Diacovo, M.D., 286-2852

Vascular biology and immunology. Investigative efforts are aimed at dissecting the adhesive interactions responsible for recruiting platelets and leukocytes to sites of inflammation and vascular trauma. Our laboratory is using molecular and biochemical approaches to modify the expression of cell surface adhesion receptors (selectins and integrins). Several animal models are available to study the role of adhesion receptors using intravital microscopy.

Brian Hackett, M.D., Ph.D., 286-2833

Molecular biology of lung development. Research will focus on the molecular regulation of pulmonary epithelial differentiation. Areas of interest include the use of molecular markers for all lineage analysis and the role of Forkhead transcription factors in pulmonary epithelial differentiation.

David B. Haslam, M.D., 286-2888

Mechanisms of disease caused by bacterial toxins. Research focuses on the binding and intracellular transport of shiga toxins within human cells. An area

of particular interest is the genetic and evolutionary basis for human susceptibility to shiga toxins. In addition, research is examining the ability of shiga toxins to gain access to the cytoplasm by exploiting normal quality control mechanisms in the endoplasmic reticulum.

Robert J. Hayashi, M.D., 454-4118
Laboratory investigation is focused on the role of T lymphocytes in immune tolerance during viral and bacterial infection. Clinical research interests are in the area of BMT.

Paul Hruz, M.D., Ph.D., 454-6051
Research interests include structure/function relationships in facilitative glucose transporters, congenital and acquired lipodystrophy syndromes, and insulin resistance associated with HIV protease inhibitor therapy.

David M. Jaffe, M.D., 454-2341
Clinical research interests are: (1) occult bacteremia —identification, clinical decision making; (2) trauma—injury prevention, head and cervical spine injuries; (3) health care delivery system—role of the pediatric emergency department; and (4) pain management.

Judith E.C. Lieu, M.D., 454-2138
Clinical Outcomes Research in Pediatric Otolaryngology. The Clinical Outcomes Research office performs clinical epidemiology and health services research. (Please reference the elective offered by Jay F. Piccirillo, M.D., in Otolaryngology for more details.) These techniques and methodologies are used to investigate clinical problems seen in pediatric otolaryngology. Projects include the follow-up and evaluation of newborn hearing screening programs, progression of hearing loss in children, and evaluation of unilateral hearing loss. Other projects of the student's choosing that would utilize these research techniques may also be pursued.

Lori Luchtman-Jones, M.D., 454-6018
Investigative efforts are focused on clinical coagulation and sickle cell disease.

Virginia L. Miller, Ph.D., 286-2891
Molecular basis of the pathogenesis of the enteric pathogens *Yersinia enterocolitica* and *Salmonella typhimurium.*

Louis J. Muglia, M.D., Ph.D., 286-2847
Studies in our laboratory seek to determine: (1) the mechanism determining the timing of parturition, and (2) the role and regulation of hypothalamic neuropeptides involved in the stress response and reproduction, utilizing transgenic and gene knockout mice.

William C. Parks, Ph.D., 286-2862
Research is focused on regulation of matrix and proteinase production as well as biological functions of proteinases.

J. Julio Pérez Fontán, M.D., 454-2527
Airway nerves and inflammation. Biology of the airway intrinsic neuronal network and its role in airway neurogenic inflammation.

Scott Saunders, M.D., Ph.D., 286-2850
Investigative efforts are aimed at understanding the molecular basis of development through cell and molecular biological approaches, including transgenic and knockout mouse technology. Specific areas of interests are: (1) understanding the role of cell surface heparan sulfate proteoglycans in morphogenesis; and (2) the biology of neuron migration in development of the central nervous system.

Alan L. Schwartz, M.D., Ph.D., 454-6005
Investigative efforts are aimed at understanding: (1) the biology of cell surface receptors including biochemical and molecular dissection of the mechanisms responsible for receptor-mediated endocytosis of blood coagulation proteins; and (2) the regulation of intracellular protein turnover.

Shalini Shenoy, M.D., 454-6018
Investigation of immunologic basis of graft versus host disease.

Carl H. Smith, M.D., 454-6029
We investigate the cellular process underlying the maternal/fetal transport of amino acids and other nutrients by the human placental syncytiotrophoblast. This goal is approached through isolation and individual study of the maternal- and fetal-facing plasma membranes of the syncytiotrophoblast and through culture of cells derived from placental trophoblast. Cloned transporters are used when appropriate to understand transporter structure, function and interrelationships. Current investigations include: (1) the cloning of cDNAs for placental membrane transporters; (2) their expression in model systems for comparison with transport in membrane isolated directly from placenta; and (3) investigations of the effects of hypoxia on trophoblast amino acid transport.

Joseph W. St. Geme, M.D., 286-2887
The molecular basis of *Haemophilus influenzae* pathogenicity. *Haemophilus influenzae* is a common cause of localized respiratory tract infections, such as otitis media, sinusitis and pneumonia. In addition, this organism is an important cause of meningitis and septicemia. We are employing methods of molecular and cell biology to characterize the bacterial and the host cell factors involved in the pathogenesis of disease due to this model mucosal pathogen.

Gregory A. Storch, M.D.; Max Q. Arens, Ph.D.; Richard S. Buller, Ph.D.; staff, 454-6079
Rapid diagnosis of viral and other unconventional infections. The Diagnostic Virology Laboratory is studying the use of the polymerase chain reaction and oligonucleotide sequencing for the diagnosis of

infections caused by viruses and other unconventional pathogens, and the detection of resistance to antiviral agents. Current projects include: (1) the detection of herpes viruses and BK Virus in the blood of organ transplant recipients; (2) the detection of vector-borne agents in blood; (3) the detection of respiratory pathogens; and (4) the molecular detection and epidemiology of antibiotic resistance. Future projects will explore other infections caused by other unconventional pathogens that are not easily diagnosed using existing methods, and the application of PCR for quantitation of infectious agents and the detection of resistance to antiviral agents.

Robert C. Strunk, M.D., 454-2694
Clinical studies of patients with asthma aimed at understanding the mechanisms of death due to asthma in children.

Neil H. White, M.D., 286-1157
Our work involves patient-oriented research in the management of diabetes in children. Arrangements can be made for involvement in or development of projects aimed at improving outcome or prevention of diabetes mellitus and its complications.

David B. Wilson, M.D., Ph.D., 286-2834
Research is focused on the molecular switches that regulate control genes during early embryonic development and differentiation.

Faculty

THE HARRIET B. SPOEHRER PROFESSOR AND HEAD OF DEPARTMENT

Alan L. Schwartz, Ph.D., Case Western Reserve University, 1974; M.D., 1976. (See Department of Molecular Biology and Pharmacology.)

Professors Emeriti

Alexis F. Hartmann Jr., M.D., Washington University, 1951.

John C. Herweg, M.D., Washington University, 1945.

Lawrence I. Kahn, M.D., Louisiana State University, 1945.

J. Neal Middelkamp, M.D., Washington University, 1948.

Penelope G. Shackelford, M.D., Washington University, 1968. (See Department of Molecular Microbiology.)

Jessie L. Ternberg, Ph.D., University of Texas, 1950; M.D., Washington University, 1953; Sc.D. (hon.), Grinnell College, 1972. (See Department of Surgery.)

Jean H. Thurston, M.D., University of Alberta, 1941. (See Department of Neurological Surgery and Department of Neurology.)

Teresa J. Vietti, M.D., Baylor University, 1953. (See Department of Radiology.)

Professor Emeritus and Lecturer

Philip R. Dodge, M.D., University of Rochester, 1948. (See Department of Neurological Surgery and Department of Neurology.)

Professors

Anne M. Bowcock, Ph.D., University of Witwatersrand, 1984. (See Department of Genetics, Department of Medicine and Clinical Investigation Program.)

Talal A. Chatila, M.D., American University, 1984. (See Department of Pathology and Immunology.)

Aharon J. Ciechanover, M.D., Hebrew W. Israel, 1973; Ph.D., Technion Faculty Medical, Israel, 1987.

Park J. White M.D. Professor of Pediatrics

F. Sessions Cole, M.D., Yale University, 1973. (See Department of Cell Biology and Physiology and Clinical Investigation Program.)

Louis P. Dehner, M.D., Washington University, 1966. (See Department of Pathology.)

W. Edwin Dodson, M.D., Duke University, 1967. (See Department of Neurological Surgery and Department of Neurology.)

Edwin B. Fisher, Ph.D., State University of New York, 1972. (See Department of Medicine, Alvin J. Siteman Cancer Center and Clinical Investigation Program.) (Also Department of Psychology)

Elliot F. Gellman, M.D., University of Missouri, 1961.

Helene B. Roberson Professor of Pediatrics

Jonathan D. Gitlin, M.D., University of Pittsburgh, 1978. (See Department of Pathology and Immunology and Clinical Investigation Program.)

David H. Gutmann, Ph.D., University of Michigan, 1984; M.D., 1986. (See Department of Neurological Surgery and Department of Neurology.)

Aaron Hamvas, M.D., Washington University, 1981.

Keith A. Hruska, M.D., Creighton University, 1969. (See Department of Cell Biology and Physiology and Department of Medicine.)

Dana Brown/St. Louis Children's Hospital Professor of Pediatrics

David M. Jaffe, M.D., The University of Chicago, 1978.

W. McKim Marriott, M.D./ St. Louis Children's Hospital Professor of Pediatrics

James P. Keating, M.D., Harvard University, 1963.

Daniel P. Kelly, M.D., University of Illinois, 1982. (See Department of Medicine and Department of Molecular Biology and Pharmacology.)

Michael L. Landt, Ph.D., University of Oregon, 1976. (Laboratory Medicine) (See Department of Pathology.)

Michael Lovett, Ph.D., University of London, 1982. (See Department of Genetics.)

Achiahu Ludomirsky, M.D., Sackler School of Medicine, Tel-Aviv University, Israel, 1975.

Susan B. Mallory, M.D., University of Texas, 1974. (See Department of Medicine.)

Appoline Blair/St. Louis Children's Hospital Professor of Surgery

Jeffrey L. Marsh, M.D., The Johns Hopkins University, 1970. (See Department of Surgery.)

William H. McAlister, M.D., Wayne State University, 1954. (See Department of Radiology.)

Robert P. Mecham, Ph.D., Boston University, 1976. (See Department of Cell Biology and Physiology, Department of Medicine and Department of Biomedical Engineering.)

Virginia L. Miller, Ph.D., Harvard University, 1985. (See Department of Molecular Microbiology.)

Michael J. Noetzel, M.D., University of Virginia, 1977. (See Department of Neurological Surgery and Department of Neurology.)

Tae Sung Park, M.D., Yonsei University, 1971. (See Department of Neurological Surgery.)

William C. Parks, Ph.D., Medical School of Wisconsin, 1982. (See Department of Cell Biology and Physiology.)

Alumni Endowed Professor of Pediatrics

J. Julio Pérez-Fontán, M.D., Universidad de Santiago, 1977. (See Department of Anesthesiology.)

Allen P. and Josephine B. Green Professor of Pediatric Neurology

Arthur L. Prensky, M.D., New York University, 1955. (See Department of Neurological Surgery and Department of Neurology.)

Robert J. Rothbaum, M.D., The University of Chicago, 1976.

Ernest and Jane G. Stein Professor of Developmental Pediatrics

Steven M. Rothman, M.D., State University of New York, Upstate, 1973. (See Department of Anatomy and Neurobiology, Department of Neurological Surgery and Department of Neurology.)

Spencer T. and Ann W. Olin Distinguished Professor in the School of Medicine

Larry J. Shapiro, M.D., Washington University, 1971.

Ross W. Shepherd, M.B.B.S., University of Queensland, 1970.

Carl H. Smith, M.D., Yale University, 1959. (See Department of Pathology and Immunology.)

Joseph W. St. Geme, M.D., Harvard University, 1984. (See Department of Molecular Microbiology.)

Gregory A. Storch, M.D., New York University, 1973. (See Department of Medicine and Department of Molecular Microbiology.)

Donald Strominger Professor of Pediatrics

Robert C. Strunk, M.D., Northwestern University, 1968. (See Clinical Investigation Program.)

Phillip I. Tarr, M.D., Yale University, 1980. (See Department of Molecular Microbiology.)

Bradley T. Thach, M.D., Washington University, 1968.

Lawrence Tychsen, M.D., Georgetown University, 1979. (See Department of Anatomy and Neurobiology and Department of Ophthalmology and Visual Sciences.)

Neil H. White, M.D., Albert Einstein College of Medicine, 1975. (See Clinical Investigation Program.)

Michael P. Whyte, M.D., State University of New York, Downstate, 1972. (See Department of Medicine.)

Professors Emeriti (Clinical)

Maurice J. Lonsway, M.D., Washington University, 1950.

Helen E. Nash, M.D., Meharry Medical College, 1945.

Steven I. Plax, M.D., University of Missouri, 1961.

Professors (Clinical)

Mohamad T. Amjad, M.D., University of Teheran, 1961.

C. Read Boles, M.D., Washington University, 1943.

James M. Corry, M.D., Washington University, 1974.

Maurice J. Keller, M.D., Columbia University, 1940.

Kevin J. Murphy, M.D., St. Louis University, 1978.

Homer E. Nash Jr., M.D., Meharry Medical College, 1951.

Frederick D. Peterson, M.D., Washington University, 1957.

George Sato, M.D., Washington University, 1947.

Warren G. Sherman, M.D., Tulane University, 1969.

Mary A.T. Tillman, M.D., Howard University, 1960.

Professor (Adjunct)

Steven D. Shapiro, M.D., The University of Chicago, 1983. (See Department of Cell Biology and Physiology, Department of Medicine and Clinical Investigation Program.)

Arnold W. Strauss, M.D., Washington University, 1970.

Michael S. Watson, Ph.D., University of Alabama, 1981.

Associate Professor Emeritus

James K. Turner, M.D., Washington University, 1953.

Associate Professors

David T. Balzer, M.D., St. Louis University, 1985.

Gordon R. Bloomberg, M.D., University of Illinois, 1959.

Guojun Bu, Ph.D., Virginia Polytechnic Institute, 1990. (See Department of Cell Biology and Physiology.)

Charles E. Canter, M.D., St. Louis University, 1979.

Douglas W. Carlson, M.D., Southern Illinois University, 1984.

Randall A. Clary, M.D., University of Illinois, 1984. (See Department of Otolaryngology.)

Jeffrey G. Dawson, M.D., University of Louisville, 1982.

John F. DiPersio, M.D., Ph.D., University of Rochester, 1980. (See Department of Medicine, Department of Pathology and Immunology and Alvin J. Siteman Cancer Center.)

Anthony G. Durmowicz, M.D., University of Maryland, Baltimore, 1983.

Thomas W. Ferkol Jr., M.D., Ohio State University, 1985. (See Department of Cell Biology and Physiology.)

Robert P. Foglia, M.D., Georgetown University, 1974. (See Department of Surgery.)

Dorothy K. Grange, M.D., University of Florida, Gainesville, 1981.

Brian P. Hackett, Ph.D., Boston University, 1984; M.D., 1986. (See Clinical Investigation Program.)

Gary E. Hirshberg, M.D., Hahnemann Medical College, 1972. (See Department of Anesthesiology.)

Dee Hodge III, M.D., University of California, San Francisco, 1978.

Abby L. Hollander, M.D., University of Cincinnati, 1986.

Robert M. Kennedy, M.D., Medical College of Georgia, 1980.

Benjamin C.P. Lee, M.B.B.S., University of London, 1966. (See Department of Radiology.)

Fiona H. Levy, M.D., New York Medical College, 1987.

Mark E. Lowe, M.D., University of Miami, 1984.

Jeffrey A. Lowell, M.D., Yale University, 1985. (See Department of Surgery.)

Mark J. Manary, M.D., Washington University, 1982.

Barry P. Markovitz, M.D., University of Pennsylvania, 1983. (See Department of Anesthesiology.)

Rick A. Martin, M.D., University of Utah, 1987.

Kathleen A. McGann, M.D., University of Pennsylvania, 1985.

Louis J. Muglia, Ph.D., The University of Chicago, 1986; M.D., 1988. (See Department of Molecular Biology and Pharmacology and Clinical Investigation Program.)

Jeffrey J. Neil, M.D., Ph.D., Washington University, 1984. (See Department of Neurology and Clinical Investigation Program.)

Joan L. Rosenbaum, M.D., University of Texas, 1983.

Angela M. Sharkey, M.D., St. Louis University, 1986.

Karin Shepherd, M.B.B.S., University of Queensland, 1970.

Paul S. Simons, M.D., Washington University, 1967.

Edwin Trevathan III, M.D., Emory University, 1982. (See Department of Neurology.)

Alison J. Whelan, M.D., Washington University, 1986. (See Department of Medicine and Alvin J. Siteman Cancer Center.)

Lynn K. White, M.D., Harvard Medical School, 1984. (See Department of Medicine.)

Karen M. Wickline, M.D., St. Louis University, 1986.

David B. Wilson, M.D., Ph.D., Washington University, 1986. (See Department of Molecular Biology and Pharmacology and Clinical Investigation Program.)

Jane Y. Wu, M.D., Shanghai Medical University, 1986; Ph.D., Stanford University, 1991. (See Department of Molecular Biology and Pharmacology.)

Barbara A. Zehnbauer, Ph.D., The University of Chicago, 1979. (See Department of Pathology and Immunology and Alvin J. Siteman Cancer Center.)

Associate Professors Emeriti (Clinical)

Helen M. Aff-Drum, M.D., Washington University, 1934.

Stanley L. Harrison, M.D., Washington University, 1930.

Sol Londe, M.D., Washington University, 1927.

Frank S. Wissmath, M.D., Washington University, 1943.

Associate Professors (Clinical)

Walter F. Benoist, M.D., Washington University, 1972.

Garrett C. Burris, M.D., Louisiana State University, 1968. (See Department of Neurological Surgery and Department of Neurology.)

Ray S. Davis, M.D., University of Louisville, 1978.

Charles H. Dougherty, M.D., University of Rochester, 1973.

Jay S. Epstein, M.D., Emory University, 1983.

James A. Gerst, M.D., University of Missouri, 1972.

Marshall B. Greenman, M.D., University of Illinois, 1948.

Robert J. Hoffman, M.D., St. Louis University, 1976.

Nancy E. Holmes, M.D., University of Missouri, 1976.

William L. Johnson, M.D., University of Missouri, 1980.

Shirley M. Knight, M.D., Washington University, 1980.

Joel S. Koenig, M.D., Vanderbilt University, 1982.

Kenneth A. Koerner, M.D., Washington University, 1941.

Katherine L. Kreusser, M.D., Indiana University, 1978.

Norton S. Kronemer, M.D., University of Missouri, 1962.

Jack A. Land Jr., M.D., University of Mississippi, 1977.

Richard L. Lazaroff, M.D., St. Louis University, 1978.

John C. Martz, M.D., Washington University, 1942.

Thomas C. McKinney, M.D., Washington University, 1980.

Alison C. Nash, M.D., Baylor College of Medicine, 1981.

James R. Rohrbaugh, M.D., Ohio State University, 1974. (See Department of Neurological Surgery and Department of Neurology.)

William J. Ross, M.D., Washington University, 1972.

Blaine M. Sayre, M.D., Washington University, 1968.

Patricia B. Wolff, M.D., University of Minnesota, 1972.

Gerald Wool, M.D., Washington University, 1962.

Assistant Professors

Max Q. Arens, Ph.D., Virginia Polytechnic Institute, 1971.

Leonard B. Bacharier, M.D., Washington University, 1992. (See Department of Medicine and Clinical Investigation Program.)

Anne M. Beck, M.D., Southern Illinois University, Springfield, 1988.

Paul A. Checchia, M.D., Southern Illinois University, Springfield, 1993.

Anne M. Connolly, M.D., Indiana University, 1984. (See Department of Neurological Surgery and Department of Neurology.)

Michael T. Connor, M.D., Wayne State University, 1974. (See Department of Anesthesiology.)

John N. Constantino, M.D., Washington University, 1988. (See Department of Psychiatry.)

Maite de la Morena, M.D., Complutense University, Madrid, Spain, 1992.

Michael R. DeBaun, M.D., Stanford University, 1987. (See Division of Biostatistics.)

Thomas G. Diacovo, M.D., McGill University, Montreal, Canada, 1988. (See Department of Pathology and Immunology.)

Dennis Dietzen, Ph.D., Indiana University, 1992.

Patrick A. Dillon, M.D., Georgetown University, 1988. (See Department of Surgery.)

Joan C. Downey, M.D., Harvard University, 1985.

James J. Fehr III, M.D., University of Michigan, 1988. (See Department of Anesthesiology.)

Jaime Garcia-Heras, Ph.D., La Plata University, 1977; M.D., 1986.

R. Mark Grady, M.D., Washington University, 1989.

David B. Haslam, M.D., University of Calgary, 1987.

Sherrie M. Hauft, M.D., University of Texas, 1984.

Robert J. Hayashi, M.D., Washington University, 1986.

Robert O. Heuckeroth, M.D., Ph.D., Washington University, 1990.

S. Paul Hmiel, M.D., Ph.D., Case Western Reserve University, 1989.

Mark C. Johnson, M.D., The Johns Hopkins University, 1982. (See Clinical Investigation Program.)

Ramzi Kilani, M.D., University of Jordan, 1983.

Lori Luchtman-Jones, M.D., University of California, San Diego, 1987.

Gregg T. Lueder, M.D., University of Iowa, 1985. (See Department of Ophthalmology and Visual Sciences.)

Janet D. Luhmann, M.D., Loyola University, 1991.

Bess A. Marshall, M.D., Vanderbilt University, 1986.

Amit Mathur, M.D., AGRA University, India, 1986.

Robert K. Minkes, M.D., Tulane University, 1992. (See Department of Surgery.)

Harlan R. Muntz, M.D., Washington University, 1977.

Jeffrey G. Ojemann, M.D., Washington University, 1992. (See Department of Anatomy and Neurobiology and Department of Neurological Surgery.) (Also Psychology)

Robert T. Paschall, M.D., University of Tennessee, 1974.

Kimberly S. Quayle, M.D., Washington University, 1988.

Edward K. Rhee, M.D., University of Pittsburgh, 1993.

Scott Saunders, M.D., Ph.D., Stanford University, 1990. (See Department of Molecular Biology and Pharmacology and Clinical Investigation Program.)

Walton Schalick III, M.D., The Johns Hopkins University, 1995; Ph.D., 1997.

Bradley L. Schlaggar, M.D., Washington University, 1994. (See Department of Neurology.)

Pamela M. Schuler, M.D., University of Michigan, 1979.

Shalini Shenoy, M.D., University of Mysore, 1981.

Theodore C. Simon, Ph.D., George Washington University, 1990. (See Clinical Investigation Program.)

Sharon R. Smith, M.D., Bowman Gray School of Medicine, 1991.

Stuart C. Sweet, M.D., Ph.D., University of Michigan, 1989.

Jeffrey H. Teckman, M.D., Washington University, 1989.

Elizabeth Chan Uong, M.D., University of Philippines, 1986.

Andrew J. White, M.D., University of Texas, Southwestern, 1994.

Kelvin A. Yamada, M.D., Baylor College of Medicine, 1983. (See Departments of Neurology and Neurological Surgery.)

Research Assistant Professors

Jane Garbutt, M.D., Ch.B., Bristol University, England, 1977. (See Department of Medicine.)

Carol L. Wilson, Ph.D., Princeton University, 1992.

Assistant Professors Emeriti (Clinical)

Martin Calodney, M.D., New York University, 1936.

Alfred S. Schwartz, M.D., The Johns Hopkins University, 1936.

Assistant Professors (Clinical)

William S. Adams, M.D., University of Missouri, Columbia, 1989.

Denis I. Altman, M.B., B.Ch., University of The Witwatersrand, 1975. (See Department of Neurological Surgery and Department of Neurology.)

Patricia J. Amato, M.D., Medical College of Ohio, 1982.

Jill M. Baer, M.D., University of Kentucky, 1975.

Angela L. Bard, M.D., Indiana University, Indianapolis, 1981.

Edward T. Barker, M.D., Washington University, 1957.

Susan L. Baumer, M.D., University of Pennsylvania, 1975.

Earl C. Beeks Jr., M.D., University of Missouri, 1981.

Jean E. Birmingham, M.D., University of Missouri, 1988.

Huldah C. Blamoville, M.D., Meharry Medical College, 1965.

Yolette V. Brown, M.D., Washington University, 1982.

Max H. Burgdorf, M.D., Washington University, 1974.

Tattamangalam P. Chandrika, M.S.B.S., Calicut Medical College, 1973.

Mary M. Cradock, M.D., St. Louis University, 1995.

Michael E. Danter, M.D., University of Illinois, 1987.

John C. Davis, M.D., University of Michigan, 1980.

Tulay Dincer, M.D., Hacettepe University, 1977.

Robert W. Edmonds, M.D., Washington University, 1960.

Elliott H. Farberman, M.D., St. Louis University, 1973.

Ira J. Friedman, M.D., University of Arkansas, 1960.

John P. Galgani Jr., M.D., St. Louis University, 1982.

Tessa D. Gardner, M.D., Harvard University, 1972.

Joseph K. Goldenberg, M.D., University of Missouri, Kansas City, 1980.

Santosh Gupta, M.B., B.S., Lucknow University, 1963; D.C.H., University of London, 1966.

David E. Hartenbach, M.D., University of Missouri, 1987.

J. Larry Harwell, M.D., University of Missouri, 1961.

Denise R. Johnson, M.D., Loma Linda University, 1984.

Larry A. Jones, M.D., The Johns Hopkins University, 1976.

Joseph A. Kahn, M.D., University of Missouri, 1977.

Michele E. Kemp, M.D., Washington University, 1981.

Henry L. Knock, M.D., The Johns Hopkins University, 1953.

Barry Light, Ph.D., University of Missouri, 1977; M.D., 1980.

John F. Mantovani, M.D., University of Missouri, 1974. (See Department of Neurological Surgery and Department of Neurology.)

M. Michael Maurer Jr., M.D., Washington University, 1972.

Ariane E. May, M.D., University of Medicine and Dentistry, New Jersey, 1987.

Karen K. Norton, M.D., Louisiana State University, 1989.

Susan Pittman, M.D., University of Missouri, 1963.

Juanita C. Polito-Colvin, M.D., Southwestern University, 1979.

Janis B. Robinson, M.D., University of Pennsylvania, 1977.

Isabel L. Rosenbloom, M.D., University of Maryland, 1984.

Jerry L. Rosenblum, M.D., Washington University, 1974.

Martin D. Rudloff, M.D., Washington University, 1981.

Richard W. Sato, M.D., Washington University, 1977.

Margaret A. Schmandt, M.D., St. Louis University, 1987.

C. Jeffrey Sippel, Ph.D., St. Louis University, 1980; M.D., 1983.

Harold B. Sitrin, M.D., St. Louis University, 1971.

Anita R. Stiffelman, M.D., New York University, 1987.

Robert H. Strashun, M.D., New York University, 1982.

M. Anne Street, M.D., University of Illinois, 1976.

Marc E. Weber, M.D., University of Tennessee, 1974.

George T. Wilkins Jr., M.D., University of Illinois, 1957.

Kathie R. Wuellner, M.D., St. Louis University, 1978.

Assistant Professor (Adjunct)

Katherine A. Gnauck, M.D., Universite Libre de Bruxelles, 1985.

Instructors

Alisa N. Altman, M.D., State University of New York, Stony Brook, 1998.

Janice E. Brunstrom, M.D., Medical College of Virginia, 1987. (See Department of Neurological Surgery and Department of Neurology.)

Lara A. Danziger-Isakov, M.D., Case Western Reserve University, 1997.

Yasmeen N. Daud, M.D., University of Missouri, Kansas City, 2000.

Carolyn A. Delaney, M.D., Washington University, 2000.

Alexis M. Elward, M.D., University of Maryland, 1994.

Kathleen M. Fentzke, M.D., University of Chicago, Pritker, 1997.

Anthony R. French, Ph.D., University of Illinois at Urbana-Champaign, 1995; M.D., 1997.

Claudia M. Gerard, M.D., St. Louis University, 1996.

Matthew I. Goldsmith, M.D., University of Toronto, 1995.

Brigitte N. Gomperts, M.D., University of Witwatersrand, Johannesburg, South Africa, 1993.

Rebecca Green, M.D., Ph.D., Washington University, 1993.

Eyad M. Hanna, M.D., Washington University, 2000.

Michael R. Harris, Ph.D., St. Louis University, 1981; M.D., 1991.

Jacqueline Hoffman, M.D., Harvard University, 1979; Ph.D., Washington University, 1994.

Galit Holzmann-Pazgal, M.D., Northwestern University, Chicago, 1994.

Paul Hruz, Ph.D., Medical College of Wisconsin, 1993; M.D., 1994.

Donald V. Huebener, D.D.S., Washington University, 1969. (Dental Medicine) (See Department of Radiology.)

David A. Hunstad, M.D., Washington University, 1995.
Christina L. Ingram, M.D., Washington University, 1990.
Brian J. Kelly, M.B., Ch.B., University of Cape Town, 1972.
Lisa B. Klassen, M.D., Washington University, 1999.
Nikoleta S. Kolovos, M.D., University of Pittsburgh, 1996.
Henry W. Kort, M.D., Michigan State University, East Lansing, 1996.
Deborah L. Lerner, M.D., Harvard University, 1992.
Anna S. Lijowska, M.D., Jagiellonian University, Krakow, Poland, 1988.
Alicia Lynn, M.D., University of Missouri, Columbia, 1996.
John K. McGuire, M.D., Northwestern University, 1993.
Michelle McKane, M.D., University of Texas, San Antonio, 1998.
Jeffrey S. McKinney, M.D., Ph.D., University of Iowa, 1995.
William A. McManus, M.D., St. Louis University, 1986.
Lisa Moscoso, M.D., Ph.D., Washington University, 1998.
Kyle A. Nelson, M.D., Medical College of Wisconsin, Milwaukee, 1997.
William L. Rives, M.D., University of Missouri, Columbia, 1996.
Kelly L. Ross, M.D., University of Missouri, Columbia, 1996.
David Rudnick, M.D., Ph.D., Washington University, 1994.
Purvi P. Shah, M.D., Baylor College of Medicine, 2000.
Fei F. Shih, M.D., Ph.D., University of Pennsylvania, 1997.
Vipul Singla, M.D., University of Kansas, 2000.
Mythili Srinivasan, M.D., St. Louis University, 1996.
Michael Turmelle, M.D., Johns Hopkins University, 1998.
Cyd Charisse Williams, M.D., University of Wisconsin, 1991.
Kristine G. Williams, M.D., Georgetown University, 1994.
Kimberly A. Wollmuth, M.D., Oregon Health Sciences University, Portland, 1999.
Angela Wong, M.D., Washington University, 1999.
Ralph A. Wuebker Jr., M.D., University of Missouri, Kansas City, 1994.
Min Zhang, M.D., Shanghai Second Medical University, 1985.

Research Instructors

Brian D. Bennett, Ph.D., University of Cincinnati, 1990.
Richard S. Buller, Ph.D., University of Montana, 1983.
Lala R. Chaudhary, Ph.D., Institute of Nutrition USSR, Moscow, 1977.
Dale K. Kobayashi, M.B.A., University of Missouri, 1993.
Yonghe Li, Ph.D., James Cook University, Australia, 1998.
Cheryl Quinn, Ph.D., University of Tennessee, Memphis, 1982.

Instructors (Clinical)

Susan E. Adams, Ph.D., University of Kansas, 1984; M.D., Washington University, 1991.
Jennifer L. Arter, M.D., University of Iowa, 1998.
Bonnie J. Aust, M.D., University of Texas, 1979.
Ivette N. Baker, M.D., Universidad Central del Caribe, 1984.
Johnie C. Baker, M.D., Universidad Central del Caribe, 1984.
Robert J. Bradshaw, M.D., St. Louis University, 1980.
Seth J. Brownridge, M.D., Washington University, 1982.
John R. Carlile, M.D., University of Kansas, 1975.
Rubilinda Casino, M.D., University of Santo Tomas, 1979.
Glenn S. Cheng, M.D., University of Texas, San Antonio, 1988.
Darryl S. Cohen, D.O., Texas College, 1981.
Donald V. Dichsen, M.D., University of Nebraska, 1964.
Alla Dorfman, M.D., Chernovtsy State Medical School, 1986.
Diane M. Eschmann, M.D., University of Missouri, 1993.
Laura A. Esswein, M.D., University of Missouri, 1991.
Isabel Fernandez-Holtzman, M.D., Michigan State University, 1995.
Gregory K. Finn, M.D., Washington University, 1992.
Anna M. Fitz-James, M.D., George Washington University, 1981.
Edward B. Fliesher, M.D., St. Louis University, 1978.
Myrto Frangos, M.D., St. Louis University, 1985.
Maurice J. Gabriel, M.D., University of DeSevilla, Spain, 1970.
Alice B. Granoff, M.D., University of Texas, Southwestern, 1963.
Roman E. Hammes, M.D., University of Iowa, 1954.
Melanie G. Hampton, M.D., University of Kentucky, Louisville, 1981.
Elinor F. Hancock, M.D., Meharry Medical College, Nashville, 1982.
Suzanne M. Hanson, M.D., Northwestern University, 1993.
Nathan Henninger, M.D., St. Louis University, 1999.
Sharon Ho, M.D., University of New York, Syracuse, 1999.
Russel Hoffmann, M.D., University of Florida, 1995.
Mary Ann Hollman, M.D., University of Alabama, Birmingham, 1988.
J. Joseph Horan, M.D., St. Louis University, 1971.
Denise K. Ihnat, M.D., Yale University, 1991.
Carl S. Ingber, M.D., Boston University, 1972.
Aidan W. Ip, M.D., The University of Chicago, 1979.
Joyce D. Johnson, M.D., Case Western Reserve University, 1982.
Erzsébet Jung, M.D., Semmelweis University, Budapest, Hungary, 1987.

Nadim A. Kanafani, M.D., University of Missouri, Columbia, 1998.

Sheldon Kessler, M.D., St. Louis University, 1951.

Katherine L. Komendowski, M.D., Uniformed Services University, 1984.

Jennifer S. Ladage, M.D., St. Louis University, 1991.

Stacie S. Laff, M.D., Rush Medical College, 1993.

Leland M. Laycob, M.D., University of Missouri, 1968.

Kenneth C. Levy, M.D., The University of Chicago, 1988.

Robert D. Lins, M.D., University of Missouri, 1969.

Suzanne L. Miller, M.D., University of Illinois, 1978.

Mary R. Morgan, M.D., Washington University, 1990.

Janet G. Mueller, M.D., Washington University, 1992.

David A. Nile, M.D., St. Louis University, 1981.

David C. Norman, M.D., Rush Medical College, 1992.

Jerome H. O'Neil Jr., M.D., St. Louis University, 1981.

Irma I. Ortiz-Arroyo, M.D., University of Puerto Rico, 1985.

Alison H. Oswald, M.B.C.H.B., University of Cape Town, South Africa, 1982.

Eugenia M. Pierce, M.D., St. Louis University, 1958.

Daniel S. Plax, M.D., Washington University, 1993.

Robert L. Quaas, M.D., The University of Chicago, 1975.

Mohammad H. Rahman, M.B.B.S., University of Karachi, 1960.

Pathmawathy T. Ramesvara, M.B.B.S., University of Sri Lanka, 1972.

Emanuel Rashet, M.D., St. Louis University, 1962.

Sheryl S. Ream, M.D., St. Louis University, 1986.

Timothy Reed, M.D., University of Southern Alabama, 1989.

Catherine R. Remus, M.D., Rush Medical College, Illinois, 1983.

George H. Rezabek, D.O., Chicago College of Osteopathic Medicine, 1971.

Vernon J. Roden, M.D., St. Louis University, 1971.

Ella Rozin, M.D., Minsk State Medical School, 1980.

Christina M. Ruby, M.D., Northwestern University, 1994.

Diane M. Rup, M.D., Case Western Reserve University, 1986.

Joseph Schachter, M.D., Indiana University, 1979.

Howard J. Schlansky, M.D., University of Missouri, Kansas City, 1978.

Seymour M. Schlansky, M.D., Chicago Medical School, 1950.

Martin P. Schmidt, M.D., St. Louis University, 1986.

Jacquelyn C. Schnidman, M.D., St. Louis University, 1979.

Eleanor M. Shaw, M.D., University of Missouri, 1983.

Nareshkumar Solanki, B.M., B.S., University of Nairobi, 1975.

Robert D. Spewak, M.D., St. Louis University, 1979.

Craig A. Spiegel, M.D., Case Western Reserve University, 1982.

Norman P. Steele, M.D., Indiana University, 1972.

Randall S. Sterkel, M.D., Washington University, 1993.

Susan C. Sylvia, M.D., Washington University, 1997.

Jeanne M. Trimmer, M.D., Northwestern University, 1988.

Garland R. Tschudin, M.D., University of Missouri, 1975.

April L. Tyus, M.D., St. Louis University, 1997.

Sharon D. Vermont, M.D., University of Missouri, Kansas City, 1993.

Roger J. Waxelman, M.D., University of Missouri, 1969.

Don Weiss, M.D., University of Medicine and Dentistry of New Jersey, 1986.

Karen Whiteside, M.D., Washington University, 1998.

Hayley Wurzel, M.D., Washington University, 1999.

Mona Yassin, M.D., Al-Azhan University Faculty of Medicine, 1979.

Cecilia H. Yu, M.D., University of Texas, Southwestern, 1992.

DEPARTMENT OF PSYCHIATRY

Instruction in psychiatry is given during the second, third and fourth years of the medical curriculum. Emphasis is on the teaching of psychiatry as a medical discipline, including the biological, social and psychological mechanisms and manifestations of psychiatric illness, as well as psychological reactions to other illnesses. Psychiatric disorders are common and disabling illnesses. An explosion of knowledge resulting from research in neuroscience, genetics and epidemiology is leading to exciting advances in understanding and treating these disorders. Our department is heavily involved in this research and our didactic curriculum integrates current clinical information with research advances in order to help students develop the knowledge, skills and attitudes to recognize these illnesses and understand the basic principles of treatment.

SECOND YEAR

M85 676A DISEASES OF THE NERVOUS SYSTEM: PSYCHIATRY

Instructor: *Laura J. Bierut, M.D.,* 362-3492

This course emphasizes the diagnosis of major psychiatric illnesses in adults and children. Psychiatric diseases are described in terms of epidemiology, clinical presentation, natural history, genetics, differential diagnosis and clinical management. Interviewing techniques and performance of the mental status exam will be demonstrated by patient interviews.

THIRD YEAR

M85 770 PSYCHIATRY CLERKSHIP

Instructor: *Kevin J. Black, M.D.,* 362-2469

Up to 11 students spend four weeks on the inpatient psychiatry service of either Barnes-Jewish Hospital or Metropolitan St. Louis Psychiatric Center. At either site, students evaluate and treat patients under the supervision of house staff and an attending physician, attend teaching conferences, including small group sessions with a psychiatrist that cover the psychiatric interview, and complete other assigned learning experiences. See **www.psychiatry.wustl.edu/Education/Med%20student/wums3info.htm** for current details or to review the goals of the clerkship.

M85 775 AMBULATORY CLERKSHIP: PSYCHIATRY FOR GENERALISTS

Instructor: *Kevin J. Black, M.D.,* 362-2469

Up to six students may elect to pursue their ambulatory medicine selective through the Department of Psychiatry. Students submit a written review of a relevant clinical topic of their choice, and participate in clinical duties. Students will be assigned to one of the following clinical options: Barnes-Jewish Hospital adult psychiatry clinic and community psychiatry, psychiatry consultation service, Metropolitan St. Louis Psychiatric Center emergency room, or child psychiatry clinic. As of this writing, there is no night call at any site. See **www.nil.wustl. edu/labs/kevin/psy/options.htm** for further details.

FOURTH YEAR

Electives

M85 805 PSYCHIATRY CONSULT SERVICE

Instructor: *Carol S. North, M.D.,* 747-2013

The fourth-year student will work closely with the consult resident and consult team that also includes the attending and advanced practice nurse in the evaluation and treatment of patients referred to the psychiatry consult service. The student will attend weekly consult/liaison teaching conferences, as well as Grand Rounds and Research Rounds. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M85 810 OUTPATIENT COMMUNITY PSYCHIATRY

Instructor: *Laura J. Bierut, M.D.,* 362-3492

This is a flexible clerkship where effort is made to tailor the activities to the students' interests. Students will assist in diagnosis and treatment of adult psychiatric clinic and ER patients. The patients present with a wide variety of psychological and interpersonal problems, as encountered in an everyday office practice of an internist or general practice specialist. In this setting, the student will have the opportunity to learn a variety of treatment techniques under supervision. Students completing the clerkship have indicated their enjoyment of the opportunity for independent patient management. **Valid start weeks for 4-week blocks are:** Weeks 13 and 17.

M85 831 ELECTROCONVULSIVE THERAPY (ECT)

Instructors: *Keith E. Isenberg, M.D.; ECT staff,* 362-1819

The student will be involved in the neuropsychiatric assessment of patients referred for ECT. In addition, the student will receive training in the application of ECT and in the clinical management of patients receiving ECT. The student will be encouraged to review appropriate literature and make clinically relevant case-oriented presentations. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M85 836 CLINICAL PSYCHIATRY — INPATIENT PSYCHIATRIC SERVICE

Instructor: *Eugene H. Rubin, M.D., Ph.D.,* 362-2462

This is a senior rotation that provides the students with an opportunity to expand their knowledge of inpatient clinical psychiatry by functioning as externs. Students attend all staffing and teaching conferences given to first-year psychiatry residents, take patients in rotation, and share night call with other first-year residents approximately every fifth night. Immediate supervision is provided by the inpatient attending, and additional supervision can be arranged as desired. Teaching emphasis is directed toward psychiatric diagnosis, appropriate use of psychopharmacologic agents, psychotherapeutic intervention, use of community resources and pursuit of the psychiatric scientific literature. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M85 840 CHILD PSYCHIATRY

Instructor: *Gary Boxer, M.D.,* 286-1740

This elective in child psychiatry utilizes the Child Psychiatry Outpatient Clinic at St. Louis Children's Hospital. It provides experience in age-appropriate diagnostic and treatment methods in children and adolescents. Experience is also provided on the Consultation Service of St. Louis Children's Hospital. A paper on a topic of student's choosing is required. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M85 900)

Andrey Anokhin, Ph.D., 286-2201, *anokhin@matlock.wustl.edu*

Genetics of brain function and behavior in relation to substance abuse. This research elective is intended for students interested in biological psychology, psychophysiology, psychopharmacology of drugs of abuse, and behavior genetics. Anokhin is conducting experimental studies with human volunteers, including twins, in order to better understand biobehavioral mechanisms underlying nicotine and alcohol addiction, as well as possible mediators of risk such as behavioral disinhibition and negative affect. One of the studies explores genetic influences on brain activity and autonomic measures related to inhibitory control of behavior and processing of emotional information. Identical and fraternal twins are assessed using quantitative electroencephalogram (EEG) and event-related potentials (ERPs) recorded during a variety of behavioral tasks and administered neuropsychological tests and personality questionnaires. Another study investigates the effects of cigarette smoking and nicotine deprivation on cognitive and emotional functioning. Another study looks at the effects of moderate dose of alcohol on brain function and performance. Interested students will be able to learn a variety of methods used in these studies including digital EEG and ERPs; startle response measures; emotion induction using affective pictures, self-report measures and questionnaires; and collection of blood samples for DNA analysis. *Format* of this research elective will include (1) directed reading; (2) participation in laboratory experiments with human subjects; (3) analysis of existing data from alcohol and smoking challenge experiments. *Qualifications:* Reliability and responsibility, ability to commit specified amount of time per week and work on schedule (can be negotiated on an individual basis), PC experience, and willingness to obtain short training and certification in ethical issues related to human studies.

Laura J. Bierut, M.D., 362-3492

This research elective will focus on analyzing data from a high-risk study of addiction. Cocaine dependent individuals were recruited from chemical dependency treatment centers and their relatives were interviewed. Students will have the opportunity to examine family and environmental factors that place some at risk for developing alcohol and other substance dependence.

Kevin J. Black, M.D., 747-2013

Students will participate in ongoing neuroimaging studies of movement disorders or neuropsychiatric illnesses. Degree of participation will relate to the student's available research time, skills and interest. See **www.nil.wustl.edu/labs/kevin** for examples of past research.

Robert J. Cormier, Ph.D., 362-8658

Neuron-astrocyte interaction. Astrocytes are integral components of brain function. In addition to their critical role in metabolic support for neurons, astrocytes may participate in information processing through cytoplasmic Ca^{2+} elevations, which are triggered by synaptic transmission, travel as waves across and among astrocytes, and may be transmitted by neurons. The student will be introduced to methods for studying the physiology of and bidirectional communication between neurons and astrocytes. These methods include fluorescent imaging of Ca^{2+} and electrophysiology.

Linda B. Cottler, Ph.D., 286-2252

There are several NIH-funded projects pertaining to many broad areas of research: (1) studies to prevent HIV high-risk behaviors in women who use drugs or drink heavily; (2) work on the reliability and validity of interviews that assess dependence disorders; (3) ecstasy abuse and dependence among teens and young adults.

John G. Csernansky, M.D., 362-2616

Neurobiology of schizophrenia. Students may participate in the conduct of clinical or preclinical studies of schizophrenia and related topics. Involvement in clinical studies can include training and experience in interviewing psychiatric patients or

gaining experience in the techniques of brain imaging. Involvement in preclinical studies can involve training and experience in receptor binding, microdialysis, immunohistochemistry and animal behavior.

Renee M. Cunningham-Williams, Ph.D., 286-2264
The GAMCO Project is Phase II of a three-phase program of research and is funded in part by the National Institute on Drug Abuse (NIDA DA #04300). Students choosing this research elective may learn research skills by being involved in the following and other activities including: (1) developing, revising, and testing diagnostic items that map on to DSM criteria; (2) recruiting subjects (n=300) from the community for personal interviews to test the psychometric properties of the Gambling Assessment Module; (3) learning to administer a structured diagnostic assessment; (4) learning the Discrepancy Interview Protocol and debriefing procedures; (5) writing and testing computer scoring algorithms; (6) observing and bench-testing the computerized GAM; and (7) assisting in the writing of project manuals and reports.

Gabriel A. de Erausquin, M.D., Ph.D., 362-5186
Mechanism of cell death of transplanted dopamine neurons. Students may participate and carry out experiments of transplantation of embryonic nervous tissue in animal models of Parkinson's disease, including behavioral testing, immunohistochemistry, assessment of cell survival and transplant integration, and pharmacology of neuroprotective drugs. Alternatively, students may participate in studies of the molecular mechanism of dopamine cell death and survival in an *in vitro* model of progression in Parkinson's disease. These studies involve immunohistochemistry and *in situ* hybridization of signaling molecules, dynamic fluorescent imaging on individual dopamine neurons, and whole-cell patch clamp electrophysiology.

Alison M. Goate, D.Phil., 362-8691
Genetic studies of Alzheimer's disease. Studies can involve laboratory-based projects on the genetics or cell biology of Alzheimer's disease or clinical studies involving the collection of data through telephone or personal interview of individuals with a family history of dementia.

John W. Newcomer, M.D., 362-2459
Clinical memory research; research concerning the control of weight and glucose and lipid metabolism. This elective offers the student a broad exposure to clinical protocols related to the neurochemical regulation of memory performance and glucose metabolism, including protocols in patients with schizophrenia. Students will have an opportunity to focus on a particular project of interest.

Carol S. North, M.D., 747-2013
The student will work closely with North in various aspects of ongoing research projects in psychiatric epidemiology and clinical studies or topics of the student's choice. Ongoing studies include drug abuse and the homeless population, research on populations affected by disasters and terrorism, electroconvulsive therapy, psycho-education for serious mental illness, psychiatric aspects of gastrointestinal disease, and somatoform disorders. Potential activities include subject interviews, editing, data entry, data analysis, literature reviews and writing papers for publication.

Rumi K. Price, Ph.D., 286-2282
The student will work closely with Price on ongoing research projects in substance abuse and psychiatric epidemiology. The current projects include: a longitudinal study of the impact of drug abuse and war trauma; a focused study on protective factors mitigating suicidal risk; an international epidemiologic study of developmental psychopathology; a study of gene-environment interaction using ethnic-specific substance sensitivity genes; application of computer-intensive but highly flexible data-mining techniques such as large-scale epidemiologic data.

Yvette I. Sheline, M.D., 362-8422
Two-month minimum. Opportunity for students with computer programming skills to work closely with Sheline in a neuroimaging project investigating brain activation in the limbic system in response to emotional stimuli. Students will be involved in acquiring and analyzing fMRI data, interviewing patients and writing up results.

NOTE TO STUDENTS: There are always a number of research projects in the Department of Psychiatry. For additional information contact Eugene H. Rubin, Ph.D., 362-2462.

WILLIAM GREENLEAF ELIOT DIVISION OF CHILD PSYCHIATRY

The Division of Child Psychiatry offers a varied teaching program for medical students, residents in psychiatry and fellows at St. Louis Children's Hospital and the Child Psychiatry Center. The center provides outpatient services to a varied and broad population of children with mental disorders. Trainees are assigned to these various services, where they participate in diagnostic evaluations and see patients in treatment, under supervision of a fellow and attending physician.

Faculty

Department of Psychiatry

SAMUEL B. GUZE PROFESSOR AND CHAIR OF DEPARTMENT

Charles F. Zorumski, M.D., St. Louis University, 1978. (See Department of Anatomy and Neurobiology.)

Professors Emeriti

Blake W. Moore, Ph.D., Northwestern University, 1952. (Biochemistry)

George E. Murphy, M.D., Washington University, 1952.

Lee N. Robins, Ph.D., Radcliffe College, 1951. (Sociology) (Also Faculty of Arts and Sciences)

Saul Rosenzweig, Ph.D., Harvard University, 1932. (Medical Psychology) (Also Department of Psychology)

William R. Sherman, Ph.D., University of Illinois, 1955. (Biochemistry)

Professors

Robert M. Carney, Ph.D., Washington University, 1978. (Also Department of Psychology)

Theodore J. Cicero, Ph.D., Purdue University, 1968. (See Administration and Department of Anatomy and Neurobiology.)

Wallace Renard Professor

C. Robert Cloninger, M.D., Washington University, 1970; M.D. (hon.), Umea University, Sweden, 1983. (See Department of Genetics and Masters Program in Psychiatric Epidemiology.)

Ray E. Clouse, M.D., Indiana University, 1976. (Medicine) (See Department of Medicine.)

Linda B. Cottler, Ph.D., Washington University, 1987. (Epidemiology) (See Program in Health Administration and Masters Program in Psychiatric Epidemiology.)

Gregory B. Couch Professor

John G. Csernansky, M.D., New York University, 1979. (See Department of Anatomy and Neurobiology.)

Seth A. Eisen, M.D., Washington University, 1966. (See Department of Medicine.)

Kenneth E. Freedland, Ph.D., University of Hawaii, 1982. (Also Department of Psychology)

Alison M. Goate, D.Phil., University of Oxford, 1983. (Genetics) (See Department of Genetics.)

Spencer T. Olin Professor

Andrew C. Heath, D.Phil., University of Oxford, 1983. (Psychology) (See Department of Genetics.) (Also Department of Psychology)

Barry Hong, Ph.D., St. Louis University, 1982. (See Department of Medicine.) (Also Department of Psychology)

Richard W. Hudgens, M.D., Washington University, 1956.

Keith E. Isenberg, M.D., Indiana University, 1978.

Patrick J. Lustman, Ph.D., Michigan State University, 1980. (Also Department of Psychology)

Mark A. Mintun, M.D., Washington University, 1981. (See Department of Biomedical Engineering and Department of Radiology.)

Carol S. North, M.D., Washington University, 1983. (See Masters Program in Psychiatric Epidemiology.)

John P. Feighner Professor of Neuropsychopharmacology

John W. Olney, M.D., Iowa University, 1963. (See Department of Pathology and Immunology.)

Dabeeru C. Rao, Ph.D., Indian Statistical Institute, 1971. (Biostatistics) (See Department of Genetics and Division of Biostatistics.)

Samuel and Mae S. Ludwig Professor

Theodore Reich, M.D., McGill University, 1963. (See Department of Genetics and Masters Program in Psychiatric Epidemiology.)

John P. Rice, Ph.D., Washington University, 1975. (Mathematics) (See Department of Genetics, Division of Biostatistics and Clinical Investigation Program.)

Eugene H. Rubin, Ph.D., Washington University, 1977; M.D., 1978.

Marcel T. Saghir, M.D., American University, 1963.

Brian K. Suarez, Ph.D., University of California, Los Angeles, 1974. (See Department of Genetics.)

Richard D. Wetzel, Ph.D., St. Louis University, 1974. (See Department of Neurological Surgery and Department of Neurology.)

Min Zhuo, Ph.D., University of Iowa, 1992. (Neurobiology) (See Department of Anesthesiology.)

Research Professor Emerita

Madelon T. Price, Ph.D., Washington University, 1973.

Research Professor

Kathleen K. Bucholz, Ph.D., Yale University, 1986. (See Masters Program in Psychiatric Epidemiology.)

Professors Emeriti (Clinical)

Sydney B. Maughs, M.D., Washington University, 1935.

Patricia L. O'Neal, M.D., Washington University, 1948.

Professor (Visiting)

James C. Romeis, Ph.D., Syracuse University/Maxwell School–Social Science, 1976.

Professors (Adjunct)

Aleksandar Janca, M.D., University of Novi Sad, 1977.

Norman Sartorius, M.D., University of Zagreb, 1958.

Associate Professor Emeritus

Collins E. Lewis, M.D., Harvard University, 1971.

Associate Professors

Laura J. Bierut, M.D., Washington University, 1987.

Michael R. Jarvis, Ph.D., University of Illinois, 1982; M.D., Washington University, 1985.

Elliot C. Nelson, M.D., University of Illinois, 1986.

John W. Newcomer, M.D., Wayne State University, 1985. (Also Department of Psychology)

Bruce L. Nock, Ph.D., Rutgers University, 1980. (Neurobiology) (See Department of Anatomy and Neurobiology.)

Daniel D. Pugh, M.D., Washington University, 1964.

Thomas F. Richardson, M.D., Washington University, 1963.

John Rohrbaugh, Ph.D., University of Illinois, 1973. (Also Department of Psychology)

Yvette I. Sheline, M.D., Boston University, 1979. (See Department of Medicine and Department of Radiology.)

Dragan Svrakic, M.D., University of Belgrade, 1978; Ph.D., 1989.

Denise E. Wilfley, Ph.D., University of Missouri, Columbia, 1989. (See Department of Medicine and Department of Pediatrics.) (Also Department of Psychology)

Research Associate Professors

Yukitoshi Izumi, M.D., Yamagata University, 1985; Ph.D., 1989.

Rosalind J. Neuman, Ph.D., Washington University, 1981. (See Department of Genetics.)

Rumi K. Price, Ph.D., University of California, 1988. (See Masters Program in Psychiatric Epidemiology and Clinical Investigation Program.)

David Wozniak, Ph.D., Washington University, 1984. (Also Department of Psychology)

Associate Professors Emeriti (Clinical)

Edward H. Kowert, M.D., Washington University, 1943.

Joseph McKinney, M.D., Washington University, 1958.

James B. Smith, M.D., University of Missouri, 1967.

Associate Professors (Clinical)

Jack L. Croughan, M.D., Kansas University, 1968.

Fred W. Gaskin, M.D., University of Minnesota, 1968.

Robert S. Hicks, M.D., University of Arkansas, 1958.

Wanda M. Lamb, M.D., Washington University, 1948.

Jay L. Liss, M.D., Washington University, 1966.

Jay Meyer, M.D., St. Louis University, 1960.

Mary Ann Montgomery, M.D., Northwestern University, 1973.

Rashmi Nakra, M.B.B.S., Lady Hardinge, 1970.

Paul M. Packman, M.D., Washington University, 1963.

Elizabeth F. Pribor, M.D., St. Louis University, 1985.

William M. Riedesel II, M.D., Cornell University, 1973.

E. Robert Schultz, M.D., Washington University, 1955. (See Department of Neurology.)

Harold D. Wolff, M.D., State University of Iowa, 1955.

Associate Professor (Adjunct)

Christer Allgulander, M.D., Karolinska Institute, 1973.

Assistant Professors

Deanna M. Barch, Ph.D., University of Illinois, 1974. (Psychology) (Also Department of Psychology)

Kevin J. Black, M.D., Duke University, 1990. (See Department of Neurology and Department of Radiology.)

Zhou-feng Chen, Ph.D., University of Texas, 1994. (See Department of Anesthesiology and Department of Molecular Biology and Pharmacology.)

Gabriel A. de Erausquin, M.D., University of Buenos Aires, 1989; Ph.D., 1990. (See Department of Neurology.)

Nuri B. Farber, M.D., Washington University, 1989.

Daniela S. Gerhard, Ph.D., Cornell University, 1982. (See Department of Genetics.)

Debra A. Gusnard, M.D., The University of Chicago, 1982. (See Department of Radiology.)

Donna A.K. Kalauokalani, M.D., University of Hawaii, 1991. (See Department of Anesthesiology.)

Jennifer Kwon, M.D., University of Michigan, 1989. (See Department of Neurology.)

Pamela Madden, Ph.D., University of Pittsburgh, 1992. (Psychology)

Steven J. Mennerick, Ph.D., Washington University, 1995. (See Department of Anatomy and Neurobiology.)

Joel Posener, M.D., McGill University, 1987.

Devna Rastogi-Cruz, M.D., Washington University, 1991.

Stephen L. Ristvedt, Ph.D., University of Pennsylvania, 1989. (Medical Psychology)

Research Assistant Professors

Andrey Anokhin, Ph.D., Russian Academy of Sciences, 1987.

Renee M. Cunningham-Williams, Ph.D.,Washington University, 1994. (See Masters Program in Psychiatric Epidemiology.)

Thomas Przybeck, Ph.D., Washington University, 1983.

Erik Sirevaag, Ph.D., University of Illinois, 1994.

Alexandre A. Todorov, Ph.D., Louisiana State University, 1992.

Assistant Professor Emeritus (Clinical)

Juan C. Corvalan, M.D., Argentina National University, 1965.

Assistant Professors (Clinical)

Ahmad Ardekani, M.D., Pahlavi University, 1974.

William W. Clendenin, M.D., University of Tennessee, 1963.

Alejandro M. Datuin, M.D., University of Santo Tomas, 1965. (Metropolitan St. Louis Psychiatric Center)

Mary Davis, M.D., Washington University, 1952.

Paul Dewald, M.D., University of Rochester, 1945.

Terry A. Fuller, M.D., Washington University, 1974.

Luis A. Giuffra, M.D., Universidad Peruana Cayetano Meredia, Peru, 1986; Ph.D., Yale University, 1991.

Anna Hartnett, M.D., University of Ottawa, 1960.

Thomas Hartnett, M.D., University of Ottawa, 1959.

Frederick G. Hicks, M.D., University of Minnesota, 1981.

Sheldon G. Holstad, Pharm.D., University of Iowa, 1986. (Pharmacy) (St. Louis College of Pharmacy)

Mark C. Johnson, M.D., University of Kentucky, 1980.

Saaid Khojasteh, M.D., Shiraz University, 1981.

Ervin Lipschitz, M.D., Washington University, 1949.

Gregory Mattingly, M.D., Washington University, 1989.

Scott McCormick, M.D., The University of Chicago, 1985.

James R. Mikolajczak, M.D., St. Louis University, 1972.

Jule Miller, M.D., Washington University, 1953.

Thomas Nowotny, M.D., Washington University, 1985.

Eric J. Nuetzel, M.D., St. Louis University, 1976.

Diane Rankin, M.D., University of Colorado, 1968.

James L. Rutherford, M.D., University of Iowa, 1980.

Jo-Ellyn M. Ryall, M.D., Washington University, 1975.

Berette Salazar, M.D., University of New Mexico, 1982.

Paul W. Sheffner, M.D., Washington University, 1974.

Nathan Simon, M.D., Washington University, 1955.

Reed E. Simpson, M.D., Washington University, 1976.

Wayne A. Stillings, M.D., Washington University, 1975.

Edwin D. Wolfgram, M.D., State University of Iowa, 1959.

Christopher Wuertz, M.D., University of Illinois, 1984.

Assistant Professor (Visiting)

Michael T. Lynskey, Ph.D., Otego University, New Zealand, 1996.

Instructors

Mehmet E. Dokucu, M.D., University of Ege–Bornova, Turkey, 1988; Ph.D., Washington University, 1998.

Amelia L. Gallitano-Mendel, M.D., Ph.D., University of Pennsylvania School of Medicine, 1997.

Keith S. Garcia, M.D., University of Texas Medical School–Houston, 1997; Ph.D., Graduate School of Biomedical Sciences–Houston, 1998.

Dan W. Haupt, M.D., University of Vermont, 1997.

Tamara Hershey, Ph.D., Washington University, 1996.

Gitry Heydebrand, Ph.D., University of Missouri-St. Louis, 1994.

Valerie S. Knopik, Ph.D., University of Colorado, Boulder, 2000.

Loon-Tzian Lo, M.D., Fujian Medical College, 1984.

Melissa A. Swallow, M.D., University of Iowa College of Medicine, 1997.

R. Robinson Welch, Ph.D., University of Missouri, Columbia, 1988.

Research Instructors

Robert J. Cormier, Ph.D., University of Texas, 1995.

Julia D. Grant, Ph.D., The Pennsylvania State University, 1997.

Anthony Hinrichs, Ph.D., Washington University, 1998.

Cynthia A. Joyner, Ph.D., Ohio University, Athens, 1992.

Elizabeth A. Lobos, Ph.D., Washington University, 1994.

Nenad M. Svrakic, Ph.D., University of Illinois, 1979.

Instructors (Clinical)

Lachman K. Abichandani, M.D., Far Eastern University, 1974.

Aqeeb Ahmad, M.D., Liaquat Medical College, 1970.

Dale J. Anderson, M.D., Washington University, 1979.

Richard H. Anderson, Ph.D., Brigham Young University, 1986; M.D., St. Louis University, 1989.

Scott J. Arbaugh, M.D., St. Louis University, 1985.

Susan Boyer, M.D., University of Missouri, 1993.

Allyson Boyle, M.D., Columbia University, 1983.

David M. Conner, M.D., University of Oklahoma, 1983.

Jon Todd Dean, M.D., University of Texas, 1987.

Cynthia Florin, M.D., Columbia University, 1984.

Darrin S. Friesen, M.D., Washington University, 1994.

David J. Goldmeier, M.D., Washington University, 1982.

Miggie Greenberg, M.D., Case Western University School of Medicine, 1990.

Steven Harvey, M.D., Washington University, 1992.

Linda S. Horne, M.D., Ohio State University, 1986.

Colin MacKenzie, M.D., Case Western Reserve University, 1996.

Virgil L. Malmberg, M.D., University of Missouri, 1978.

Jyothi Mandava, M.D., Gulbarga University, India, 1996.

Jose Mathews, M.D., University College of Medical Sciences, 1992.

Douglas McCoy, M.D., Southern Illinois University, 1990.

Susan A. Minchin, M.D., Ph.D., University of Iowa College of Medicine, 1991.

David M. Montani, M.D., Washington University, 1996.

Randi H. Mozenter, Ph.D., Washington University, 1989. (Medical Psychology)

John S. Rabun, M.D., University of Tennessee, 1987.

Stacey L. Smith, M.D., Northwestern University, 1991.

Michele M. Van Eerdewegh, M.D., Free University of Brussels, Belgium, 1970.

Division of Child Psychiatry

BLANCHE F. ITTLESON PROFESSOR AND DIRECTOR OF DIVISION

Richard D. Todd, Ph.D., University of Texas, 1977; M.D., 1981. (Child Psychiatry) (See Department of Genetics.)

Professor Emeritus

E. James Anthony, D.P.M., University of London, 1947; M.D., 1949. (Child Psychiatry)

Professor

Barbara Geller, M.D., Albert Einstein College of Medicine, 1964. (Child Psychiatry)

Associate Professor

Kelly N. Botteron, M.D., University of Kansas, 1988. (Child Psychiatry) (See Department of Radiology.)

Research Associate Professor

Gwendolyn G. Reich, Ph.D., Washington University, 1978. (Child Psychiatry)

Associate Professors (Clinical)

Haruo Kusama, M.D., Washington University, 1965. (Child Psychiatry)

Zila Welner, M.D., Hebrew University, 1961. (Child Psychiatry) (See Department of Pediatrics.) (Hawthorn Children's Psychiatric Hospital)

Assistant Professor Emeritus

Loretta K. Cass Seleski, Ph.D., Ohio State University, 1950. (Medical Psychology)

Assistant Professors

Gary Boxer, M.D., University of Colorado, 1980. (Child Psychiatry)

John N. Constantino, M.D., Washington University, 1988. (Child Psychiatry) (See Department of Pediatrics.)

Anne L. Glowinski, M.D., Baylor College of Medicine, 1992.

Joan Luby, M.D., Wayne State University, 1985. (Child Psychiatry) (See Masters Program in Psychiatric Epidemiology.)

Assistant Professors (Clinical)

James E. Edwards, M.D., University of Tennessee, 1962. (Child Psychiatry)

Barbara S. Silverstein, Ph.D., St. Louis University, 1994. (Social Work)

Jagdish Suri, M.D., King George Medical College, 1964. (Child Psychiatry)

Instructors (Clinical)

Michael R. Banton, M.D., St. Louis University, 1985. (Child Psychiatry)

Brad Z. Berger, M.D., Northwestern University, 1990.

David I. Berland, M.D., University of Missouri, Columbia, 1973.

Robert H. Brady, M.D., Tufts University School of Medicine, 1995.

James W. Byrd, D.O., University of Osteopathic Medicine and Health Sciences, 1991. (Child Psychiatry)

LaRhonda Raeshell Jones, M.D., University of Missouri, Kansas City, 1994.

Kimberli McCallum, M.D., Yale University, 1986. (Child Psychiatry)

Syed T. Rizvi, M.D., University of Karachi, 1993.

John D. Rogakos, M.D., Washington University, 1995.

Jeffrey Schulman, M.D., University of Kentucky, 1974. (Child Psychiatry)

Adelita Segovia-Langley, M.D., National University of Asuncion School of Medicine, Paraguay, 1991.

Vinod Suri, M.D., Punjab University, 1962. (Hawthorn Children's Psychiatric Hospital)

DEPARTMENT OF RADIATION ONCOLOGY

The Department of Radiation Oncology was created on July 1, 2001, after being unanimously approved by the Executive Faculty on June 6, 2001. The department has a broad program that focuses on excellence in patient care, innovative research and creative didactic activities for medical students, residents in radiation oncology and other specialties as well as allied health personnel. The department is one of the largest, most academically balanced and best equipped in the country. The Department of Radiation Oncology is responsible for all radiation therapy procedures at Washington University Medical Center.

Our faculty has gained international recognition for innovative technological advances in physics and treatment planning, biological research, computer applications and clinical investigation.

Milestones

- demonstration of a hypoxic subpopulation in *in vivo* tumors
- experimentation on biological basis of pre-operative radiation
- customized (Cerrobend) shielding system to protect normal tissues during irradiation
- in collaboration with Biomedical Computer Laboratory, design and construction of first small dedicated computer for radiation therapy treatment planning
- in collaboration with Varian Associates and NCI, design and construction of the first generation of high-energy, dual-modality, multiple-energies linear accelerator (Clinac 35)
- development of three-dimensional radiation therapy treatment planning and delivery systems
- clinical applications of 3-D conformal and intensity-modulated radiation therapy
- use of imaging modalities in treatment planning in radiation therapy, including PET scanning

The Department of Radiation Oncology occupies a large, attractive and convenient clinical facility that was recently inaugurated on the ground floor of the Center for Advanced Medicine (about 50,000 square feet). The clinical facilities include nine linear accelerator rooms, four 3-D and conventional simulator rooms, and a high dose rate brachytherapy suite with two treatment rooms. Furthermore, the facility houses the gamma knife unit, which is operated in collaboration with HealthSouth Corporation. Initially, we will operate with seven state-of-the-art computer control medical linear accelerators with the latest accessories, including multi-leaf collimator. One of the accelerators is equipped to perform intensity-modulated radiation therapy using the Peacock system from NOMOS Corporation. We have advanced treatment planning computer systems for 3-D conformal and intensity-modulated radiation therapy. The modern brachytherapy suite includes capability for high dose rate remote afterloading and for image-guided permanent prostate seed implants. Interstitial and external hyperthermia treatments are also available.

Gamma knife as well as Linac-based stereotactic irradiation (radiosurgery) programs are in operation. In addition, the Physics faculty have research laboratories and offices on the third and sixth floors of Barnard Hospital and on the fourth floor of the Clinical Sciences Research Building. We are in the process of formulating plans for an Innovative Technology Research Center to be housed in some of the space formerly occupied by the clinical service at the Mallinckrodt Institute of Radiology ground floor as well as in Barnard Hospital. The administrative offices of the department, as well as the Cancer and Radiation Biology laboratory and faculty offices and the Oncology Information computer systems are housed at the 4511 Forest Park Medical Building. The total amount of space occupied by the department is close to 100,000 square feet.

FIRST YEAR

Summer Oncology Clerkship for First-Year Students

An eight-week summer clerkship program is available for first-year medical students. The students participate in the clinical activities of the Radiation Oncology Center and are exposed to the fundamental concepts of cancer biology and clinical radiation therapy in a series of lectures, seminars and case presentation conferences. They have the opportunity to conduct either laboratory research or clinical investigation under the direction of the staff members of the sections of clinical radiation oncology and cancer biology. *Joseph R. Simpson, Ph.D., M.D.; Joseph L. Roti Roti, Ph.D.*

THIRD YEAR

M90 740 RADIATION ONCOLOGY CLERKSHIP

Instructor: *Joseph R. Simpson, M.D., Ph.D.,* 362-8567

The four-week clerkship in radiation oncology will provide students with the opportunity to participate in the evaluation and management of a broad range of patients referred for consideration of radiation therapy. Clerkship activities will take place entirely within the Barnes-Jewish Hospital/Siteman Cancer Center complex. Students will conduct patient evaluations under the supervision of radiation oncology department residents and faculty. Students will also attend and participate in regularly scheduled departmental conferences, which typically occur on a daily basis at 7 or 7:15 a.m. Monday

through Thursday and 8 a.m. on Friday as well as on Thursday afternoons twice monthly. Students will also have the opportunity to attend the appropriate multidisciplinary clinics, follow-up clinics and multidisciplinary conferences (such as pediatric neuro-oncology, cardiothoracic oncology, lymphoma, GYN tumor conferences) pertaining to their rotation schedule.

Instructional materials are available for students on the rotation (students are NOT expected to purchase any curricular materials for the clerkship). Student performance will be evaluated by both resident and faculty members who supervise the student over the course of the four-week clerkship.

FOURTH YEAR
Electives

M90 840 CLINICAL RADIATION ONCOLOGY

Instructors: *Joseph R. Simpson, M.D.,* 362-8567; *Carlos A. Perez, M.D.,* 362-8500

The clinical division offers an elective with emphasis on the evaluation, planning of and administration of radiation therapy in patients with malignant tumors. The students have the opportunity to enhance their knowledge on the natural history, pathological and biological features of cancer and to sharpen their clinical skills participating in the management of these patients. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M90 900)

Carlos A. Perez, M.D., 362-3499

Broad range of opportunities for investigation in: (1) prognostic factors and therapy outcome in a variety of patients with cancer; (2) three-dimensional treatment conformal and intensity-modulated radiation therapy in the treatment of patients with head and neck, lung, pancreas, rectal or prostate cancer; (3) biological studies exploring mechanisms involved in cellular DNA damages and repair by irradiation, heat and/or cytologic agents; (4) computer applications in data analysis and information systems; and (5) clinical outcome analysis projects.

Jay Locke, M.D., 362-9786

Introduction to laboratory research. The student will have the opportunity to participate in bench and animal research in the discipline of radiobiology. Modern investigational techniques will be taught, including northerns, westerns, DNA binding analysis (gel shifts), and *in vivo* tumor measurement and imaging, using micro PET. Opportunities to work on Cox2 or PET imaging projects are available. Interested students are encouraged to contact Jay Locke, M.D., to discuss current projects and identify areas of investigation of mutual interest.

Faculty

CHAIR OF DEPARTMENT

Carlos A. Perez, M.D., Universidad de Antioquia, 1960.

Professors

Perry W. Grigsby, M.D., University of Kentucky, 1982.

Hsiu-san Lin, M.D., Taiwan University, 1960; Ph.D., The University of Chicago, 1968. (See Department of Molecular Microbiology.)

Robert J. Myerson, Ph.D., University of California, 1974; M.D., University of Miami, 1980.

James A. Purdy, Ph.D., University of Texas, 1971. (Radiation Physics)

Joseph L. Roti Roti, Ph.D., University of Rochester, 1972. (Radiation and Cancer Biology) (See Department of Biochemistry and Molecular Biophysics and Department of Cell Biology and Physiology.)

Professor Emerita

Teresa J. Vietti, M.D., Baylor University, 1953. (Radiation Oncology) (See Department of Pediatrics.)

Associate Professors

Robert E. Drzymala, Ph.D., University of Oklahoma, 1977. (Radiation Physics) (See Department of Neurological Surgery.)

Eric E. Klein, M.S., University of Massachusetts, 1985. (Radiation Physics)

Andrei Laszlo, Ph.D., University of California, 1981. (Radiation and Cancer Biology)

Zuofeng Li, D.Sc., Washington University, 1989. (Radiation Physics)

Daniel A. Low, Ph.D., Indiana University, 1988. (Radiation Physics) (See Department of Biomedical Engineering.)

Jeff M. Michalski, M.D., Medical College of Wisconsin, 1986. (See Alvin J. Siteman Cancer Center.)

Eduardo G. Moros, Ph.D., University of Arizona, Tucson, 1990. (Radiation Physics) (See Department of Biomedical Engineering.)

Keith M. Rich, M.D., Indiana University, 1977. (See Department of Anatomy and Neurobiology, Department of Neurological Surgery and Department of Neurology.)

Joseph R. Simpson, Ph.D., The University of Chicago, 1967; M.D., Harvard University, 1973.

Associate Professor Emeritus

Gilbert H. Nussbaum, Ph.D., Harvard University, 1967. (Radiation Physics)

Research Associate Professor

Ryuji Higashikubo, Ph.D., Bowling Green State University, 1978. (Radiation and Cancer Biology)

Associate Professors (Clinical)

Venkata R. Devineni, M.D., Osmania Medical College, 1974.

Bruce J. Walz, M.D., Washington University, 1966.

Assistant Professors

Jeffrey D. Bradley, M.D., University of Arkansas, 1993.

Joseph O. Deasy, Ph.D., University of Kentucky, 1992. (Radiation Physics) (See Department of Biomedical Engineering.)

Nobuo Horikoshi, Ph.D., University of Tokyo, 1989. (Radiation and Cancer Biology)

Jay Locke, M.D., Boston University, 1995.

Robert S. Malyapa, M.D., Ph.D., All India Institute of Medical Sciences, 1987.

David B. Mansur, M.D., University of Kansas, 1992.

Sasa Mutic, M.S., University of Colorado, 1996. (Radiation Physics)

Tej K. Pandita, Ph.D., Panjab University, 1980. (Radiation and Cancer Biology)

Buck E. Rogers, Ph.D., Washington University, 1995. (Radiation and Cancer Biology) (See Department of Radiology.)

Jason W. Sohn, Ph.D., Medical College of Ohio, 1998. (Radiation Physics)

Research Assistant Professors

Walter R. Bosch, D.Sc., Washington University, 1990. (Radiation Physics)

Clayton R. Hunt, Ph.D., The University of Chicago, 1979. (Radiation and Cancer Biology)

John W. Matthews, D.Sc., Washington University, 1980. (Radiation Physics)

William L. Straube, M.S., Washington University, 1992. (Radiation Physics)

Assistant Professor (Clinical)

MacDonald B. Logie, M.D., Northwestern University, 1967.

Instructors

Ming-shun Chen, Ph.D., Kansas State University, 1991. (Radiation and Cancer Biology)

Jacqueline Esthappan, Ph.D., University of Texas, Austin, 1971. (Radiation Physics)

Seymour Fox, Ph.D., University of Oklahoma, 1977. (Computer Sciences)

Daniel F. Mullen, D.D.S., University of Missouri, Kansas City, 1977. (Computer Science)

Marie E. Taylor, M.D., University of Washington, Seattle, 1982.

Wade L. Thorstad, M.D., University of Texas, Houston, 1991.

Milos Vicic, Ph.D., University of Belgrade, 1999. (Radiation Physics)

Imran Zoberi, M.D., Washington University, 1996.

Research Instructor

Mai Xu, M.D., Ph.D., China Medical University, 1992. (Radiation and Cancer Biology)

Instructors (Clinical)

Muhammad S. Mahmood, M.D., Washington University, 1989.

James V. Piephoff, M.D., University of South Carolina, 1989.

Tapan Roy, M.D., Baroda Medical College at Baroda, India, 1974.

DEPARTMENT OF RADIOLOGY

The Mallinckrodt Institute of Radiology (MIR) serves as the Department of Radiology for Washington University School of Medicine, helping to guide the consulting physician in the discovery, treatment and, ultimately, the healing of disease. Established in 1930, MIR is one of the largest and most scientifically sophisticated radiology centers worldwide.

Internationally recognized for its groundbreaking research, the Institute continues to pioneer new radiological techniques for better patient care.

Milestones

- development of the first diagnostic test for gallbladder disease
- design and construction of the first cross-sectional X-ray laminagraph
- collaboration on design and installation of the first cyclotron located in a U.S. medical center
- development of positron emission tomography (PET)
- installation of one of the world's first computed tomography (CT) and magnetic resonance (MR) scanners
- interfacing of a minicomputer with a gamma camera, improving accuracy and efficiency of nuclear medicine procedures
- establishment of the first mobile mammography van west of the Mississippi River
- integration of CT and MR scans with three-dimensional technology
- application of organic chemistry to the preparation of radiopharmaceuticals used in medical imaging
- measurement of cerebral blood flow and metabolism
- establishment of the St. Louis region's most comprehensive interventional radiology center
- application of PET for measuring metabolic activity in relation to cardiac blood flow

The Institute occupies more than 400,000 total square feet, comprising its own 13-story building with satellite facilities in Barnes-Jewish, St. Louis Children's and Wohl hospitals; the Clinical Sciences Research and East buildings; the Scott Avenue Imaging Center; and the Center for Advanced Medicine. The department provides diagnostic radiology, nuclear medicine and radiation physics for all hospitals in the Washington University Medical Center, Barnes-Jewish West County Hospital and Barnes-Jewish St. Peters Hospital.

MIR clinical facilities are on the second floor of the Institute (chest radiology, body computed tomography, operating room imaging, computed radiography); third floor (neuroradiology, MRI, angiography); fourth floor (gastrointestinal and genitourinary radiology); and the fifth floor (MRI). PET clinical and research facilities are available on the seventh floor. A comprehensive interventional radiology center occupies the eighth floor. Nuclear medicine is on the ninth floor of the Barnes-Jewish Hospital West Pavilion. Ultrasonography, currently housed on the 10th floor of the West Pavilion, will move to the fourth floor of the Institute in spring 2003. Orthopedic imaging is on the sixth floor of the Center for Advanced Medicine. The Breast Health Center, on the fifth floor of the Center for Advanced Medicine, is a multidisciplinary facility that provides a full range of breast imaging services and interventional procedures. In the north wing of St. Louis Children's Hospital is a complete pediatric radiology facility, offering ultrasound, nuclear medicine, CT and MRI. The diagnostic facilities at Barnes-Jewish Hospital north offer state-of-the art equipment and a staff of talented specialists in abdominal and chest radiology, MRI, nuclear medicine and interventional radiology. Musculoskeletal radiology services are available on the sixth floor of the Center for Advanced Medicine.

The Institute has 102 examination rooms for diagnostic radiology, one PET/CT scanner, nine CT scanners (all with spiral CT capability and two with multidetector arrays), six PET scanners, 11 MR scanners (five devoted to research), 16 ultrasound machines, and six mammography units. In addition, as part of the department's community outreach effort, the Institute cosponsors with Barnes-Jewish Hospital a mobile mammography van that provides screening services at corporate and public sites in the St. Louis metropolitan area.

MIR research facilities are in the Clinical Sciences Research Building (radiological sciences), in the East Building (electronic radiology) and in the Scott Avenue Imaging Center (neurological PET, molecular pharmacology, MR imaging, optical imaging and cardiovascular imaging).

Administrative, teaching and support functions occupy the sixth floor and the ninth through the 12th floors of the Institute.

The Mallinckrodt Institute of Radiology at Washington University Imaging Center is an extension of the medical school campus East Building. Opened in November 1994, the Imaging Center's 70,000 square feet of space is dedicated to PET, MR and related sciences research. One of the best-equipped multidisciplinary facilities worldwide, the Imaging Center provides centralized resources for the scientific evaluation of imaging technology and for the development and application of advanced imaging systems. Researchers have access to advanced PET systems; five magnetic resonance scanners; three medical cyclotrons; *in vivo* MR spectroscopy; laboratories; animal care facilities; a neuropsychology laboratory; electrical engineering laboratories for image reconstruction; and high-end

graphics workstations. The Imaging Center also houses sophisticated computer facilities that are used for clinical, research and teaching applications.

FIRST YEAR

During the first semester of the gross anatomy course, conferences are given by several members of the radiology staff in the following areas: neuro, chest, cardiac, musculoskeletal and abdominal radiology. These sessions are arranged to coincide with the particular area of the body being studied in the anatomical dissection classes. Conferences are conducted in small groups, giving students an opportunity to relate directly with the radiologists.

Selectives

M04 501 ANATOMY THROUGH THE EYES OF THE RADIOLOGIST

Coordinator: *Pam Schaub,* 362-2928

A five-week seminar that seeks to reinforce the first-semester anatomy experience by relating previously learned anatomical information to radiographic images. As a byproduct, this elective provides a link for the first-year anatomists to the real world of medicine. Students will be expected to work in small groups prior to the meeting of each seminar to review a set of radiographic images and/or review recommended reading. Groups assigned a case will be responsible for presenting their findings to the class. Radiologists from radiology subspecialties will moderate the conference and supply appropriate complementary cases as needed.
Harvey S. Glazer, M.D.

SECOND YEAR

Twelve hours of lecture are devoted to an introduction to radiology. The majority of the course is devoted to diagnostic radiology, including computed tomography, ultrasound, nuclear medicine and magnetic resonance. Radiation biology also is introduced. The course also includes review of individual teaching file cases at small group sessions.
Harvey S. Glazer, M.D.

FOURTH YEAR

Electives

M90 805 RADIOLOGY — MALLINCKRODT INSTITUTE OF RADIOLOGY

Instructor: *Lawrence M. Kotner Jr., M.D.,* 454-7400

Lectures, seminars and innovative conferences emphasizing film interpretation and the role of radiology in the solution of clinical diagnostic problems are the "core" of this elective. The student will have an opportunity to be involved in the daily workload of subspecialty radiology and will be able to observe diagnostic and therapeutic examinations. Each student will spend one to two weeks on each of two or more of the following sections of Radiology:

- Chest Radiology
- Cross-Sectional Imaging
- GI Radiology
- GU Radiology
- Interventional Radiology
- Neuroradiology
- Nuclear Medicine
- Pediatric Radiology
- Radiation Oncology
- Skeletal Radiology/ER

All efforts will be made to arrange these subspecialty assignments to meet the needs and interests of the individual student. The ACR teaching file and audiovisual materials, as well as an extensive library, will be available. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M90 808 BODY CT

Instructors: *Fernando R. Gutierrez, M.D.; Sanjeev Bhalla, M.D.,* 362-2927

Students will work with two attendings and four residents and participate in all aspects of the Body CT service including interview of patients, protocoling examinations, review and interpretation of diagnostic CT examination and consultation with referring physicians. Approximately 300 CTs are performed each week including chest, abdominal and pelvic examinations and biopsy procedures. Students will attend the daily CT teaching conference and have the opportunity to attend other lectures and conferences. Special interests can be accommodated. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M90 820 CLINICAL NUCLEAR MEDICINE

Instructor: *Tom R. Miller, M.D., Ph.D.,* 362-2809

The student will be exposed to the full range of clinical nuclear medicine. In conjunction with the staff, the student will be responsible for planning and interpreting isotopic studies in patients referred to the Department. Opportunity exists to learn instrumentation techniques, including computer applications. There are daily conferences and scan interpretation sessions. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M90 842 THORACIC IMAGING — MIR

Instructor: *Harvey S. Glazer, M.D.,* 362-2927

A four-week elective emphasizing the interactions between chest radiologists and the various clinical services, to include thoracic surgery, thoracic

oncology and pulmonary medicine. Learn to read chest radiographs at the viewing console while providing liaison with the clinical teams. This active elective will include the daily chest teaching conference and participation in weekly autopsy, thoracic surgery and thoracic oncology conferences, as well as the imaging aspects of the clinico-pathological medicine conference. Learn to identify subtle pneumothorax and pneumonia. Learn the limitations of portable chest radiographs. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M90 900)

Interested students should contact the appropriate individual in each division regarding the types of research projects available.

Kyongtae Ty Bae, M.D., Ph.D., 747-1733

Quantitative imaging analysis. My research interests are quantitative and physiologic imaging and computer applications in diagnostic imaging. Radiology is a fast-growing medical specialty. Rapid developments in computers and technology have provided an opportunity to explore for new radiology and clinical applications and to use imaging as a quantification tool. Ongoing research projects include image segmentation and processing, computer-aided diagnosis, contrast medium pharmacokinetics, and functional and physiologic CT and MRI imaging.

Jeffery J. Brown, M.D., 362-2967

My research is primarily concerned with MR imaging of anatomic areas outside the central nervous system. Specific areas of interest include evaluation of new MR pulse sequences and contrast agents for abdominal, cardiac and breast MRI.

Thomas E. Conturo, M.D., Ph.D., 362-8421

My research group's interests include magnetic resonance (MR) technique development and experimental studies involving cerebral perfusion and diffusion imaging, including neuronal fiber tracking in the human brain, MR imaging of brain functional activation and development of MR contrast agents.

Farrokh Dehdashti, M.D., 362-7418

Positron emission tomography (PET) is an imaging technique that produces images reflective of biochemical processes of normal and abnormal tissues. PET is complementary to anatomic imaging modalities such as computed tomagraphy (CT) and magnetic resonance imaging (MRI). The ability of PET to quantify the fundamental processes, such as blood flow, oxygen metabolism, glucose metabolism and receptor density, makes this technique very desirable to both investigators and clinicians. This lab's research utilizes the conventional PET radiopharmaceutical, F-18 fluorodeoxyglucose (FDG), as well as a variety of unique PET radiopharmaceuticals such as 16α[^{18}F]-fluoro-17β-estradiol (FES), an estrogen receptor based imaging tracer, Cu-60-diacetyl-bis[N^4-methylthiosemicarbazone (Cu-60 ATSM), a hypoxic imaging tracer, 16β-[^{18}F]-fluoro- 5α-dihydrotesterone (FDHT), an androgen receptor based imaging tracer, and ^{94m}Tc-sestamibi to assess the functional capacity of multidrug drug resistance. Below is a partial list of the research projects relating to PET: (1) PET assessment of response to hormone therapy in advanced hormone-sensitive breast cancer (the major goal of this project is to predict response to hormone therapy in breast cancer based on PET assessment of flare reaction); (2) Imaging *MDR1* P-glycoprotein transport activity *in vivo* with ^{94m}Tc-sestamibi PET to predict response to chemotherapy in extensive stage small cell cancer (the major goal of this project is to assess whether ^{94m}Tc-sestamibi PET will provide a functional assessment of *MDR1* Pgp in extensive stage small cell lung cancer and whether tumor uptake of ^{94m}Tc-sestamibi prior to chemotherapy will predict treatment failure in these patients); (3) PET assessment of tumor hypoxia using a copper labeled PET radiopharmaceutical in patients with cervical cancer; (4) PET assessment of androgen receptors in patients with metastatic or recurrent prostate carcinoma using an androgen analogue, FDHT (the goal of this project is to determine the feasibility of PET imaging using FDHT and whether the uptake of this tracer can be blocked by flutamide in patients with prostate cancer); (5) Functional assessment of P-glycoprotein with conventional nuclear medicine imaging and ^{99m}Tc-sestamibi in patients with advanced breast cancer; (6) PET assessment of limited-stage small cell lung cancer (the overall goal of the proposed research study is to determine the additional value of PET in the staging of patients with limited-stage small cell lung cancer); (7) PET assessment of prostate cancer using FDG and C-11 acetate (the major goal of this project is to determine which of these tracers is more effective in imaging patients with prostate cancer).

Rob J. Gropler, M.D., 747-3878

Cardiovascular imaging research. The research in the Cardiovascular Imaging Laboratory is designed to better understand the relationship between myocardial perfusion, intermediary metabolism and mechanical function in both normal and abnormal cardiac states. The research involves the integration of several imaging techniques with diverse strengths such as PET, MRI, CT and echocardiography. The success of the research requires several paths of investigation to be pursued in parallel. For example, in order to image the biologic processes of interest requires continued technical developments for each of the imaging methods listed above. There are ongoing efforts to permit more accurate PET measurements of myocardial substrate metabolism. They include the development of novel tracers of extracted substrates, the development of acquisition

schemes to assess endogenous substrate metabolism, and the validation of mathematical approaches to correlate the tracer kinetics with the underlying metabolic processes. These studies are being pursued in small and large animal models and then in humans. Another example includes the current efforts to develop approaches to image the coronary arteries non-invasively by MRI using novel contrast agents and acquisition schemes. In addition, techniques are being developed to permit MR guided interventions on the coronary arteries. This undertaking includes the development of novel guide-wire tracking and catheter tracking schemes using both passive and active approaches. Finally, to permit assessments of myocardial oxygenation and thus, perfusion, techniques are being developed to permit BOLD imaging the myocardium. Another path of the research is to determine how this perfusional-metabolic-functional relation is altered by normal life changes and then determine how disease states alter the relationship. For example, both PET and MRI are being used to characterize the age and gender related changes on myocardial perfusion, substrate metabolism and function. To study the relationship in disease states, similar studies are being performed in patients with diabetes, hypertensive heart disease, obesity and dilated cardiomyopathy. These studies have relevance because these disease states all increase with age and in general, are more common in men. A third path is to determine the mechanisms responsible for these changes in this metabolic-functional relation and identify potential interventions that may reverse or ameliorate them. In this regard, similar imaging studies are being performed to determine the importance of nitric oxide and the PPARa system in defining this metabolic-functional relation.

Charles F. Hildebolt, D.D.S., Ph.D., 362-8410

The assessment of oral bone by digital radiographic imaging, including the new assessment methods based on photostimulable phosphor radiography. Assessments are focused on the use of radiographic imaging of oral bone to determine osteoporosis risk and the association between oral bone mass and dietary intake of calcium and vitamin D.

Tom R. Miller, M.D., Ph.D., 362-2807

Research projects are available in positron emission tomography (PET) in the following areas: (1) Use of PET in radiation therapy treatment planning in patients with cervical cancer; (2) Evaluation of prognosis in cervical cancer by quantitative measures of tumor size, uptake and heterogeneity; (3) Evaluation of new radiopharmaceuticals in prostate cancer and renal cell cancer.

Mark A. Mintun, M.D., 362-3316/362-6965

Positron Emission Tomography (PET). Our research group uses positron emission tomography (PET) in human subjects as a tool in the investigation of two distinct areas: The first area of research involves the study of the metabolic needs of the brain during neural work. While initially controversial, PET studies from the Institute showing the anaerobic utilization of glucose in the human brain during visual processing of stimuli are now firmly accepted. This anaerobic glucose metabolism occurs despite the apparent abundance of oxygen. Normal aerobic metabolism can be demonstrated when the visual cortex is at rest. Recent data from this laboratory has shown that coupling of oxygen delivery and oxygen utilization may not be the primary determinant of blood flow regulation during neuronal activation. Furthermore, there is likely a time-dependent regulation of oxygen utilization after a change in neuronal firing. The metabolic substrates for blood flow control and models of glucose metabolism during increased neuronal activity are issues under investigation.

A second area of research involves the use of PET to study the biology of depression treatment as well as other related neuropsychiatric diseases. A recent interest in the laboratory is the use of serontonergic measures to probe the changes in brain receptor function during treatment of depression with different antidepressant drugs. This research group has recently shown that, using the highly selective radioligand [18F]-altanserin to image serotonin-2A receptors *in vivo*, depressed patients have substantially decreased serotonin-2A receptors in the hippocampus compared to normal control subjects. The effect of antidepressant treatment on receptor density is being studied in order to study the responsiveness and down-regulation of this system. We are also working to validate methodology to allow the measure of serotonin regulation of dopamine release in the basal ganglia and orbital frontal cortex. This approach will allow the design of studies to investigate the potential impact of serotonergic abnormalities in depression on endogenous dopamine function. Other ongoing research has focused on the biology of addiction and involves the imaging of dopamine receptors in the basal ganglia, measuring the release of dopamine after pharmacologic challenges, and the measure of GABA-A receptors in different patient populations.

Stephen M. Moerlein, Ph.D., 362-8466

Research interests lie in the general area of labeled tracer development for nuclear medicine imaging, especially positron-emission tomography (PET). Developmental effort begins with synthesis of target structures, preclinical screening that involves *in vitro* biochemistry and pharmacological testing, and *ex vivo* biodistribution studies in small animals. Promising tracers are then examined by *in vivo* imaging of animal subjects and tracer kinetic modeling. The final step in the transition of a radiochemical into a labeled drug takes into account radiation dosimetry, pharmaceutical quality, and the development of automated production to streamline delivery to human subjects. Each of these aspects is researched, with a primary interest in novel agents for examination of neurological processes by PET.

David R. Piwnica-Worms, M.D., Ph.D., 362-9356
Research projects in molecular imaging are available. Molecular imaging is broadly defined as the characterization and measurement of biological processes in living animals, model systems and humans at the molecular and cellular level using remote imaging detectors such as PET, SPECT, MRI and near-infrared fluorescence. Our goal is to advance the understanding of normal biology and pathophysiology through noninvasive investigation of molecular and cellular events *in vivo*. Projects focus on validation and use of PET reporter genes and PET reporter probes as well as luciferase and bioluminescence imaging to investigate gene expression patterns in cancer, development of peptide conjugates for membrane transduction of PET, SPECT and MR contrast agents, and infectious disease *in vivo* and investigations *in vitro* and *in vivo* of the transport functions of the multidrug resistance (*MDR1*) P-glycoprotein family of membrane transporters.

William J. Powers, M.D., 362-2957
Research opportunities are available using positron emission tomography to measure cerebral blood flow and metabolism in human subjects to investigate how the blood borne supply of oxygen and glucose is regulated to energy demand in physiological and pathological conditions. Ongoing projects include studies of cerebrovascular disease, head trauma, Huntington's disease and Parkinson's disease.

Marcus E. Raichle, M.D., 362-6907
We use functional imaging techniques, both positron emission tomography and functional magnetic resonance imaging, to study the normal organization of the human brain and the effect of selected diseases. The research focuses on both the methodology (imaging and experimental) and specific questions in cognitive neuroscience.

Jerold W. Wallis, M.D., 362-2809
Recent research projects have included three–dimensional display of tomographic images, development of software for analysis of (and correction for) patient motion during tomographic acquisition, development of new iterative tomographic image reconstruction techniques and work on use of the internet in nuclear medicine.

Michael J. Welch, Ph.D., 362-8435
Short-lived positron emitting radionuclides such as carbon-11 and fluorine-18 can be used to trace physiologic and pharmacologic processes in humans. Tracers are being developed to probe brain receptors, tumor receptors and enzyme systems.

Bruce R. Whiting, Ph.D., 362-6965
Quantitative Computed Tomography (CT). By developing accurate models of the physics of CT image acquisition and incorporating these models into image reconstruction algorithms, improved quantitative information can be obtained from clinical CT images. Applications include 3D localization of cochlear implants, protocols to minimize CT radiation dose, brachytherapy dose planning, and alveolar bone structure. There are opportunities for computer programming and algorithm development, experimental data collection, conducting observer studies and analyzing clinical patient data.

Faculty

HEAD OF DEPARTMENT AND DIRECTOR OF THE MALLINCKRODT INSTITUTE OF RADIOLOGY

R. Gilbert Jost, M.D., Yale University, 1969. (Also Department of Computer Science)

Professor Emeritus

Gary D. Shackelford, M.D., Washington University, 1968. (See Department of Pediatrics.)

Professors

Joseph J.H. Ackerman, Ph.D., Colorado State University, 1977. (See Department of Medicine.) (Also Department of Chemistry)

D. Claire Anderson, M.D., Washington University, 1971.

Dennis M. Balfe, M.D., Medical College of Wisconsin, 1975.

G. James Blaine III, D.Sc., Washington University, 1974.

Harold Burton, Ph.D., University of Wisconsin, 1968. (See Department of Anatomy and Neurobiology and Department of Cell Biology and Physiology.)

Mark S. Conradi, Ph.D., Washington University, 1977. (Also Department of Physics)

James P. Crane, M.D., Indiana University, 1970. (See Department of Genetics and Department of Obstetrics and Gynecology.)

Michael D. Darcy, M.D., Ohio State University, 1979. (See Department of Surgery.)

M. Wayne Flye, M.D., University of North Carolina, 1967. Ph.D., Duke University, 1980. (See Department of Surgery and Department of Molecular Microbiology.)

Mokhtar Gado, M.D., Cairo University, 1960. (See Department of Neurological Surgery.)

Louis A. Gilula, M.D., University of Illinois, 1967. (See Department of Surgery.)

Harvey S. Glazer, M.D., Washington University, 1976.

Diana L. Gray, M.D., University of Illinois, 1981. (See Department of Obstetrics and Gynecology.)

Perry W. Grigsby, M.D., University of Kentucky, 1982. (See Department of Radiation Oncology.)

Robert L. Grubb Jr., M.D., University of North Carolina, 1965. (See Department of Neurological Surgery and Department of Neurology.)

Jay P. Heiken, M.D., Columbia University, 1978.

Saulo Klahr, M.D., Universidad Nacional de Colombia, 1959. (See Department of Medicine.)

Philip A. Ludbrook, M.B.B.S., University of Adelaide, 1963. (See Department of Medicine and Clinical Investigation Program.)

Robert H. Mach, Ph.D., State University of New York, Buffalo, 1985.

Jeffrey L. Marsh, M.D., The Johns Hopkins University, 1970. (See Department of Surgery and Department of Pediatrics.)

William H. McAlister, M.D., Wayne State University, 1954. (See Department of Pediatrics.)

William D. Middleton, M.D., Duke University, 1981.

Tom R. Miller, Ph.D., Stanford University, 1971; M.D., University of Missouri, 1976. (Also Department of Electrical Engineering)

Mark A. Mintun, M.D., Washington University, 1981. (See Department of Biomedical Engineering, Department of Psychiatry and Clinical Investigation Program.)

Barbara S. Monsees, M.D., Washington University, 1975.

Roberto Pacifici, M.D., Perugia University, 1981. (See Department of Medicine.)

Michael K. Pasque, M.D., University of Oklahoma, 1978. (See Department of Biomedical Engineering and Department of Surgery.)

Joel S. Perlmutter, M.D., University of Missouri, 1979. (See Department of Neurological Surgery and Department of Neurology.)

Steven E. Petersen, Ph.D., California Institute of Technology, 1982. (See Department of Neurological Surgery and Department of Neurology.)

Daniel D. Picus, M.D., The University of Chicago, 1981. (See Department of Surgery.)

David R. Piwnica-Worms, M.D., Ph.D., Duke University, 1984. (See Department of Molecular Biology and Pharmacology.)

William J. Powers, M.D., Cornell University, 1975. (See Department of Neurological Surgery, Department of Neurology and Clinical Investigation Program.)

Marcus E. Raichle, M.D., University of Washington, 1964. (See Department of Anatomy and Neurobiology, Department of Biomedical Engineering and Department of Neurology.)

Henry D. Royal, M.D., St. Louis University, 1974.

Stuart S. Sagel, M.D., Temple University, 1965.

Daniel P. Schuster, M.D., Yale University, 1976. (See Department of Medicine.)

Gregorio A. Sicard, M.D., University of Puerto Rico, 1972. (See Department of Surgery.)

Barry A. Siegel, M.D., Washington University, 1969. (See Department of Medicine, Alvin J. Siteman Cancer Center, and Clinical Investigation Program.)

Marilyn J. Siegel, M.D., State University of New York, 1969. (See Department of Pediatrics.)

Donald L. Snyder, Ph.D., Massachusetts Institute of Technology, 1966. (See Institute for Biomedical Computing.) (Also Department of Electrical Engineering)

Robert W. Thompson, M.D., University of Michigan, 1983. (See Department of Surgery and Clinical Investigation Program.)

William G. Totty, M.D., University of Tennessee, 1975.

Michael J. Welch, Ph.D., University of London, 1965. (See Department of Molecular Biology and Pharmacology and Alvin J. Siteman Cancer Center.) (Also Department of Chemistry)

Professors (Clinical)

Ronald G. Evens, M.D., Washington University, 1964. (Also Department of Economics)

Noah Susman, M.D., Washington University, 1952.

Associate Professors

Samuel Achilefu, Ph.D., University of Nancy I, France, 1991.

Carolyn J. Anderson, Ph.D., Florida State University, 1990. (See Department of Molecular Biology and Pharmacology.)

Premsri T. Barton, M.D., Mahidol University, Thailand, 1973.

Jeffrey J. Brown, M.D., University of California, San Diego, 1983.

Randy Lee Buckner, Ph.D., Washington University, 1995. (Also Department of Psychology)

Thomas E. Conturo, M.D., Ph.D., Vanderbilt University, 1989. (Also Department of Physics)

DeWitte T. Cross III, M.D., University of Alabama, 1980.

Víctor G. Dávila-Román, M.D., University of Puerto Rico, 1981.

William B. Dawson, M.D., University of Oklahoma, 1973.

Farrokh Dehdashti, M.D., Pahlavi University, Iran, 1977.

Colin P. Derdeyn, M.D., University of Virginia, 1988.

Keith C. Fischer, M.D., The Johns Hopkins University, 1971.

Robert J. Gropler, M.D., University of Cincinnati, 1981. (See Department of Medicine and Clinical Investigation Program.)

Fernando R. Gutierrez, M.D., University of Valladolid, 1974.

Thomas E. Herman, M.D., The Johns Hopkins University, 1975.

Charles F. Hildebolt, D.D.S., Ohio State University, 1970; Ph.D., Washington University, 1987.

David M. Hovsepian, M.D., Columbia University, 1986. (See Department of Surgery.)

Lawrence M. Kotner Jr., M.D., Washington University, 1968.

Benjamin C.P. Lee, M.B.B.S., University of London, 1965.

Robert G. Levitt, M.D., University of California, 1972.

Elizabeth Gerard McFarland, M.D., University of California, San Diego, 1987.

Stephen M. Moerlein, Ph.D., Washington University, 1982. (See Department of Biochemistry and Molecular Biophysics.)

Christopher J. Moran, M.D., St. Louis University, 1974.

Jeffrey J. Neil, M.D., Ph.D., Washington University, 1984. (See Department of Neurology.)

Joseph A. O'Sullivan, Ph.D., University of Notre Dame, 1986. (Also Department of Electrical Engineering)

William R. Reinus, M.D., New York University, 1979. (See Department of Medicine.)

Brian G. Rubin, M.D., University of Vermont, 1984. (See Department of Surgery and Clinical Investigation Program.)

Janice W. Semenkovich, M.D., Washington University, 1981.

Sharlene A. Teefey, M.D., University of Hawaii, 1980.

Thomas M. Vesely, M.D., Mayo Medical School, 1986. (See Department of Surgery.)

Jerold W. Wallis, M.D., Stanford University, 1981. (See Clinical Investigation Program.)

Franz J. Wippold II, M.D., St. Louis University, 1977.

Research Associate Professor

Tom O. Videen, Ph.D., University of Washington, 1981. (See Department of Neurology.)

Associate Professors (Clinical)

Sumner Holtz, M.D., St. Louis University, 1948.

Philip J. Weyman, M.D., Yale University, 1972.

Associate Professor (Adjunct)

Shiying Zhao, Ph.D., University of South Carolina, 1991.

Assistant Professors

Kyongtae T. Bae, Ph.D., University of Pennsylvania, 1988; M.D., University of Chicago, 1992.

Sanjeev Bhalla, M.D., Columbia University College of Physicians and Surgeons, 1994.

Kevin J. Black, M.D., Duke University, 1990. (See Department of Psychiatry and Department of Neurology.)

Kelly N. Botteron, M.D., University of Kansas, 1988. (See Department of Psychiatry.)

Daniel B. Brown, M.D., Hahnemann University, 1983.

Maurizio Corbetta, M.D., University of Pavia, Italy, 1985. (See Department of Anatomy and Neurobiology and Department of Neurology.)

Constance S. Courtois, M.D., Medical University of South Carolina, 1985.

Steven Don, M.D., Vanderbilt University, 1985.

James R. Duncan, M.D., Ph.D., Washington University, 1988.

Dione M. Farria, M.D., Harvard University, 1989.

Edward M. Geltman, M.D., New York University, 1971. (See Department of Medicine.)

David S. Gierada, M.D., Wayne State University, 1988.

Debra A. Gusnard, M.D., The University of Chicago, 1982. (See Department of Psychiatry.)

William P. James, M.D., University of Missouri, 1993.

Richard A. Kraus, M.D., University of Toronto, 1973.

Keith A. Kronemer, M.D., Tulane University, 1990.

Richard LaForest, Ph.D., Laval University, Quebec, Canada, 1994.

Susan M. Langhorst, Ph.D., University of Missouri-Columbia, 1982.

Gary D. Luker, M.D., Washington University, 1991.

Vadim A. Markel, Ph.D., New Mexico State University, 1995.

Robert C. McKinstry III, Ph.D., Massachusetts Institute of Technology, 1991; M.D., Harvard Medical School, 1992. (See Clinical Investigation Program.)

Christine O. Menias, M.D., George Washington University, 1995.

Mary A. Middleton, M.D., Medical College of Wisconsin, 1982.

Vamsidhar R. Narra, M.D., Osmania University, India, 1990.

Buck E. Rogers, Ph.D., Washington University, 1995.

David A. Rubin, M.D., University of Pennsylvania, 1988.

Bradley L. Schlaggar, M.D., Ph.D., Washington University, 1994. (See Department of Neurology and Depatment of Pediatrics.)

Maria E. Schmidt, M.D., Yale University, 1983.

Vijay Sharma, Ph.D., Panjab University, 1987.

Yvette I. Sheline, M.D., Boston University, 1979. (See Department of Psychiatry.)

Cary L. Siegel, M.D., University of Michigan, 1987.

Emily L. Smith, M.D., Washington University, 1968.

Yuan-Chuan Tai, Ph.D., University of California, Los Angeles, 1998.

Alan J. Tiefenbrunn, M.D., Washington University, 1974. (See Department of Medicine.)

Nikolaos V. Tsekos, Ph.D., University of Minnesota, 1995.

Suresh Vedantham, M.D., The University of Chicago, 1992.

Kimberly N. Wiele, M.D., University of Missouri, 1981.

Pamela K. Woodard, M.D., Duke University, 1990.

Dmitriy A. Yablonskiy, Ph.D., Ukrainian Academy of Sciences, 1981.

Research Assistant Professors

Kathleen B. McDermott, Ph.D., Rice University, 1996.

Stephen M. Moore, M.S., Washington University, 1984.

Bruce R. Whiting, Ph.D., Carnegie-Mellon University, 1977.

Jie Zheng, Ph.D., University of Cincinnati, 1994.

Assistant Professors (Clinical)

Gene L. Davis Jr., M.D., University of Virginia, 1972.

James W. Debnam Jr., M.D., University of Louisville, 1962.

Albert E. Hesker, M.D., University of Missouri, 1964.

Daniel J. Leary Jr., M.D., Washington University, 1966.

Ben R. Mayes Jr., M.D., Washington University, 1966.

Gary H. Omell, M.D., University of Tennessee, 1967.

Naris Rujanavech, M.D., Faculty of Medicine, Siriraj Hospital, 1972.

Robert F. Scheible, M.D., Washington University, 1972.

Steven L. Solomon, M.D., The University of Chicago, 1985.

Chandrakant C. Tailor, M.B.B.S., Maharaja Sayajirao University of Baroda, 1972.

Assistant Professor (Adjunct)

Celette Sugg Skinner, Ph.D., University of North Carolina, Chapel Hill, 1991.

Research Scientists

Pilar Herrero, M.S., Washington University, 1997.

Francis Miezin, M.S., University of Wisconsin, 1972. (See Department of Neurology.)

Sally Wagner Schwarz, M.S., University of Southern California, 1976.

Gordon L. Shulman, Ph.D., University of Oregon, 1979. (Neuropsychology) (See Department of Neurological Surgery.) (Also Department of Psychology.)

Abraham Z. Snyder, Ph.D., Rockefeller University, 1977; M.D., SUNY, Buffalo, 1981.

Instructors

Michael G. Crowley, Ph.D., University of Florida, 1982.

Glenn Fletcher, Ph.D., Michigan State University, 1981.

Michael S. Gelbart, M.D., Ohio State University, 1996.

Thomas K. Pilgram, Ph.D., University of California, Berkeley, 1982.

Mehdi Poustchi-Amin, M.D., Ludwig-Maximilian University, Germany, 1989.

Joshua S. Shimony, M.D., Ph.D., University of Illinois, Urbana-Champaign, 1995.

Sheng-Kwei (Victor) Song, Ph.D., Washington University, 1990.

Katie D. Vo, M.D., Cornell University Medical College, 1991.

Research Instructors

Erbil Akbudak, Ph.D., Washington University, 1996.

Wenhua Chu, Ph.D., Institute of Chemistry, Academia Sinica, Beijing, China, 1988.

Lisa T. Connor, Ph.D., Washington University, 1992.

Carmen S. Dence, M.S., Florida State University, 1972.

Joon Young Kim, Ph.D., Hanyang University, 1997.

Jason S. Lewis, Ph.D., University of Kent, United Kingdom, 1996.

Kathryn E. Luker, Ph.D., Washington University, 1994.

Mark P. McAvoy, Ph.D., Southern Illinois University, Carbondale, 1998.

David G. Politte, D.Sc., Washington University, 1999.

David E.C. Reichert, Ph.D., University of Illinois, 1994.

Zhude Tu, Ph.D., Beijing Normal University, Beijing, China, 1995.

Jim Zheng Wang, Ph.D., Texas A&M University, 1997.

Instructors (Clinical)

Maryellen E. Amato, M.D., Case Western Reserve University, 1981.

Arthur F. Bishop, M.D., University of Illinois, 1977.

Charles F. Garvin, M.D., University of Missouri, Kansas City, 1982.

James A. Junker, M.D., St. Louis University, 1979.

John H. Niemeyer, M.D., Washington University, 1982.

Edward F. Ragsdale, M.D., Washington University, 1964.

Jerry Tobler, Ph.D., California Institute of Technology, 1978; M.D., Yale University, 1983.

MARY CULVER DEPARTMENT OF SURGERY

The Department of Surgery includes the Divisions of General Surgery, Cardiothoracic Surgery, Pediatric Surgery, Plastic Surgery and Urologic Surgery. The formal instruction begins in the third year. For the duration of the 12-week rotation in Surgery, students are assigned clinical rotations, both within the Department of Surgery and in other departments at the School of Medicine, in which they have the opportunity to participate in the care of surgical patients. Students attend daily patient rounds and outpatient clinics as well as scheduled and emergency surgical procedures. Seminars and teaching conferences are scheduled on a regular basis. In the fourth year, students may select a subinternship elective offered through the various services within the Division of General Surgery. In addition, within the Department of Surgery, electives are available in pediatric surgery, transplant surgery, vascular surgery, cardiovascular and thoracic surgery, urologic surgery, and plastic and reconstructive surgery.

THIRD YEAR

M95 790 INTEGRATED SURGICAL DISCIPLINES CLERKSHIP

During the 12-week surgery clerkship, students are assigned to three separate rotations. Each student is assigned to a required general surgery rotation at Barnes-Jewish Hospital, Christian Northeast Hospital, or the Veterans Administration Medical Center. In addition, each student selects elective rotations in other general surgical fields, surgical subspecialties and related disciplines of critical care. The student is an active participant in the daily care of patients on each service and attends the service teaching conferences and rounds. For the duration of the 12-week rotation, there are weekly small-group tutorial sessions with faculty members and a biweekly lecture series.

FOURTH YEAR

There is ample opportunity for fourth-year students to participate in elective rotations within each Division of the Department of Surgery. Many of the fourth-year surgery electives are structured to allow the student to participate as a "sub-intern," facilitating experiences in preoperative, intraoperative and postoperative patient management. Generally, the minimum duration of a fourth-year elective rotation in the Department of Surgery is four weeks. Research electives are also available.

Electives

M95 863 ACTING INTERNSHIP, SURGICAL ONCOLOGY AND ENDOCRINE SURGERY

Instructors: *Timothy J. Eberlein, M.D.; Jeffrey F. Moley, M.D.; Rebecca L. Aft, M.D.; L. Michael Brunt, M.D.; Jill R. Dietz, M.D.; Virginia A. Herrmann, M.D.; Terry C. Lairmore, M.D.; Jerome F. Levy, M.D.*

This subinternship elective is designed to give students in-depth experience in the clinical management of patients on the Endocrine and Surgical Oncology Service (Unit I Service). Students will serve as clerks and will be responsible for patient management with housestaff under the guidance of the chief resident and attending surgeons. Clinical exposure is focused on thyroid, parathyroid and adrenal surgery, as well as breast oncology, GI oncology, melanoma and soft-tissue sarcomas. The course will offer opportunities for students to gain experience in preoperative, intraoperative and postoperative patient management. There will be opportunity for students to evaluate patients, decide on a diagnostic and management strategy and provide care under housestaff and faculty guidance, as well as ample opportunity to attend and participate in conferences. Note: If a student desires to work more closely with a "specific attending," he/she must make special arrangements with the faculty member prior to beginning this elective. If you have any questions regarding this notice, please call Jackie Fleming in the Surgical Education Office (362-8029). **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 879 ACTING INTERNSHIP, HEPATOBILIARY PANCREATIC SURGERY

Instructors: *Steven M. Strasberg, M.D.; Jeffrey A. Drebin, M.D.; David Linehan, M.D.,* 362-7147

This subinternship elective is designed to give students in-depth experience in the clinical management of patients on the Hepatobiliary/Pancreatic (Unit II) Service. The Unit II Service is a busy upper gastrointestinal service with a focus on hepatobiliary and pancreatic diseases and their treatment. The course will offer opportunities for students to gain experience in preoperative, intraoperative and postoperative patient management. Students will serve as clerks and will be responsible for patient management with housestaff under the guidance of the chief resident and attending surgeons. There will be opportunity for students to evaluate patients, decide on a diagnostic and management strategy and provide care under housestaff and faculty guidance, as well as ample opportunity to attend and participate in conferences. Note: If a student desires to work more closely with a "specific attending," he/she must make special arrangements with the faculty member prior to beginning this elective. If you have any questions regarding this

notice, please call Jackie Fleming in the Surgical Education Office (362-8029). **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 814 ACTING INTERNSHIP, TRAUMA SERVICE

Instructors: *Timothy G. Buchman, Ph.D., M.D.; Bradley Freeman, M.D.; Douglas J.E. Schuerer, M.D.; Robb R. Whinney, D.O.*

The student on this elective will function as a subintern on the Trauma and Emergency Service within the Section of Burns, Trauma, and Surgical Critical Care. Student involvement in all aspects of clinical surgery is accomplished by student attendance in the outpatient office, preoperative patient evaluation, in-hospital patient management and postoperative outpatient follow-up after discharge. Practical experience will focus on the initial evaluation and resuscitation of traumatized patients and other emergency care patients. The student will also participate in regular rounds, conferences and in-house call. Note: If a student desires to work more closely with a "specific attending," he/she must make special arrangements with the faculty member prior to beginning this elective. If you have any questions regarding this notice, please call Jackie Fleming in the Surgical Education Office (362-8029). **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 893 ACTING INTERNSHIP, MINIMALLY INVASIVE SURGERY

Instructors: *Nathaniel J. Soper, M.D.; Mary L. Klingensmith, M.D.; L. Michael Brunt, M.D.,* 454-8877

This subinternship elective in minimally invasive surgery is offered by Nathaniel J. Soper, M.D., a member of the Hepatobiliary Pancreatic (HPB) Section of the General Surgery Division. Surgeons in this section of the Division of General Surgery regularly perform the following procedures laparoscopically: cholecystectomy, common bile duct exploration, staging of intra-abdominal malignant disease, gastric fundoplication, inguinal hernia repair and gastroenterostomy. The medical student electing this rotation will participate in the outpatient office and direct patient care, assist and observe in a wide range of laparoscopic procedures and participate in teaching rounds and conferences. During this rotation, the student may also have the opportunity to observe and participate in minimally invasive surgical procedures performed by surgeons in other specialty sections within the Division of General Surgery (e.g., Colorectal Surgery, Urologic Surgery, Endocrine and Surgical Oncology). Additionally, the student may also elect to participate in the laboratory of the Washington University Institute for Minimally Invasive Surgery one or two days per week. Notice: If a student desires to work more closely with a "specific attending," he/she must make special arrangements with the faculty member prior to beginning this elective. If you have any questions regarding this notice, please call Jackie Fleming in the Surgical Education Office (362-8029). **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 871 ACTING INTERNSHIP, VASCULAR SURGERY

Instructors: *Gregorio A. Sicard, M.D.; Brian G. Rubin, M.D.; M. Wayne Flye, M.D.; Eric Choi, M.D.; Patrick J. Geraghty, M.D.; Luis A. Sanchez, M.D.,* 362-7841

This subinternship elective is designed to give students in-depth experience in the clinical management of patients on the Vascular Surgery Service. The elective will offer opportunities for students to gain experience in preoperative, intraoperative and postoperative management of patients with surgically treated vascular diseases/conditions. Students will serve as clerks and will be responsible for patient management with housestaff under the guidance of the chief resident and attending surgeons. There will be opportunity for students to evaluate patients, decide on a diagnostic and management strategy and provide care under housestaff and faculty guidance, as well as ample opportunity to attend and participate in conferences. Notice: If a student desires to work more closely with a "specific attending," he/she must make special arrangements with the faculty member prior to beginning this elective. If you have any questions regarding this notice, please call Jackie Fleming in the Surgical Education Office (362-8029). **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 862 ACTING INTERNSHIP, COLON AND RECTAL SURGERY

Instructors: *James W. Fleshman, M.D.; Elisa H. Birnbaum, M.D.; David W. Dietz, M.D; Matthew G. Mutch, M.D.*

This subinternship elective is designed to give students in-depth experience in the clinical management of patients on the Colorectal Surgery Service. Students work closely with the attendings within the Section of Colon and Rectal Surgery, and clinical exposure is focused on a wide range of benign and malignant colorectal diseases. There is exposure to radiation oncology and the specialized areas of nursing related to care of patients with colorectal cancer and inflammatory bowel disease. The course will offer opportunities for students to gain experience in preoperative, intraoperative and postoperative patient management under housestaff and faculty guidance, as well as ample opportunity to attend and participate in conferences. Notice: If a student desires to work more closely with a "specific attending," he/she must make special arrangements with the Colorectal Surgery Office prior to beginning this elective. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 891 ORGAN TRANSPLANTATION

Instructors: *Surendra Shenoy, M.D., Ph.D., and Martin D. Jendrisak, M.D.,* 362-5701; *William C. Chapman, M.D.,* 362-7792; *Niraj Desai, M.D.,* 747-1393; *Jeffrey A. Lowell, M.D.,* 362-2820

The care of transplant patients requires the integration of multiple diverse medical and surgical disciplines. This elective clerkship in organ transplantation encompasses the preoperative evaluation of adult and pediatric recipients of either kidney or liver transplants, or organ grafts procured from cadaveric or living related donors, and participation in the operative management of these patients. Emphasis is also placed on postoperative care, multimodality immunosuppression, management of allograft rejection and organ retrieval and preservation. Basic hepatic and renal physiology, fluid and electrolyte balance, and transplantation immunology are stressed. Management of the complications of diabetes, portal hypertension and infectious diseases are a part of the complete management of these patients. This course is designed to offer the student an overview of the field of organ transplantation. The student functions as an integral part of the transplant team and assumes appropriate responsibilities under supervision. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 820 CARDIOTHORACIC SURGERY

Instructors: *Joel D. Cooper, M.D.; Richard J. Battafarano, M.D.; Ralph J. Damiano Jr., M.D.; William A. Gay, M.D.; Charles B. Huddleston, M.D.; Jennifer S. Lawton, M.D.; Eric N. Mendeloff, M.D.; Bryan F. Meyers, M.D.; Nader Moazami, M.D.; Marc R. Moon, M.D.; Michael K. Pasque, M.D.; G. Alexander Patterson, M.D.; Charl J. de Wet, M.D.; Laureen L. Hill, M.D.; Eric Jacobsohn, M.D.*

The senior elective in cardiothoracic surgery is a four-week clinical rotation with two-week blocks divided between adult cardiac, pediatric cardiac and general thoracic surgery according to the student's preference. Students will participate in morning work rounds, attend the operative procedures of their choice, and attend weekly conferences and teaching rounds. Students will be introduced not only to the surgical procedures but also to the postoperative care of the surgical patients.

On the pediatric and adult cardiac services, students will be introduced to the principles of cardiopulmonary bypass, ventricular assist devices, cardiac transplantation, coronary artery bypass surgery, valve repair and others.

On the adult cardiac surgery service, students will function as **subinterns** under the direct supervision of a faculty member.

On the thoracic surgical rotation students will have the opportunity of performing **bronchoscopy**, esophagoscopy and gastroscopy, and will participate in surgical resections of lung cancer and esophageal cancer, as well as surgery for emphysema and for benign esophageal conditions. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 830 PLASTIC RECONSTRUCTIVE SURGERY

Instructor: *Thomas Tung, M.D.,* 362-4588

The period on plastic surgery may either be spent as a clinical clerkship or conducting a basic laboratory project. The purpose of the clinical clerkship is to familiarize the student with the basic principles of tissue repair and reconstruction. The student will have successive assignments to each of the attending staff and the ward resident during the four weeks. This will expose the student to the breadth and depth of plastic surgery. Alternatively, if the student has identified a focus of interest, the student may participate on those services of special interest, such as hand or pediatric plastic surgery. The student will assume an active role on the plastic surgery service and will participate in the total management of a wide variety of surgical problems including congenital anomalies, microvascular surgery, surgery of the upper extremity, peripheral nerve surgery, cosmetic surgery and general reconstructive plastic surgery. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 831 PLASTIC SURGERY AMBULATORY CARE

Instructor: *Thomas Tung, M.D.,* 362-4588

The period on plastic surgery ambulatory care will focus on outpatient management of hand fractures, nerve injuries, facial traumas, wound healing/repair, pediatric injury, skin lesions and general outpatient plastic surgery. This rotation will focus on teaching basic suturing, radiology related duties, casting and splinting. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 850 UROLOGY

Instructor: *Gerald Andriole, M.D.,* 362-8212

A four-week clinical clerkship in pediatric and/or adult urology will offer the interested student experience with a spectrum of problems in clinical urology. The student will learn the basic diagnostic procedures and management of surgical and non-surgical aspects of patient care on the private and ward services under the supervision of the attending staff and house staff. Clinical conferences are held four days per week. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 880 PEDIATRIC SURGERY

Instructor: *Robert Foglia, M.D.,* 454-6022

The student will fully participate as a subintern in all aspects of pediatric surgical patient care, including preoperative evaluation, surgery and postoperative care. Twice-daily rounds are made with the resident staff and daily rounds with the attending staff. Participation in general surgery pediatric clinic and emergency room care. Conferences include mortality

and morbidity, radiology, pathology, trauma, case presentations and basic science, as well as daily contact with pediatric radiology, are expected. Students are encouraged to undertake clinical investigations if they have an interest. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 807 SURGERY CLERKSHIP, GENERAL SURGERY—KEOKUK AREA HOSPITAL (RURAL PRACTICE)

Instructor: *Ronald Kinateder, M.D.*, (319) 524-5734

Students work under the supervision of two general surgeons involved in a rural practice at the Keokuk Area Hospital, Keokuk, Iowa. Students function under a preceptorship arrangement and are involved in the diagnosis and management of a large variety of patients with general surgery conditions. Patients are followed from their initial office visit through outpatient diagnostic procedures and on to hospital admission for operation. Students assist or participate in surgery as first assistants, perform some minor surgeries under supervision, and have frequent opportunities to gain experience in a variety of endoscopic procedures. Students are an integral part of the practice of the two general surgeons. Housing is provided across the street from the hospital and food maintenance covered by the hospital. Keokuk is located approximately 3.5 hours north of St. Louis and is accessible by car. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 820 CRITICAL CARE

Instructors: *Timothy G. Buchman, Ph.D., M.D.*, 362-9347; *Walter A. Boyle III, M.D.; J. Perren Cobb, M.D.; Craig M. Coopersmith, M.D.; Alex S. Evers, M.D.; Eric Jacobsohn, M.D.; Laureen L. Hill, M.D.; Richard S. Hotchkiss, M.D.; George Tseng, M.D.; Omokhaye Higo, M.D.; John Mazuski, M.D.; Douglas J.E. Schuerer, M.D.*

This clinical elective is designated to familiarize the student with the management of the critically ill patient. The setting is the 8400 surgical intensive care unit at Barnes-Jewish Hospital. The student will receive individualized training in critical care management including stabilization of the critically ill or injured patient, cardiovascular assessment and invasive hemodynamic monitoring, management of the airway and mechanical ventilator support, and other aggressive support as needed. The student will function as an integral member of the surgical intensive care unit team, which consists of physicians with specialty training in critical care; critical care fellows; house staff from surgery, anesthesiology and other specialties; pharmacists; and nutrition experts. The student will actively participate in daily rounds with members of the team and will be actively involved in the management of critically ill patients from all the surgical specialties except cardiothoracic and neurosurgery. Practical experience will be gained in placement and interpretation of invasive and non-invasive cardiovascular monitors, the recognition and treatment of shock syndromes including trauma and burns, airway management and the use of mechanical ventilation, the diagnosis and treatment of renal insufficiency, management and treatment of infectious problems including septic shock, management of fluids and electrolytes, and nutrition. **Valid start weeks for 4-week blocks are:** Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M95 900)

David W. Dietz, M.D., 454-7177

Clinical research in colorectal cancer and inflammatory bowel disease. Minimum rotation length: three months. Ongoing projects are focused on predictors of response to neoadjuvant therapy in rectal cancer. Currently, ^{60}Cu-ATSM PET scanning is being evaluated as a measure of tumor hypoxia and response to neoadjuvant chemoradiation. Potential also exists for the evaluation of molecular and genetic markers in this context through collaboration with the laboratory of Howard McLeod, PharmD. A number of clinical projects are also available utilizing the colorectal cancer and Crohn's disease databases maintained in the section. The student will work under the direct supervision of David W. Dietz, M.D., and other members of the Section of Colon and Rectal Surgery.

Susan E. Mackinnon, M.D., 362-4587

Peripheral nerve surgical research. Our laboratory investigates nerve injury and regeneration including nerve transplantation. The student will be encouraged to design and complete his/her own research study during the elective.

Susan E. Mackinnon, M.D., 362-4593

Plastic surgery research laboratories. Minimum rotation length: six weeks. The research rotation can be conducted in the plastic surgery laboratories under the direction of Judith M. Gurley, M.D., Alex A. Kane, M.D., James B. Lowe III, M.D., Thomas H.H. Tung, M.D., Christopher J. Hussussian, M.D., Susan E. Mackinnon, M.D., or Jeffrey L. Marsh, M.D. A project will be designed with the student prior to his/her rotation on plastic surgery so that all the materials and methods will be available at the beginning of the rotation. Ongoing projects include: (1) nerve repair and regeneration; (2) the effects of growth factors on wound healing; (3) *in vivo* tissue generation and tissue differentiation; (4) the mechanical, structural and biochemical effects of stress on scar tissue maturation; (5) *in vivo* anatomy of craniofacial deformities; and (6) outcome analysis of methods of cleft lip and palate management.

Nathaniel J. Soper, M.D., 454-8877

Minimally invasive surgery. Minimum rotation length: four weeks. Under the auspices of the Washington University Institute for Minimally Invasive Surgery

(WUIMIS), a number of surgeons are investigating the physiologic consequences of laparoscopic surgery and new applications for procedures and technologies. Nathaniel J. Soper, M.D., is currently investigating clinical outcomes of laparoscopic foregut surgery, tissue effects of RF energy applied to the esophagus, and biomechanics of tissue prostheses.

Robert W. Thompson, M.D., 362-7410
Pathophysiology of abdominal aortic aneurysms. Minimum rotation length: eight weeks. This laboratory research elective allows the student the opportunity to be exposed to, and participate in, active basic science investigations regarding the pathophysiology and treatment of abdominal aortic aneurysms. This laboratory utilizes both human clinical material and animal models of aneurysm disease, combined with molecular and cellular techniques such as Western and Northern blots, reverse transcriptase polymerase chain reactions, immunohistochemistry and *in situ* hybridization. The student will have the opportunity to integrate these laboratory studies with clinical knowledge based on a busy clinical practice in vascular surgery and to interact frequently with faculty and staff in the Section of Vascular Surgery.

Faculty

BIXBY PROFESSOR OF SURGERY AND CHAIR OF DEPARTMENT

Timothy J. Eberlein, M.D., University of Pittsburgh, 1977. (See Department of Pathology and Immunology and Alvin J. Siteman Cancer Center.)

Division of Cardiothoracic Surgery

Evarts A. Graham Professor of Surgery and Head of Division

Joel D. Cooper, M.D., Harvard College, 1964.

Professors Emeriti

Thomas B. Ferguson Sr., M.D., Duke University, 1947.

Charles L. Roper, M.D., University of Colorado, 1953.

Professors

Hendrick B. Barner, M.D., University of Washington, 1957.

John P. Boineau, M.D., Duke University, 1959.

John E. Codd, M.D., St. Louis University, 1963.

John Shoenberg Professor

Ralph J. Damiano Jr., M.D., Duke University, 1980.

William A. Gay Jr., M.D., Duke University, 1961.

Charles B. Huddleston, M.D., Vanderbilt University, 1978.

Jacqueline and William Maritz Professor

Thalachallour Mohanakumar, Ph.D., Duke University, 1974. (See Department of Medicine and Department of Pathology and Immunology.)

Michael K. Pasque, M.D., University of Oklahoma, 1978. (See Department of Radiology and Department of Biomedical Engineering.)

Joseph C. Bancroft Professor

Alec Patterson, M.D., Queen's University, 1974.

Professor (Clinical)

Ronald Leidenfrost, M.D., SUNY Upstate Medical School, 1973.

Professor (Adjunct)

James L. Cox, M.D., University of Tennessee, 1967.

Associate Professor Emeritus

Martin Bergmann, M.D. Washington University, 1945.

Associate Professors

Eric Jacobsohn, M.B.Ch.B., University of Cape Town Medical School, Cape Town, South Africa, 1984. (See Department of Anesthesiology.)

Eric N. Mendeloff, M.D., University of California, Los Angeles, 1985.

Marc R. Moon, M.D., Wayne State University, 1988.

Nabil A. Munfakh, M.D., University of Michigan, 1985.

Research Associate Professor

Richard B. Schuessler, Ph.D., Clemson University, 1977. (See Department of Biomedical Engineering.)

Assistant Professors

Michael S. Avidan, M.D., University of The Witwatersrand, South Africa, 1991. (See Department of Anesthesiology.)

Richard J. Battafarano, M.D., Hahnemann University, 1988; Ph.D., University of Minnesota, 1997.

Charl J. de Wet, M.B.Ch.B., University of Pretoria, South Africa, 1990. (See Department of Anesthesiology.)

Laureen L. Hill, M.D., University of California, Davis, 1992. (See Department of Anesthesiology.)

Jennifer S. Lawton, M.D., Hahnemann University, 1992.

Bryan F. Meyers, M.D., The University of Chicago, 1986.

Nader Moazami, M.D., Columbia University, 1992.

Instructor (Clinical)

Howard S.J. Walker, M.D., Baylor University, 1974.

Division of General Surgery

Head of Division and Professor

Gregorio A. Sicard, M.D., University of Puerto Rico, 1972. (See Department of Radiology and Clinical Investigation Program.)

Professors Emeriti

Charles B. Anderson, M.D., Yale University, 1962.

Walter F. Ballinger, M.D., University of Pennsylvania, 1948.

Jerome F. Levy, M.D., Washington University, 1958.

William W. Monafo Jr., M.D., Tufts University, 1957.

Gordon W. Philpott, M.D., Washington University, 1961.

Professors

Peter B. Angood, M.D., University of Manitoba, Canada, 1981.

Harry Edison Professor of Surgery

Timothy G. Buchman, Ph.D., University of Chicago, 1978; M.D., 1980. (See Department of Anesthesiology and Department of Medicine.)

William C. Chapman, M.D., Medical University of South Carolina, 1984.

Jeffrey A. Drebin, M.D., Ph.D., Harvard University, 1987.

James W. Fleshman Jr., M.D., Washington University, 1980.

M. Wayne Flye, M.D., University of North Carolina, 1967; Ph.D., Duke University, 1980. (See Department of Molecular Microbiology and Department of Radiology.)

Paul J. Goodfellow, Ph.D., Queens University, 1985. (See Department of Obstetrics and Gynecology and Alvin J. Siteman Cancer Center.)

Virginia A. Herrmann, M.D., St. Louis University, 1974.

Solon and Bettie Gershman Professor

Ira J. Kodner, M.D., Washington University, 1967.

Jeffrey A. Lowell, M.D., Yale University, 1985.

Jeffrey F. Moley, M.D., Columbia University, 1980. (See Alvin J. Siteman Cancer Center.)

Daniel D. Picus, M.D., The University of Chicago, 1981. (See Department of Radiology.)

Nathaniel J. Soper, M.D., University of Iowa, 1980.

Pruett Professor of Surgery

Steven M. Strasberg, M.D., University of Toronto, 1963.

Robert W. Thompson, M.D., University of Michigan, 1983. (See Department of Cell Biology and Physiology, Department of Radiology and Clinical Investigation Program.)

Samuel A. Wells Jr., M.D., Emory University, 1961.

Ming You, M.D., Ph.D., Beijing University, 1982.

Professor (Clinical)

Burton Shatz, M.D., Washington University, 1943.

Associate Professors

Dorothy A. Andriole, M.D., New York University, 1980.

Elisa H. Birnbaum, M.D., University of Illinois, 1985.

Walter A. Boyle III, M.D., University of California, San Francisco, 1977. (See Department of Anesthesiology.)

L. Michael Brunt, M.D., The Johns Hopkins University, 1980.

J. Perren Cobb, M.D., University of Louisville, 1986.

Michael D. Darcy, M.D., Ohio State University, 1979. (See Department of Radiology.)

Richard S. Hotchkiss, M.D., University of Virginia, 1976. (See Department of Anesthesiology and Department of Medicine.)

David M. Hovsepian, M.D., Columbia University, 1986. (See Department of Radiology.)

Peter A. Humphrey, M.D., Ph.D., University of Kansas, 1984. (See Department of Pathology and Immunology.)

Terry C. Lairmore, M.D., Vanderbilt University, 1988.

John Mazuski, M.D., Ph.D., University of California, Los Angeles, 1981.

Brian G. Rubin, M.D., University of Vermont, 1984. (See Department of Radiology.)

Luis A. Sanchez, M.D., Harvard University, 1987. (See Department of Radiology.)

Thomas M. Vesely, M.D., Mayo Medical School, 1986. (See Department of Radiology.)

Yian Wang, M.D., Ph.D., Beijing University, 1982.

Associate Professors Emeriti (Clinical)

Richard V. Bradley, M.D., Washington University, 1952.

Stanley L. London, M.D., Washington University, 1949.

Richard G. Sisson, M.D., Yale University, 1946.

Willard B. Walker, M.D., Washington University, 1946.

Associate Professors (Clinical)

Kenneth J. Bennett, M.D., Tulane University, 1965.

William D. Shieber, M.D., Washington University, 1953.

Research Associate Professors

William G. Dilley, Ph.D., University of California, 1970.

Timothy P. Fleming, Ph.D., University of Missouri, Columbia, 1985. (See Department of Genetics.)

Gundumi A. Upadhya, Ph.D., Bangalore University, India, 1984.

Assistant Professors

Rebecca L. Aft, Ph.D., University of Wisconsin, Madison, 1983; M.D., Washington University, 1992. (See Clinical Investigation Program.)

Daniel B. Brown, M.D., Hahnemann University, 1993. (See Department of Radiology.)

Eric Choi, M.D., The University of Chicago, 1990.

Craig M. Coopersmith, M.D., University of Pennsylvania, 1991. (See Department of Anesthesiology.)
Niraj Desai, M.D., University of Pennsylvania, 1993.
David W. Dietz, M.D., Jefferson Medical College of Thomas Jefferson University, 1993.
Jill Richardson Dietz, M.D., Jefferson Medical College of Thomas Jefferson University, 1993.
James R. Duncan, M.D., Ph.D., Washington University, 1988. (See Department of Radiology.)
J. Christopher Eagon, M.D., Harvard University, 1988.
Bradley D. Freeman, M.D., Duke University, 1988. (See Clinical Investigation Program.)
Patrick J. Geraghty, M.D., Northwestern University, 1991.
Peter S. Goedegebuure, Ph.D., Erasmus University, Rotterdam, Netherlands, 1989.
Bruce L. Hall, Ph.D., Duke University, 1991; M.D., 1992.
Martin D. Jendrisak, M.D., Ohio State University, 1978.
Mary E. Klingensmith, M.D., Duke University, 1992.
David Linehan, M.D., University of Massachusetts, 1990.
Matthew G. Mutch, M.D., Washington University, 1994.
Randall V. Olson, M.D., University of Alberta, 1995. (See Department of Radiology.)
Douglas J.E. Schuerer, M.D., University of Pittsburgh, 1995.
Surendra Shenoy, M.D., Ph.D., Kasturba Medical College, 1975.
Suresh Vedantham, M.D., The University of Chicago, 1992. (See Department of Radiology.)
Robb R. Whinney, D.O., Philadelphia College of Osteopathic Medicine, 1994.

Research Assistant Professors

Andres Jaramillo, Ph.D., University of Louisville, 1991.
William J. Lemon, Ph.D., University of Michigan, 1998.
Zhongqui Zhang, M.D., Ph.D., Capital University of Medical Sciences, 1989.

Assistant Professors Emeriti (Clinical)

George A. Oliver, M.D., Washington University, 1952.
Frank O. Richards, M.D., Howard University, 1947.
Donald C. Sauer, M.D., Washington University, 1960.

Assistant Professors (Clinical)

Kenneth J. Arnold, M.D., Washington University, 1968.
Ronald Kinateder, M.D., University of Missouri, 1966.
Jerry R. Meyers, M.D., Washington University, 1966.
Shale M. Rifkin, M.D., Washington University, 1948.
Leonard B. Weinstock, M.D., University of Rochester, 1981.

Instructor

Laurence Yee, M.D., University of Pittsburgh, 1990.

Instructors (Clinical)

Lawrence Billy, M.D., St. Louis University, 1966.
John B. Buettner, M.D., Washington University, 1967.
Michael Hayek, M.D., University of Missouri, 1982.
Elizabeth Hilliker, M.D., Washington University, 1970.
Allen P. Klippel, M.D., St. Louis University, 1946. (See Department of Medicine.)
David P. Krajcovic, M.D., Washington University, 1969.
Alan M. Londe, M.D., Washington University, 1961.
Mark A. Ludwig, M.D., The University of Chicago, 1976.
Kevin Mitchell, M.D., Howard University, 1985.
Julian C. Mosley Jr., M.D., Washington University, 1972.
Thomas Niesen, M.D., Tulane University, 1979.
Charles L. Parks, M.D., Washington University, 1969.
Ricardo Rao, M.D., University of Missouri, Columbia, 1987.
Marlys E. Schuh, M.D., Washington University, 1979.
Debra Seoane, M.D., University of Miami, 1986.
William Yates, M.D., Northwestern University, 1985.

Division of Pediatric Surgery

Head of Division and Associate Professor
Robert P. Foglia, M.D., Georgetown University, 1974.

Professor Emerita

Jessie L. Ternberg, Ph.D., University of Texas, 1950; M.D., Washington University, 1953; Sc.D. (hon.), Grinnell College, 1972. (See Department of Pediatrics.)

Assistant Professors

Patrick A. Dillon, M.D., Georgetown University, 1988. (See Department of Pediatrics.)
Tamir Keshen, M.D., New York Medical College, 1993.
George B. Mychaliska, M.D., University of California, San Francisco, 1991.

Division of Plastic and Reconstructive Surgery

Sydney M. Shoenberg, Jr. and Robert H. Shoenberg Professor of Plastic and Reconstructive Surgery and Head of Division
Susan E. Mackinnon, M.D., Queen's University, 1975. (See Department of Otolaryngology and Program in Occupational Therapy.)

Professors Emeriti

Minot P. Fryer, M.D., The Johns Hopkins University, 1940; D.S.C., Brown University, 1972.
Paul M. Weeks, M.D., University of North Carolina, 1958.

Professors

Donald V. Huebener, D.D.S., Washington University, 1969.

Appoline Blair St. Louis Children's Hospital Professor of Surgery

Jeffrey L. Marsh, M.D., The Johns Hopkins University, 1970. (See Department of Pediatrics.)

Associate Professors

Keith E. Brandt, M.D., University of Texas, Houston, 1983.

Bruce A. Kraemer, M.D., Washington University, 1979.

Research Associate Professor

Christine B. Novak, M.S., University of Toronto, 1992. (See Program in Occupational Therapy.)

Assistant Professors

Judith M. Gurley, M.D., University of North Carolina, 1990.

Christopher J. Hussussian, M.D., Yale University, 1990.

Alex A. Kane, M.D., Dartmouth University, 1991.

James B. Lowe III, M.D., University of Oklahoma, 1992.

Thomas H.H. Tung, M.D., University of Maryland, 1990.

Assistant Professors (Clinical)

Mark E. Beehner, D.D.S., Loyola University, 1979; M.D., St. Louis University, 1990.

Joseph W. Eades, M.D., Washington University, 1960.

Andrew M. Kim, D.M.D., Washington University, 1984.

Richard J. Nissen, D.D.S., University of Iowa, 1988.

Homa Youn Sedighi, D.D.S., Washington University, 1987.

Instructors

Christine J. Cheng, M.D., University of Texas Health Science Center, San Antonio, 1993.

Mary K. Seaton, B.S., University of Missouri, 1977.

Instructors (Clinical)

David A. Caplin, M.D., University of Cincinnati, 1975.

H. Groves Cooke, D.D.S., Washington University, 1971.

Bruce I. White, M.D., Washington University, 1964.

Robert A. Young, M.D., Ohio State University, 1978.

Division of Urologic Surgery

Head of Division and Professor

Gerald L. Andriole Jr., M.D., Jefferson Medical College, 1978. (See Clinical Investigation Program.)

Professor Emeritus

Charles B. Manley Jr., M.D., University of Missouri, 1958. (See Department of Pediatrics.)

Professors

William J. Catalona, M.D., Yale University, 1968.

Carl G. Klutke, M.D., University of Michigan, 1983.

Professor Emeritus (Clinical)

Robert K. Royce, M.D., Washington University, 1942.

Associate Professor

Robert S. Figenshau, M.D., University of Minnesota, 1987.

Associate Professors Emeriti (Clinical)

William T. Bowles, M.D., Stanford University, 1955.

M. Richard Carlin, M.D., Yale University, 1947.

Assistant Professors

Paul F. Austin, M.D., University of Kentucky, 1991.

Steven B. Brandes, M.D., Mt. Sinai School of Medicine, The City University of New York, 1990.

Arnold D. Bullock, M.D., The Johns Hopkins University, 1987.

Douglas E. Coplen, M.D., Indiana University, 1985.

Adam S. Kibel, M.D., Cornell University, 1991.

Jaime Landman, M.D., Columbia College of Physicians and Surgeons, 1993.

Cathy Kim Naughton, M.D., State University of New York, Buffalo, 1993.

Research Assistant Professors

Steven Weintraub, M.D., Medical College of Virginia, 1985.

Yan Yan, Ph.D., Nanjing Medical College, China, 1983.

Assistant Professors Emeriti (Clinical)

Lawrence M. Aronberg, M.D., Washington University, 1936.

Richard P. Parsons, M.D., Washington University, 1958.

Assistant Professor (Clinical)

James G. Bucy, M.D., Northwestern University, 1962.

Instructor

Charles H. Nicolai, M.D., Washington University, 1946.

Instructors (Clinical)

Demetrios Katsikas, M.D., Wayne State University, 1989.

Saul Klein, M.D., Syracuse University, 1959.

Neal Neuman, M.D., St. Louis University, 1971.

Athanase Nicolaidis, M.D., Faculty of Medicine, University of Paris, 1961.

Jeffrey A. Parres, M.D., University of Missouri, 1987.

Enrique P. Perinetti, M.D., National University of Cuyo, 1968.

Courtney Shands III, M.D., Vanderbilt University, 1982.

Herbert Sunshine, M.D., Washington University, 1954.

Ralph J. Torrence, M.D., Georgetown University, 1980.

Brad White, M.D., Loyola University, 1993.

ALVIN J. SITEMAN CANCER CENTER

The Alvin J. Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine is world renowned for its basic science and translational research. The Siteman Cancer Center (SCC) enhances and promotes interactions among the cancer research efforts throughout the campus and has provided an organizational focus and stimulus for researchers to continue to produce high quality institutional research. The Center holds more than $95 million in extramural funding for cancer research and is organized into eight research programs (cancer genetics, cancer and developmental biology, tumor immunology, hematopoietic development and malignancy, cellular proliferation, oncologic imaging, prevention and control, and clinical and translational research). The SCC also provides 12 shared resource facilities to its more than 250 research members. Shared resource facilities include: bioinformatics core, biostatistics core, clinical trials core, embryonic stem cell core, hereditary cancer core, high speed cell sorter core, molecular core laboratory, multiplexed gene analysis core, pharmacology core, proteomics core, small animal cancer imaging core and tissue procurement core.

The SCC provides numerous opportunities in cancer research education and training through seminars, conferences, courses and research opportunities. Individuals are encouraged to contact the Siteman Cancer Center at (800) 600-3606 or via the web site *www.siteman.wustl.edu* for more information. A few educational opportunities are listed below.

SCC Basic Science Seminar Series

The SCC sponsors a campus-wide seminar series for basic cancer biology topics on the first Thursday of each month at 3 p.m. at the Eric P. Newman Education Center. Speaker information can be found on the SCC web site at *www.siteman.wustl.edu*. Attendance is open.

Research Program Specific Activities

All of the Siteman Cancer Center research programs have regular internal seminars or work-in-progress discussion groups, and these frequently involve students and postdocs.

- The Cancer Genetics Program has a seminar on the second Tuesday of each month; a new discussion group around new gene discovery is planned. Contact Paul J. Goodfellow, Ph.D., for more information.
- The Cancer and Developmental Biology Program runs a biweekly laboratory research presentation seminar, which meets at 9 a.m. on Tuesdays. Contact David M. Ornitz, Ph.D., M.D., for more information.
- The Tumor Immunology Program utilizes the long-standing Immunology Seminar Series sponsored by the Department of Pathology and Immunology at 4 p.m. on Mondays in the Eric P. Newman Education Center. There are also dedicated sessions allotted to the topics of Tumor Immunology. Contact Robert D. Schreiber, Ph.D., for more information.
- The Hematopoietic Development and Malignancy Program convenes a weekly journal club to review primary and published data. About three-fourths of the presentations are in a journal club format, with the remainder from participating laboratories. Current literature regarding hematopoiesis and current trials in gene therapy are presented and critically reviewed. Contact Timothy J. Ley, M.D., for more information.
- The Cellular Proliferation Program sponsors a weekly seminar series entitled "Signaling/Cell Cycle." Each academic year, up to six speakers from outside the medical school are invited to present their current work. On weeks alternating with invited speakers, graduate students and postdoctoral research fellows working in the laboratories of our members present their research. Contact Helen M. Piwnica-Worms, Ph.D., for more information.
- The Marilyn Fixman Clinical Cancer Conference is held on the third Wednesday of each month in the Steinberg Amphitheater on the Barnes-Jewish Hospital north campus. Speakers at this conference present a disease-based clinical topic at each session. Contact the SCC administration office at (314) 454-8439 for the schedule.
- The Prevention and Control Program has multiple regular research group meetings in nicotine dependence and smoking cessation, early detection, cancer communication and intervention research and psychosocial factors. Contact Edwin B. Fisher, Ph.D., for more information.
- There are more than 15 weekly/biweekly disease-based clinical conferences, and these can be found on the SCC web site.

Cancer Biology Special Emphasis Pathway

The SCC launched a new special emphasis pathway as part of the Division of Biology and Biomedical Sciences graduate program in 2002. The SCC will sponsor up to 16 students per year to participate in the program, which will be focused on multi-disciplinary cancer biology research. The pathway will include participation in a cancer biology course, the SCC basic science seminar series, work-in-progress inter-lab meetings and journal clubs with at least one of the five basic research programs within the SCC. For more information on this new program contact Lee Ratner, M.D., Ph.D.

Faculty

Spencer T. and Ann W. Olin Distinguished Professor and Director

Timothy J. Eberlein, M.D., University of Pittsburgh, 1977. (See Department of Pathology and Immunology and Department of Surgery.)

Deputy Director

John F. DiPersio, M.D., Ph.D., University of Rochester, 1980. (See Department of Medicine, Department of Pathology and Immunology, and Department of Pediatrics.)

Associate Director of Basic Research; Program Leader, Hematopoietic Development and Malignancy; Core Director, Embryonic Stem Cell

Timothy J. Ley, M.D., Washington University, 1978. (See Department of Genetics and Department of Medicine.)

Associate Director of Clinical Investigations; Program Leader, Clinical and Translational Research

Jeffrey F. Moley, M.D., Columbia University, 1980. (See Department of Surgery.)

Associate Director of Prevention and Control; Program Co-Leader, Prevention and Control

Edwin B. Fisher, Ph.D., State University of New York, 1972. (See Department of Medicine.) (Also Department of Psychology)

Education Program Leader

Lee Ratner, M.D., Ph.D., Yale University, 1979. (See Department of Medicine and Department of Molecular Microbiology.)

Program Leader, Cancer Genetics; Core Co-Director, Hereditary Cancer

Paul J. Goodfellow, Ph.D., Queens University, 1985. (See Department of Genetics, Department of Obstetrics and Gynecology and Department of Surgery.)

Program Leader, Cancer and Developmental Biology

David M. Ornitz, Ph.D., University of Washington, 1987; M.D., 1988. (See Department of Molecular Biology and Pharmacology.)

Program Leader, Tumor Immunology

Robert D. Schreiber, Ph.D., State University of New York, 1973. (See Department of Molecular Microbiology and Department of Pathology and Immunology.)

Program Leader, Cellular Proliferation

Helen M. Piwnica-Worms, Ph.D., Duke University, 1984. (See Department of Cell Biology and Physiology.)

Program Co-Leader, Prevention and Control

Ross C. Brownson, Ph.D., Colorado State University, 1985. (St. Louis University School of Public Health)

Program Leader, Oncologic Imaging; Core Co-Director, Small Animal Cancer Imaging

Michael J. Welch, Ph.D., University of London, 1965. (See Department of Molecular Biology and Pharmacology, Department of Radiology and Department of Biomedical Engineering.)

Program Leader, Developmental Therapeutics

Paula M. Fracasso, M.D., Ph.D., Yale University, 1984. (See Department of Medicine.)

Core Director, Bioinformatics

Jeffrey D. Milbrandt, M.D., Washington University, 1978; Ph.D., University of Virginia, 1983. (See Department of Medicine and Department of Pathology and Immunology.)

Core Director, Biostatistics

J. Philip Miller, A.B., Washington University, 1965. (See Division of Biostatistics.)

Core Director, Clinical Trials

Jeff M. Michalski, M.D., Medical College of Wisconsin, 1986. (See Department of Radiation Oncology.)

Core Co-Director, Good Manufacturing Practice (GMP) Facility

Steven M. Devine, M.D., University of Massachusetts, 1987. (See Department of Medicine.)

Core Co-Director, Good Manufacturing Practice (GMP) Facility

Jan A. Nolta, Ph.D., University of Southern California, 1997. (See Department of Medicine.)

Core Co-Director, Hereditary Cancer

Alison J. Whelan, M.D., Washington University, 1986. (See Department of Medicine and Department of Pediatrics.)

Core Director, High-Speed Cell Sorter

Timothy A. Graubert, M.D., Harvard University, 1988. (See Department of Medicine.)

Core Director, Molecular Core Laboratory

Barbara A. Zehnbauer, Ph.D., The University of Chicago, 1979. (See Department of Pathology and Immunology and Department of Pediatrics.)

Core Director, Multiplexed Gene Analysis; Core Director, Tissue Procurement

Mark A. Watson, M.D., Ph.D., Washington University, 1992. (See Department of Pathology and Immunology.)

Core Director, Pharmacology

Howard L. McLeod, Pharm.D., Philadelphia College of Pharmacy and Science, 1990. (See Department of Genetics and Department of Medicine.)

Core Director, Proteomics

R. Reid Townsend, M.D., Tulane University, 1976; Ph.D., The Johns Hopkins University, 1982. (See Department of Medicine.)

Core Co-Director, Small Animal Cancer Imaging

Joseph J.H. Ackerman, Ph.D., Colorado State University, 1977. (See Department of Chemistry.)

Co-Chair, Protocol Review and Monitoring Committee

Joel Picus, M.D., Harvard Medical School, 1984. (See Department of Medicine.)

Co-Chair, Protocol Review and Monitoring Committee

Barry A. Siegel, M.D., Washington University, 1969. (See Department of Medicine, Department of Radiology and Clinical Investigation Program.)

TEACHING AND RESEARCH DIVISIONS, AND PROGRAMS

DIVISION OF BIOSTATISTICS

The Division of Biostatistics is a medical school-wide facility that engages in teaching, research and biostatistical consultation activities. Interested students may pursue intensive studies through electives offered by the division. At the initiative of other departments, the division also offers additional short courses in biostatistics. The division participates actively in both pre-doctoral and post-doctoral training. In addition to the core research program of the division, its research activities include collaborative projects with various departments of the medical school. Biostatistical consultation represents an important activity of the division, providing expertise in both theoretical and applied areas.

Research activities of the division span a wide range of topics dealing with a number of disorders of considerable public health importance, and provide research opportunities at both theoretical and applied levels. Several research projects involve close interaction and collaboration with a number of research groups at the Medical Center. The present core research program of the division deals with genetic epidemiology, especially as it relates to cardiovascular disease. A number of theoretical and applied problems are addressed, including: nature-nurture resolution and identification of the genetic basis of risk factor domains such as lipids, obesity, blood pressure and hypertension, and insulin resistance and diabetes; exploration of temporal trends in the degree of genetic and environmental effects; and multivariate associations among multiple risk factors. Timely theoretical issues also are addressed, such as the sampling of families through patients and statistical properties of methods of data analysis. Most recent research also emphasizes gene-gene and gene-environment interactions.

Present collaborative research projects include: a coordinating center for a multicenter family and genetic study of heart disease (FHS); a coordinating center for a multicenter study to assess the genetic basis of coronary artery calcification (SCAN); a coordinating center for a multicenter study to assess the genetic basis of response to exercise training (HERITAGE); a coordinating center for a multicenter NETWORK study on the genetics of hypertension (HyperGEN) and the Family Blood Pressure Program (FBPP); coordinating centers for two multicenter studies to assess the genetic basis of response to intervention through incorporation of gene-environment interactions (GOLDN and GenSalt); a coordinating center for the Consortium for Radiologic Imaging Studies for Polycystic Kidney Disease (CRISP) to determine the effectiveness of new and innovative imaging methods for monitoring and assessing the progress of PKD; a coordinating center for the Polycystic Kidney Disease Treatment Network (PKD-TN) to evaluate hypertensive medications that may be effective in slowing progression of PKD in individuals suffering from the disease; a coordinating center for a trial in ocular hypertensives (OHTS); important collaborative studies of Alzheimer's disease and cancer through support roles as the ADRC biostatistics core and the Alvin J. Siteman Cancer Center biostatistics core; studies on ischemic heart disease; several epidemiological research projects developing methods for increasing public awareness and utilization of measures that are known to decrease the likelihood of developing heart disease and for encouraging behaviors that will improve prognosis following a heart attack.

The division provides consultation in a wide range of areas including the statistical design of experiments and clinical trials, protocol development, database management, analysis of data and interpretation of results. Some of the areas of special strength and expertise include cardiovascular biostatistics, computing and statistical packages. The division is well-equipped to provide assistance at the stage of preparing grant applications, including careful discussions of study design, sample size calculations, randomization schemes, computer resources and data analysis.

GENETIC EPIDEMIOLOGY MASTER OF SCIENCE (GEMS) PROGRAM (M21)

The Genetic Epidemiology Master of Science (GEMS) training program provides an interdisciplinary educational opportunity for people who want to work at the dynamic nexus of genetics and medicine. There are growing needs for scientists with this training both in academia and industry. With the wealth of data from the Human Genome Project and the availability of powerful new computational approaches, abundant opportunities are now available to explore and characterize the interplay between genes and the environment that affect the biological processes that underlie disease.

MASTER OF SCIENCE (M.S.) DEGREE

The core faculty for this multidisciplinary program come from 11 departments/divisions in the School of Medicine. The GEMS degree program is sponsored by the Division of Biostatistics and the departments of Genetics and Psychiatry, and includes world-renowned scientific leaders in their respective areas. D.C. Rao, Ph.D., director of the Division of Biostatistics and the GEMS program director, is one of the founding fathers of the field. The full-time, two-year, 44 credit hour GEMS program is designed to prepare students to work at the interface of genetics, statistics, epidemiology and computing.

CERTIFICATE IN GENETIC EPIDEMIOLOGY

We offer a Certificate in Genetic Epidemiology exclusively to Washington University faculty and staff. The Certificate may be earned after successful completion (with a minimum of a "B" average) of five core courses (15 credit hours) that are normally offered to Master's candidates in Genetic Epidemiology. These courses are: M21 505 Biostatistics for Research Workers, M21 515 Fundamentals of Genetic Epidemiology, M21 500 Introduction to General Epidemiology (all offered in the fall semester), and M21 5482 Human Linkage and Association Analysis and M21 550 Introduction to Bioinformatics (both offered in the spring semester). Courses may be taken over a period of several years.

Prospective Students

Since Genetic Epidemiology is an interdisciplinary field, we expect applicants to come from a variety of backgrounds, but primarily from the biological or the quantitative sciences, and possibly at different points in their careers: undergraduates with quantitative sciences (e.g., mathematics through calculus plus one semester of statistics) and/or biological sciences (at least through Fundamentals of Biology III: Genetics or equivalent) background; people with terminal degrees in other (related) disciplines who seek to gain expertise in genetic epidemiology; current employees of pharmaceutical and biotechnology companies seeking additional training and formal credentials in the field. All prospective students must provide evidence of basic skills in computer programming through coursework, documented experience or by passing a proficiency exam. Promising candidates who do not meet all the prerequisites will work with the Program Director to take the appropriate courses or training to rectify weaknesses.

Location

The GEMS Program is located in the Division of Biostatistics at 706 S. Euclid Ave. (Old Shriner's Hospital).

Further Information

See our website at **www.biostat.wustl.edu/gems** or contact the Program Administrator (362-1052 or **pa@wubios.wustl.edu**) or write to:

The GEMS Program
Division of Biostatistics
Campus Box 8067
660 S. Euclid Ave.
St. Louis, MO 63110-1093
Telephone: (314) 362-1052
Fax: (314) 362-2693

Registration Instructions

Students will register with the Program Administrator in Genetic Epidemiology. Before registering, current Washington University students must obtain appropriate consent from their division. Students outside the GEMS program enrolling in individual courses must have permission of the coursemaster.

Academic Calendar

The GEMS program follows the calendar of the College of Arts and Sciences.

M21 500 INTRODUCTION TO GENERAL EPIDEMIOLOGY

Instructor: *Linda B. Cottler, Ph.D.,* 286-2252

Epidemiology is the study of health and disease in the population. This course, while introducing epidemiologic methods and classic medical studies, emphasizes the clinical importance of psychiatric epidemiology. Credit: 3 units. Cross-listed as M08 500 (MPE).

M21 505 BIOSTATISTICS FOR RESEARCH WORKERS

Instructors: *Michael A. Province, Ph.D.*, 362-3616; *Kenneth B. Schechtman, Ph.D.*, 362-2271

Designed for those researchers who want to expand their knowledge of practical methods in statistics. Oriented toward statistical and epidemiological concepts, applications, practical hints and hands-on approach to data, rather than theory or derivation of formulas. Heavy use is made of SAS/PC for in-class examples and homework problems. We will cover classical methods (e.g., t-test, chi-square, correlation), multivariate methods (regression, logistic models, ANOVA, survival analysis), study design, probability and maximum likelihood. Some selected topics (e.g., reliability, factor analysis, survey and sampling, research design) are then covered in greater detail. Credit: 3 units. Cross-listed as M08 505A (MPE) and L41 5066 (Biology).

M21 515 FUNDAMENTALS OF GENETIC EPIDEMIOLOGY

Instructors: *Treva K. Rice, Ph.D.,* 362-3662; *Brian K. Suarez, Ph.D.,* 362-9433

Causes of phenotypic variation, familial resemblance/aggregation, heritability (family, twin and adoption designs), biometrical genetics, Hardy-Weinberg Equilibrium, major gene, segregation analysis, ascertainment, study designs, basic concepts in linkage and association analysis. (Lab practice with SEGPATH, PAP, S.A.G.E.) Credit: 3 units.

M21 535 POPULATION GENETICS

Instructor: *Alan R. Templeton, Ph.D.,* 935-6868

An introduction to the basic principles of population and ecological genetics. Mechanisms of microevolutionary processes; integrated ecological and genetic approach to study the adaptive nature of the evolutionary process. Prerequisite: L41 3051 Fundamentals of Biology III: Genetics. Credit: 3 units. Cross-listed as L41 4181 (Biology). Credit: 3 units.

M21 540 ADVANCED TOPICS IN GENETIC EPIDEMIOLOGY

Instructors: *Ingrid B. Borecki, Ph.D.,* 362-3690; *John P. Rice, Ph.D.,* 286-2572

Approaches and methods to take an investigation from the discovery of a genetic influence on a complex trait to gene localization and characterization; linkage and association studies with emphasis on quantitative traits; parametric vs. non-parametric linkage methods; measured genotype analysis; concepts in population genetics; fine mapping and gene localization; characterization of genetic effects; role of animal models; current concepts in the genetics of complex traits including coronary heart disease, cancer, psychiatric disorders. Lecture and computer labs. Prerequisite: M21 515 Fundamentals of Genetic Epidemiology. Credit: 3 units.

M21 5482 HUMAN LINKAGE AND ASSOCIATION ANALYSIS

Instructors: *Anne M. Bowcock, Ph.D.,* 747-3264; *John P. Rice, Ph.D.,* 286-2572

Meiosis, inheritance, Hardy-Weinberg Equilibrium, Linkage: definition, crossing over, map functions, phase, LOD scores, genetic heterogeneity, penetrance, phenocopies, and liability classes, multipoint analysis, non-parametric analysis (sibpairs and pedigrees), quantitative trait analysis, determination of power for mendelian and complex trait analysis, linkage disequilibrium analyses, allelic association (case control designs and family bases studies). Credit: 2 units. Cross-listed as M08 5482 (Genetics).

M21 550 INTRODUCTION TO BIOINFORMATICS

Instructors: *C. Charles Gu, Ph.D.,* 362-3642; *Gary D. Stormo, Ph.D.,* 747-5534

Provide a broad exposure to the basic concepts, methodology and application of bioinformatics to solve biological problems. Specifically, the students will learn the basics of online genomic/protein databases and database mining tools, and acquire understanding of mathematical algorithms in genome sequence analysis (alignment analysis, gene finding/predicting), and of the impact of recent developments in the DNA chip technology. Prerequisite: M21 505 Biostatistics for Research Workers. Credit: 3 units.

M21 599 DIRECTED INDEPENDENT STUDY

Instructors: *D.C. Rao, Ph.D.,* 362-3608; *Michael Lovett, Ph.D.,* 747-3265

A faculty member will work with the student in specific areas related to the student's primary needs. Prerequisite: permission of the instructor. Credit: variable, maximum 6 units.

M21 601 INDEPENDENT STUDY

Instructors: *D.C. Rao, Ph.D.,* 362-3608; *Michael Lovett, Ph.D.,* 747-3265

Student selects a faculty mentor in consultation with the coursemasters and pursues independent study in the mentor's lab. The general goal is to strengthen the overall learning portfolio for the student. If specific areas are not indicated for additional study, work could be initiated toward the Independent Research/Apprenticeship to be carried out in the spring. Credit: 2 units.

M21 610 INDEPENDENT RESEARCH

Instructors: *D.C. Rao, Ph.D.,* 362-3608; *Michael Lovett, Ph.D.,* 747-3265

Student selects a faculty mentor in consultation with the instructors to undertake a supervised research project in the mentor's lab. The goal is to acquire independent research skills and to develop excellent writing and presentation abilities. A report based on the research must be written in the format of an actual scientific publication and presented to a select audience. Credit: 9 units.

M21 615 STUDY DESIGN AND MANAGEMENT

Instructors: *J. Philip Miller, A.B.,* 362-3617; *C. Charles Gu, Ph.D.,* 362-3642

Learn critical study design issues; optimal study designs; cost-benefit analysis; power analysis; study management issues (protocols, data entry, data flow, database management, QC); special considerations for multicenter studies; human studies; principles and issues in designing linkage and association studies; and ethical, legal and social issues concerning human studies. Prerequisites: M21 505 Biostatistics for Research Workers and M21 540 Advanced Topics in Genetic Epidemiology. Credit: 3 units.

M21 625 TRENDS IN GENETIC EPIDEMIOLOGY

Instructors: *Michael A. Province, Ph.D.,* 362-3616; *Howard L. McLeod, Ph.D.,* 747-5183

This course covers timely special issues and therefore some topics may change from year to year. It will start with the following topics in the first year: Pharmacogenomics, Data Mining and Pattern Recognition, Heterogeneity, Meta-analysis, Sequential Analysis, and Identification of Functional Variants. Prerequisite: M21 540 Advanced Topics in Genetic Epidemiology and permission of the instructor. Credit: 3 units.

Faculty

PROFESSOR AND DIRECTOR

Dabeeru C. Rao, Ph.D., Indian Statistical Institute, 1971. (See Department of Genetics and Department of Psychiatry.)

Professors

Mae Etsuko Gordon, Ph.D., University of Wisconsin, 1978. (See Department of Ophthalmology and Visual Sciences.)

J. Philip Miller, A.B., Washington University, 1965. (See Alvin J. Siteman Cancer Center.)

Michael A. Province, Ph.D., Washington University, 1987.

John P. Rice, Ph.D., Washington University, 1975. (See Department of Psychiatry.)

Stanley Sawyer, Ph.D., California Institute of Technology, 1964. (Also Faculty of Arts and Sciences)

Edward L. Spitznagel Jr., Ph.D., The University of Chicago, 1965. (Also Faculty of Arts and Sciences)

Associate Professor

Ingrid B. Borecki, Ph.D., University of Hawaii, 1981. (See Department of Genetics.)

Kenneth B. Schechtman, Ph.D., Washington University, 1978. (See Department of Medicine and Alvin J. Siteman Cancer Center.)

Research Associate Professors

Curtis A. Parvin, Ph.D., University of Minnesota, 1980. (See Department of Medicine and Department of Pathology and Immunology.)

Treva K. Rice, Ph.D., University of Colorado, 1987.

Paul A. Thompson, Ph.D., University of North Carolina, 1983.

Assistant Professor Emerita

Barbara B. Hixon, B.S., University of Illinois, 1941.

Assistant Professors

Michael R. DeBaun, M.D., Stanford University, 1987. (See Department of Pediatrics.)

C. Charles Gu, Ph.D., Washington University, 1992.

William D. Shannon, Ph.D., University of Pittsburgh, 1995. (See Department of Medicine.)

Research Assistant Professors

Ping An, M.D., Shanghai Medical University, Shanghai, China, 1987.

Mary Feitosa, Ph.D., University of Sao Paulo, Sao Paulo, Brazil, 1990.

Feng Gao, Ph.D., Emory University, 2002.

Chengjie Xiong, Ph.D., Kansas State University, 1997.

Yan Yan, Ph.D., Johns Hopkins School of Hygiene and Public Health, 1998. (See Department of Surgery.)

Kai Yu, Ph.D., University of Pittsburgh, 2000.

Research Instructors

Jonathan Corbett, Ph.D., Washington University, 1999.

Aldi Kraja, Ph.D., University of Illinois, Urbana, 1999.

PROGRAM IN MEDICAL HUMANITIES

The Humanities Program in Medicine is a University-wide program dedicated to providing students with a broadened exposure to areas other than the biological sciences during their medical education. These areas include clinical ethics, jurisprudence, history, economics, literature and health policy. The program is directed from the dean's office at the medical school and utilizes faculty located at the Hilltop Campus, medical school and law school, as well as extramural faculty.

The mission of the program is to generate an appreciation of the relationship of human experience, culture, institutions and values to medicine and thereby help to educate professionals who will apply that understanding to their activities as practicing physicians, biomedical researchers and/or medical administrators. This program is an enhancement of an already strong curriculum in order to prepare medical students to pursue their professional careers more effectively. It takes a major role in the Practice of Medicine course integrated over the first two years of medical school. In addition, several electives are offered during the fourth year.

M80 541 TOPICS IN MEDICINE/MEDICAL HUMANITIES

Instructors: *Rebecca Dresser, J.D.; Stephen S. Lefrak, M.D.,* 454-7116

This is a required course given in the spring semester of the first year of medical school. This interdepartmental course is highly coordinated with Medical Humanities. Students select topics of interest for in-depth study initiated by discussions in a small-group, seminar format. Development of topics includes input from a broad range of disciplines, including sociology, philosophy, ethics, history, communications and economics, as well as the biological and medical sciences. It is offered as a menu of mini-courses, each limited to approximately 20 students. Each section consists of six two-hour sessions with a faculty member(s) devoted to an individual subject. Each student must select one course from the menu.

OTHER COURSES

M04 582-01 ALZHEIMER'S DISEASE IN THE CLINIC AND THE LAB

Instructors: *John C. Morris, M.D.; Alison M. Goate, D.Phil.; David M. Holtzman, M.D.; Eugene M. Johnson Jr., Ph.D.; James E. Galvin, M.D.; Randy Lee Buckner, Ph.D.; Daniel W. McKeel Jr., M.D.; Joseph L. Price, D.Phil.; Thomas M. Meuser, Ph.D.; and others*
(all: 286-2881)

Alzheimer's disease (AD) affects more than 4 million Americans and this number will increase substantially as our population ages. The cost of caring for AD patients has been estimated at over $100 billion annually. The human toll on patients and family members can be heartbreaking. Patients and families turn to primary care and specialist physicians (e.g., neurologists, psychiatrists, geriatricians) for answers to their plight. The good news for physicians is that research on AD is moving at a rapid pace. Exciting advances in diagnostic techniques have occurred and new treatments are in the FDA approval pipeline.

Students in this course will be treated to a dynamic overview of the most exciting areas of AD clinical and basic science research from one of the top Alzheimer Disease Research Centers in the world. Find out how amyloid plaques and other AD-related abnormalities form in the brain and new discoveries about their possible reversal! The course includes lecture and student presentation components, as well as opportunities to observe patients and families in an active dementia clinic, participate in neuropathology evaluations of demented individuals, and access to Alzheimer investigators in molecular genetics, cell biology and neuroanatomy.

M80 856 HEALTH ADMINISTRATION I

Instructor: *Dennis L. Lambert, Ph.D.*, 362-3266

During the last decade, the U.S. health care system has undergone dynamic change. Socioeconomic and policy changes have resulted in a continuing evolution of new forms of health care delivery. The goal of this elective is to expose the senior medical student to the organization of the health care delivery system in the U.S. and discuss changes that have impacted the financing, organization and delivery of health care. Students will also be exposed to the various methods insurers use for payment, and will become familiar with current organizations and operations of selected inpatient and outpatient provider organizations. The course will be conducted by faculty using a seminar approach drawing upon background textbooks, monographs, timely topical articles and current research publications to focus the weekly discussions.

By prior arrangement with the coursemaster, the medical student may elect to audit Health Administration Program classes of their choice in finance, human resource management, health law, health policy, and management information systems. This will be arranged according to individual interests and schedules. **Valid start weeks for 4-week blocks are:** Weeks 13, 17, 21, 25, 29, 33, 37 and 41. **Valid start weeks for longer blocks are:** Weeks 13, 17 and 29.

GRADUATE PROGRAMS

DIVISION OF BIOLOGY AND BIOMEDICAL SCIENCES

The Division of Biology and Biomedical Sciences, organized in 1973, is a consortium of university departments that together provide interdisciplinary training for full-time Ph.D. students. This unique organization was formed because of the realization that research and training in modern biology transcend the limits of departmental structure. The faculty consists of members of seven preclinical departments in the School of Medicine — Anatomy and Neurobiology, Biochemistry and Molecular Biophysics, Cell Biology and Physiology, Genetics, Molecular Microbiology, Pathology and Immunology, and Molecular Biology and Pharmacology; 10 clinical departments — Anesthesiology, Medicine, Neurology and Neurological Surgery, Obstetrics and Gynecology, Ophthalmology and Visual Sciences, Otolaryngology, Pediatrics, Psychiatry, Radiology and Surgery; the Department of Biology; and the Department of Chemistry in the School of Arts and Sciences. More than 300 faculty are affiliated with one or more of 12 broad training programs: Biochemistry, Chemical Biology, Computational Biology, Developmental Biology, Evolution Ecology and Population Biology, Immunology, Molecular Biophysics, Molecular Cell Biology, Molecular Genetics, Molecular Microbiology and Microbial Pathogenesis, Neurosciences, and Plant Biology. Faculty in these programs take responsibility for all divisional activities, including recruiting, admissions, advising and research training. In addition, many divisional courses and seminars are offered by the participating faculty.

Currently, more than 500 graduate students are enrolled in the Division, including 150 students pursuing both the Ph.D. and the M.D. through the Medical Scientist Training Program (see page 20). Requirements for the Ph.D. include a series of courses tailored to a student's background and interests, qualifying examinations, execution of laboratory research and defense of a dissertation generated through original scientific investigation. Although students enter the Division through an affiliation with one of the 12 programs, it is possible for a student to transfer to another program as interests evolve. During the first year, advisers are appointed to assist students in selecting courses and seminars, as well as to help them in choosing three laboratory rotations in which they will spend several months becoming acquainted with a particular area of scientific research. Most students choose a research adviser by the end of the first year.

Applications for admission to the Ph.D. programs of the Division are due December 15 for matriculation the following fall. Admission is based on demonstrated ability, future promise and the number of positions currently available. Applicants should have completed rigorous undergraduate training in biology, chemistry, physics or related fields at a high level of scholastic achievement. It is required that each applicant take the aptitude test of the Graduate Record Examination (GRE). The advanced GRE subject test is highly recommended. Additional information and application for admission to the Ph.D. programs may be obtained from our web site at *dbbs.wustl.edu* or by writing to the Director of Admissions, Washington University School of Medicine, Campus Box 8226, 660 S. Euclid Ave., St. Louis, Missouri 63110-1093 (e-mail: *admissions@dbbs.wustl.edu*). Students who wish to pursue both the Ph.D. and M.D. degrees must apply to the Medical Scientist Training Program (see page 20).

Students admitted to the graduate programs are guaranteed full stipend and tuition support contingent upon satisfactory performance. The stipend for the 2003-2004 academic year will be $21,500 annually. Tuition remission is provided to all students, and life, disability and health care also is provided by the Medical Center Student Health Service. The Division provides support for its Ph.D. students from several sources, including federally funded training grants provided by the National Institutes of Health.

The following graduate courses are offered by the Division of Biology and Biomedical Sciences, and they are available both to Ph.D. and M.D. students who meet the prerequisites for the appropriate course. Those courses particularly relevant to a given department are cross-listed under the department in this Bulletin. Faculty members in charge of courses and their departmental affiliations are shown at the end of each course description.

L41 (Bio) 501 HUMAN ANATOMY

For full description, see Department of Anatomy and Neurobiology's M05 501A Human Anatomy and Development.

L41 (Bio) 5011 ETHICS AND RESEARCH SCIENCE

Instructor: *Staff, Division of Biology and Biomedical Sciences,* 362-3365

Exploration of ethical issues research scientists confront on a daily basis. Topics will include, but are not limited to: student-mentor relationships, allegations of fraud, collaborators' rights and responsibilities, conflicts of interest and confidentiality. Case study and scenario presentations will provide focus for discussions. Prerequisite: open to graduate students engaged in research. Six 90-minute sessions. Credit: 1 unit.

L41 (Bio) 502 GENERAL PHYSIOLOGY

Instructor: *Robert S. Wilkinson, Ph.D.,* 362-2300

This course applies the fundamental physiological mechanisms of cell biology to the functions of the major organ systems of the body, namely, the cardiovascular, renal, respiratory, gastrointestinal and

endocrine systems. The course is intended primarily for first-year medical students. The Physiology and Microscopic Anatomy courses are closely coordinated within the same schedule. Course continues into the spring semester with a different schedule. Prerequisites: Bio 5061 or the equivalent and permission of course director. Credit: 6 units.

L41 (Bio) 5051 FOUNDATIONS IN IMMUNOLOGY

Instructor: *Herbert W. Virgin IV, M.D., Ph.D.*, 362-9223

Designed for graduate students as an in-depth introduction to immunology. Topics: antibody structure and genetics, B cell recognition, T cell receptor, major histocompatibility complex, T cell recognition, regulation of the immune response, immune mediators, humoral and cellular effector mechanisms. Discussion group will meet once a week on Thursday from 3-5 p.m. Prerequisite: Introductory Biochemistry and/or Genetics helpful. Permission of instructor. This course is referenced in the Department of Pathology and Immunology. Credit: 4 units.

L41 (Bio) 5062 CENTRAL QUESTIONS IN CELL BIOLOGY

Instructor: *Guojun Bu, Ph.D.*, 286-2860

This course explores areas of cell biology under active investigation. Topics include receptor biology, protein trafficking, signal transduction pathways. Special emphasis will be on the neuronal aspects of cell biology, with examples of pathogenesis of neurological diseases. For each section, introductory lectures are accompanied by discussions of experimental techniques and evaluations of the strategies employed in recent original papers. Prerequisites: L41 (Bio) 5068, or permission of instructor. Two hours each week alternating between lectures and discussions. This is referenced in the Department of Cell Biology and Physiology. Credit: 2 units.

L41 (Bio) 5065 CELL BIOLOGY OF THE STRESS RESPONSE

Instructor: *Joseph L. Roti Roti, Ph.D.*, 362-9770

Both prokaryotic and eukaryotic cells have evolved strategies to cope with potentially lethal stresses. Current knowledge of these stress responses will be discussed, including the repair of damaged DNA, cell-cycle check-point pathways, scavenging free radicals and alteration of gene expression to resist further exposure to stress. Prerequisite: Protein Chemistry, Nucleic Acid Chemistry. Two hours lecture and one hour journal club per week, with students presenting assigned paper(s). Credit: 2 units.

L41 (Bio) 5066 BIOSTATISTICS FOR RESEARCH WORKERS

For full description, see Division of Biostatistics, M21 505.

L41 (Bio) 5067 INTRO TO BIOINFORMATICS

Instructors: *C. Charles Gu, Ph.D.*, 362-3642; *Gary D. Stormo, Ph.D.*, 747-5534

Provide a broad exposure to the basic concepts, methodology and application of bioinformatics to solve biological problems. Specifically, the students will learn the basics of online genomic/protein databases and database mining tools, and will acquire understanding of mathematical algorithms in genome sequence analysis (alignment analysis, gene finding/predicting), and of the impact of recent developments in the DNA chip technology. Prerequisite: M21 505 Biostatistics for Research Workers. Same as M21 GEMS 550.

L41 (Bio) 5068 FUNDAMENTALS OF MOLECULAR CELL BIOLOGY

Instructor: *John A. Cooper, M.D., Ph.D.*, 362-3964

This course is one of the two fall courses that comprise the core curriculum for the graduate programs in Cell and Molecular Biology. The goal of the course is for incoming graduate students to learn about research on molecular mechanisms that underlie cell structure and function. As such, the course emphasizes research and experimental strategies. The course includes a strong emphasis on how the techniques and approaches of protein biochemistry are used in cell biology research. Topics covered in the course include protein structure analysis, protein purification, membrane structure and function, protein and vesicular trafficking, enzyme kinetics, receptor-ligand binding, membrane channel electrophysiology, signal transduction, the cell cycle, apoptosis, cell motility and extracellular matrix. The format is two lectures and one small group discussion section per week. Each discussion section focuses on one or more original research articles, which the students read, prepare written critiques, and discuss in the group, which is facilitated by a faculty member. Exams are open-book and taken home over a weekend. Enrollment is restricted to graduate students in the Ph.D. programs of the Division of Biology and Biomedical Sciences. If space permits, graduate students in other programs, medical students and undergraduate students may enroll, but only with explicit permission from the instructor. Same as M15 5068 and M04 5068. Same as E62 BME 5068. Credit: 4 units.

L41 (Bio) 5073 BIOORGANIC CHEMISTRY JOURNAL CLUB

Instructor: *George W. Gokel Ph.D.*, 362-9297; *staff*

Discussion of recent literature and research topics in Bioorganic Chemistry. Credit: 1 unit.

L41 (Bio) 5074 RADIOPHARMACEUTICAL CHEMISTRY AND BIOLOGY

Instructor: *Carolyn J. Anderson, Ph.D.*, 362-8427

This course will teach the fundamentals of radiopharmaceutical chemistry and biology for the

diagnostic imaging of disease and therapy of cancer. Students will attend one weekly lecture, of which the first several weeks will focus on the basics of radionuclide production, radiochemistry and biological applications of radiopharmaceuticals. The lectures later in the semester will focus on research topics in molecular nuclear medicine. One class hour per week. Credit contingent on attendance and regular participation. Students will also be given papers and asked to write a critique. Credit: 1 unit.

L41 (Bio) 5092 MOLECULAR AND DEVELOPMENTAL BIOLOGY JOURNAL CLUB

Instructors: *Aaron DiAntonio, M.D., Ph.D.,* 362-9925; *Kristen L. Kroll, Ph.D.,* 362-7045

This course will teach the fundamentals of organization and oral presentation of scientific information. Presentations will be of recent articles from the literature relating to modern molecular and developmental biology, as well as original research by the students. Students will be evaluated on clarity and effectiveness of presentations. Credit: 1 unit.

L41 (Bio) 5102 ISSUES OF DISABILITY IN SOCIETY

Instructor: *David B. Gray, Ph.D.,* 286-1658

The emergence of disability as a public health concern in the United States has implications for all aspects of society. This course allows the student to explore global disability issues with an emphasis on the more personal aspects of living with a disability, including policy issues, community integration, housing, assistive technology, transportation, employment self-care, recreation, communication and health care. The course has a multidisciplinary focus and is designed for students pursuing professional careers where issues of disability must be considered and for students who want to become informed of the impact of disability on the individual and society. Same as M01 OT 426.

L41 (Bio) 5123 EXPERIMENTAL HEMATOPOIESIS JOURNAL CLUB

Instructor: *Daniel C. Link, M.D.,* 362-8771

Journal club in which papers that describe significant advances in the field of experimental hematopoiesis are discussed. Students are expected to present one paper per semester and attend the weekly (1 hour) session. No prerequisites. Credit: 1 unit.

L41 (Bio) 5125 STUDENT-RUN CELL BIOLOGY JOURNAL CLUB

Instructor: *Robert W. Mercer, Ph.D.,* 362-6924

Participants (students) present summaries of current research published in various journals in the field of cell biology. A large component of this journal club includes coaching in oral presentation. Students receive one credit for regular participation and for making one presentation. Credit: 1 unit.

L41 (Bio) 5126 DEVELOPMENTAL BIOLOGY JOURNAL CLUB

Instructor: *Kathryn G. Miller, Ph.D.,* 935-7305

Participants (students, faculty and postdoctorates) present summaries of current research published in various journals in the field of developmental biology. Credit: 1 unit, contingent on attendance and one presentation per semester.

L41 (Bio) 5128 CELL BIOLOGY OF EXTRACELLULAR MATRIX JOURNAL CLUB

Instructor: *J. Michael Shipley, Ph.D.,* 454-7990

This journal club covers a broad range of topics related to extracellular matrix, including the fields of biochemistry, molecular biology, cell biology and developmental biology. Speakers give a brief background to introduce the topic and then focus on one or two papers from the current literature. Presentations are given by faculty, students and postdoctorates. Students receive one credit for regular participation and for making one presentation. Credit: 1 unit.

L41 (Bio) 5129 GLYCOBIOLOGY DISCUSSION GROUP

Instructor: *Jacques U. Baenziger, M.D., Ph.D.,* 362-8730

Recent papers that deal with glycobiology will be presented each week for discussion. Those wishing to take the course for credit (1 per semester) must attend and present once during a semester. Anyone wishing to be placed on the e-mail list announcing topics should contact Jacques U. Baenziger, M.D., Ph.D., at *baenziger@pathology.wustl.edu.* Credit: 1 unit.

L41 (Bio) 5132 CYTOSKELETON DISCUSSION GROUP

Instructor: *John A. Cooper, M.D., Ph.D.,* 362-3964

Weekly presentations of recent literature and research, with each participant presenting once per semester. Opportunity for students to discuss the context, implications and future directions for research. Prerequisite: L41 (Bio) 5068 or undergraduate course in cell biology. This is referenced in the Department of Cell Biology and Physiology. Credit: 1 unit.

L41 (Bio) 5137 ION CHANNELS JOURNAL CLUB

Instructor: *Colin G. Nichols, Ph.D.,* 362-6630

Student will attend journal club every week and participate in group discussion of recent paper. Once per semester student will choose a paper and present it to the group. Credit: 1 unit.

L41 (Bio) 5138 JOURNAL CLUB FOR THE MOLECULAR MECHANISM OF AGING

Instructor: *Shin-ichiro Imai, M.D., Ph.D.,* 362-7228

Why do we age? What causes aging? How is our life span determined? This new journal club will address

such fundamental but challenging questions of aging and longevity. Recent studies on aging and longevity are now unveiling regulatory mechanisms of the complex biological phenomenon. We'll cover the latest progress in this exciting field and stimulate discussions on a variety of topics including aging-related diseases. One hour of paper presentation and discussion per every two weeks. Prerequisite: Basic knowledge of molecular biology and genetics of model organisms, such as yeast, *C. elegans*, *Drosophila* and mouse. Credit: 1 unit.

L41 (Bio) 5142 CELL AND MOLECULAR BIOLOGY OF BONE

Instructor: *Keith A. Hruska, M.D.*, 286-2855

The course is designed around a core of general lectures, each supplemented by two to four student presentations, from the recent literature. Topics include, but are not limited to, bone cell ontogeny, integrin/cadherin-based signal transduction, hormonal regulation, and cell:cell communication. Prerequisite: L41 (Bio) 5068 or consent of coursemaster. Credit: 2 units.

L41 (Bio) 5144 SIGNAL TRANSDUCTION IN HUMAN BIOLOGY

Instructors: *Kendall J. Blumer, Ph.D.*, 362-1668; *Anthony J. Muslin, M.D.*, 747-3525

This course focuses on the human biology of signal transduction in normal and diseased states. It consists of lectures and student presentations. State-of-the-art experimental approaches and linkage between basic and clinical research will be highlighted, showing how multidisciplinary research leads to understanding of disease mechanisms, and improved diagnosis and treatment. Prerequisite: L41 (Bio) 5068 Fundamentals of Molecular Cell Biology. Credit: 2 units.

L41 (Bio) 5171 MEDICAL IMMUNOLOGY

Instructor: *Andrey S. Shaw, M.D.*, 362-4614

An introduction to basic concepts in immunology and immunopathology. Lectures focus on antigen-antibody interactions, immunoglobulin structure and genetics, the cellular basis of the immune response and immune regulation, T cell effector mechanisms, the inflammatory response, complement, the positive and negative roles of hypersensitivity, and immune deficiency. Prerequisite: some background in biochemistry and genetics helpful. Permission of coursemaster. Offered during the first half of the second medical semester. Three-four lecture hours a week, two 2-hour lab periods, four 1-hour clinical discussion groups. Credit: variable, maximum 3 units.

L41 (Bio) 5191 PATHOBIOLOGY OF HUMAN DISEASE STATES

Instructors: *Daniel C. Link, M.D.*, 362-8771; *Hector D. Molina, M.D.*, 747-0339

Three human disease states will be discussed in detail. Topics will include background clinical and epidemiological information, followed by a detailed examination of the molecular and cellular events that underlie the disease state. Examples of pertinent topics include malaria, cystic fibrosis, sickle cell anemia, diabetes or lupus. Prerequisite: must be a Markey Pathway student. Credit: 2 units.

L41 (Bio) 5192 CANCER BIOLOGY JOURNAL CLUB

Instructors: *Jason D. Weber, Ph.D., 747-3896*

This journal club covers current papers in molecular oncology, cancer genetics and contemporary molecular biology. Presentations will be given by students, post-docs and faculty, then discussed. Credit: 1 unit.

L41 (Bio) 5215 THURSDAY DEVELOPMENT RAVE

Instructor: *Ross L. Cagan, Ph.D.*, 362-7796

Travel the Medical School to gain hands-on experience with new techniques and approaches to developmental biology. We will emphasize a different approach in which doing goes hand-in-hand with asking. Developmental biology can be fun ... so ... no note-taking allowed; we'll give you the notes. Bring your curiosity. Food, beverages and music are all part of the mix. You will learn! Due to the nature of the class, size will be limited. Credit: 2 units.

L41 (Bio) 5217 SPECIAL TOPICS IN MICROBIAL PATHOGENESIS

Instructor: *L. David Sibley, Ph.D.*, 362-8873

Primarily for graduate and MSTP students, this seminar course involves discussion of current research of pathogenic microorganisms and their virulence determinants. Emphasis on model systems that demonstrate the cellular and molecular basis of host-pathogen interactions. Prerequisite: advanced elective course Molecular Microbiology and Pathogenesis or permission of instructor. Two class hours a week. This is referenced in the Department of Molecular Microbiology. Credit: 2 units.

L41 (Bio) 5225 PROTEINS JOURNAL CLUB

Instructor: *Linda C. Kurz, Ph.D.*, 362-3401

A weekly journal club of recent literature and research in the fields of protein structure and function. Presentations are given by graduate students, postdoctoral fellows and faculty. Presentation of controversial topics and results are encouraged. Credit: 1 unit, contingent upon regular attendance and one presentation. Prerequisite: graduate standing.

L41 (Bio) 5235 GENETICS JOURNAL CLUB

Instructors: *Mark Johnston, Ph.D.*, 362-2735; *Susan K. Dutcher, Ph.D.*, 362-2765

This journal club will be focused on the Genetics Department seminar series. Students will present one or a few recent papers by the seminar speaker scheduled for that week. Students will provide a brief written evaluation (on a form that will be provided) of their peers' presentations and the faculty advisors will meet with each student after the presentation to provide feedback. Credit: 1 unit.

L41 (Bio) 5255 EXPERIMENTAL SKELETAL BIOLOGY JOURNAL CLUB

Instructor: *Steven Teitelbaum, M.D.*, 454-8463

The journal club, which meets weekly, focuses on cellular and molecular biology of the skeleton. Emphasis is placed on gaining insights into normal skeletal homeostasis as well as systemic disorders of bone. Papers presented for review are selected from the most competitive journals. Participants are encouraged to "think outside of the box" and discuss novel molecular discoveries that may impact bone cell function. Credit: 1 unit.

L41 (Bio) 5261 MOLECULAR MECHANISMS OF IMMUNOLOGICAL DISEASES

Instructor: *Wayne M. Yokoyama, M.D.*, 362-9075

Advanced immunology students will be exposed to human diseases that appear to have an immunological basis. In addition to lectures and evaluation of recent clinical and relevant basic immunology literature, an emphasis will be placed on direct encounters with patients and pathologic material when feasible, providing students with a human aspect to discussions of immune pathogenesis. Diseases covered will include those with known causes such as AIDS and autoimmune disorders such as systemic lupus erythematosus and rheumatoid arthritis for which a molecular basis is not fully understood. Other areas may include asthma and tissue transplantation where effector mechanisms are better characterized. Since most of these disorders have no cure or are imperfect clinical entities, the class will discuss research areas that may be fruitful and lead to improved diagnosis and treatment. Prerequisite: Foundations of Immunology or permission of instructor. Credit: 2 units.

L41 (Bio) 5262 HUMAN IMMUNOBIOLOGY

Instructor: *Wayne M. Yokoyama, M.D.*, 362-9075

Advanced immunology students will be exposed to clinical manifestations of human diseases that have an immunological base, such as rheumatoid arthritis, systemic lupus erythematosus, juvenile rheumatoid arthritis, allergy and asthma, by interacting with physicians seeing these patients in the outpatient clinic. Prerequisite: Molecular Mechanisms of Immunological Diseases or consent of instructor. Credit: 1 unit.

L41 (Bio) 5272 ADVANCED TOPICS IN IMMUNOLOGY

Instructors: *Barry P. Sleckman, M.D., Ph.D.*, 747-8235; *Kenneth M. Murphy, M.D., Ph.D.*, 362-2009

This course uses a journal club format to discuss contemporary issues in the cell and molecular biology of the immune system. Discussions focus on the use of current approaches to analyze the cellular and molecular basis of immunity. Topics include mechanisms of antigenic specificity, diversity, cell communication, differentiation, activation and effector activity. Prerequisite: L41 (Bio) 5051 and permission of instructor. Credit: 2 units. This is referenced in the Department of Pathology and Immunology.

L41 (Bio) 5282 CHROMATIN STRUCTURE AND GENE EXPRESSION

Instructor: *Sarah C. R. Elgin, Ph.D.*, 935-5348

A special topics course covering nucleosome structure, histone modification and chromatin remodeling in gene activation, and epigenetic regulation in yeast, *Drosophila*, mammals and plants. One-hour review of the topic followed by a one-hour discussion of assigned current literature; emphasis on experimental design. Prerequisite: L41 (Bio) 548 Nucleic Acids and Protein Biosynthesis. Credit: 2 units.

L41 (Bio) 5288 SPECIAL TOPICS IN MOLECULAR GENETICS

Instructor: *Lee Ratner, M.D., Ph.D.*, 362-8836

A special topics course with lectures and discussion on the molecular basis of cancer, including a historical overview, action of dominant and recessive oncogenes, chromosomal translocations, viral oncology, cell cycle dysregulation, intracellular signaling, apoptosis, and tumor immunology. Credit: 2 units.

L41 (Bio) 5312 MACROMOLECULAR INTERACTIONS

Instructor: *Timothy M. Lohman, Ph.D.*, 362-4393

This course will cover equilibria, kinetics and mechanisms of macromolecular interactions from a quantitative perspective. Thermodynamics, multiple binding equilibria (binding polynomials), linkage phenomena, cooperativity, allostery, macromolecular assembly, enzyme catalysis and mechanism, steady-state and pre-steady state kinetics, and isotope effects. Modern methods of computer analysis using non-linear least squares-fitting and simulation to analyze binding isotherms and full kinetic time courses is emphasized. Prerequisite: Physical Chemistry, Biochemistry, Calculus and Organic Chemistry. Three class hours per week. Credit: 3 units.

L41 (Bio) 5313 OPTICAL SPECTROSCOPIC METHODS IN BIOPHYSICS

Instructor: *John M. Jean, Ph.D.*, 362-4197

An introduction to molecular spectroscopy and photophysics with an emphasis on fluorescence methods for the study of biomolecular structure and dynamics. Topics include radiative and nonradiative transitions, time-resolved techniques, fluorescence microscopy, and single molecule methods. Prerequisite: Permission of instructor. Credit: 3 units.

L41 (Bio) 5314 MOLECULAR BIOPHYSICS GRADUATE SEMINAR

Instructor: *Kathleen B. Hall, Ph.D.*, 362-4196

Student presentation of molecular biophysics topic. Second-year students present from literature; senior students give formal research seminar. Attendance required for all molecular biophysics students. Credit: 1 unit.

L41 (Bio) 5319 MOLECULAR FOUNDATIONS OF MEDICINE

Instructor: *Linda J. Pike, Ph.D.*, 362-9502

This course is designed primarily for medical students and will cover fundamental aspects of biochemistry and cell biology. The course begins with a treatment of protein structure and the function of proteins in the cytoskeleton and cell motility. The principles of enzyme kinetics and regulation are then discussed and basic pathways for the synthesis and metabolism of carbohydrates and lipids are introduced. This leads into a discussion of membrane structure and the function of cellular organelles in biological processes including energy production, protein degradation and protein trafficking. Special topics workshops presented by physicians serve to link the basic science to the clinic. Prerequisite: Coursemaster approval is required. This course is cross-listed in the Department of Biochemistry and Molecular Biophysics as M15 502 (Molecular Foundations of Medicine). Credit: 3 units.

L41 (Bio) 5325 PROTEIN STRUCTURE AND FUNCTION

Instructor: *Jay W. Ponder, Ph.D.*, 362-4195

The first half of the course covers descriptive amino acid, peptide and protein structure; protein folding, engineering and design; and introductions to enzyme kinetics and thermodynamics protein-ligand interactions. The second half of the course focuses on biophysical methods for the determination and analysis of protein structure and function. These include sections on visible spectroscopy, nuclear magnetic resonance and crystallography. This course is required for the Programs in Biochemistry and in Molecular Biophysics. Prerequisite: undergraduate course in physical chemistry. Credit: 3 units.

L41 (Bio) 5327 OPTICAL SPECTROSCOPY: THEORY AND APPLICATIONS

Instructor: *Kathleen B. Hall, Ph.D.*, 362-4196

Spectroscopic methods to be covered include fluorescence, both ensemble and single molecule, and absorption (circular dichroism); fluorescence correlation spectroscopy will also be discussed. The quantum chemistry/physics behind these methods will be reviewed. Prerequisite: Consent of instructor. Credit: 2 units.

L41 (Bio) 5335 LINKAGE THEORY AND EXPERIMENT

Instructor: *Enrico Di Cera, M.D.*, 362-4185

The course will cover basic concepts of linkage and their application to the analysis of protein function and interactions. The course is meant to expose students in Biochemistry to the conceptual framework behind current approaches to the study of protein function and interactions, using a very simple mathematical treatment (no knowledge of calculus required) and the discussion of specific biological systems. Topics to be covered include: 1. Linkage cycles; 2. Allostery and cooperativity; 3. Site-specific linkage; 4. Epitope mapping using Ala-scanning mutagenesis; 5. Double-mutant cycles; and 6. Rational protein engineering. Prerequisite: Basic knowledge of protein structure and function. Credit: Variable, maximum 1.5 unit.

L41 (Bio) 5342 MACROPHAGE BIOLOGY

Instructor: *Thomas H. Steinberg, M.D.*, 362-9218

This special topics course will examine aspects of cell and molecular biology of the macrophage: endocytosis, phagocytosis, adhesion, motility, signal transduction, antigen processing, lysosomes and intracellular parasitism. Prerequisite: Fundamentals of Molecular Cell Biology L41 (Bio) 5068 or Foundations in Immunology L41 (Bio) 5051. Offered in alternate years. Two hours a week. Credit: 2 units.

L41 (Bio) 5352 DEVELOPMENTAL BIOLOGY

Instructor: *David C. Beebe, Ph.D.*, 362-1621

Analysis of a selected set of key processes in development, such as pattern formation, cell-cell signaling and morphogenesis. The focus is on molecular approaches applied to important model systems, but framed in classical concepts. Prerequisite: Fundamentals of Molecular Cell Biology (5068) and Nucleic Acids (548). Credit: 3 units.

L41 (Bio) 5381 MECHANISMS OF PROTEIN TARGETING AND INTERCOMPARTMENTAL TRANSPORT

Instructor: *Philip D. Stahl, Ph.D.*, 362-6950

Recent advances regarding the molecular mechanisms responsible for targeting and intercompartmental transport of proteins to and between specific organelles, such as the endoplasmic reticulum, golgi apparatus, lysosomes, mitochondria

and nucleus. Particular emphasis on the development and use of cell-free systems that faithfully reconstitute key protein targeting and transport events. Material consists primarily of original research articles presented by students. Prerequisite: Molecular Cell Biology (may not be taken concurrently). Credit: 1 unit.

L41 (Bio) 5384 ADVANCED CELL BIOLOGY

Instructors: *Jean E. Schaffer, M.D.,* 362-8717; *William C. Parks, Ph.D.,* 286-2862

A lecture/discussion course for graduate and MSTP students that emphasizes current research directions in fundamental processes of cellular biology. Topics will be covered in depth over two-week blocks and will include glycobiology, membranes, extracellular proteolysis, cell communications and contacts, and receptor-mediated endocytosis. Prerequisite: L41 (Bio) 5068 or permission of coursemasters. Credit: 3 units.

L41 (Bio) 5391 MOLECULAR VIROLOGY

Instructor: *Henry V. Huang, Ph.D.,* 362-2755

Emphasis is on the basic molecular biology of virus replication, gene expression, host interactions and pathogenesis. The course will be a combination of lectures and student-led discussion sessions. Prerequisite: first-semester core curriculum for Programs in Cell and Molecular Biology. Special topics course. Credit: 2 units.

L41 (Bio) 5392 MOLECULAR MICROBIOLOGY AND PATHOGENESIS

Instructor: *Michael Caparon, Ph.D.,* 362-1485

First half focuses on microbial physiology and genetics, with special attention to recent discoveries in gene regulation and protein processing. Second half devoted to microorganisms that cause disease, with emphasis on the molecular interactions between pathogen and host. Prerequisite: first-semester core curriculum for programs in Cell and Molecular Biology. Credit: 3 units. This is referenced in the Department of Molecular Microbiology.

L41 (Bio) 5393 MOLECULAR VIROLOGY JOURNAL CLUB

Instructors: *David A. Leib, Ph.D.,* 362-2689; *Andrew S. Pekosz, Ph.D.,* 747-2132

Journal club with a minimum of one student presentation with faculty critique. Prerequisite: permission of instructor. Credit: 1 unit.

L41 (Bio) 5416 MOLECULAR MICROBIOLOGY AND PATHOGENESIS JOURNAL CLUB

Instructor: *Joseph Vogel, Ph.D.,* 747-1029

Presentations by students, postdoctoral fellows and faculty on a broad range of topics of current interest, including the fields of molecular mechanisms of pathogenesis, biochemistry, molecular biology, cell biology, developmental biology and immunology. Speakers usually give a brief background to introduce the topic and then focus on one or two papers from the current literature. Credit requires attendance at all sessions and one or two presentations during the year. Credit: 1 unit.

L41 (Bio) 5417 HEMATOLOGY/ONCOLOGY JOURNAL CLUB

Instructors: *Stuart A. Kornfeld, M.D.,* 362-8803; *Philip W. Majerus, M.D.,* 362-8801

This journal club, founded in 1966, covers a broad range of topics of current interest, including the fields of biochemistry, molecular biology, cell biology, developmental biology and immunology. Speakers usually give a brief background to introduce the topic and then focus on one or two papers from the current literature. Presentations are given by graduate students, postdoctorate fellows and the faculty. Each attendee presents two to three times per year. Participants are expected to attend all the sessions. Credit: 1 unit.

L41 (Bio) 5419 SEMINARS IN MICROBIOLOGY AND INFECTIOUS DISEASES

Instructor: *Joseph Vogel, Ph.D.,* 747-1029

Work-in-progress seminars by graduate students and postdoctoral fellows. Prerequisite: Bio 5392 Molecular Microbiology and Pathogenesis. Credit: 1 unit.

L41 (Bio) 5443 NUCLEIC ACIDS AND NUCLEIC ACID PROTEIN INTERACTIONS JOURNAL CLUB

Instructor: *Kathleen B. Hall, Ph.D.,* 362-4196

The biochemistry of nucleic acids and nucleic acid-protein interactions. Focus is on the functional and structural properties of these molecules, addressed through basic biochemical and quantitative approaches. Credit: 1 unit.

L41 (Bio) 5456 ADVANCED CRYSTALLOGRAPHY

Instructor: *Gabriel Waksman, Ph.D.,* 362-4562

The advanced course in protein crystallography will address all aspects of modern protein crystallography including fundamentals of crystallography, the derivation of the structure factor and electron density equation, symmetry and space groups, direct methods, isomorphous replacement, molecular replacement, data collection and crystal growing theory and techniques. Prerequisites: undergraduate Physical Chemistry and L41 (Bio) 5325 Protein Structure and Function. Two class hours per week. This is referenced in the Department of Biochemistry and Molecular Biophysics. Credit: 2 units.

L41 (Bio) 5461 MOLECULAR RECOGNITION

Instructors: *Garland R. Marshall, Ph.D.,* 362-1567; *Jay W. Ponder, Ph.D.,* 362-4195

The physical basis of recognition as exemplified in ligand binding to receptors is the focus with modeling of interactions between macromolecules of biological interest such as G-protein coupled

receptors and ligands such as drugs and hormones. Approaches to structure-based design of novel ligands as well as development of active site hypotheses when the three-dimension structure of the receptor is unknown will be developed. Emphasis will be placed on pharmacophore determination, receptor site modeling, three-dimensional quantitative structure-activity relationships, neural networks and *de novo* design. Applications will be taken from biological systems of therapeutic interest such as inhibition of proteases (HIV protease, thrombin, collagenase), homology modeling of enzyme targets such as convertases and design of minor groove ligands for DNA. Each student should expect to complete a project applying one of the computational methods discussed. Two hours of lecture plus three hours of lab per week. Prerequisite: Physical Chemistry, basic Biological Chemistry. Minimum five students. This is referenced in the Department of Biochemistry and Molecular Biophysics. Credit: 3 units.

L41 (Bio) 5464 COMPUTATIONAL BIOCHEMISTRY

Instructor: *Jay W. Ponder, Ph.D.*, 362-4195

This course will cover the application of computer modeling and simulation to problems involving biological macromolecules of interest such as enzymes, receptors, nucleic acids, etc. Lectures will discuss the theory and algorithms behind a variety of simulation techniques. Implementation of these approaches through computational chemistry and molecular modeling will be used to explore their applicability to experimental systems. Alternative paradigms and methods for handling problems at differing levels of structural resolution will be emphasized. Topics examined in detail include molecular mechanics force fields, optimization, dynamics-based simulation, protein folding, homology modeling, tertiary structure prediction, etc. Applications will be taken from well-defined biological systems with critical experimental data available for comparison and validation. Each student should expect to complete a project applying one of the computational methods discussed. Prerequisite: Calculus and Physical Chemistry. Minimum five students. This is referenced in the Department of Biochemistry and Molecular Biophysics. Credit: 3 units.

L41 (Bio) 5466 CURRENT TOPICS IN BIOCHEMISTRY

Instructors: *David P. Cistola, M.D., Ph.D.*, 362-4382; *Mark E. Lowe, M.D., Ph.D.*, 286-2857

Special topics course involving the discussion of research papers covering a broad range of topics in the field of biochemistry. Papers selected from the primary literature will be presented and discussed by students with guidance from the instructor. Emphasis will be placed on papers that illustrate the application of chemical approaches to important biological processes. Designed primarily for first- and second-year graduate students in the Biochemistry Ph.D. program. Prerequisite: Coursemaster permission. Credit: 1 unit.

L41 (Bio) 5468 CARDIOVASCULAR BIOPHYSICS JOURNAL CLUB

Instructor: *Sándor J. Kovács, Ph.D., M.D.*, 454-7660

This journal club is intended for graduate students with a background in the quantitative sciences (engineering, physics, math, chemistry, etc.). The subjects covered are inherently multidisciplinary. We will review landmark and recent publications in quantitative cardiovascular physiology, mathematical modeling of physiologic systems and related topics such as chaos theory and nonlinear dynamics of biological systems. Familiarity with calculus, differential equations, and basic engineering/thermodynamic principles is assumed. Knowledge of anatomy/physiology is not required. Same as E72 BME 5911. Credit: 1 unit.

L41 (Bio) 5472 CARDIOVASCULAR MRI — FROM PHYSICS TO CLINICAL APPLICATION

Instructor: *Sándor J. Kovács, Ph.D., M.D.*, 454-7660

This graduate course (seniors welcome) will cover the basic physics involved in creating an image by magnetic resonance technology. The use of this technology, specifically as it applies to the unique challenges of cardiovascular applications, will be examined. This will include topics such as motion compensation techniques, real-time imaging, exogenous contrast enhancement, and quantitative flow measurements, for example. As much as one-third of the class will involve actual case studies and the discussion of clinical use for cardiovascular MRI. Students will demonstrate competence in the subject through a combination of homework, a final examination, and a small semester project. Prerequisite: Calculus, introductory human physiology/anatomy/biology course. Same as E62 BME 590M. Credit: 3 units.

L41 (Bio) 5474 ALGORITHMS FOR COMPUTATIONAL BIOLOGY

Instructor: *Michael R. Brent, Ph.D.*, 935-6621

This course will focus on how to sequence and analyze a genome, emphasizing computational and algorithmic issues. After taking this course, you should be able to parachute into a genome informatics group, understand what's going on, and do something useful on your first day. Topics covered include: the essential biology, the essential probability theory, base calling and quality clipping, genome assembly (including aspects of sequence alignment), repeat masking, predicting protein-coding genes (including Hidden Markov Models and comparative genomics approaches), predicting gene function by comparing to proteins of known function, basic RNA gene finding, and advanced topics in sequence alignment. This course will

include a combination of paper-and-pencil homework assignments and programming labs. Prerequisite: CS 241 or CS 514N or L41 (Bio) 5495. Same as E61 CS 547T. Credit: 3 units.

L41 (Bio) 548 NUCLEIC ACIDS AND PROTEIN BIOSYNTHESIS

Instructor: *John E. Majors, Ph.D.*, 362-1135

Fundamental aspects of structure, biosynthesis and function of nucleic acids and the biosynthesis of proteins. Emphasis on mechanisms involved in the biosynthetic processes and the regulation thereof. Prerequisite: L41 (Bio) 337, 449, or equivalent or permission of instructor. This is referenced in the Department of Biochemistry and Molecular Biophysics. Credit: 3 units.

L41 (Bio) 5481 STUDENT-RUN MOLECULAR GENETICS JOURNAL CLUB

Instructor: *John E. Majors, Ph.D.*, 362-1135

Students in the Molecular Genetics Program have organized this journal club, which meets weekly. The speaker provides the faculty member in charge with a one-page outline of their presentation ahead of the class time. Students provide written evaluations of the quality and content of each others' talks. The forms are given to each speaker by way of the faculty member in charge. All students receiving credit are expected to give one presentation per semester and to attend regularly. This is referenced in the Department of Biochemistry and Molecular Biophysics. Credit: 1 unit.

L41 (Bio) 5482 HUMAN LINKAGE AND ASSOCIATION ANALYSIS

Instructor: *Anne Bowcock, Ph.D.*, 747-3264

Meiosis, inheritance, Hardy Weinberg Equilibrium, Linkage: definition, crossing over, map functions, phase, LOD scores, LINKAGE, genetic heterogeneity, penetrance, phenocopies, and liability classes, multipoint analysis, non-parametric analysis (sibpairs and pedigrees), quantitative trait analysis, determination of power for mendelian and complex trait analysis, linkage disequilibrium analyses, allelic association (case control designs and family bases studies). Twenty-four hours of lectures; six hours of student presentations. Credit: 2 units. Same as M21 GEMS 5482.

L41 (Bio) 5484 GENETICS AND DEVELOPMENT OF *C. ELEGANS* JOURNAL CLUB

Instructor: *Tim Schedl, Ph.D.*, 362-6162

Students will present a research paper (or present their current thesis research) and the appropriate background material. Credit: 1 unit.

L41 (Bio) 5486 CLASSIC EXPERIMENTS IN MOLECULAR BIOLOGY

Instructors: *Susan K. Dutcher, Ph.D.*, 362-2765; *Sean R. Eddy, Ph.D.*, 362-7666; *Mark Johnston, Ph.D.*, 362-2735

A few key papers stand out as the historical foundations of molecular genetics. They illuminate the process of intuition, creative experimentation and insight that led to what we now accept as dogma in our field. This class, organized in the style of a journal club, will explore this history through presentations by students of these classic papers. Each student will be responsible for presenting one topic, consisting of two to three papers, placing them in their historical context through background reading from the contemporary literature. Prerequisite: Graduate standing and L41 (Bio) 548 and L41 (Bio) 5491, or consent of instructors. Credit: 1 unit.

L41 (Bio) 5488 GENOMICS

Instructors: *Tim Schedl, Ph.D.*, 362-6162; *Barak A. Cohen, Ph.D.*, 362-3674

A hybrid of concepts and practical applications in genomics. Areas covered include how genomes are mapped and sequenced, computational methods for gene predictions, functional genomic techniques for ascribing function to DNA, RNA and protein sequence and how genomic techniques and resources can advance the study of human disease. Heavy emphasis will be placed on students acquiring basic skills needed to navigate and manipulate databases of DNA sequence, gene expression and other types of genome wide data. Prerequisites: Molecular Cell Biology (Bio 5068), Nucleic Acids (Bio 548). Credit: 3 units.

L41 (Bio) 5491 ADVANCED GENETICS

Instructor: *James B. Skeath, Ph.D.*, 362-0535

Fundamental aspects of organismal genetics with emphasis on experimental studies that have contributed to the molecular analysis of complex biological problems. Examples drawn from bacteria, yeast, nematodes, fruit flies and mammalian systems. Prerequisite: graduate standing or permission of instructor. This is cross-listed in the Department of Genetics. Credit: 3 units.

L41 (Bio) 5494 QUANTITATIVE CARDIOVASCULAR PHYSIOLOGY

Instructor: *Sándor J. Kovács, Ph.D., M.D.*, 454-7660

The course will cover the mechanical, thermodynamic, electrical and pump function role of the heart as well as tissue elasticity, viscosity of selected media, aspects of the microcirculation and wave propagation. Mathematical modeling of various physiologic functions will be stressed. The connection between model prediction and comparison to *in vivo* human physiologic data will be emphasized. The question of whether new physiology can be predicted from first principles will be considered. Same as E62 BME 5494. Credit: 3 units.

L41 (Bio) 5495 COMPUTATIONAL MOLECULAR BIOLOGY

Instructor: *Sean R. Eddy, Ph.D.*, 362-7666

A detailed survey of the mathematical and algorithmic basis for methods in computational molecular biology. Topics covered include sequence alignment algorithms, multiple sequence alignment, RNA structure prediction, motif and pattern searches, and phylogenetic inference. Two lectures per week, plus a discussion section each week in which students present a current paper in the field. Students will acquire a working knowledge of UNIX and the C programming language during the course. There are no formal prerequisites, but an aptitude for mathematics and computer programming is essential. The course is generally too advanced for biologists simply seeking to learn how to use common bioinformatics tools. Same as E62 BME 537. Credit: 3 units.

L41 (Bio) 5496 SEMINAR IN COMPUTATIONAL MOLECULAR BIOLOGY

Instructor: *Gary D. Stormo, Ph.D.*, 747-5534

Computational methods in molecular biology. Focus is on novel methods and recent contributions in computational genomics, proteomics and transcriptomics. Same as E61 CS 6804. Credit: 1 unit.

L41 (Bio) 5497 SPECIAL TOPICS IN COMPUTATIONAL MOLECULAR BIOLOGY

Instructor: *Gary D. Stormo, Ph.D.*, 747-5534

In-depth discussion of problems and methods in computational molecular biology. Each year, three topics will be covered, and those will change yearly. Prerequisite: L41 (Bio) 5495 or instructor's consent. Same as E71 CS 543T. Credit: 2 units.

L41 (Bio) 550 MEDICAL GENETICS

Instructors: *Alison J. Whelan, M.D.*, 362-8050; *Jeffrey I. Gordon, M.D.*, 362-7243

Topics covered include population and quantitative genetics, clinical cytogenetics, biochemical genetics and metabolic defects. Lectures, clinics and small group discussions. Prerequisite: an introductory genetics course and permission of the instructor. This is cross-listed in the Department of Genetics as M30 511 Medical Genetics. Credit: 2 units.

L41 (Bio) 554 NEURAL SCIENCES

For full description, see the Department of Anatomy and Neurobiology, M35 554 Neural Sciences.

L41 (Bio) 5565 ORAL PRESENTATION OF SCIENTIFIC DATA

Instructor: *Jeff W. Lichtman, M.D., Ph.D.*, 362-2504

Practical course on how to prepare and present scientific data to an audience, either as a seminar or as a course lecture. Prerequisite: first-year neuroscience program courses. Credit: 1 unit.

L41 (Bio) 5571 CELLULAR NEUROBIOLOGY

Instructor: *Jim Huettner, Ph.D.*, 362-6624

This course will present a fully integrated overview of nerve cell structure, function and development at the molecular and cellular level. Broad topics to be covered include gene structure and regulation in the nervous system, quantitative analysis of voltage- and chemically-gated ion channels, presynaptic and postsynaptic mechanisms of chemical neurotransmission, sensory transduction, neurogenesis and migration, axon guidance and synapse formation. Ten lectures plus four hours of discussion per week for six weeks. There will be two exams and a written research proposal, as well as homework problems and summaries of discussion papers. Prerequisite: graduate standing or permission of the instructor. Credit: 6 units.

L41 (Bio) 5581 NEURAL BASIS OF ACOUSTIC COMMUNICATIONS

Instructor: *Nobuo Suga, Ph.D.*, 935-8530

Lectures and seminars in hearing and acoustic signals of animals, from invertebrates to humans. Structural and functional adaptation for processing the signals for communication and echolocation are considered. Prerequisite: L41 (Bio) 3411 or L41 (Bio) 3421, or a course comparable to Physiological Psychology. One two-hour class per week. Offered in the fall semester of odd-numbered years. Credit: 2 units.

L41 (Bio) 5606 COGNITIVE NEUROSCIENCE OF HUMAN MEMORY

Instructor: *Randy L. Buckner, Ph.D.*, 935-5019

A survey of issues related to the cognitive neuroscience of human memory will be discussed including working and long-term memory. Reading will consist of classic works by James, Fuster, Goldman-Rakic, Milner, and Squire as well as many contemporary articles that highlight hot issues and new techniques. Requirements will include readings, attendance, brief presentations, and active participation in classroom discussion. Prerequisite: graduate standing. Same as L33 (Psych) 5090. Credit: 3 units.

L41 (Bio) 5628 CLASSIC PAPERS ON MEMORY (AND THE ONES THAT GOT AWAY)

Instructor: *Randy L. Buckner, Ph.D.*, 935-5019

Classic articles in memory will be discussed in the context of why they are seminal to the field. By covering these, students are expected to obtain a broad survey of important works in memory research. Topics will include amnesia, LTP, levels of processing, implicit memory, false memory, brain imaging and others. Within each topic, articles that are less seminal, but reported at about the same time, will also be discussed. A goal of the class will be to debate what specifically allowed the classic articles to change the way we think. What sets them apart? Requirements will include attendance, class

participation, and periodic brief class presentations. Prerequisite: Graduate standing or permission of instructor. Same as L33 Psych 4629.

L41 (Bio) 5641 COMPUTATIONAL NEUROSCIENCE

Instructor: *Charles H. Anderson, Ph.D.*, 362-1799

This course provides a unified framework for understanding neurobiological systems based on principles of computation and information theory. Students learn how neuronal circuits function through the construction of computer simulations. The discussion begins with small insect systems and ends with sensory, motor, and high-level cortical circuits in primates. Two hours of lectures per week with homework assignments using Matlab. In addition, class projects are assigned in collaboration with experimental neuroscientists. Prerequisite: Calculus, Linear Systems and Programming Experience. Same as E62 BME 5641. Credit: 3 units.

L41 (Bio) 5651 NEURAL SYSTEMS

Instructor: *Joseph L. Price, Ph.D.*, 362-3587

The course will consist of lectures and discussions of the sensory, motor and integrative systems of the brain and spinal cord, together with a weekly lab. The lectures will present aspects of most neural systems, and will be given by faculty members who have specific expertise on each topic. The discussions will include faculty-led group discussions and papers presented and discussed by students. The labs will include human brain dissections, examination of histological slides, physiological recordings, behavioral methods, computational modeling and functional neural imaging. Credit: 4 units.

L41 (BIO) 5657 BIOLOGICAL NEURAL COMPUTATION

Instructor: *Kurt A. Thoroughman, Ph.D.*, 935-9094

This course will consider the computations performed by biological nervous systems. Readings and discussions will investigate the physiological bases of computations made by ion channels, synapses, dendrites, neurons and neuronal networks. Readings will include classic and current primary research papers. Computer laboratories will determine how simple mathematical models succeed or fail to represent observed biological function. Prerequisites: calculus, some experience with differential equations, cell or organismal biology. Same as E72 BME 590Q.

L41 (Bio) 5662 BIOLOGICAL APPLICATIONS OF OPTICAL MICROSCOPY

Instructor: *Mark P. Goldberg, M.D.*, 362-3258

Introduction to the light microscope as a tool for innovative research in cell biology and neuroscience. Topics include optical microscope theory, electronic image acquisition and analysis, fluorescent probes for intracellular ions such as calcium and confocal microscopy. Seminar format with faculty and student participation. Prerequisite: graduate standing or permission of instructor. Audit only by prior arrangement with instructor. Two class hours per week. Credit: 2 units.

L41 (Bio) 5663 NEUROBIOLOGY OF DISEASE

Instructors: *Mark P. Goldberg, M.D.*, 362-3258; *Bradley L. Schlaggar, M.D., Ph.D.*, 454-6120

This is an advanced graduate seminar on the neuroscience of nervous system disorders. Each session is taught by a guest with expertise in a specific neurologic or psychiatric disease. The first hour is a lecture on clinical manifestations and pathophysiology. The second hour is a journal club format in which students present assigned papers. Prerequisite: Introductory neuroscience course at the graduate or medical school level. The course is open to upper-level graduate students in the neuroscience program. Others only by prior arrangement with the instructor. Web site: *www.neuro.wustl.edu/bio5663/* Credit: 2 units.

L41 (Bio) 567 ADVANCED TUTORIALS IN NEURAL SCIENCES

Instructor: *Joshua R. Sanes, Ph.D.*, 362-2507; *staff*

Directed readings and discussions for graduate students on selected topics in advanced neuroscience. Topics and specific instructors to be listed at registration. Each tutorial will last six weeks. Two class hours per week for six weeks, 1 unit. Offered in both fall and spring semesters. Open to all students interested in the neurosciences program. Prerequisite: consent of instructor for non-neurosciences students. Credit: 1-3 units, depending on how many sessions taken.

L41 (Bio) 572 SEMINAR IN PLANT BIOLOGY

Instructor: *Eric J. Richards, Ph.D.*, 935-7196

A weekly discussion of modern research in plant biology including topics in molecular genetics, development, biochemistry, physiology, population dynamics and plant-pathogen interactions. Research seminars by local and outside speakers will be intermixed with journal club presentations in alternating weeks. Credit will be contingent on one journal club presentation per semester, regular attendance and active participation in group discussions. Credit: 2 units.

L41 (Bio) 580 SEMINAR IN POPULATION BIOLOGY

Instructor: *Allan Larson, Ph.D.*, 935-4656

This weekly seminar, covering different topics each semester, should be taken by graduate students in the program. Prerequisite: graduate standing or permission of the instructors. Credit: variable, 2 or 3 units.

L41 (Bio) 585 SEMINAR IN FLORISTIC TAXONOMY

Instructor: *P. Mick Richardson, Ph.D.,* 577-5176

A survey of angiosperm families, their morphology, cytology, anatomy, palynology, chemistry and evolution. Prerequisite: L41 (Bio) 4132 or equivalent. Credit: 1 unit.

L41 (Bio) 590 RESEARCH

Instructors: *Staff, Division of Biology and Biomedical Sciences,* 362-3365

Credit to be arranged. Research is listed as 900-level course in each department.

L41 (Bio) 5911 SEMINAR IN BIOLOGY AND BIOMEDICAL SCIENCES

Instructors: *Staff, Division of Biology and Biomedical Sciences,* 362-3365

These seminars cover the recent literature in various areas not included in other courses, or in more depth than other courses. Credit to be arranged.

L41 (Bio) 5915 TEACHING PRACTICE IN BIOLOGY AND BIOMEDICAL SCIENCES

Instructor: *John H. Russell, Ph.D.,* 362-2558

Students serve as teaching assistants for undergraduate and graduate-level courses. Faculty-supervised activities include lecture presentation, leading discussion and problem-solving sessions and laboratory instruction. Prerequisite: restricted to graduate students in the Division of Biology and Biomedical Sciences. Credit: 1 unit.

L41 (Bio) 5999 INDEPENDENT WORK

Instructors: *Staff, Division of Biology and Biomedical Sciences,* 362-3365

This course is designed for individual students wishing to explore in-depth specialized areas of literature or technology with one or more faculty members. Credit will vary with the amount of work and discussion, but cannot be more than 3 credits. Credit: Variable, maximum 3 units.

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

DEPARTMENT OF BIOMEDICAL ENGINEERING

Biomedical engineering is the integration of engineering methods with biological science and medical practice. It strives to provide increased quantitative and analytical understanding of complex living organisms. Through this increased understanding, biomedical engineers can contribute to advances in biomedical research and to improvements in health care.

In many areas of medicine and biology, advances are being driven by technology. For example, modern computer technology is fundamental to the new fields of computational molecular biology, genome analysis and computational neuroanatomy. Systems approaches are increasingly important to advancing knowledge of many biological processes. Other facets of biomedical engineering will lead to improved diagnostic and therapeutic agents, improved prostheses, and new approaches to tissue and organ repair including the use of bio-resorbable materials, reconstituted tissue and regenerated cells. With the increased understanding that comes from scientific research and the tools of biomedical engineering, a bountiful era of increased understanding of disease, health care informatics, new biomaterials, and revolutionary medical devices can be realized.

Biomedical engineering has been a focus of activity for almost 40 years in both the School of Engineering and Applied Science and the School of Medicine at Washington University in St. Louis. Contributions of the university include advances in imaging technologies for biology and medicine; positron emission tomography, confocal optical microscopy, advanced ultrasound imaging, magnetic resonance imaging and X-ray tomography. The university has played a leading role in applying high-speed communications systems to transmit scientific and medical information. Furthermore, the university is recognized worldwide for its work in mapping and sequencing the human genome, in computational molecular biology, in mapping of the human brain, and in cardiovascular engineering.

Biomedical engineering is an extremely diverse field encompassing the activities of faculty at Washington University in departments at the medical school as well as the engineering school. Recognizing the strength and diversity of existing programs, the Department of Biomedical Engineering was established on July 1, 1997. Together with the newly established Institute of Biomedical and Medical Engineering, involving faculty from the School of Engineering and Applied Science, the School of Medicine and also from the College of Arts & Sciences, this network facilitates and promotes the graduate educational training of biomedical engineers at Washington University. The Executive Council of the Institute, with broad representations from both the School of Engineering and Applied Science and the School of Medicine, has the responsibility to facilitate and coordinate student access to these various research opportunities. A graduate committee composed of members of the full-time faculty and the Institute determines the guidelines for graduate students in biomedical engineering.

The goals of graduate education in Biomedical Engineering at Washington University are to continue the University's innovative and nationally recognized research programs and to train a new generation of leaders who apply engineering science throughout biology and medicine in government, industry and

academia. This is a broad vision of biomedical engineering as a field and defines a role for which Washington University is ideally suited.

Biomedical Engineering course offerings:
BME 500 Independent Study
BME 501 Graduate Seminar
BME 503A Cell and Organ Systems Biology
BME 5068 Fundamentals of Molecular Cell Biology
BME 537 Computational Molecular Biology
BME 537A Intensive Course in Computational Molecular Biology
BME 546 Algorithms for Computational Biology
BME 5494 Quantitative Cardiovascular Physiology
BME 557 Cellular and Subcellular Biomechanics
BME 558 Biological Transport
BME 559 Introduction to Biomechanics
BME 560A Biomechanics
BME 562 Mechanics of Growth and Development
BME 5641 Computational Neuroscience
BME 566 Cardiac Electrophysiology
BME 567 Cardiovascular Engineering II: Cardiac Mechanics
BME 568 Cardiovascular Dynamics
BME 582A Instrumentation
BME 590A Special Topics in Biomedical Engineering
BME 590B Special Topics: Medical Computer Vision
BME 590C Cardiovascular Magnetic Resonance Imaging
BME 590F Special Topics: Cell and Tissue Engineering
BME 590G Special Topics: Topics in Neural Engineering, Sensorimotor Systems and Computations
BME 590H Special Topics: Introduction to Biomaterials Science
BME 590K Nonlinear Elasticity in Biomechanics
BME 590L Special Topics: Engineering Aspects of Biotechnology
BME 590M Cardiovascular MRI—From Physics to Clinical Application
BME 590N Special Topics: Modeling Biomolecular Systems
BME 590P Polymer Principles in Protein Structure
BME 590Q Biological Neural Computation
BME 590R Introduction to Biomechanics
BME 590S Special Topics: Tissue Engineering
BME 590T Applied Neural Communication and Control
BME 590U Special Topics: Biotechnology Techniques for Engineers
BME 5911 Cardiovascular Biophysics Journal Club
BME 599 Master's Research
BME 600 Doctoral Research

For additional related courses, see the Bulletin of the School of Engineering and Applied Science.

Faculty

PROFESSOR AND CHAIRMAN OF DEPARTMENT

Frank Chi-Pong Yin, Ph.D., University of California, San Diego, 1970; M.D., 1973. (See Department of Medicine.)

Professors Emeriti

Harold W. Shipton, C.Eng., Shrewsbury Technical College, 1949.

Salvatore P. Sutera, Ph.D., California Institute of Technology, 1960.

Lewis J. Thomas Jr., M.D., Washington University 1957.

Professors

R. Martin Arthur, Ph.D., University of Pennsylvania, 1968.

Philip V. Bayly, Ph.D., Duke University, 1993.

G. James Blaine III, D.Sc., Washington University, 1974.

John P. Boineau, M.D., Duke University, 1959. (See Department of Medicine and Department of Surgery.)

Harold Burton, Ph.D., University of Wisconsin, 1968. (See Department of Anatomy and Neurobiology and Department of Cell Biology and Physiology.)

Michael E. Cain, M.D., George Washington University, 1975. (See Department of Medicine.)

Sean R. Eddy, Ph.D., University of Colorado, 1991. (See Department of Genetics.)

Elliot L. Elson, Ph.D., Stanford University, 1966. (See Department of Biochemistry and Molecular Biophysics.)

William A. Frazier III, Ph.D., Washington University, 1973. (See Department of Biochemistry and Molecular Biophysics and Department of Cell Biology and Physiology.)

Bijoy K. Ghosh, Ph.D., Harvard University, 1983.

Stephen M. Highstein, M.D., University of Maryland Medical School, 1965; Ph.D., University of Tokyo Faculty of Medicine, 1976. (See Department of Anatomy and Neurobiology and Department of Otolaryngology.)

Jeffery W. Lichtman, M.D., Ph.D., Washington University, 1980. (See Department of Anatomy and Neurobiology.)

Garland R. Marshall, Ph.D., Rockefeller University, 1966. (See Department of Biochemistry and Molecular Biophysics and Department of Molecular Biology and Pharmacology.)

Robert P. Mecham, Ph.D., Boston University, 1976. (See Department of Cell Biology and Physiology, Department of Medicine and Department of Pediatrics.)

James G. Miller, Ph.D., Washington University, 1969. (See Department of Medicine.)

Thomas R. Miller, M.D., University of Missouri, 1976. (See Department of Radiology.)

Michael K. Pasque, M.D., University of Oklahoma, 1978. (See Department of Radiology and Department of Surgery.)

Marcus E. Raichle, M.D., University of Washington, 1964. (See Department of Anatomy and Neurobiology, Department of Neurology and Department of Radiology.)

Carl M. Rovainen, Ph.D., Harvard University, 1967.

Donald L. Snyder, Ph.D., Massachusetts Institute of Technology, 1966. (See Department of Radiology.)

Joseph H. Steinbach, Ph.D., University of California, San Diego, 1973. (See Department of Anatomy and Neurobiology and Department of Anesthesiology.)

Gary D. Stormo, Ph.D., University of Colorado, 1981. (See Department of Genetics.)

Barna A. Szabo, Ph.D., State University of New York, 1969.

Larry A. Taber, Ph.D., Stanford University, 1979.

Alan R. Templeton, Ph.D., University of Michigan, 1972.

W. Thomas Thach Jr., M.D., Harvard University, 1964. (See Department of Anatomy and Neurobiology, Department of Biochemistry and Molecular Biophysics, Department of Neurology and Program in Physical Therapy.)

David C. Van Essen, Ph.D., Harvard University, 1971. (See Department of Anatomy and Neurobiology.)

Michael J. Welch, Ph.D., University of London, 1965. (See Department of Molecular Biology and Pharmacology, Department of Radiology and Alvin J. Siteman Cancer Center.)

Thomas A. Woolsey, M.D., The Johns Hopkins University, 1969.

Professor (Adjunct)

Gary Brandenburger, D.Sc., Washington University, 1973.

Research Professors

Charles H. Anderson, Ph.D., Harvard University, 1962. (See Department of Anatomy and Neurobiology.)

Julius Goldstein, Ph.D., University of Rochester, 1965.

Associate Professors

Amir Arsham Amini, D.Sc., University of Michigan, 1990.

Dora Angelaki, Ph.D., University of Minnesota, 1991.

Paul C. Bridgman, Ph.D., Purdue University, 1980. (See Department of Anatomy and Neurobiology.)

Andreas H. Burkhalter, Ph.D., University of Zurich, 1977. (See Department of Anatomy and Neurobiology and Department of Neurological Surgery.)

Ron Cytron, Ph.D., University of Illinois, 1984.

Daniel R. Fuhrmann, Ph.D., Princeton University, 1984.

Robert J. Gropler, M.D., University of Cincinnati, 1981.

Sándor J. Kovács, Ph.D., California Institute of Technology, 1977; M.D., University of Miami, 1979. (See Department of Medicine.)

Stanley Misler, Ph.D., New York University, 1976; M.D., 1978. (See Department of Cell Biology and Physiology and Department of Medicine.)

Joseph A. O'Sullivan, Ph.D., University of Notre Dame, 1986.

Steven E. Petersen, Ph.D., California Institute of Technology, 1982. (See Department of Anatomy and Neurobiology, Departments of Neurology and Neurological Surgery and Department of Radiology.)

William D. Richard, Ph.D., University of Missouri, Rolla, 1988.

Frederick U. Rosenberger, D.Sc., Washington University, 1969.

M. Victor Wickerhauser, Ph.D., Yale University, 1985.

Samuel A. Wickline, M.D., University of Hawaii, 1980. (See Department of Medicine.)

Research Associate Professors

Jack R. Engsberg, Ph.D., University of Iowa, 1985. (See Department of Neurological Surgery and Program in Occupational Therapy.)

Joseph W. Klaesner, Ph.D., Vanderbilt University, 1995.

Richard B. Schuessler, Ph.D., Clemson University, 1977. (See Department of Surgery.)

Assistant Professors

Kyongtae T. Bae, Ph.D., University of Pennsylvania, 1988; M.D., The University of Chicago, 1992.

Thomas E. Conturo, M.D., Ph.D., Vanderbilt University, 1989. (See Department of Radiology.)

P. Duffy Cutler, Ph.D., University of California, Los Angeles, 1992. (See Department of Radiology.)

Gregory C. DeAngelis, Ph.D., University of California, Berkeley, 1992.

Robert H. Deusinger, Ph.D., University of Iowa, 1981. (See Department of Medicine and Program in Physical Therapy.)

Donald L. Elbert, Ph.D., University of Texas, Austin, 1997.

Warren R. Gish, Ph.D., University of California, Berkeley, 1988. (See Department of Genetics.)

James E. Huettner, Ph.D., Harvard University, 1987. (See Department of Cell Biology and Physiology.)

Gregory M. Lanza, Ph.D., University of Georgia, 1981.
Timothy J. McCarthy, Ph.D., University of Liverpoool, 1989.
Scott D. Minor, Ph.D., University of Iowa, 1987.
Daniel W. Moran, Ph.D., Arizona State University, 1994.
Michael J. Mueller, Ph.D., Washington University, 1992.
Ruth Okamoto, D.Sc., Washington University, 1997.
Rohit V. Pappu, Ph.D., Tufts University, 1996.
Jay W. Ponder, Ph.D., Harvard University, 1984. (See Department of Biochemistry and Molecular Biophysics.)
Douglas D. Robertson Jr., Ph.D., Georgetown University, 1982.
Shelly E. Sakiyama-Elbert, Ph.D., California Institute of Technology, 2000.
David S. Sept, Ph.D., University of Alberta, 1997.
Jin-Yu Shao, Ph.D., Duke University, 1997.
Matthew J. Silva, Ph.D., Massachusetts Institute of Technology, 1996.
Kurt A. Thoroughman, Ph.D., The Johns Hopkins University, 1999.
Jerold W. Wallis, M.D., Stanford University, 1981. (See Department of Radiology.)

Research Assistant Professors

John M. Ollinger, D.Sc., Ph.D., Washington University, 1986. (See Department of Radiology.)
Xin Yu, Sc.D., Massachusetts Institute of Technology, 1996.
DeQuan Zou, D.Sc., Washington University, 1993.

HEALTH ADMINISTRATION PROGRAM

Philosophy

The faculty of the Health Administration Program of Washington University believes that administrative personnel in health organizations require not only a solid foundation in management, but also an understanding of those aspects of finance, regulation and strategic planning unique to the health care field. Since its inception in 1946, the Program has acted on the premise that health administration students would benefit from exposure to the environment in which they ultimately will work. To this end, the Program has maintained an organizational structure consisting of a core faculty located within the School of Medicine, augmented by faculty from other schools and departments within the university, as well as affiliated institutions and agencies. This multidisciplinary approach enables the student to acquire not only management knowledge and skills, but also an understanding of the many complexities unique to the health care sector.

Curriculum and Sequence of Study

Required courses constitute 70 percent of the course sequence for the Master of Health Administration degree, offering vital exposure to the generic knowledge in the health administration area. In addition to the elective courses available within the Health Administration Program (HAP), students may take up to 15 semester hours of graduate work in other units of Washington University. The HAP student's faculty adviser must approve the selection of courses in the student's individual curriculum. The student's previous academic work, employment experience and ultimate professional goals enter into the individual's personalized curriculum.

As a means of furthering interdisciplinary study, up to 15 semester hours of HAP courses are open to interested graduate students from other areas of Washington University. There is also a dual M.H.A.-J.D. degree with the School of Law, a dual M.H.A.-M.B.A. degree with the Graduate School of Business Administration and a dual M.H.A.-M.I.M. degree with the School of Engineering. A dual degree is also offered with the School of Arts and Sciences in Human Resource Management (M.H.A.-M.A.) through University College. Medical students interested in attaining the M.H.A. degree can complete one semester of required HAP courses as part of their fourth-year electives. The remaining three semesters of HAP courses can then be completed after the student has attained his/her M.D. degree.

The sequence of study requires two years, each consisting of a fall and spring semester. Upon completion of the four semesters, or a total of 60 units, the student will receive a master's of health administration (M.H.A.) degree. The statute of limitations is five years from the date of matriculation to complete all requirements for the M.H.A. degree. Contingent upon graduation, the student has the option of pursuing a 12-24 month postgraduate administrative fellowship. A certificate will be awarded by Washington University School of Medicine and the affiliated fellowship organization upon its satisfactory completion.

Administrative Fellowship

The 12-24 month optional postgraduate administrative fellowship will be served in a hospital, health agency, health organization or health system that has been recommended and approved by the full-time faculty. This option is available only to those persons who have the M.H.A. degree conferred upon them by the Washington University Health Administration Program. The purpose of the fellowship is to provide the graduate with an opportunity to observe and practice those concepts and principles learned during the didactic on-campus exposure. The administrative fellowship is strongly recommended, as this postgradu-

ate practical exposure is deemed necessary for adequate professional career preparation. The fellowship is completed under the direction of a well-qualified and experienced health care executive.

The full-time faculty maintains close liaison with the administrative fellow and the preceptor. An educational plan that outlines the fellow's activities for the coming year must be filed by the fellow, and the fellow reviews his/her learning progression at the end of the fellowship in a report to HAP's director. The preceptor sends two evaluation reports to the director of HAP and shares the responsibility for recommending awarding of the certificate by Washington University School of Medicine and the fellowship site organization.

Admission Requirements

Washington University's Health Administration Program is committed to nondiscriminatory practices in selection of applicants regarding race, sex, age, religion or national origin. The faculty and staff are affirmatively committed to recruiting, enrolling and educating students from minority groups who have the potential for graduate study.

A minimum of a bachelor's degree from an accredited university or college acceptable to Washington University School of Medicine is required, as is completion of the Graduate Record Examination (Aptitude Test) or the Graduate Management Aptitude Test. International students are also required to take the TOEFL exam. No specific undergraduate major field of study is required for admission into the program; however, at least one semester of accounting is required and introductory courses in economics, statistics (or their equivalents) and mathematics through college algebra are very strongly recommended. An on-site interview is required.

Tuition per semester	$11,500
Books and supplies (per semester)	550
Application fee (nonrefundable)	30

FOURTH YEAR

Medical Student Elective

M80 856 HEALTH ADMINISTRATION I

This elective is described in the Teaching and Research Divisions, and Programs chapter.

Faculty

ASSOCIATE PROFESSOR AND DIRECTOR

Stuart B. Boxerman, D.Sc., Washington University, 1970.

Assistant Professor

Ronald E. Gribbins, Ph.D., University of Wisconsin, 1975.

Assistant Professor of Health Administration

Mark A. Schnitzler, Ph.D., Washington University, 1997.

Instructor

Dennis L. Lambert, Ph.D., Washington University, 1994.

Research Instructor

Simone M. Cummings, Ph.D., University of North Carolina, 1999.

HEALTH CARE SERVICES PROGRAM

The Health Care Services Program at Washington University responds to the growing need for interdisciplinary professionals with expertise in the planning, implementation and evaluation of health service programs. Sponsored jointly by Washington University's School of Medicine, Department of Psychology and University College, this 30-unit graduate degree program draws on the broad expertise of university faculty and research personnel. The curriculum examines organizational influences important to the development of innovative programs for individuals and families, stressing health education and the application of current research findings.

Admission to the Health Care Services Program is open on a selective basis to qualified applicants with a bachelor's degree in a science or health-related field from an accredited institution. Applicants should have completed training in one of the several professions involved in the health care environment. Others may be admitted whose training and goals are congruent with the purposes of the program and acceptable to the admissions committee. The Master of Health Science degree can be pursued on a part-time basis with most courses held during the late afternoon or evening hours to accommodate the working professional. Students may select electives from various departments and divisions of the university (health administration, social work, psychology, human resources management).

Faculty

DIRECTOR

Edwin B. Fisher, Ph.D., State University of New York, Stony Brook, 1972. (Professor of Psychology, Medicine, and Pediatrics and Director, Division of Health Behavior Research.)

ASSOCIATE DIRECTOR

Kelly M. Everard, Ph.D., University of Kentucky, 1995. (Research Associate, Division of Health Behavior Research, Department of Medicine)

Instructors

Teresa Deshields, Ph.D., University of Georgia, 1985. (Assistant Professor, Division of Health Behavior Research, Department of Medicine, Director of Psychosocial Services, Siteman Cancer Center)

Patricia E. Freed, R.N., M.S.N., Ed.D., Southern Illinois University-Edwardsville, 1995. (Associate Professor, Jewish Hospital College of Nursing and Allied Health)

Joan Heins, M.A., Washington University, 1990. (Research Patient Coordinator, Division of Health Behavior Research, Department of Medicine)

Robyn Housemann, Ph.D., St. Louis University, 2000. (Assistant Professor, St. Louis University School of Public Health)

Cheryl A. Houston, Ph.D., St. Louis University, 2000. (Director of Dietetics, Program in Dietetics, Department of Environmental Sciences, Fontbonne University)

Donna B. Jeffe, Ph.D., Washington University, 1993. (Research Assistant Professor, Division of Health Behavior Research, Department of Medicine)

Arthur Lucas, M.Div., Duke University School of Divinity, 1973. (BJC Spiritual Care Services)

Anat Reschke, Ph.D., Washington University, 2000. (Instructor in Medicine, Division of Health Behavior Research, Department of Medicine)

Donald Rickert, Ph.D., St. Louis University, 1984. (Professor, St. Louis College of Pharmacy)

Mario Schootman, Ph.D., University of Iowa, 1993. (Assistant Professor of Epidemiology and Medicine, Division of Health Behavior Research, Department of Medicine)

Leigh Tenkku, M.P.H., St. Louis University, 1998.

Mark Walker, Ph.D., University of Memphis, 1998. (Instructor in Medicine, Division of Health Behavior Research, Department of Medicine)

Valerie Yancey, Ph.D., St. Louis University, 1998. (Associate Professor, Jewish Hospital College of Nursing and Allied Health)

PROGRAM IN OCCUPATIONAL THERAPY

The Program in Occupational Therapy prepares students for professional practice and through its research generates knowledge to address the issues facing individuals with disabilities, chronic diseases and developmental disabilities. Students are prepared as generalists but in addition can specialize for work in pediatrics, aging, work and industry or social participation. The curriculum focuses on the dynamic interaction of the biological and psychological, environmental and occupational factors that enable persons to fulfill roles, and lead meaningful and productive lives. Students interact with leading physicians and scientists whose practice and science is contributing to better methods of treatment of persons with disabilities. In addition students are linked with community agencies and leaders that are providing services to individuals with disabling conditions. Undergraduate students in psychology, biology and anthropology will find that the Program offers a means of applying their knowledge in a professional field. Applicants must hold a bachelor's degree or be a participant in an approved three-two program and have completed prerequisite courses from an accredited college or university. The OT Program is accredited by the Accreditation Council for Occupational Therapy Education of the American Occupational Therapy Association. Graduates of the Program will be eligible to sit for the national certification examination.

Master of Science in Occupational Therapy Degree Program

The professional Master of Science in Occupational Therapy degree requires courses that develop the knowledge and skills necessary to practice occupational therapy. Each candidate for a Master of Science in Occupational Therapy degree must complete a minimum of 75 hours of coursework, usually accomplished in five semesters of study (two academic years and the intervening summer.) Six months of supervised clinical fieldwork is required to be completed within 12 months of completion of coursework.

Doctor of Occupational Therapy Degree Program

The Doctor of Occupational Therapy (O.T.D.) is a professional degree providing students the opportunity to focus their occupational therapy studies in one of four areas of concentration: Productive Aging,

Social Participation and the Environment, Work and Industry, and Pediatrics. The O.T.D. requires seven semesters of study and three clinical placements.

A full description of degrees in Occupational Therapy is available from the office of the Program in Occupational Therapy, or at the web site *www.ot.wustl.edu*.

Tuition (graduate, full time) per semester: $11,550
Fee, per three-month clinical fieldwork: $2,000

Faculty

ASSOCIATE PROFESSOR AND ELIAS MICHAEL DIRECTOR

M. Carolyn Baum, Ph.D., OTR/L, Washington University, 1993. (See Department of Neurology.)

Professors

Susan E. Mackinnon, M.D., Queen's University, 1975. (See Department of Surgery and Department of Otolaryngology.)

J. Gail Neely, M.D., University of Oklahoma, 1965. (See Department of Otolaryngology.)

Associate Professors

C. Robert Almli, Ph.D., Michigan State University, 1970.

Michael N. Diringer, M.D., University of Kentucky, 1982. (See Departments of Neurology and Neurological Surgery.)

Alexander W. Dromerick, M.D., University of Maryland, 1986. (See Department of Neurology.)

Janet Duchek, Ph.D., University of South Carolina, 1982.

Dorothy F. Edwards, Ph.D., Washington University, 1980.

David B. Gray, Ph.D., University of Minnesota, 1974.

Leonard N. Matheson, Ph.D., University of Southern California, 1979.

Jay F. Piccirillo, M.D., University of Vermont, 1985. (See Department of Medicine and Department of Otolaryngology.)

Assistant Professors

Ellen F. Binder, M.D., Washington University, 1981. (See Department of Medicine.)

Bradley A. Evanoff, M.D., M.P.H., Washington University, 1986. (See Department of Medicine and Clinical Investigation Program.)

Philip E. Higgs, M.D., University of Florida, 1974.

Research Assistant Professors

Jack R. Engsberg, Ph.D., University of Iowa, 1985. (See Department of Neurological Surgery and Department of Biomedical Engineering.)

Holly Hollingsworth, Ph.D., University of Illinois, Urbana, 1975.

Instructors

Christine Berg, Ph.D., OTR/L, Washington University, 1999.

Elizabeth Daniels, M.S., OTR/L, Washington University, 1996.

Kathleen Kniepmann, M.P.H., OTR/L, Harvard University, 1981.

Patricia D. La Vesser, Ph.D., OTR/L, Washington University, 2000.

Peggy A. Neufeld, M.A., OTR/L, New York University, 1976.

Monica Perlmutter, M.A., OTR/L, Washington University, 1989.

Mary K. Seaton, M.H.S., OTR/L, Washington University, 1996.

Susan Stark, Ph.D., OTR/L, University of Missouri, Columbia, 1998.

PROGRAM IN PHYSICAL THERAPY

Physical Therapy is the science of human movement applied to rehabilitation, injury, fitness, injury prevention and overall health. Practicing in a variety of settings, physical therapists diagnose and treat movement dysfunction in patients with skill, competence and compassion. The Program in Physical Therapy is committed to providing students with excellent scientific and clinical education, in an environment that strives to continually lead the industry in practice, research, innovation and advocacy of movement health.

The Program in Physical Therapy at the School of Medicine offers three formal curricula that collectively foster opportunities for lifelong learning and comprehensive career development.

The Professional Doctor of Physical Therapy

The professional curriculum is an intensive three-year experience leading to the degree Doctor of Physical Therapy. The principle focus of this professional training is to develop scientific and clinical expertise in the diagnosis and treatment of movement-related conditions. By integrating biomedical and physical sciences and clinical education with behavioral and social sciences, this curriculum provides students with the scientific expertise, critical thinking skills and interpersonal communication necessary for effective clinical practice, comprehensive treatment design, patient advocacy, patient education and health promotion. Applicants for admission must have completed 1) a bachelor's degree at an accredited institution, and 2) prerequisite courses in biology, chemistry, physics, mathematics, anatomy, physiology, English, psychology and social sciences, and 3) the Graduate Record Examination.

The Post-Professional Doctor of Physical Therapy

The post-professional clinical doctorate curriculum offers practicing physical therapists an opportunity enhance their roles as diagnosticians, evidence-based practitioners and educators for an advanced model of practice. Designed to refine the practicing physical therapist's scientific and clinical expertise, the post-professional program also leads to a Doctor of Physical Therapy. Applicants for admission must have 1) graduated from an accredited professional physical therapy program, 2) acquired acceptable grade point averages in previous academic endeavors, and 3) achieved acceptable scores on the Graduate Record Examination.

Doctor of Philosophy in Movement Science

The focus of the interdisciplinary doctoral program in Movement Science is to prepare future researchers and faculty members who can enhance the profession of physical therapy. Admission to this curriculum requires acceptable scores on the Graduate Record Examination, excellence in previous academic work and demonstrated beginning abilities in posing questions of importance to the study of movement.

The faculty members of the Program in Physical Therapy are committed to being leaders in discovering and transmitting new knowledge related to movement dysfunction, preparing clinicians to assume multiple roles in a complex health care environment and fulfilling the service mission to society through active participation in humanistic, scientifically-based patient care. Students in all curricula are expected to participate actively in an environment that values integrity, initiative, creativity and the strong belief that physical therapy intervention promotes health. In these ways, all individuals associated with the Program in Physical Therapy may achieve their highest professional and personal potential.

Tuition: Professional curriculum
$12,450 per semester
Post-professional curriculum
$436 per credit
Doctoral curriculum
$13,450 per semester

Further information may be obtained by direct correspondence with the Program in Physical Therapy, Campus Box 8502, 4444 Forest Park Blvd., St. Louis, MO 63108-2212.

Phone: (314) 286-1400
Fax: (314) 286-1410
e-mail: *ptprog@msnotes.wustl.edu*
Web site: *pt.wustl.edu*

Faculty

DIRECTOR, RESEARCH DIVISION, DIRECTOR AND ASSOCIATE PROFESSOR

Susan S. Deusinger, Ph.D., Washington University, 1987. (See Department of Neurology.)

Professors

Stephen M. Highstein, M.D., University of Maryland, 1965; Ph.D., University of Tokyo, 1976. (See Department of Otolaryngology.)

Shirley A. Sahrmann, Ph.D., Washington University, 1973. (See Department of Cell Biology and Physiology, Department of Neurological Surgery and Department of Neurology.)

Paul S.G. Stein, Ph.D., Stanford University, 1970. (Also Department of Biology)

Michael J. Strube, Ph.D., University of Utah, 1982. (Also Department of Psychology)

W. Thomas Thach Jr., M.D., Harvard University, 1964. (See Department of Anatomy and Neurobiology, Department of Neurology and Department of Biomedical Engineering.)

Associate Professors

Michael J. Mueller, Ph.D., Washington University, 1992.
David R. Sinacore, Ph.D., University of West Virginia, 1992.

Research Associate Professor

Julaine M. Florence, D.P.T., Washington University, 2002.

Assistant Professor Emeritus

Robert J. Hickok, M.H.A., Washington University, 1971. (See Health Administration Program.)

Assistant Professors

Robert H. Deusinger, Ph.D., University of Iowa, 1981. (See Department of Medicine and Department of Biomedical Engineering.)
Scott D. Minor, Ph.D., University of Iowa, 1987.
Barbara J. Norton, Ph.D., Washington University, 1996.
Susan B. Racette, Ph.D., The University of Chicago, 1994. (See Department of Medicine.)
Jennifer S. Stith, Ph.D., Washington University, 1994.
Linda Van Dillen, Ph.D., Washington University, 1994.

Research Assistant Professors

Joseph W. Klaesner, Ph.D., Vanderbilt University, 1995. (See Department of Biomedical Engineering.)
DeQuan Zou, D.Sc., Washington University, 1993. (See Department of Biomedical Engineering.)

Instructor (Emeritus)

Kathleen Dixon, M.Ed., The Johns Hopkins University, 1969.

Instructors

Nancy J. Bloom, D.P.T., Washington University, 2002.
Tamara Burlis, M.H.S./P.T., Washington University, 1993.
Cheryl Caldwell, D.P.T., Washington University, 2002.
B. Ruth Clark, Ph.D., St. Louis University, 1988.
Suzanne M. Cornbleet, M.A., Washington University, 1987.
Beth Crowner, M.S.P.T., Washington University, 1989.
Ethel Frese, M.H.S./P.T., Washington University, 1985.
Marcie Harris Hayes, M.P.T. Northwestern University, 1996.
Mary Hastings, D.P.T., Washington University, 2002.
Renee Ivens, M.H.S./P.T., Washington University, 1996.
Debra Fleming McDonnell, M.S.P.T., Washington University, 1990.
Mary Kate McDonnell, M.H.S./P.T., Washington University, 1985.
Catherine Siener, M.H.S./P.T., Washington University, 1994.
Tracy Spitznagle, M.H.S./P.T., Washington University, 1994.
Susan K. Strecker, M.A., Washington University, 1995.
Janet Tenhula, M.H.S./P.T., Washington University, 1986.
Pam Wendl, M.S.P.T., Washington University, 1993.

PSYCHIATRIC EPIDEMIOLOGY MASTER PROGRAM (MPE)

The MPE Program, offered by the Epidemiology and Prevention Research Group in the Department of Psychiatry at Washington University Medical School, was established in 1989 by Lee Robins, Ph.D., and is the first and only program of its kind in the world. This program offers fundamental epidemiological and research skills, with an emphasis on interdisciplinary studies within a medical school environment. The program is noted for its public health focus, as it encompasses prevention, treatment and intervention research. It also strongly emphasizes training in the responsible conduct of science.

Candidates develop practical research skills and learn basic epidemiological methods that can be applied to many disciplines. They study the history and development of the major national and international psychiatric epidemiology studies, and they become familiar with diagnostic instruments commonly used in the field. Students learn how to organize and manage population surveys, including design, data collection and data analysis. Instructors in the program are experienced research investigators, with productive research teams.

Students come from varied backgrounds such as public health, social work, engineering, nursing, mathematics, psychology and anthropology. The overall objective of the MPE Program is to prepare pre-doctoral students and post-doctoral fellows for a productive research career in epidemiology, with an emphasis on behavioral risk factors. Graduate students in other University programs are also encouraged to enroll in courses. Undergraduate students are welcome, with the instructor's approval.

DEGREE IN PSYCHIATRIC EPIDEMIOLOGY

A Master in Psychiatric Epidemiology degree is offered to candidates enrolled in the program. The degree may be earned after successful completion of 30 credits made up of 14 core courses (25 credit hours) that are required in the MPE Program and 5 credits of elective courses. Elective credits may

include additional hours of Independent Study (beyond the required 6 hours). Required courses are: M08 500 Introduction to General Epidemiology, M08 502 Instruments of Psychiatric Diagnoses and Assessment, M08 505A (cross-listed as M21 505) Biostatistics for Research Workers, M08 507 Epidemiology Seminar I, M08 508 Landmarks in Psychiatric Epidemiology, M08 532 Psychiatry Grand Rounds I, M08 533 Psychiatry Research Seminar I (all offered in Fall), M08 507A Epidemiology Seminar II, M08 507B Epidemiology Seminar III, M08 532A Psychiatry Grand Rounds II, M08 533A Psychiatry Research Seminar II, M08 538 Research Methods, M08 676 Psychiatric Disorders of the Nervous System (all offered in Spring), and M08 506 Independent Study (offered Fall and Spring). In addition, a program-approved manuscript or grant application is required for graduation.

ACADEMIC CALENDAR

In general, the MPE Program follows the calendar of the School of Medicine for beginning and ending dates of semesters; students should consult the web site given below for specific courses offered each semester.

REGISTRATION INFORMATION FOR NON-MPE STUDENTS

All courses are open to any student, with the instructor's approval.

REGISTRATION INFORMATION FOR MPE STUDENTS

Registration is donethrough the Program Director's office.

FURTHER INFORMATION

For further information, view our web site at *www.epi.wustl.edu* (click on MPE) or contact Peg Greco, Administrative Coordinator (314) 286-2261 or *grecop@epi.wustl.edu*).

LOCATION

The MPE Program Administration is located at 40 N. Kingshighway, Parc Frontenac Building, Suite 4. Courses are held in this building and in various locations of the medical school.

DIRECTOR

The director of the MPE Program is Linda B. Cottler, Ph.D., Professor of Epidemiology in Psychiatry.

M08 500 INTRODUCTION TO GENERAL EPIDEMIOLOGY

Instructor: *Linda B. Cottler, Ph.D.*, 286-2252

Epidemiology is the study of health and disease in the population. This course, while introducing epidemiologic methods and classic medical studies, emphasizes the clinical importance of psychiatric epidemiology. Credit: 3 units.

M08 502 INSTRUMENTS OF PSYCHIATRIC DIAGNOSES AND ASSESSMENT

Instructor: *Kathleen K. Bucholz, Ph.D.,* 286-2284

Introduction to commonly used interviews, both structured and semi-structured, and questionnaire development since 1940 for the diagnosis of specific psychiatric disorders in children and adults. Credit: 1 unit.

M08 505A BIOSTATISTICS FOR RESEARCH WORKERS

Instructor: *Michael A. Province, Ph.D.,* 362-3616

Designed for those researchers who want to expand their knowledge of practical methods in statistics. Oriented toward statistical and epidemiological concepts, applications, practical hints, and a hands-on approach to data. Heavy use of SAS/PC for in-class examples and homework problems. Credit: 3 units. Cross-listed as M21 505 (GEMS).

M08 506 INDEPENDENT STUDY

Instructor: *Arranged mentor*

Student arranges with a faculty member to: 1) participate in that person's ongoing research; 2) research literature on a specific topic; 3) carry out secondary data analysis with an existing data set; 4) design and/or carry out an original research project; and/or 5) prepare a grant proposal. The faculty member meets regularly with the student and guides the project. Credit: 1-3 units.

M08 507 EPIDEMIOLOGY SEMINAR I: RECENT TRENDS IN EPIDEMIOLOGY (Credit: 1 unit)
M08 507A EPIDEMIOLOGY SEMINAR II: RECENT PROGRESS IN EPIDEMIOLOGY (Credit: 1 unit)
M08 507B EPIDEMIOLOGY SEMINAR III: POST DOC PRESENTATIONS (Credit: 1 unit)

Instructor: *Rumi K. Price, Ph.D.,* 286-2282

This series offers introduction tutorials for newly developed analytic techniques or techniques developed in other fields for advanced applications to epidemiologic studies.

M08 508 LANDMARKS IN PSYCHIATRIC EPIDEMIOLOGY

Instructor: *Kathleen K. Bucholz, Ph.D.,* 286-2284

A review of the major studies in psychiatric epidemiology, describing methods and results, from the 1920s to the present. Credit: 1 unit.

M08 532 PSYCHIATRY GRAND ROUNDS I (Credit: 1 unit)
M08 532A PSYCHIATRY GRAND ROUNDS II (Credit: 1 unit)

Instructor: *Carol S. North, M.D.,* 747-2013

Clinical psychiatric issues are discussed and illustrated with presentations of patients. Students discuss the presentation after each lecture, focusing on content and style.

M08 533 PSYCHIATRY RESEARCH SEMINAR I (Credit: 1 unit)
M08 533A PSYCHIATRY RESEARCH SEMINAR II (Credit: 1 unit)
Instructor: *Kathleen Bucholz, Ph.D.*, 286-2284

Research studies in psychiatry covering a broad range of topics. Students meet to discuss the seminar after each lecture.

M08 538 RESEARCH METHODS
Instructor: *Linda B. Cottler, Ph.D.*, 286-2252

A hands-on approach to psychiatric and substance abuse research. Enrollees attend confidential project meetings, being exposed to the ins and outs of the project's daily operations. Credit: 3 units.

M08 676 PSYCHIATRIC DISORDERS OF THE NERVOUS SYSTEM
Instructor: *Laura J. Bierut, M.D.*, 362-3492

Emphasizes the diagnosis of major psychiatric illness. Psychiatric disease will be described in terms of epidemiology, clinical presentation, natural history, genetics, differential diagnosis and clinical management. Biological and psychological influences on these diseases will be presented. Interviewing techniques and performance of mental status exam will be demonstrated by patient interviews. Credit: 1 unit.

M08 540 MINI COURSE–EPIDEMIOLOGY METHODS
Instructor: *Kathleen K. Bucholz, Ph.D.*, 286-2284

Short course in epidemiologic methods. Credit: 1 unit.

M08 522 MINI COURSE–GENETICS
Instructor: *Theodore Reich, M.D.*, 362-2149

Seminar format, topics vary. Credit: 1 unit.

M08 523 MINI COURSE–PSYCHOLOGICAL TESTING
Instructor: *Richard D. Wetzel, Ph.D.*, 362-2440

Seminar format, topics vary. Credit: 1 unit.

M08 531 MINI COURSE–PERSONALITY DISORDERS
Instructor: *C. Robert Cloninger, Ph.D.*, 362-7005

Seminar format, topics vary. Credit 1 unit.

M08 541 MINI COURSE–SCHIZOPHRENIA
Instructor: *Nuri B. Farber, M.D.*, 362-2459

Seminar format. Credit: 1 unit.

M08 542 MINI COURSE–BIPOLAR DISORDER
Instructor: *Nuri B. Farber, M.D.*, 362-2459

Seminar format. Credit: 1 unit.

M08 537 INTRODUCTION TO CHILD PSYCHIATRY I (Credit: 1 unit)
M08 537A INTRODUCTION TO CHILD PSYCHIATRY II (Credit: 1 unit)
Instructor: *Joan Luby, M.D.*, 286-2730

These courses address normative development and developmental psychopathology as it relates to mental disorders occuring in children and adolescents.

Faculty

DIRECTOR AND PROFESSOR

Linda B. Cottler, Ph.D., Washington University, 1987. (Epidemiology) (See Department of Psychiatry and Health Administration Program.)

ASSOCIATE DIRECTOR AND RESEARCH ASSISTANT PROFESSOR

Renee M. Cunningham-Williams, Ph.D., M.P.E., Washington University, 1994. (Social Work) (See Department of Psychiatry.)

Professors

C. Robert Cloninger, M.D., Washington University, 1970. (See Department of Psychiatry and Department of Genetics.)

Carol S. North, M.D., Washington University, 1983; M.P.E., 1993. (See Department of Psychiatry.)

Michael A. Province, Ph.D., Washington University, 1987. (See Clinical Investigation Program.)

Theodore Reich, M.D., McGill University, 1963. (See Department of Genetics and Department of Psychiatry.)

Edward L. Spitznagel Jr., Ph.D., The University of Chicago, 1965. (See Division of Biostatistics.) (Also Department of Mathematics)

Richard D. Wetzel, Ph.D., St. Louis University, 1974. (See Department of Neurological Surgery and Department of Neurology.)

Research Professor

Kathleen K. Bucholz, Ph.D., Yale University, 1986. (See Department of Psychiatry.)

Associate Professor

Laura J. Bierut, M.D., Washington University, 1987.

Research Associate Professor

Rumi K. Price, Ph.D., University of California, 1988. (See Department of Psychiatry.)

Assistant Professors

Nuri B. Farber, M.D., Washington University, 1989.

Joan Luby, M.D., Wayne State University, 1985. (See Department of Psychiatry.)

MASTER OF SCIENCE IN CLINICAL INVESTIGATION PROGRAM (MSCIP)

The Master of Science in Clinical Investigation Program (MSCIP) responds to the need for formal training for research fellows and junior faculty in clinical investigation, specifically in patient-oriented research. Students entering the program will choose a mentor during the first semester from a limited pool of experienced faculty so that they may begin laying the foundation for their clinical research. This two-year program will provide one year of didactic teaching in the subjects of study design, biostatistics, techniques used in research, and the basic scientific foundations and principles relevant to clinical research. The second-year students will continue research in their mentors' laboratories and prepare a grant proposal. This written grant proposal, and the oral presentation of it, will be used as the final evaluation of each student's abilities and readiness to compete for national-level funding agency grants. Offered through Washington University School of Medicine, this 30-unit graduate degree program is based on the School of Medicine's strength in basic research and draws on the varied expertise of its faculty and research personnel.

Admission to the MSCIP is open, on a selected basis, to qualified applicants with either an M.D. or a Ph.D. degree. M.D. applicants should have completed their clinical training. This program is also designed to allow anyone who is interested to audit one or more courses without admission to the full degree-granting program. For more information, please contact the MSCIP office at (314) 747-4614, or send correspondence to: Master of Science in Clinical Investigation Program, Washington University School of Medicine, Campus Box 8009, 660 S. Euclid Ave., St. Louis, MO 63110.

Tuition per credit hour:	$850
Tuition per course for auditing students:	$600

M17 500 CLINICAL RESEARCH STUDY DESIGN

Coursemasters: *Samuel Klein, M.D.*, 362-8190; *Bradley A. Evanoff, M.D., M.P.H.*, 454-3850

Introduction to basic principles in designing and implementing a clinical research study, including developing an appropriate research question, choosing the correct study design, obtaining approval for the experimental protocol, reporting the data, and submitting a grant proposal. Student evaluation based upon final written examination. Credit: 2 units.

M17 501 TECHNIQUES OF PATIENT-ORIENTED RESEARCH (I)

Coursemasters: *William J. Powers, M.D.*, 362-2957; *Jeffrey E. Saffitz, M.D., Ph.D.*, 362-7728

The theoretical basis and scientific application of contemporary methods in molecular and cellular biology will be considered in the context of patient-oriented research. Student evaluation will be based on a written, problem-solving take-home examination. Credit: 3 units.

M17 502 SCIENTIFIC FOUNDATIONS OF TRANSLATIONAL RESEARCH (I)

Coursemasters: *F. Sessions Cole, M.D., Ph.D.*, 454-6148; *Steven D. Shapiro, M.D.*, 454-2694

Review current theories of genetic, development, and environmental mechanisms for disease in three separate modules. Student evaluation based upon a final written examination. Credit: 3 units.

M17 505 BIOSTATISTICS FOR PATIENT-ORIENTED RESEARCH

Coursemasters: *Kenneth B. Schechtman, Ph.D.*, 362-2271; *Michael A. Province, Ph.D.*, 362-2616

Designed to expand the knowledge of practical methods in statistics for investigators in patient-oriented research. Includes statistical concepts, applications, practical hints and a hands-on approach to data. Heavy use of SAS/PC for in-class examples and homework problems. Student evaluations based upon final written examination. Credit: 3 units.

M17 550 RESEARCH PROPOSAL SEMINAR

Coursemasters: *Samuel Klein, M.D.*, 362-8190; *Bradley A. Evanoff, M.D., M.P.H.*, 454-3850; *Kenneth B. Schechtman, Ph.D.*, 362-2271

Proposals for research projects are presented for critical review. The potential importance of the study, study design, experimental protocol, analytical methods and statistics will be discussed. Student evaluation will be based upon satisfactory submission of research proposal to the IRB. Prerequisite for this course is Clinical Research Study Design. Credit: 1 unit.

M17 551 TECHNIQUES OF PATIENT-ORIENTED RESEARCH (II)

Coursemasters: *William J. Powers, M.D.*, 362-2957; *Jeffrey E. Saffitz, M.D., Ph.D.*, 362-7728

The theoretical basis and scientific application of modern biological imaging modalities and analysis of whole body composition and systemic physiology will be considered in the context of patient-oriented research. Student evaluation will be based on a written, problem-solving take-home examination. Credit: 3 units.

M17 552 SCIENTIFIC FOUNDATIONS OF TRANSLATIONAL RESEARCH (II)

Coursemasters: *F. Sessions Cole, M.D., Ph.D.*, 454-6148; *Steven D. Shapiro, M.D.*, 454-2694

Modern scientific principles relevant to patient-oriented research, presented as modules in the "bench-to-bedside" paradigm for specific diseases. Example modules include cardiovascular, cancer and

inherited disease. Emphasis is placed on general biologic processes that translate to specific clinical manifestations. Student evaluation based upon a discussion paper of a disease not covered by course materials. Credit: 3 units.

M17 600 TOPICS IN CLINICAL RESEARCH

Coursemaster: *Daniel P. Schuster, M.D.,* 362-3776

A weekly journal club of recent and key papers in the field of clinical research. Presentations are given by graduate students. Credit contingent upon regular attendance and one presentation. Credit: 1 unit.

M17 900 INDEPENDENT STUDY

Instructor: TBD (student's mentor)

A clinical research project supervised by a mentor acceptable to the MSCIP. Requires a written grant proposal. Credit: 5 units.

Faculty

DIRECTOR, PROFESSOR AND ASSOCIATE DEAN FOR CLINICAL RESEARCH

Daniel P. Schuster, M.D., Yale University, 1976. (See Department of Medicine and Department of Radiology.)

Professors

Anne M. Bowcock, Ph.D., University of The Witswatersrand, 1984. (See Department of Genetics, Department of Medicine, and Department of Pediatrics.)

F. Sessions Cole, M.D., Ph.D., Yale University, 1973. (See Department of Cell Biology and Physiology and Department of Pediatrics.)

Philip E. Cryer, M.D., Northwestern University, 1965. (See Department of Medicine.)

Edwin B. Fisher, Ph.D., State University of New York, 1972. (See Department of Medicine and Alvin J. Siteman Cancer Center.) (Also Department of Psychology)

Jonathan D. Gitlin, M.D., University of Pittsburgh, 1978. (See Department of Pathology and Immunology and Department of Pediatrics.)

Mae Etsuko Gordon, Ph.D., University of Wisconsin, 1978. (See Department of Medicine, Department of Ophthalmology and Visual Sciences, and Division of Biostatistics.)

Virginia A. Herrmann, M.D., St. Louis University, 1974. (See Department of Surgery.)

Samuel Klein, M.D., Temple University, 1979. (See Department of Medicine.)

Michael Lovett, Ph.D., University of London, 1981. (See Department of Genetics and Department of Pediatrics.)

Philip A. Ludbrook, M.D., University of Adelaide, 1963. (See Department of Medicine and Department of Radiology.)

J. Philip Miller, A.B., Washington University, 1965. (See Division of Biostatistics, Psychiatric Epidemiology and Alvin J. Siteman Cancer Center.)

Thomas R. Miller, Ph.D., Stanford University, 1971; M.D., University of Missouri, 1976. (See Department of Radiology.) (Also Department of Electrical Engineering)

Mark A. Mintun, M.D., Washington University, 1981. (See Department of Psychiatry and Department of Radiology.)

Barbara S. Monsees, M.D., Washington University, 1975. (See Department of Radiology.)

Colin G. Nichols, Ph.D., University of Leeds, 1985. (See Department of Cell Biology and Physiology.)

M. Alan Permutt, M.D., Washington University, 1965. (See Department of Cell Biology and Physiology and Department of Medicine.)

Steven E. Petersen, Ph.D., California Institute of Technology, 1981. (See Department ofAnatomy and Neurobiology, Department of Neurological Surgery, Department of Neurology (Neuropsychology) and Department of Radiology.)

David R. Piwnica-Worms, M.D., Ph.D., Duke University, 1984. (See Department of Molecular Biology and Pharmacology and Department of Radiology.)

William J. Powers, M.D., Cornell University, 1975. (See Department of Neurology and Department of Radiology.)

Michael A. Province, Ph.D., Washington University, 1987. (See Division of Biostatistics.)

John P. Rice, Ph.D., Washington University, 1975. (Mathematics) (See Department of Psychiatry and Division of Biostatistics.)

Jeffrey E. Saffitz, Ph.D., Case Western Reserve University, 1977; M.D., 1978. (See Department of Medicine and Department of Pathology and Immunology.)

Steven D. Shapiro, M.D., The University of Chicago, 1983. (See Department of Cell Biology and Physiology, Department of Medicine and Department of Pediatrics.)

Gregorio A. Sicard, M.D., University of Puerto Rico, 1972. (See Department of Radiology and Department of Surgery.)

Barry A. Siegel, M.D., Washington University, 1969. (See Department of Medicine, Department of Radiology and Alvin J. Siteman Cancer Center.)

Robert C. Strunk, M.D., Northwestern University, 1968. (See Department of Pediatrics.)

Neil H. White, M.D., Albert Einstein College of Medicine, 1975. (See Department of Pediatrics.)

Associate Professors

Dana R. Abendschein, Ph.D., Purdue University, 1978. (See Department of Cell Biology and Physiology and Department of Medicine.)

William E. Clutter, M.D., Ohio State University, 1975. (See Department of Medicine.)

Gerard M. Doherty, M.D., Yale University, 1986. (See Department of Surgery and Alvin J. Siteman Cancer Center.)

Robert J. Gropler, M.D., University of Cincinnati, 1981. (See Department of Medicine and Department of Radiology.)

Janet B. McGill, M.D., Michigan State University, 1979. (See Department of Medicine and Department of Pediatrics.)

Robert F. Nease Jr., Ph.D., Stanford University, 1989. (See Department of Medicine.)

Jeffrey J. Neil, M.D., Ph.D., Washington University, 1984. (See Department of Neurology and Department of Pediatrics.)

Brian G. Rubin, M.D., University of Vermont, 1984. (See Department of Radiology and Department of Surgery.)

Kenneth B. Schechtman, Ph.D., Washington University, 1978. (See Department of Medicine and Division of Biostatistics.)

Robert W. Thompson, M.D., University of Michigan, 1983. (See Department of Radiology and Department of Surgery.)

Jerold W. Wallis, M.D., Stanford University, 1981. (See Department of Radiology.)

David B. Wilson, M.D., Ph.D., Washington University, 1986. (See Department of Molecular Biology and Pharmacology and Department of Pediatrics.)

Richard K. Wilson, Ph.D., University of Oklahoma, 1986. (See Department of Genetics.)

Kevin E. Yarasheski, Ph.D., Kent State University, 1986. (See Department of Medicine.)

Mary M. Zutter, M.D., Tulane University, 1981. (See Department of Pathology and Immunology.)

Research Associate Professors

Rosalind J. Neuman, Ph.D., Washington University, 1981. (Mathematics) (See Department of Psychiatry.)

Bruce W. Patterson, Ph.D., University of Illinois, 1980. (See Department of Medicine.)

Rumi K. Price, Ph.D., University of California, 1988. (See Department of Psychiatry and Psychiatric Epidemiology.)

Assistant Professors

Rebecca L. Aft, Ph.D., University of Wisconsin, Madison, 1983; M.D., Washington University, 1992. (See Department of Surgery.)

Philip M. Barger, M.D., Case Western Reserve University, 1989. (See Department of Medicine.)

Mario Castro, M.D., University of Missouri, Kansas City, 1988. (See Department of Medicine.)

Bradley A. Evanoff, M.D., M.P.H., Washington University, 1986. (See Department of Medicine and Program in Occupational Therapy.)

Bradley D. Freeman, M.D., Duke University, 1988. (See Department of Surgery.)

Brian F. Gage, M.D., University of California, 1988. (See Department of Medicine.)

Thomas H. Gallagher, M.D., Harvard University, 1990. (See Department of Medicine.)

Brian P. Hackett, Ph.D., Boston University, 1984; M.D., 1986. (See Department of Pediatrics.)

Mark C. Johnson, M.D., The Johns Hopkins University, 1982. (See Department of Pediatrics.)

Robert C. McKinstry III, Ph.D., Massachusetts Institute of Technology, 1991; M.D., Harvard University, 1992. (See Department of Radiology.)

Louis J. Muglia, Ph.D., The University of Chicago, 1986; M.D., 1988. (See Department of Molecular Biology and Pharmacology and Department of Pediatrics.)

Vamsidhar R. Narra, M.D., Osmania University, India, 1990. (See Department of Radiology.)

Daniel S. Ory, M.D., Harvard University, 1986. (See Department of Medicine.)

Scott Saunders, M.D., Ph.D., Stanford University, 1990. (See Department of Molecular Biology and Pharmacology and Department of Pediatrics.)

William D. Shannon, Ph.D., University of Pittsburgh, 1995. (See Department of Medicine, Alvin J. Siteman Cancer Center and Division of Biostatistics.)

Theodore C. Simon, Ph.D., George Washington University, 1990. (See Department of Pediatrics.)

Mark A. Watson, M.D., Ph.D, Washington University, 1992. (See Department of Pathology and Immunology and Alvin J. Siteman Cancer Center.)

Pamela K. Woodard, M.D., Duke University, 1990. (See Department of Radiology.)

Research Assistant Professors

Donna B. Jeffe, Ph.D., Washington University, 1993. (See Department of Medicine.)

Kathleen C. Sheehan, Ph.D., St. Louis University, 1986. (See Department of Pathology and Immunology.)

Instructors

Leonard B. Bacharier, M.D., Washington University, 1992. (See Department of Medicine and Department of Pediatrics.)

Laura A. Bayer, Ph.D., Virginia Commonwealth University, 1997. (See Department of Medicine.)

Teresa Deshields, Ph.D., University of Georgia, 1985. (See Department of Medicine.)

Mitchell H. Grayson, M.D., The University of Chicago, 1993. (See Department of Medicine.)

Jeffrey S. Greiwe, M.D., Southern Illinois University, Carbondale, 1996. (See Department of Medicine.)

Mario Schootman, Ph.D., University of Iowa, 1993. (See Department of Medicine.)

Mark Walker, Ph.D., University of Memphis, 1998. (See Department of Medicine.)

SCHOOL OF MEDICINE/ ST. LOUIS COLLEGE OF PHARMACY STUDENT RESEARCH TRAINING PROGRAM

A key academic institution in our biomedical and clinical health center environment is the St. Louis College of Pharmacy. It is one of the premier institutions in the country for the teaching and training of pharmacists. The College's extensive pharmaceutical sciences curriculum has generated interest by a number of their students in laboratory biomedical research. Students beyond their fourth year at St. Louis College of Pharmacy who demonstrate interest in science and research, and are recommended by the College faculty, will have an opportunity to complete 10- to 14-week fellowships in any of the laboratories at the School of Medicine. Students can, with consent of their advisors at the College of Pharmacy and the laboratory principal investigator, extend their stay. This joint research collaboration should encourage those students in the program to pursue graduate degrees in the Division of Biomedical Sciences at the School of Medicine.

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Hudson E. Bridge Chancellor
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Executive Vice Chancellor and Dean of Arts and Sciences
Larry J. Shapiro
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Richard A. Roloff
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Shirley K. Baker
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[1] Part-Time Faculty Representative 2002-2004
[2] Clinical Full-Time Representative 2002-2004
[3] Preclinical Full-Time Representative 2001-2003

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Clinical Representative to the Executive Committee of the Faculty Council
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Clinical Representative to the Executive Committee of the Faculty Council
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ad hoc

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Wade L. Thorstad

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Doctor of Medicine and Doctor of Philosophy Degrees

Afkarian, Maryam
Tehran, Iran
B.A., University of California, Berkeley, '94
Internal Medicine/Research
New York Presbyterian Hospital-Cornell University
New York, NY

Banerjee, Ritu
Bergen, NJ
B.A., Swarthmore College, '94
Pediatrics
University of California, San Francisco
San Francisco, CA

Bernstein, Michael Lyn
Woodbury, IA
B.A., The Johns Hopkins University, '94
Plastic Surgery
University of Michigan
Ann Arbor, MI

Chang, Louis Kay-Shion
Stanford, CA
B.S., Stanford University, '96
Transitional Year
Harbor-UCLA Medical Center
Los Angeles, CA
Ophthalmology
University of California, Los Angeles
Los Angeles, CA

Clements, Mark Allen
Plymouth, IN
B.S., Butler University, '93
Pediatrics
Children's Mercy Hospital
Kansas City, MO

Cukras, Catherine Ann
Scarsdale, NY
B.S., Princeton University, '96
Transitional Year
University of Pennsylvania Health System-Presbyterian
Philadelphia, PA
Ophthalmology
Scheie Eye Institute/University of Pennsylvania
Philadelphia, PA

Fink, Doran Leonard
Stanford, CA
B.S., Stanford University, '96
Pediatrics
The Johns Hopkins Hospital
Baltimore, MD

Frohnert, Paul William
Frankfurt, Germany
B.S., Macalester College, '92
Internal Medicine-Preliminary
Saint Louis University Hospital
St. Louis, MO

Gavin, Mark Raymond
Chicago, IL
B.A., Washington University, '95
Internal Medicine
Mayo Graduate School of Medicine
Rochester, MN

Hellman, Nathan Edward
New Haven, CT
B.S., Yale University, '96
Internal Medicine
Hospital of the University of Pennsylvania
Philadelphia, PA

Ho, Alan Loh
Des Plaines, IA
B.S., Stanford University, '95
Internal Medicine/Research
New York Presbyterian Hospital-Cornell University
New York, NY

Kerchner, Geoffrey Allen
Oak Ridge, TN
B.A., Harvard University, '94
Internal Medicine-Preliminary
University of California, San Francisco
San Francisco, CA
Neurology
University of California, San Francisco
San Francisco, CA

King-Casas, Katherine Yudeh
Houston, TX
B.A., Harvard University, '96
Pediatrics
Baylor College of Medicine
Houston, TX

Lam, Jonathan Jak Sum
West Memphis, AR
B.A., Harvard University, '97
Orthopaedic Surgery
University of California, San Francisco
San Francisco, CA

Murata, Haruhiko
Clark, WA
B.A., Washington University, '94
Research Fellowship
National Cancer Institute
Bethesda, MD

Nagarajan, Rakesh[1]
Henrico, VA
B.A., University of Virginia, '94
Instructor in Pathology and Immunology
Washington University School of Medicine
St. Louis, MO

Putcha, Girish Venkata
Bhilai, India
B.A., Rice University, '91
Pathology
Stanford University
Palo Alto, CA

Saifee, Owais
Karachi, Pakistan
B.S., Northwestern University, '93
Transitional Year
St. John's Mercy Medical Center
St. Louis, MO
Anesthesiology
Massachusetts General Hospital
Boston, MA

Schilling, Joel David
Madison, WI
B.A., Colorado College, '96
Internal Medicine
Barnes-Jewish Hospital
St. Louis, MO

Sehy, Jonathan Victor
Champaign, IL
B.S., University of Illinois, Urbana, '96
Transitional Year
St. Vincent's Hospital
New York, NY
Diagnostic Radiology
The Johns Hopkins Hospital
Baltimore, MD

van Berkel, Victor Henry
Boston, MA
B.S., Massachusetts Institute of Technology, '96
General Surgery
Massachusetts General Hospital
Boston, MA

Walsh, Mark Kim
Gambier, OH
B.A., Kenyon College, '96
Transitional Year
St. Francis Hospital
Evanston, IL
Ophthalmology
The Johns Hopkins Hospital/Wilmer Institute
Baltimore, MD

Zarrin, Amy Rebecca
New York, NY
B.S., Cornell University, '93
Internal Medicine-Preliminary
Beth Israel Deaconess Medical Center
Boston, MA
Neurology
Harvard University/Beth Israel Deaconess Medical Center
Boston, MA

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[1]Degree Conferred in December 2002

Doctor of Medicine and Master of Arts Degrees

Boyd, Jessica Henderson
Oakton, VA
B.A., Harvard University, '98
Pediatrics
St. Louis Children's Hospital
St. Louis, MO

Wahab, Sasha Hyatt
Washington, DC
B.A., University of Virginia, '97
Transitional Year
Forest Park Hospital
St. Louis, MO
Radiation Oncology
Barnes-Jewish Hospital
St. Louis, MO

Wee, Raymond
Lake Forest, IL
B.S., M.S., Yale University, '98
Transitional Year
University of Hawaii
Honolulu, HI
Ophthalmology
Massachusetts Eye and Ear Infirmary
Boston, MA

Doctor of Medicine Degrees

Albrecht, Suzanne Grace
O'Fallon, MO
B.S., University of South Carolina, Columbia, '99
Pediatrics
Baylor College of Medicine
Houston, TX

Anast, Jason William
St. Louis, MO
B.S., Washington University, '99
NIH Research Fellowship
University of California, San Francisco
San Francisco, CA

Arett, Christopher Thomas
Chesterfield, MO
B.A., Washington University, '99
Surgery-Preliminary
University of California, San Francisco
San Francisco, CA

Aumock, Angel Kay
Elkhorn, WI
B.S., University of Wisconsin, Madison, '99
Internal Medicine
Beth Israel Deaconess Medical Center
Boston, MA

Bork, Sarah E.
Toledo, OH
B.S., Michigan State University, '99
Internal Medicine
University of Washington Affiliated Hospitals
Seattle, WA

Borman-Shoap, Emily Cray
Altoona, WI
B.A., Carleton College, '99
Pediatrics
University of Minnesota
Minneapolis, MN

Brady, Patrick Wharton
Columbus, OH
B.A., University of Virginia, '99
Pediatrics
Cincinnati Children's Hospital
Cincinnati, OH

Burgner, Karen Marie
Naperville, IL
B.S., University of Illinois, Urbana-Champaign, '99
Internal Medicine
McGaw Medical Center-Northwestern University
Chicago, IL

Canales, John Fierros
San Antonio, TX
B.A., University of Texas, Austin, '99
Internal Medicine
University of Texas-Southwestern
Dallas, TX

Chan, Stanley Uy
Salisbury, MD
B.S., Duke University, '97
Internal Medicine-Preliminary
Barnes-Jewish Hospital
St. Louis, MO
Diagnostic Radiology
Barnes-Jewish Hospital
St. Louis, MO

Chang, Jerry Weiger
Taipei, Taiwan
B.S., Duke University, '98
Plastic Surgery
Yale-New Haven Hospital
New Haven, CT

Chao, Andrea
Princeton Junction, NJ
B.S., Cornell University, '99
General Surgery
Brigham and Women's Hospital
Boston, MA

Chavez-Frazier, Arianne Elizabeth
Pearland, TX
B.A., Rice University, '99
Transitional Year
Arrowhead Regional Medical Center
Colton, CA

Chen, Joseph
Reno, NV
A.B., B.S., Stanford University, '97
Internal Medicine
Stanford University
Palo Alto, CA

Chen, Li Ern
Singapore
B.A., Washington University, '99
General Surgery
Barnes-Jewish Hospital
St. Louis, MO

Chen-Becker, Deborah
Dublin, OH
B.A., Case Western Reserve University, '99
Pediatrics
University of Colorado
Denver, CO

Cheng, Amy S.
Monterey Park, CA
B.A., University of California, Berkeley, '99
Transitional Year
St John's Mercy Medical Center
St. Louis, MO
Dermatology
Barnes-Jewish Hospital
St. Louis, MO

Cheung, Gilbert Yannick
Alexandria, VA
B.S., Massachusetts Institute of Technology, '97
Internal Medicine-Preliminary
Barnes-Jewish Hospital
St. Louis, MO

Clifford, Keri Shannon
Stevens Point, WI
B.S., University of Wisconsin, Madison, '99
Deferring residency

Connelly, James Albert
Dubuque, IA
B.S., University of Iowa, '99
Pediatrics
University of Michigan
Ann Arbor, MI

Craig, Vanessa Jane
Mont Vernon, NH
B.A., Columbia University, '99
Internal Medicine
Beth Israel Deaconess Medical Center
Boston, MA

Daniels, Lauren Cecelia
St. Louis, MO
B.S., Massachusetts Institute of Technology, '99
Pediatrics
Stanford University
Palo Alto, CA

Daymont, Carrie Bess
Erdenheim, PA
B.S., Duke University, '99
Pediatrics
Children's Hospital of Philadelphia
Philadelphia, PA

Fair, Joanna Ruth
Huntsville, TX
B.A., Rice University, '95
Diagnostic Radiology
University of New Mexico
Albuquerque, NM

Filippino, Scott Robert
North Canton, OH
B.S., Carnegie Mellon University, '99
Psychiatry
Barnes-Jewish Hospital
St. Louis, MO

Flynn, Ashley Carter
Portland, ME
B.A., Swarthmore College, '98
Pediatrics
St. Louis Children's Hospital
St. Louis, MO

Gabriel, Peter Edward
Moorestown, NJ
B.A., Duke University, '99
Internal Medicine-Primary
Hospital of the University of Pennsylvania
Philadelphia, PA

Ginde, Adit Arun
Upper Marlboro, MD
B.A., Rice University, '99
Emergency Medicine
Beth Israel Deaconess Medical Center
Boston, MA

Goldstein, Jordan Louis
Highland Park, IL
B.A., University of Pennsylvania, '99
Orthopaedic Surgery
Rush-Presbyterian-St. Luke's Medical Center
Chicago, IL

Hatfield, Daniel Eric
Gilbertsville, KY
B.S., University of Notre Dame, '99
Internal Medicine-Preliminary
St. Mary's Health Center
St. Louis, MO
Diagnostic Radiology
Barnes-Jewish Hospital
St. Louis, MO

Heaton, Jennifer Jill
Tulsa, OK
B.A., Pomona College, '98
Internal Medicine-Preliminary
University of Oklahoma
Tulsa, OK
Emergency Medicine
George Washington University
Washington, DC

Hu, Shasa
St. Louis, MO
B.S., Stanford University, '98
Internal Medicine-Preliminary
Mt. Sinai Medical Center
Miami, FL

Iofin, Ilya
Rockville, MD
B.A., Princeton University, '99
Orthopaedic Surgery
New York University Medical Center/Hospital for Joint Diseases
New York, NY

Irving, Sarah Elizabeth
Hingham, MA
B.A., Dartmouth College, '95
Family Practice
Eastern Maine Medical Center
Bangor, ME

Jarrett, Delma Yemisi
Chicago, IL
B.A., Harvard University, '99
Transitional Year
Memorial Sloan-Kettering Cancer Center
New York, NY
Diagnostic Radiology
Massachusetts General Hospital/Harvard University
Boston, MA

Jones, Rachel Ann
Florissant, MO
B.S., Washington University, '99
Emergency Medicine
Barnes-Jewish Hospital
St. Louis, MO

Kamath, Ganesh Vasant
Jacksonville, MO
B.S., The Johns Hopkins University, '99
Orthopaedic Surgery
Barnes-Jewish Hospital
St. Louis, MO

Kawamura, David Hiroshi
Portage, MI
B.A., Columbia University, '99
Plastic Surgery
Barnes-Jewish Hospital
St. Louis, MO

King, Erin Lee
Redwood City, CA
B.A., Stanford University, '97
Obstetrics-Gynecology
McGaw Medical Center-Northwestern University
Chicago, IL

Koay, Kelly Weiwei
Singapore
B.A., University of Michigan, Ann Arbor, '98
Medicine/Pediatrics
Duke University
Durham, NC

Lacy, Sarah M.
Ann Arbor, MI
B.S., University of Michigan, Ann Arbor, '98
Pediatrics
University of Michigan
Ann Arbor, MI

Ladha, Alim Mirza
Miami, FL
B.S., University of Miami, '98
Surgery-Preliminary
University of North Carolina
Chapel Hill, NC
Neurological Surgery
University of North Carolina
Chapel Hill, NC

Lawson, Amy L.
Overland, MO
B.S., University of Nebraska, Lincoln, '99
Pediatrics
St. Louis Children's Hospital
St. Louis, MO

Lucco, Kerith Lucia
Edwardsville, IL
B.S., Stanford University, '98
Obstetrics-Gynecology
Barnes-Jewish Hospital
St. Louis, MO

Mahoney, Heather Jeanine
Flower Mound, TX
B.S., Texas A&M University, '97
Emergency Medicine
New York University
New York, NY

McGregor, Tracy Lynn
St. Louis, MO
B.S., University of Notre Dame, '99
Pediatrics
St. Louis Children's Hospital
St. Louis, MO

Mesher, Staci Alison
Baldwin, NY
B.A., Yale University, '99
Internal Medicine
Mt. Sinai Hospital
New York, NY

Miyashita, Yosuke
Columbus, OH
B.S., Washington University, '99
Pediatrics
St. Louis Children's Hospital
St. Louis, MO

Montalvo Quiñones, Valerie Hope
Eureka, CA
B.A., Washington University, '98
Surgery-Preliminary
Loma Linda University Medical Center
Loma Linda, CA

Nakamura, Sterling Moichiro[2]
Burlingame, CA
B.S., University of California, Los Angeles, '96
Family Practice
Mercy Medical Center-Merced
Merced, CA

Namazie, Sheyda
Brookline, MA
B.A., Williams College, '97
Pediatrics
St. Louis Children's Hospital
St. Louis, MO

Oberhelman, Amy Patricia
Manhattan, KS
B.A., Stanford University, '99
Transitional Year
St. John's Mercy Medical Center
St. Louis, MO
Diagnostic Radiology
Barnes-Jewish Hospital
St. Louis, MO

O'Donnell, Heather Colleen
Yorktown Heights, NY
B.A., College of the Holy Cross, '97
Pediatrics
New York Presbyterian Hospital-Columbia
New York, NY

Patil, Avinash Shantagonda
Lafayette, CA
B.S., University of California, Davis, '98
Emergency Medicine
Loma Linda University
Loma Linda, CA

Pettit, Kelli Kreul
Racine, WI
B.H., University of Wisconsin, Madison, '99
General Surgery
Medical College of Wisconsin
Milwaukee, WI

Prager, Jeremy David
Ann Arbor, MI
B.A., Duke University, '98
Otolaryngology
Washington University
St. Louis, MO

Quant, Eudocia Carmen
Miami, FL
B.S., Northwestern University, '98
Internal Medicine-Preliminary
Beth Israel Deaconess Medical Center
Boston, MA
Neurology
Harvard University/Massachusetts General Hospital/Brigham and Women's Hospital
Boston, MA

Ragar, Brent Allen
Cabot, AR
B.H., University of Arkansas, '99
Medicine/Pediatrics
Massachussetts General Hospital/Harvard University
Boston, MA

Reyes, Michael John
Santa Clarita, CA
B.S., University of California, Los Angeles, '98
Orthopaedic Surgery
Barnes-Jewish Hospital
St. Louis, MO

Rich, Rachel Aileen
Newhall, CA
B.S., University of California, Los Angeles, '98
Plastic Surgery
Rhode Island Hospital/Brown University
Providence, RI

Roy, Lance Atlas
Chesapeake, VA
B.A., Florida State University, '99
Transitional
Naval Medical Center
San Diego, CA

Schmitt, Sarah Elizabeth
Summerville, SC
B.S., Brown University, '99
Internal Medicine-Preliminary
Hospital of the University of Pennsylvania
Philadelphia, PA
Neurology
University of Pennsylvania
Philadelphia, PA

Sharma, Umang
Carmel, IN
B.S., Purdue University, '99
Family Practice
University of Washington Affiliated Hospitals
Seattle, WA

Smith, Rebecca Armstrong
Madison, WI
B.A., Smith College, '95
Psychiatry
UCLA-Neuropsychiatric Institute
Los Angeles, CA

Somsel, Elizabeth Lee
Marshall, MI
B.S., University of Michigan, Ann Arbor, '99
Pediatrics
St. Louis Children's Hospital
St. Louis, MO

Srokowski, Tomasz Pawel
Wroclaw, Poland
B.S., Southern Illinois University, Edwardsville, '94
Internal Medicine
Barnes-Jewish Hospital
St. Louis, MO

Stark, Timothy Daniel
Rochester Hills, MI
B.H., University of Michigan, Ann Arbor, '98
Anesthesiology
Cleveland Clinic Foundation
Cleveland, OH

Stephenson, Leroi Arthur
Wycoff, NJ
B.A., Rutgers, The State University of New Jersey, Newark, '99
General Surgery
Lenox Hill Hospital
New York, NY

Stover, Mark Conrad
Lawrence, KS
B.S., University of Kansas, '96
Emergency Medicine
Hospital of the University of Pennsylvania
Philadelphia, PA

Sun, Diane Ruolin
St. Louis, MO
B.S., Washington University, '99
Internal Medicine
Barnes-Jewish Hospital
St. Louis, MO

Swenson, Casey Tad
Cody, WY
B.A., Concordia College,
Moorhead, MN, '98
Family Practice
Duluth Graduate Medical
Education Program
Duluth, MN

Tang, Michele Wen
Kailua, HI
B.A., Rice University, '98
Internal Medicine-Primary
University of California,
San Francisco
San Francisco, CA

Terrenzi, Kristen Ingrid
Medfield, MA
B.S., Tulane University, '99
General Surgery
University of Massachusetts
Worcester, MA

Torgenson, Marcus Jewell
St. George, UT
B.S., University of Utah, '99
General Surgery
University of Utah Affiliated
Hospitals
Salt Lake City, UT

Tsai, Katherine Shuangchyu
Irvine, CA
B.S., University of California,
Irvine, '99
Internal Medicine
Barnes-Jewish Hospital
St. Louis, MO

Wang, Lilian Chiao
Parsippany, NJ
B.A., Princeton University, '99
Transitional Year
McGaw Medical Center-
Northwestern University
Evanston, IL
Diagnostic Radiology
University of Washington Affiliated
Hospitals
Seattle, WA

Warrier, Kavita Shanker
West Bloomfield, MI
B.S., University of Michigan,
Ann Arbor, '99
Pediatrics
Cincinnati Children's Hospital
Cincinnati, OH

Weems, Danielle Marie
St. Louis, MO
B.S., University of Mississippi, '94
Transitional Year
St. John's Mercy Medical Center
St. Louis, MO
Diagnostic Radiology
Barnes-Jewish Hospital
St. Louis, MO

Wunsch, Hannah
Cambridge, MA
B.A., Harvard University, '97
Internal Medicine-Preliminary
New York Presbyterian Hospital-
Columbia University
New York, NY
Anesthesiology
New York Presbyterian Hospital-
Columbia University
New York, NY

Yang, Roberta Kuo-Ju
Saratoga, CA
B.S., University of California,
Los Angeles, '98
Transitional Year
St. John's Mercy Medical Center
St. Louis, MO
Diagnostic Radiology
Barnes-Jewish Hospital
St. Louis, MO

Yoder, Jeffrey Allen
Frederick, MD
B.S., University of Maryland, '99
Internal Medicine-Preliminary
St. Mary's Health Center
St. Louis, MO
Anesthesiology
Barnes-Jewish Hospital
St. Louis, MO

Yung, Katherine Chiayee
Houston, TX
B.S., Stanford University, '98
Otolaryngology
Washington University
St. Louis, MO

Zauber, Sarah Elizabeth
South Orange, NJ
B.S., Haverford College, '99
Internal Medicine-Preliminary
Barnes-Jewish Hospital
St. Louis, MO
Neurology
Washington University
St. Louis, MO

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[2]Degree Conferred in August 2002

Medical Scientist Training Program (M.D. and Ph.D. Degrees)

Eleventh-Year Trainees

Lee, Christopher W.
San Jose, CA
B.A., Harvard University, '90

Eighth-Year Trainees

Bruce, Allen Thomas
North Attleboro, MA
B.A., The Johns Hopkins
University, '95

Cole, John Charles
Keokuk, IA
B.S., Washington University, '95

Edelson, Brian Todd
Rosylyn, NY
Sc.B., Brown University, '95

Gimenez, Mary Ann Tan
Greendale, WI
B.S., University of Wisconsin, '95

Ho, Emily L.
Rochester, NY
B.S., Yale University, '95

Johnson, Hillary Danielle
Iowa City, IA
B.S., University of Iowa, '95

Schwarz, Julie Kristina
Lafayette, LA
B.S., Duke University, '95

Yuan, Alex
Sunrise, FL
B.A., Cornell University, '95

Seventh-Year Trainees

Bartnikas, Thomas B.
Ithaca, NY
B.A., Cornell University, '96

Brewer, Judson A.
Princeton, NJ
B.A., Princeton University, '96

Burlingame, Oname O.
Claremont, CA
B.A., Claremont McKenna
College, '96

Gaut, Joseph
Springfield, MO
B.A., Washington University, '96

Hofling, August A.
Cream Ridge, NJ
B.A., Cornell University, '96

Jacoby, Meagan A.
Baltimore, MD
B.A., The Johns Hopkins
University, '96

Kozel, Beth A.
Richmond Heights, MO
B.A., Washington University, '96

Rayala, Heidi J.
St. Louis, MO
B.A., Macalester College, '95

Willis, David M.
Provo, UT
B.S., Brigham Young University, '96

Sixth-Year Trainees

Bowman, Andrew Wynn
Athens, GA
B.S., Vanderbilt University, '97

Byersdorfer, Craig Alan
Duluth, MN
B.S., University of Minnesota, Duluth, '95

Jacobsen, Christina Marie
Baltimore, MD
B.A., The Johns Hopkins University, '97

Jassim, Omar Waleed
Champaign, IL
B.S., University of Illinois, Urbana, '97

Kozel, Beth
Richmond Heights, MO
B.A., Washington University, '96

Krem, Maxwell Masters
Chesterfield, MO
B.A., Washington University, '97

Le, Nam Hoai
Fort Smith, AR
B.S., University of Arkansas, '96

Lin, Yiing
Mayfield Village, OH
B.S., Duke University, '97

Lovly, Christine Maria
Williston Park, NY
B.A., The Johns Hopkins University, '97

Maccotta, Luigi
Philadelphia, PA
B.S., St. Peter's College, '94

Magee, Jeffrey Alan
Madison, WI
B.S., University of Wisconsin, Madison, '97

Palanca, Benjulian Agustin
Everett, WA
B.S., University of Washington, '97

Pelosof, Lorraine Cheryl
Dallas, TX
B.S., University of Texas, Austin, '97

Popkin, Daniel Lewis
Nashville, TN
B.A., Princeton University, '97

Snyder, Eric Lee
Painted Post, NY
B.S., Pennsylvania State University, '97

Stacy, Rebecca Colleen
Fairport, NY
B.S., Duke University, '97

Stricker, Thomas Paul
Bettendorf, IA
B.S., University of Iowa, '97

Wang, Leo Hongli
Torrance, CA
B.A., University of California, Berkeley, '97

Westover, Michael Brandon
Temecula, CA
B.S., Brigham Young University, '99

Fifth-Year Trainees

Barmada, Sami Jihad
Pittsburgh, PA
B.S., University of Pittsburgh, '98

Besirli, Cagri Giray
Bursa, Turkey
B.S., University of Michigan, Ann Arbor, '98

Cotter, Shane Eric
Silver Spring, MD
B.S., University of North Carolina, Chapel Hill, '97

Dunn, Gavin Peter
Columbia, MO
B.A., Princeton University, '98

Hadland, Brandon Kenneth
Las Vegas, NV
B.S., Harvey Mudd College, '98

Ippolito, Joseph Edward
Fort Lauderdale, FL
B.S., Cornell University, '98

Khor, Bernard
St. Louis, MO
B.S., Massachusetts Institute of Technology, '98

Kim, Edy Yong
Bloomfield Hills, MI
B.A., Harvard University, '97

Lane, Andrew Alan
St. Louis, MO
B.H., Vanderbilt University, '98

Lin, Mike Yuhcheng
Davis, CA
B.S., University of California, Davis, '96

Lo, Mindy S.
Potomac, MD
B.A., The Johns Hopkins University, '97

Maas, James Weldon
St. Louis, MO
B.S., Stanford University, '97

Marrus, Scott Benjamin
University City, MO
B.A., Brandeis University, '96

McClellan, James Scott
Anniston, AL
B.S., Birmingham-Southern College, '97

Oh, Jung Duk
Staten Island, NY
B.A., University of Pennsylvania, '98

Robben, Paul Michael
St. Louis, MO
B.S., Kansas State University, '98

Sun, Yang
College Park, MD
B.A., The Johns Hopkins University, '98

Suntharalingam, Mythili
Woodridge, IL
B.A., M.S., Brandeis University, '98

Surana, Neeraj K.
Evansville, IN
B.S., B.A., Indiana University, Bloomington, '98

Takeshita, Junko
Ann Arbor, MI
B.A., Wellesley College, '98

Verbsky, John Wilson
Milton, WI
B.A., The University of Chicago, '92;
M.A., Washington University, '97

Wetzel, Dawn Marie
Toms River, NJ
B.A., The Johns Hopkins University, '98

Young, Arthur Paul
San Mateo, CA
B.S., University of California, '97

Fourth-Year Trainees

Baker, Justin Taylor
Decatur, GA
B.S., Brown University, '97

Bhatia, Ajay Kamal
Timonium, MD
B.A., The Johns Hopkins University, '97

Esparza, Edward Manuel
San Antonio, TX
B.A., Princeton University, '99

Evason, Kimberly Jane
Brookfield, WI
B.S., University of Iowa, '98

Hughes, Inna
St. Louis, MO
B.A., Williams College, '99

Kau, Andrew Leon
St. Louis, MO
B.S., Emory University, '98

Kummer, Terrance Thomas
Rochester, MN
B.S., University of Minnesota, '99

Lou, Jun Yang
Indianapolis, IN
B.S., Indiana University, Bloomington, '99

Lovitch, Scott Benjamin
Old Tappan, NJ
B.A., Harvard University, '99

Ungewickell, Alexander Joachim
St. Louis, MO
B.A., Washington University, '98

Villalobos, Victor Manuel
El Paso, TX
B.S., Baylor University, '99

Viquez, Natasha Monique
Northridge, CA
B.S., University of Southern California, '99

Ward, Michael Emmerson
Byron, MN
B.S., Kenyon College, '99

Wenger, Kristin Kay
North Olmsted, OH
B.A., Ohio Wesleyan University, '97

White, Robert Lazell
Frederick, MD
B.S., Washington University, '99

Yu, Yue
Los Alamos, NM
B.S., University of New Mexico, '99

Third-Year Trainees

Alexander, Jennifer Marie
Columbus, NE
B.S., University of Nebraska, Lincoln, '99

Apicelli III, Anthony John
Titusville, NJ
B.A., Princeton University, '99

Chan, Sherwin Shiu-Cheung
Vancouver, British Columbia, Canada
B.S., Queen's University at Kingston, '00

Chiang, Herbert Cheuhui
Memphis, TN
B.A., Washington University, '00

Cho, Soo-Jin
Arcadia, CA
B.S., M.S., Yale University, '00

Diamond, Mark Stephen
Washington, DC
B.A., Princeton University, '00

Dosenbach, Nico Urs
Calw, Germany
B.A., Columbia University, '00

Fotenos, Anthony
San Francisco, CA
B.S., Brown University, '99

Grenda, David Stanley
Las Vegas, NV
B.A., Harvard University, '94

Grimm, Andrew Alexander
Burnsville, MN
B.S., Massachusetts Institute of Technology, '00

Hagemann, Ian Sean
Alexandria, VA
B.A., Princeton University, '00

Hasbani, Daphne Maya
Woodbridge, CT
B.A., B.H., University of Rochester, '99

Holekamp, Terrence Fletcher
Columbia, MO
B.A., Amherst College, '99

Kesarwala, Aparna Hemant
Lawrenceville, NJ
B.A., Princeton University, '00

Klco, Jeffery Michael
Perry, OH
B.S., Boston College, '98

Lau, Man Chun Jeffrey
Macau
B.A., Washington University, '00

Martinez, Sara Cecilia
Denton, TX
B.S., University of Texas, Austin, '00; B.H., University of North Texas, '97

Masia, Ricard
Gerona, Spain
B.A., Cornell University, '00

Nybakken, Grant Edward
Piedmont, CA
B.S., Haverford College, '00

Patel, Gaurav Hiren
Evansville, IN
B.A., Washington University, '99

Roizen, Jeffrey David
Chicago, IL
B.S., Williams College, '00

Sprague, Jennifer Eryn
Nashville, IN
B.S., Indiana University, Bloomington, '00

Sternhell, Kara Ellen
Bryn Mawr, PA
B.A., Washington University, '99

Tao, Ting Yin
Knoxville, TN
B.A., Washington University, '00

Taylor, Sara Jane
Muncie, IN
B.S., Washington University, '99; M.S., '00

Tehrani, Shandiz
Simi Valley, CA
B.A., Occidental College, '00

Wahrle, Suzanne Elizabeth
Lakewood, CO
B.S., Millsaps College, '99

Wylie, John David
Redmond, WA
B.S., Ohio State University, '00

Second-Year Trainees

Baylor, Lauren Ashley
Brecksville, OH
B.S., Ohio State University, '01

Belinga, Steve-Felix
Yaounde, Cameroon
B.S., Georgia State University, '00

Chachu, Karen Ama-Serwa
Cape Coast, Ghana
B.A., Williams College, '01

DeBosch, Brian Jesse
Ann Arbor, MI
B.S., University of Michigan, Ann Arbor, '00

Fox, Michael David
West Chester, OH
B.S., Ohio State University, '01

Hendrickson, Rebecca Cappel
Seattle, WA
B.S., University of Washington, '01

Hirbe, Angela Christine
St. Charles, MO
B.A., Washington University, '01

Huckfeldt, Rachel Marilyn
Bloomington, IN
B.A., Washington University, '01

LaRiviere, Lori Loraine
San Jose, CA
B.S., California State University, Chico, '98; M.S., University of California, Santa Barbara, '01

Lavine, Kory Joshua
St. Louis, MO
B.S., University of Rochester, '01

Lindsley Jr., Robert Coleman
Wynnewood, PA
B.A., Swarthmore College, '98

McCann, Corey Michael
Oley, PA
B.S., The Pennsylvania State University, '01

Morgan, Michael Land
McComb, MS
B.S., University of Mississippi, '00; B.A., Rice University, '97

Nadler, Jacob Ward
East Amherst, NY
B.S., University of Pittsburgh, '01

Rodrigues, Randall John
Morgan Hill, CA
B.S., University of Georgia, '01

Scheidenhelm, Danielle Kaye
Belvidere, IL
B.A., Coe College, '01

Seppa, Midori Jane
Penngrove, CA
B.A., Lewis and Clark College, '99

Steed, Ashley Lynn
Raeford, NC
B.S., Duke University, '01

Sylvester, Chad Michael
Racine, WI
B.S., University of Notre Dame, '01

Wen, Leana Sheryle
Temple City, CA
B.S., California State University, Los Angeles, '01

First-Year Trainees

Akilesh, Shreeram
Bangor, ME
B.A., Dartmouth College, '00

Cai, Sheng Feng
Cincinnati, OH
B.S., Duke University, '02

Crock, Lara Wiley
Evanston, IL
B.A., Barnard College, '01

Gansner, John Michael
Campbell River, British Columbia, Canada
B.A., Harvard University, '02

Giannakis, Marios
Athens, Greece
B.S., University of Toronto, '01

Hucker, William John
O'Fallon, IL
B.S., Washington University, '01

Katona, Bryson William
Silver Spring, MD
B.A., M.S., University of Pennsylvania, '02

Lee, Chung Albert
Overland Park, KS
B.A., M.A., The Johns Hopkins University, '02

Madsen, Erik Christian
Charlotte, NC
B.S., Furman University, '02

Mahowald, Michael Anthony
Chicago, IL
B.A., Swarthmore College, '99

McCoy IV, William Howard
Pittsburgh, PA
B.S., University of Pittsburgh, '02

Mendelsohn, Bryce Abram
San Diego, CA
B.A., B.S., Emory University, '02

Miller, Bradley Ress
Indianapolis, IN
B.S., New York University, '01

Morgan, Elizabeth Amy
Wilton, CT
B.A., Dartmouth College, '00

Moulton, Elizabeth Andrea
Hilliard, OH
B.S., University of North Carolina, Chapel Hill, '02

Press, Craig Adam
Scottsdale, AZ
B.S., Northwestern University, '02

Rao, Vinod
Monroeville, PA
B.S., Massachusetts Institute of Technology, '02

Rosen, David Aaron
Farmington Hills, MI
B.S., University of Michigan, Ann Arbor, '02

Treskov, Ilya V.
St. Louis, MO
B.S., Washington University, '01

M.A. and M.D. Degrees Trainees

Christopher, Matthew John
St. Louis, MO
B.A., St. Louis University, '93

Kelly, James Edward
St. Louis, MO
B.S., University of Notre Dame, '99

Sandige, Heidi Linda
St. Louis, MO
B.A., Northwestern University, '91; M.A., Yale University, '93

Soden, Cylburn Earl
Silver Spring, MD
B.S., University of Maryland, '99

Tu, Daniel Chen
Edwardsville, IL
B.A., Washington University, '00

Turnbull, Isaiah Richard
Portland, OR
B.S., University of Oregon, '98

Ushe, Mwiza
West Springfield, MA
B.S., University of Pittsburgh, '00

M.D. Degree Trainees

Fourth-Year Class

Brandstetter, Kevin David
Town and Country, MO
B.S., Northwestern University, '99

Wartman, Lukas Delbert
Dyer, IN
B.S., University of Wisconsin, Madison, '99

Five-Year Research Program

Berry, Paul Anthony
Tampa, FL
B.S., University of South Florida, '98

Cohen, Michael
Woburn, MA
B.A., Harvard University, '98

Martinez, Carlo Obet
Valley Park, MO
B.S., University of Texas, San Antonio, '99

Rovelstad, Susan Jennifer
Waynesboro, PA
B.S., University of Illinois, Urbana-Champaign, '98

Third-Year Class

Ahmed, Kenisha Natalie
Kingston, Jamaica
B.A., Cornell University, '00

Baker, Jonathan Craig
Cincinnati, OH
B.A., St. Louis University, '00

Baumann, Aimee Marguerite
Minden, NV
B.A., Cornell University, '00

Biehl, Kenneth John
Mesa, AZ
B.S., Brigham Young University, '00

Bonds, Cale Walter
Englewood, CO
B.S., U.S. Air Force Academy, '00

Brigg, Michael Joseph
Leavenworth, KS
B.A., Dartmouth College, '00

Brooks, Erica Lynne
St. Louis, MO
B.A., Harvard University, '99

Browning, Alyssa Camille
St. Louis, MO
B.S., Rhodes College, '97

Bullock, Andrea Julie
Longmeadow, MA
B.S., Duke University, '00

Butler, Andrew Shine
Canton, MA
B.S., University of North Carolina, Chapel Hill, '00

Byrd, Greg Dee
Hillsboro, OR
B.S., University of Oregon, '00

Callisto, Anthony Jay
St. Louis, MO
B.S., University of Southern California, '00

Campbell, John Allan
Peoria, IL
B.S., University of Illinois, Urbana-Champaign, '98

Campbell, Kenisha Natalie
University City, MO
B.A., Cornell University, '00

Carlisle, John Chamberlain
Lee's Summit, MO
B.S., Duke University, '99

Carlson, Kathryn Lynne
Statesboro, GA
B.S., Cornell University, '99

Chan, Walter Waiyip
San Francisco, CA
B.S., Washington University, '00

Chen, Victoria Y.C.
North Potomac, MD
B.S., Stanford University, '97

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St. Louis, MO
B.S., University of California, Los Angeles, '97; M.A., University of California, Berkeley, '99

Cho, Samuel Kangwook
Abington, PA
B.A., University of Virginia, '99

Chu, Celeste Ming
Newport Beach, CA
B.A., Pomona College, '00

Chun, Wendy Eun
Northbrook, IL
B.A., Yale University, '00

Chung, Jonathan Hero
Glenview, IL
B.S., Union College, '00

Ciliberto, Michael
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B.S., University of Illinois, '99

Council, Matthew Daniel
Laurel, MS
B.S., University of Mississippi, '00

Cui, Qi
Brookfield, WI
B.S., Massachusetts Institute of Technology, '99

Daaga, Nefertari
Port of Spain, Trinidad
B.A., Dartmouth College, '00

Dean, Joel Glenn
Morris Plains, NJ
B.S., Cedarville College, '99

Deem, Kenneth Clark
Tacoma, WA
B.A., Dartmouth College, '98

De Shields, Alex Martin
Easton, MA
B.A., Swarthmore College, '98

Dulek, Daniel Ervin
Northport, AL
B.S., University of Notre Dame, '00

Durley, Alison Patricia
Chesterfield, MO
B.S., Yale University, '00

Dusenbery, Susan Marie
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B.S., Massachusetts Institute of Technology, '96; M.S., '97

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Fenton, MO
B.S., University of Notre Dame, '00

Faller, Bryan Andrew
Potomac, MD
B.S., University of Michigan, Ann Arbor, '00

Fialkowski, Elizabeth Anderson
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B.A., Rice University, '99

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B.A., Duke University, '99

Geula, Foead
Woodland Hills, CA
B.S., University of California, San Diego, '99

Ghuman, Anoopindar Kaur
Huntington Beach, CA
B.S., University of California, Berkeley, '00

Greene, Riley Erickson
Denver, CO
B.S., Washington and Lee University, '00

Haberfeld, Elizabeth
Englewood, NJ
B.A., Vassar College, '92

Hagemann, Andrea Ruth
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B.S., M.E., Massachusetts Institute of Technology, '97

Harari, Avital
Houston, TX
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Harris, Vernetta Lee
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B.S., Trinity University, '00

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B.A., B.S., Stanford University, '99

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Bethel Park, PA
B.A., Harvard University, '00

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B.S., M.S., Tulane University, '00

Lu, Daiying
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B.A., Baylor University, '00

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B.A., Yale University, '00

Page, Nathan Clarke
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B.A., Brigham Young University, '00

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B.S., Stanford University, '00

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B.A., Case Western Reserve University, '00

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B.S., Emory University, '00

Raaii, Farhang
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Rogers, Erica Jean
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St. Louis, MO
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Snyder, Alison Kay
St. Louis, MO
B.A., Knox College, '00

Sobol, Julia Bernard
New York, NY
B.A., Harvard University, '98

Sohren, Laura Ann
Castle Rock, CO
B.A., Washington University, '98

Stephenson, Jason Woods
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Sucherman, Daniel Robert
Highland Park, IL
B.A., Washington University, '00

Teneyck, Lisa Dawn
Boise, ID
B.A., Scripps College, '00

Tierney, Ryan Menzies
Carmel, IN
B.A., Indiana University, Bloomington, '00

Vincent, Damon T.
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B.A., Washington University, '96

Wilcox, Susan Renee
Yukon, OK
B.A., University of Oklahoma, Norman, '00

Wong, Jason K.
Tucson, AZ
B.A., University of California, Berkeley, '00

Yu, Vivian Mae
Edmonton, Alberta, Canada
B.S., Northwestern University, '00

Zink, Karen Anne
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B.A., University of Illinois, Urbana-Champaign, '99

Second-Year Class

Ahmad, Omar Rizwan
Murphysboro, IL
B.S., The University of Chicago, '01

Ambekar, Anil
Lima, OH
B.S., Northwestern University, '01

Austin, Karen Lynn
Chatham, NJ
B.A., Yale University, '01

Barnett, Kara Michelle
Livingston, NJ
B.A., Washington University, '01

Benjamin, Peter Scott
Somers, CT
B.S., Brown University, '00

Bennett, Andrea Lynn
Wayne, NJ
B.S., Boston College, '00

Berenbom, Anne Elizabeth
Prairie Village, KS
B.A., University of Pennsylvania, '01

Bergin, Patrick Finley
Madison, MS
B.S., Mississippi State University, '01

Bergner, Daniel William
Plainfield, IL
B.S., University of Illinois, Urbana-Champaign, '01

Burton, Justin Michael
Annapolis, MD
B.S., University of Maryland, College Park, '01

Bushard, Patrick John
Random Lake, WI
B.H., Northwestern University, '01

Cibulskis, Catherine Carol
Morton Grove, IL
B.A., Washington University, '00

Connor, Justin Roy
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B.S., Morehouse College, '01

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Maplewood, MO
B.A., Franklin and Marshall College, '01

Dewald, Denise Debra
Middlesex, MA
B.S., Tufts University, '90

Dhume, Pooja Bholanath
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Dubin, Joseph Ethan
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B.S., University of California, San Diego, '99; M.H., University of Michigan, '01

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B.S., University of Notre Dame, '01

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Rogers, Cynthia Elise
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B.A., Harvard University, '98

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B.S., University of Pittsburgh, '01

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B.A., University of Texas, Austin, '01

Satterthwaite, Theodore Daniel
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B.A., Williams College, '00

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West Orange, NJ
B.A., Amherst College, '00

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Sunderland, Ian Richardpaul
Winnipeg
B.S., University of Toronto, '01

Swamy, Pooja Manjula
Decatur, AL
B.S., Emory University, '01

Taft, William Biggins
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Tang, Yinyu
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B.S., Louisiana Tech University, '99; M.S., University of Texas, Austin, '01

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Princeton Junction, NJ
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Toledo, OH
B.S., University of Notre Dame, '01

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First-Year Class

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Anand, Shuchi
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B.A., Carleton College, '02

Aquino, Alejandro
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B.S., University of Notre Dame, '02

Armstrong, Leonard Hart
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B.S., Montana State University, Bozeman, '02

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Bizek, Guy Matthew
St. Louis, MO
B.A., St. Louis University, '01

Boland, Jennifer Michelle
Gays Mills, WI
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Booker, Michael Rashad
Aurora, CO
B.S., Colorado School of Mines, '98

Bottros, Michael Magdy
St. Louis, MO
B.A., Washington University, '02

Bowman, Ryan James
Bakersfield, CA
B.A., University of California, Berkeley, '00

Brewer, Paul Andrew
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B.S., George Fox University, '00

Chang, Carolyn Jean-An
Port Washington, NY
B.S., Stanford University, '02

Chen, Lea Ann
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Chiang, Lily Constance
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Chua, Kao-Ping
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Chung, Stephen Shiu-Wah
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Mansouri, Azad
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McMillan, Terri Michele
Dayton, OH
B.S., Washington University, '02

McNaughton, Candace D.
Roy, WA
B.S., Brigham Young University, '01

Megwalu, Uchechukwu Chukwudozie
Toronto, Canada
B.S., McMaster University, '03

Mercer Bolton, Nicole Renee
St. Louis, MO
B.A., University of Kansas, '97; M.S., '99

Miller, Lindsay Anne
Scottsdale, AZ
B.S., University of Arizona, '02

Mody, Gita Natwar
Charlotte, NC
B.S., Vanderbilt University, '02

Morris, Daniel Franklin
Santa Monica, CA
B.S., Massachusetts Institute of Technology, '02

Munson, Patrick Daniel
Overland, MO
B.S., United States Military Academy, '95

Muthappan, Palaniappan Ganesh
Murrysville, PA
B.S., University of Michigan, Ann Arbor, '01

Nchama, Leah Kalinda
Cornwall, Canada
B.S., McGill University, '02

Nelles, Jason Lynn
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B.S., Case Western Reserve University, '02

Newton, Paula Genese
Bowie, MD
B.S., Vanderbilt University, '02

Onuora, Tochukwu Obinna
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B.S., University of Toronto, '02

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Peterson, Timothy Richard
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B.S., University of Michigan, Ann Arbor, '99

Rapp, Brian Michael
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B.S., Washington University, '02

Reed, Elizabeth Channing
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Rene, Kristina Joy
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B.S., Concordia University Wisconsin, '02

Robison, Richard Aaron
Sierra Madre, CA
B.S., California Institute of Technology, '02

Routt, Audrey Patricia
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B.S., Washington University, '02

Saha, Paban
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B.A., M.A., The Johns Hopkins University, '02

Schlomer, Bruce Jeremy
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Shane, Thomas Scott
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Sheldahl, Amy Lynn
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So, Celaine May
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Wong, Vincent Kwok Wai
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SUMMARY OF STUDENTS IN THE SCHOOL OF MEDICINE (2002-2003)

Doctor of Medicine and Doctor of Philosophy Degrees

Graduating Class 23
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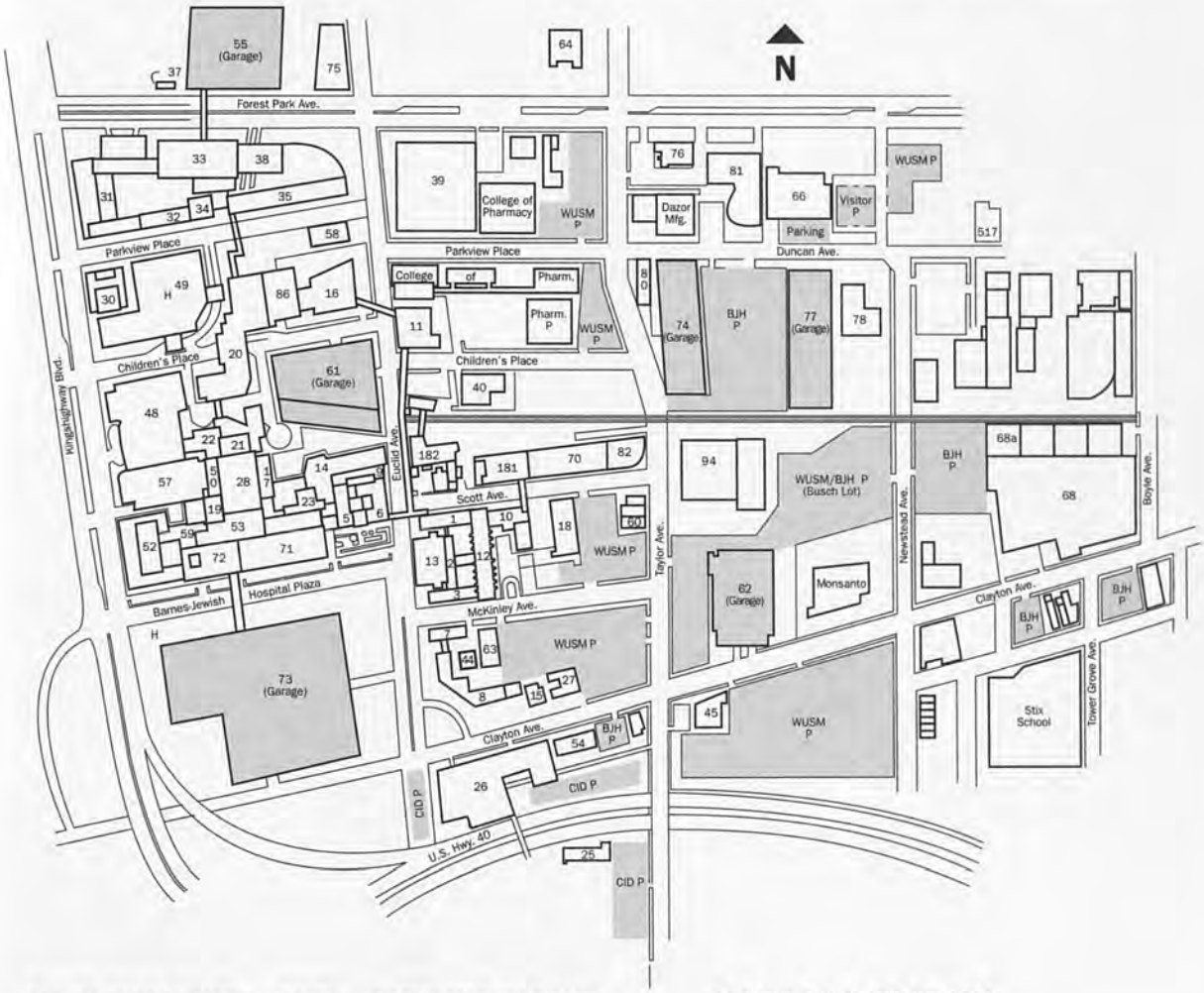

BARNES-JEWISH HOSPITAL – SOUTH

23 Peters Building
28 Barnes Service Building
52 Queeny Tower
53 Barnes Central
54 Barnes Lodge
57 Southwest Tower
59 Rand Johnson
68 Clayton Avenue Building
68a Employee Day Care Facility
71 East Pavilion
72 West Pavilion
73 Parking Garage
74 Parking Garage
94 Taylor Avenue Building (TAB)

BARNES-JEWISH HOSPITAL – NORTH

30 Shoenberg School of Nursing
31 Kingshighway Building
32 Steinberg Building
33 Shoenberg Pavilion
34 Yalem Research Building
35 Center for Advanced Medicine (CAM)
37 Shoenberg Research Building
38 Waldheim Ambulatory Care Center
39 Parking Garage
55 Parking Garage
58 Power Plant
75 Ettrick Building

WASHINGTON UNIVERSITY MEDICAL CENTER

11 Eric P. Newman Education Center

WASHINGTON UNIVERSITY SCHOOL OF MEDICINE

1 North Building
2 Cancer Research Building
3 South Building
5 Maternity Hospital
6 McMillan Hospital
7 Biomedical Computing Laboratory
8 Shriners Building
9 Irene Walter Johnson Rehabilitation
10 Olin Residence Hall
12 McDonnell Medical Sciences Building
13 Bernard Becker Medical Library
14 West Building
15 Health Administration Program
16 McDonnell Pediatric Research Building
17 Renard Hospital
18 East McDonnell S.R.F.
19 Mallinckrodt Institute of Radiology
20 Clinical Sciences Research Building
21 Wohl Clinic
22 Wohl Hospital
40 Storz Building
44 Supply Room
45 4480 Clayton
60 Library Annex
61 Parking Garage
62 Parking Garage
63 Interim Sp. Res. Facility
64 4511 Forest Park Medical Center
66 4444 Forest Park
70 East Building
76 4488 Forest Park
80 4500 Parkview
82 Imaging Center
86 Clinical Sciences Research Building North Tower Addition
181 Biotechnology Center
182 Euclid Power Plant
517 4363 Duncan

ST. LOUIS CHILDREN'S HOSPITAL

48 Parking Garage
49 St. Louis Children's Hospital
77 Parking Garage
78 Child Development Center

CENTRAL INSTITUTE FOR THE DEAF

25 Clinic/Research Building
26 Central Institute for the Deaf
27 Residence Hall

BARNARD HOSPITAL

50 Barnard Hospital

SURFACE PARKING LOTS

WUSM P School of Medicine
BJH P Barnes-Jewish Hospital
CID P Central Institute
H Heliport

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81 Rehabilitation Institute of St. Louis (RISL)

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