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WASHINGTON

1999/2000
BULLETIN *of* WASHINGTON UNIVERSITY
SCHOOL *of* MEDICINE
ST. LOUIS, MISSOURI

BULLETIN OF WASHINGTON UNIVERSITY

St. Louis, Missouri

School of Medicine
1999/2000

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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
John M. 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 1999. It is current as of June 30, 1999.

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CALENDAR 1999-2000

1999

JUNE

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

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

JULY

5 **Monday** Independence Day observance.

AUGUST

10 **Tuesday** Orientation, matriculation and initial payment of tuition for the first-year class.

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

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

SEPTEMBER

6 **Monday** Labor Day observance.

NOVEMBER

25 **Thursday** Thanksgiving Day observance.

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

DECEMBER

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

2000

JANUARY

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

7 **Friday** Deadline for payment of the balance of tuition for the first-, second-, third- and fourth-year classes.

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

MARCH

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

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

APRIL

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

29 **Saturday** Distinguished Student Scholarship/Distinguished Alumni Scholarship interviews.

MAY

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

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

19 **Friday** Commencement.

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

29 **Monday** Memorial Day Holiday observance.

JUNE

4 **Sunday** Academic year ends at 5 p.m. for the third-year class.

SCHEDULE OF CLERKSHIP AND ELECTIVE INTERVALS

Weeks	*Dates*
1-4	June 21, 1999 - July 18, 1999
5-8	July 19, 1999 - August 15, 1999
9-12	August 16, 1999 - September 12, 1999
13-16	September 13, 1999 - October 10, 1999
17-20	October 11, 1999 - November 7, 1999
21-24	November 8, 1999 - December 5, 1999
25-28	December 6, 1999 - January 16, 2000
29-32	January 17, 2000 - February 13, 2000
33-36	February 14, 2000 - March 12, 2000
37-40	March 13, 2000 - April 9, 2000
41-44	April 10, 2000 - May 7, 2000
45-48	May 8, 2000 - June 4, 2000

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

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.

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, the development of critical thinking skills, and an introduction to cultural and ethical aspects of medical practice. 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. Mornings are devoted to core instruction, encompassing an organ system-based approach which emphasizes the scientific underpinnings of medical knowledge. Clinical interactions in the first year are coordinated with medical history-taking, ethical principles in the practice of medicine, and introduction to the scientific methodology of clinical medicine and research. Afternoons are largely unscheduled to foster active, individualized learning via several optional student-run community service programs and through an extensive offering of selectives. 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. Throughout the second year, students experience increasing contact with patients in a variety of clinical settings. These clinical interactions are coordinated with formal training designed to further develop basic clinical skills including performing a physical examination, organizing and synthesizing the findings into a clinical problem list, developing a differential diagnosis and treatment plan, and accurately documenting and concisely presenting the clinical information. These experiences also engender the development of professional attitudes and high ethical standards for the practice of medicine in the 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 Dr. Pritchett, 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 which 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, 10 current faculty members have been elected to the National Academy of Sciences. Sixteen Nobel laureates have been associated with the School of Medicine. During Fiscal Year 1998, 114 members of the faculty held individual or career development awards: 61 from the National Institutes of Health, one from the American Academy of Neurology, one from the American Academy of Pediatrics, five from the American Cancer Society, three from the American Diabetes Foundation, one from the American Digestive Health Foundation, one from the American Federation for Aging Research, Inc., 19 from the American Heart Association, one from the American Lung Association, one from the American Roentgen Ray Society, one from the American Society of Nuclear Medicine, eight from Burroughs Wellcome Fund, one from the Foundation Fighting Blindness, Inc., one from the Esther A. and Joseph Klingenstein Fund, Inc., one from the Leukemia Society of America, Inc., two from The John Merck Fund, one from PEW Charitable Trusts, three from Research to Prevent Blindness, Inc., one from the Damon Runyon Walter Winchell Foundation Cancer Research Fund, and one from the Pediatric Scientist Physician Program. The School of Medicine has 18 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 1998-99, the School employed 1,259 full-time, salaried faculty members in its 18 preclinical and clinical departments. The clinical departments are further strengthened by 1,118 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 1998 Entering Class of 120 students was selected from a pool of 5,133 applicants. The School is a national institution with 45 states and 22 countries represented in the current enrollment.

In 1999, the School conferred the M.D. degree upon 102 individuals. In addition, six students received the M.A./M.D. degrees and 16 students graduated with the M.D. and the Ph.D. degrees. Graduating students who participated in the 1999 National Residency Matching Program matched in programs recognized for high quality and selectivity. Beginning on page 209, 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 560 medical students. Programs also are conducted for 614 students who are pursuing graduate degrees in health administration, occupational therapy or physical therapy. The Division of Biology and Biomedical Sciences has extensive graduate training programs for 520 students seeking the Doctor of Philosophy degree in areas of Bioorganic Chemistry, 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 12 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. Integral units of the Medical Center include the world-famous Mallinckrodt Institute of Radiology and the Institute for Biomedical Computing.

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 five years, more than $200 million has been expended on renovation and new construction. Capital improvements have added 360,000 square feet of space to the medical

school during this same period. A final stage calls for 60,000 additional square feet of space to be created. In the most recent fiscal year, more than $40 million of capital improvements were made at the School.

Medical Center-wide expansion includes the Eric P. Newman Education Center; the CSRB North Tower Research Addition; the East McDonnell Sciences Building; the Bernard Becker Medical Library; the Mallinckrodt Institute of Radiology Imaging Research Facility, East Building; the 4480 Clayton Avenue Building; and a new 1,500-car parking garage.

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 new education center provides auditoriums, classrooms, meeting space and lecture halls to support and enhance a comprehensive education program. The new 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 completion of the medical school library in the fall of 1989, a $14 million structure consisting of 113,000 gross square feet, has enabled the expansion of its programs, as well as long-term growth of its collections. Even more importantly, the structure provides state-of-the-art information management.

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 4480 Clayton Avenue Building houses administration offices for the School of Medicine and the Department of Surgery. The new 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 Pediatrics and Microbiology research facility adds new, state-of-the-art research facilities 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.

In addition, major renovations to existing buildings continue, with emphasis on research facilities. Renovations totalling $44 million have recently been completed. Major improvements and renovations have been 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 has 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. Ongoing improvements to the campus infrastructure are being made through the Public Realm Project which is focused on landscape and streetscape enhancements. The 96,650-gross-square-foot, five-story Bio Tech Building has been renovated to accommodate the Departments of Psychiatry and Cell Biology and Physiology. This renovation includes space on the ground, first and second floors for laboratories and department support, space on the fourth floor for Protein Chemistry Laboratory Research and space on the third floor to accommodate human genome studies and research. The 46,400-gross-square-foot McMillan Building renovation project includes five complete floors of general labs, offices, corridors and central mechanical and electrical system improvements. The renovation provided new offices and research labs for Neurology, Neurological Surgery and Ophthalmology, as well as a new eye clinic for Barnes-Jewish Hospital. The 294,302-gross-square-foot 4444 Forest Park Ave. renovation project includes various office and research facility renovations. The 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.

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:

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

The Edward Mallinckrodt Institute of Radiology. An internationally recognized center of excellence in teaching, research and clinical services in Radiology, the Institute is housed in a 13-story building with satellite units in the West Pavilion of Barnes-Jewish Hospital, the East Building and St. Louis Children's Hospital. MIR's facilities include two functioning cyclotrons and five magnetic resonance imaging scanners.

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 and research laboratories for the Departments of Obstetrics and Gynecology, Ophthalmology and Visual Sciences, and Otolaryngology. A new 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. This building includes facilities for a Cancer Center on the third floor, contiguous with companion facilities in the adjacent Barnard Hospital.

David P. Wohl, Jr. Memorial-Washington University Outpatient Clinics. The clinics are administered by Barnes-Jewish Hospital and handle over 100,000 outpatient visits per year. Five floors of the building are devoted to the clinics and five floors are devoted to research facilities for several departments of the School of Medicine. This building is owned by the School of Medicine, with Barnes-Jewish Hospital operating the recently expanded Emergency Room and the David P. Wohl, Jr. Memorial-Washington University Outpatient Clinics.

The *Institute for Biomedical Computing* is an inter-school organization that spans the School of Medicine and the School of Engineering and Applied Science and has been in existence since 1966. The Institute consists of: the Biomedical Computer Laboratory, the Center for Molecular Design and the Center for Computational Biology, all of which have close ties with both schools. The mission of the Institute is to advance biomedical science through the development and application of advanced computing and engineering technologies. In addition to its research activities, the Institute serves as a focal point for interdisciplinary teaching and student research in biological and biomedical computing, and the Institute sponsors a variety of interdisciplinary and multidisciplinary seminars and discussion forums.

The Institute has its primary location on the campus of the School of Medicine. The Institute creates opportunities for collaboration between the two campuses and encourages involvement of students in activities spanning the medical and engineering sciences.

Founded in 1911, the Washington University medical school library is one of the oldest and most comprehensive in the United States. Today, the *Bernard Becker Medical Library* serves as an information center for the faculty, students and staff of the Medical Center and, in addition, extends its services and resources to health professionals in the local, state and national communities.

The facility, completed in 1989, integrates five components: the Health Sciences Library, the Archives and Rare Books Collections, the Media/Computer Center, the Medical School Computing and Networking Services, and the Library Software Group. The eight-level, 114,000-square-foot structure has a capacity for more than 450,000 volumes and is one of the most technologically advanced health science libraries in America. The library collection includes more than 275,000 volumes and over 2,200 current subscriptions.

Information Services offers reference service six days and five evenings per week. Staff is available to answer a wide range of questions pertaining to biomedical and general information. Staff may be contacted by telephone (362-7085), by electronic mail (reference@medicine.wustl.edu) or at the Information Services desk on Level 1 of the library. Information Services also offers specialized training in using Medline, information management software and genetic databases such as GENBANK. Special sessions can be tailored to a particular group's needs and may be held on-site in laboratories, offices or auditoriums.

E-Catalog provides complete and current information about the library's collections. It includes access to nearly 700 electronic full-text journals and 35 on-line books. EUCLID is the library's premier on-line tool for searching and retrieving biomedical journal literature. It is available over the network for home or office use seven days a week, 24 hours a day.

The Media/Computer Center houses more than 2,500 audiovisual titles and computer programs, a network of advanced personal computer workstations, and a large computer education classroom.

The staff supports student computing. The Media/Computer Center pioneered the use of high-capacity networks and digital imaging technology in the medical curriculum. The center 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 Division 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, 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 combined resources of the Bernard Becker Medical Library ensure that the School of Medicine's faculty and students have access to state-of-the-art biomedical information. Information about library services and programs is available on the library's web site at: *http://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

Circulation	747-0023
Reference	362-7085
Interlibrary Loan	362-2780
Media/Computer Center	362-2793
Archives & Rare Books	362-4236
Help Desk	362-7798

Barnes-Jewish Hospital, a 1,442-bed teaching and research facility, is the largest hospital in the St. Louis area. 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, endocrinology, gastroenterology, geriatrics, gynecology, neurology, ophthalmology, orthopaedic surgery, otolaryngology, pulmonary disease, rheumatology, transplant and urology. Barnes-Jewish Hospital is the result of the 1996 merger between Barnes Hospital and The Jewish Hospital of St. Louis.

St. Louis Children's Hospital is one of the top pediatric health centers in the country. It provides a full range of health services for children and their families throughout its 200-mile service area and beyond. The hospital's broad spectrum of pediatric specialty services includes newborn medicine and the world's largest pediatric lung transplant program.

St. Louis Children's Hospital also provides an extensive complement of community outreach services, including specialized home care services, pediatric mobile intensive care units, clinical affiliations with regional hospitals and physicians, patient and parent support groups, education programs for parents and children, and a free parent information phone line and physician referral service staffed by registered nurses.

Barnes-Jewish and St. Louis Children's hospitals are members of *BJC Health System*, 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 Barnes-Jewish/Washington University physicians and GCRC nurses.

Central Institute for the Deaf, an internationally known institution, operates laboratories for basic and applied research into speech, language, hearing and deafness; maintains a school where deaf children are taught to listen and to talk; provides outpatient services in hearing and speech disorders for infants, children and adults; and provides graduate degree programs in audiology, speech and hearing sciences, and education for the hearing impaired.

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: 698 beds
- Metropolitan St. Louis Psychiatric Center: 125 beds
- Missouri Baptist Medical Center: 494 beds
- Veterans Administration Medical Center: 104 beds
- Shriners Hospital for Children: 80 beds

RESEARCH ACTIVITIES

Grants and contracts totaling more than $216 million supported faculty research efforts at the School of Medicine. Substantial additional research support was provided directly to faculty investigators by the Howard Hughes Medical Institute and through gifts and grants made to the Barnes-Jewish Hospital Foundation. Gifts and grants from private sources, including alumni, individuals, foundations, corporations and other organizations, totaled $45.4 million from 5,584 entities.

The School of Medicine received $189 million from the National Institutes of Health in grants, making it the fourth largest recipient of NIH dollars among the 125 U.S. medical schools in fiscal year 1998.

That money came in 584 separate grants, 516 of which were designated as research grants. Funds supporting training came in 33 additional grants, and 35 grants were for fellowships. NIH research grants supported the investigations of at least 610 full-time faculty members.

Johns Hopkins University	$223,148,725
University of Pennsylvania	$200,925,270
University of California, San Francisco	$190,593,326
Washington University	**$189,373,816**
Yale University	$178,740,603

A sampling of the many medical firsts that have taken place at the School of Medicine includes:

- Contributed 15 percent of the complete sequence of yeast DNA.
- Developed a rating scale used worldwide in the diagnosis of Alzheimer's disease.
- Development of a new strategy for creating vaccines and antibiotics against bacteria such as those that infect the bladder.
- Pioneering studies of cell suicide developed with 3-D molecular modeling technique.
- Identification of a natural target receptor for the bacterium *Helicobacter pylori*, which causes peptic ulcers.
- Studies of the secondary events that exacerbate spinal cord injury.
- First used yeast artificial chromosomes to study hereditary diseases in humans.
- 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 excitotoxic amino acids and brain injury.
- Showed that a simple blood test can effectively diagnose prostate cancer in its early stages.
- Developed a new surgical procedure in which heavily damaged portions of emphysema patients' lungs are removed, dramatically improving lung function.
- Developed a cure for hepatitis B in cases diagnosed early.
- Created a surgical cure for the abnormal heart rhythm called atrial fibrillation.
- Showed that certain exercises and calcium supplements can rebuild brittle bones in some patients.
- Developed method for introducing large proteins into cells.

Ongoing research includes:

- The discovery that zinc may be responsible for the brain damage that occurs after cardiac arrest and new research into preventing such damage.
- The Human Genome Project, one of the biggest scientific undertakings in history, to decipher the genetic messages locked away in each of the body's cells.
- Development of therapies for malaria, amebic dysentery and leishmaniasis, diseases that maim or kill millions of people in developing countries.
- Investigations into nerve transplants, including the world's first nerve transplant using nerve tissue from a cadaver donor.
- Identification of 16 gene mutations that cause what is known as maturity-onset diabetes of the young, or MODY, responsible for about 5 percent of all non-insulin-dependent diabetes.
- Efforts to develop a synthetic blood substitute and a more complete understanding of hemoglobin, an oxygen-carrying molecule present in red blood cells.
- Investigations into possibilities for preventing and reversing brain and spinal cord injury.
- Basic investigations, clinical trials and educational outreach related to Alzheimer's disease.
- Studies of the effectiveness of exercise in reversing physical frailty in the elderly.
- Evaluations of the effectiveness of drugs to treat AIDS and education of physicians in the region about how to care for AIDS patients.
- Studies of the pathology of pediatric diseases in the school's Department of Pediatrics, designated a Child Health Research Center of Excellence by NIH.
- Studies of how the ulcer- and cancer-causing bacterium *Helicobacter pylori* makes the immune system attack cells in the stomach lining.
- The George M. O'Brien Kidney and Urological Diseases Research Center's multidisciplinary studies that provide a better understanding of the cellular and molecular basis of kidney and urological diseases.
- Blood tests to quickly and safely determine whether heart attack patients will require invasive treatment to open blocked arteries.

• Development of a genetic test that accurately identifies patients who have inherited a certain thyroid cancer. Those who test positive can have the gland removed before cancer develops and spreads.

• Studies on the role of white blood cells in atherosclerosis.

• Study of the effects of diabetes on early pregnancy.

• Imaging studies of how the healthy brain functions.

• Studies of ion channels that control heart rhythms.

• Development and testing of infertility drugs.

• Research on the immune system's role in multiple sclerosis.

• Studies of the connections between nerve cells.

• Research on abdominal aortic aneurysms.

• Developing protein therapies that may be useful for treating AIDS or other infectious diseases.

• Investigating viral links to asthma.

• Basic research aimed at preparing pig organs for transplantation into humans.

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 must also 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/Course Masters 1999-2000

FIRST YEAR

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

Course No.	*Course Title*	
M75 503	Cell and Organ Systems Biology	
	David N. Menton, Ph.D. (Histology)	*362-3593*
	Paul C. Bridgman, Ph.D. (Histology)	*362-3449*
	Robert S. Wilkinson, Ph.D. (Physiology)	*362-2300*
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*
	Jeffrey I. Gordon, M.D.	*362-7243*
M30 526	Microbes and Pathogenesis	
	Scott J. Hultgren, Ph.D.	*362-6772*
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*
	Physicians, Patients and Society	
M80 501	Clinical Epidemiology and Medical Statistics	
	Jay F. Piccirillo, M.D.	*362-7504*
M25 502	• Clinical Medicine I	
	Elliot E. Abbey, M.D.	*362-2724*
M25 503	• Medicine and Human Values I	
	Stephen S. Lefrak, M.D.	*454-7116*
	Thomas H. Gallagher, M.D.	*454-8664*
	Selectives	
M04	• General Selectives	
	Carl M. Rovainen, Ph.D.	*362-2299*
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 534	Monocytes/Macrophages Progressive 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.	*454-8073*
	Michael Heffernan, M.D.	*362-9859*
M35 632	Diseases of the Nervous System	
	Alan L. Pearlman, M.D.	*362-6947*
M55 660A	Clinical Topics in Otolaryngology	
	Joel A. Goebel, M.D.	*747-0553*
M25 615A	Endocrinology and Metabolism	
	William E. Clutter, M.D.	*362-8067*
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 L.P. Stephens, M.D.	*454-7889*
M60 665	Pathology	
	Erika C. Crouch, M.D.	*454-8462*
M65 640	Pediatrics	
	Leonard B. Bacharier, M.D.	*454-2699*
	Physicians, Patients and Society	
M25 602	• Clinical Medicine II	
	Elliot E. Abbey, M.D.	*362-2724*
M25 603	• Medicine and Human Values II	
	Stephen S. Lefrak, M.D.	*454-7116*
	Thomas H. Gallagher, M.D.	*454-8664*
M25 604	• Clinical Skills	
	Yoon Kang, M.D.	*747-1342*
M90 680	• Radiology Lectures	
	Elliot E. Abbey, M.D.	*362-2724*
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.	*454-7771*
	David Windus, M.D.	*362-7261*
M25 606A	Rheumatology	
	Leslie E. Kahl, M.D.	*362-7481*

THIRD YEAR

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

Course No.	*Course Title*	*Weeks*
	Ambulatory Clerkships: (choice of one block)	4
M25 715	• Urgent Care Clerkship	
	Konika Schallen, M.D.	*362-4362*
M26 712	• Family Practice Clerkship	
	Walton Sumner II, M.D.	*454-8164*
M85 775	• Consultation/Liaison Psychiatry Clerkship	
	Kevin J. Black, M.D.	*747-2013*
M95 790	Integrated Surgical Disciplines Clerkship	12
	Thomas E. Read, M.D.	*362-8029*
M25 710	Medicine Clerkship	12
	Thomas M. De Fer, M.D.	*747-4366*
M35 720	Neurology Clerkship	4
	Alan L. Pearlman, M.D.	*362-3296*
M85 770	Psychiatry Clerkship	4
	Kevin J. Black, M.D.	*747-2013*
	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 L.P. Stephens, M.D.	*454-7889*

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 Undergraduate Medical 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 course work 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 Undergraduate Medical 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.

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.

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 Lectureship. Established in 1982 by S. E. Freund in memory of his wife to provide a visiting lectureship in clinical oncology.

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.

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.

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.

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 of radiology and head of radiation oncology at the Medical Center's Mallinckrodt Institute of Radiology.

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

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 Undergraduate Medical 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 course masters, 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. The program must be arranged with an academic adviser and is subject to the approval of the Committee on Medical Education.

Four Schools Program

A cooperative venture was begun more than a decade ago by the Departments of Medicine of four leading research universities, Duke University, The Johns Hopkins University, the University of Pennsylvania and Washington University, to develop physician-scientists. The program as currently organized provides for a year of research to be performed between the third and fourth years of medical school and is similar in this regard to the Howard Hughes research fellowship for medical students. Students interested in academic internal medicine as a career path are encouraged to apply. Research can be performed at any of the four participating institutions within the Departments of Medicine and is supported by a generous stipend provided by the Lucille P. Markey Charitable Trust. Following the research year, students will complete their medical school training and have the opportunity to continue their clinical training at the internal medicine training program at one of the four schools. Students are highly encouraged to have completed their medicine clerkships prior to or concomitant with the application deadline. Those interested in the program can obtain additional information and application forms from the local coordinator (Dr. Andrew Chan, 362-9012, e-mail: chan@im.wustl.edu). Application deadline is typically January 31 with selection of students occurring by mid-February. Students travel to the four institutions to select their basic science or clinical research mentors in March. Start date for this one-year program is July 1.

Master of Arts and Doctor of Medicine

Medical students who are interested in an intensive research experience may apply for admission to the M.A. and M.D. degrees program after the first, second or third year of medical school. Students spend one year (12 months) working in the laboratory of the faculty member whom they have selected. Application to the program consists primarily of a student-prepared proposal for a significant and feasible project defined with the advice of the faculty mentor. The program requires submission and oral defense of a thesis in the form of a publication-quality manuscript at the end of the year of research. Students completing the program will be awarded a Master of Arts degree at the time that the M.D. degree is conferred. Students accepted into this program qualify for a stipend, health coverage and tuition remission during the research year. Additional information can be obtained from the Office of the Medical Scientist Training Program.

Doctor of Philosophy

The Division of Biology and Biomedical Sciences offers predoctoral programs in Biochemistry, Bioorganic Chemistry, 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 and Sciences. All degrees are awarded through the Washington University Graduate School of Arts and Sciences. Additional information about the Divisional programs may be obtained by contacting:

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

Doctor of Medicine and Doctor of Philosophy

Washington University offers a combined M.D. and Ph.D. degrees program that utilizes the resources of the Division of Biology and Biomedical Sciences and the School of Medicine. This program, the Medical Scientist Training Program (MSTP), is designed for students interested in careers in academic medicine. Its purpose is to provide the basic research training needed for careers at major medical schools and research institutions. The program was started in 1969, is one of the oldest and largest in the country,

and is currently authorized to accept 22 students per year. The program, normally completed in seven or eight 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 $15,500 per year), health coverage, disability and life insurances, and tuition remission.

Only students who have spent an equivalent of at least two semesters in a research laboratory 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 requirements for chemistry are less rigorous, but a strong background in mathematics and physics is 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 consists of three parts: 1) two years of the usual medical curriculum, 2) at least three years of original research toward a thesis to satisfy the requirements for the Ph.D. degree, and 3) 15 months of clinical training based on a student's career goals. Degrees are awarded upon completion of the entire 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. A student can be excused, by examination, from any of the regularly offered preclinical courses and may substitute either advanced course work or laboratory research in the time made available. In this way, students may carry out supervised research during the first two years. The members of the Medical Scientist Training Program Committee are available to students to help them decide on an individual curriculum and appropriate laboratory rotations.

The performance of each student is reviewed annually and a high scholastic standing as well as a commitment to research is expected.

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 medical school classes.

Students in the combined degree program will complete medical and selected 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.

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

1) Completion of graduate course work;
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 any of the programs of the Division of Biology and Biomedical Sciences. 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
Developmental Biology
Evolutionary and Population Biology
Immunology
Molecular Biophysics
Molecular Cell Biology
Molecular Genetics
Molecular Microbiology and Microbial Pathogenesis
Neurosciences

These programs draw together faculty from all of the departments listed and provide maximum flexibility for student training.

A series of monthly seminars is held for M.D./Ph.D. students that are conducted by medical scientists of the clinical departments. These seminars are aimed at stimulating student interest in clinical medicine and at increasing awareness of major research problems in clinical medicine.

M.D./Ph.D. students attend an annual weekend retreat during which students in the Ph.D. phase of training present their research.

To keep students in the Ph.D. phase of training up to date on their clinical skills, monthly opportunities are afforded for clinical interactions. These interactions include going on rounds, attending conferences and working with the house staff.

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

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). Those who have applied to the medical school and have not received information regarding this program may request an application or obtain additional information by contacting:

Medical Scientist Training Program
Washington University School of Medicine
660 S. Euclid Avenue, Campus Box 8226
St. Louis, Missouri 63110 -1093
(800) 852-4625
e-mail: mstp@dbbs.wustl.edu

APPLYING FOR ADMISSION

For updated information, check our Admissions home page at **http://medschool.wustl.edu/admissions** ***on the Internet's World Wide Web.***

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 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, in part, to regulations covering most 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 2000 first-year class must submit their AMCAS application so that it is postmarked no later than December 1, 1999. On receipt of the application from AMCAS, the Office of Admissions promptly forwards to applicants the additional materials that must be submitted to complete the application process. At this stage, a nonrefundable Application Service Fee of $50 is

charged by the University. To check on the status of your application, see our Medical School Application Checklist on the Internet at:
http://medschool.wustl.edu/admissions/atrace.html
Once complete, the applicant's admission credentials are reviewed and independently evaluated by members of the Committee on Admissions.

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 which 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 admission decision has been made on their application. By April 15, 2000, 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. 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, 2000, the deposit is refunded.

Full-Tuition Scholarships

In 1978, the School of Medicine established a scholarship program which 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 22 years. Over the years, 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.

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, Mr. and Mrs. Spencer T. Olin Fellowships for Women, or the Armed Forces Health Professions Scholarship Program.

Distinguished Student Scholarships

Five full-tuition scholarships are awarded annually to members of the entering first-year class. In early fall 1999, selected applicants for admission to the School's 2000 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 2000-2001 scholarship recipients will be made during the week following the on-campus interviews on Saturday, May 6, 2000.

Distinguished Minority Student Scholarships

Up to seven scholarships will be awarded to eligible minority students in the 2000 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

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.
Eugene M. Bricker, 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.
David Goldring, M.D.
Samuel B. Guze, M.D.
Paul O. Hagemann, M.D.
Alexis F. Hartmann, M.D.
John C. Herweg, M.D.
John M. Kissane, M.D.
Ira J. Kodner, M.D.
Allan E. Kolker, M.D.
Nicholas T. Kouchoukos, M.D.
William M. Landau, M.D.
Virgil Loeb, M.D.
Philip W. Majerus, M.D.
Gerald Medoff, M.D.
J. Neal Middelkamp, M.D.
Benjamin Milder, M.D.
Barbara S. Monsees, M.D.
Carl V. Moore, M.D.
Robert C. Packman, M.D.
Charles W. Parker, M.D.
Gordon W. Philpott, 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.
Steven L. Teitelbaum, M.D.
Jessie L. Ternberg, Ph.D.
Mildred Trotter, Ph.D.

The 1999-2000 Distinguished Alumni Scholarships honor:
Robert S. Karsh, M.D.
Mary L. Parker, M.D.
Gary A. Ratkin, M.D.
Stuart Weiss, 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 students who are enrolled in good standing and eligible to continue in their L.C.M.E.-accredited U.S. medical schools, who have a cogent reason for requesting transfer and who have the full approval of the dean of their current school.

Transfer application forms for the 2000 third-year class are available on August 1, 1999. The application deadline is March 30, 2000. 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 April 15, 2000. Inquiries should be directed to:

Third-Year Class Transfer Program
Washington University School of Medicine
660 S. Euclid Avenue, Campus Box 8077
St. Louis, Missouri 63110-1093

FINANCIAL INFORMATION

Cost of Education

For the first-year class matriculant, tuition and housing rates for the 1999-2000 academic year are listed below. Students who enter in 1999 will benefit from a tuition stabilization plan, which provides that their annual tuition of $31,700 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 $40,258. Allowances for entertainment, travel, clothing and other miscellaneous items must be added to this estimate.

Tuition (includes Student Health Service and Microscope Lending Plan)	$31,700
Books, supplies and instruments	1,449
Housing and food	7,109

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 which 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

All tuition and fee payments 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 on or before the date specified in

the published calendar will result in a late registration fee of $50, to be added to the amount due. Any tuition and fee payments due from the student and not paid at the time of registration or on the specified due date accrue interest at the lesser of: a) the rate of one percent above the prime interest rate in effect on the first business day of the month in which that payment is due, or b) the maximum lawful interest rate then in effect. Any amounts not paid when due plus accrued interest thereon must be paid in full within three months of the original due date. If a student fails to settle such unpaid amounts within three months of the original due date, the School of Medicine will not release the student's academic record or progress reports pending settlement of the unpaid account. A student who has not satisfied all past due financial obligations to the University one month before the end of the academic year will not be allowed to progress to the next academic year or be issued a diploma.

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 acknolwledges the student's intent and provides a copy of 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 sent after January 1, 2000.

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:

4 year M.D. program:	6 years
5 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 30.

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 course work 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.

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.

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.

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 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.

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

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.

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.

Charles H. Geppert Scholarship Fund. Established by Mrs. Mary Geppert in memory of her husband, M.D. '57.

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

Dr. Arthur S. Greditzer Scholarship. Established in 1998 to provide financial assistance to 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. Hagermann Scholarship Fund. Established by Dr. and Mrs. Hagermann to assist academically well-qualified students with documented financial need. The Fund will begin supporting students in the 1999-2000 academic year.

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. 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. Trainees funded during the 1991-92 academic year are Jonathan Glickman, Theodore Ross, Sally York and John Zempel.

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.

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

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

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).

Carl V. Moore, M.D. Scholarship Fund. Earning both the A.B. and M.D. degrees at Washington University, Dr. Moore was internationally recognized for his medical research, teaching of medical students and residents, and patient care. As an administrator, he served the School as Dean for a period, was the first Vice Chancellor for Medical Affairs, and was the Busch Professor and Head of the Department of Medicine for 17 years.

The Scholarship was created in 1992 by Mrs. Dorothy Moore in memory of her husband. It provides generous financial support each year to a student who documents financial need and superior academic achievement.

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

Dr. Helen E. Nash Scholarship for African-American Medical Students. The scholarship awards $5,000 for the first year of medical studies to an individual of demonstrated academic excellence, personal achievement and commitment to serve the African-American community. The scholarship honors Dr. Helen E. Nash, an Emeritus Clinical Professor of Pediatrics, and a distinguished citizen of St. Louis.

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.

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.

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 the 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.

James L. and Dorothy Rouner Loan Fund. Established in 1997 by Dr. James & Mrs. Dorothy Rouner to be used for medical students pursuing a career in Primary Care - General Internal 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.

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

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.

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.

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.

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.

John Alfred Veazey Scholarship Fund. Established in 1992 with a bequest from Mrs. Dorothy Veazey Parker.

Dr. Howard Phillip Venable Scholarship for African-American Medical Students. The scholarship awards $5,000 for the first year of medical studies to an individual of demonstrated academic excellence, personal achievement and commitment to serve the African-American community. Dr. Venable, Clinical Associate Professor of Ophthalmology (Emeritus), has served as a member of the School's Committee on Admissions and Committee on Student Financial Aid, and is currently on the Minority Medical Student Scholarship Committee.

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. The Fund began supporting students during the 1990-91 academic year.

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.

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

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.

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 years 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.

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.

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 &* 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 Undergraduate Medical Education, Admissions, Diversity Programs and the Director of the Student Health Service may attend CAES meetings as non-voting observers.

B) *Guests* — A course master 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 course master will send a designated representative. In the event that a course master 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) For students of exceptional merit, a Letter of Commendation may be sent to the student with a copy to the Registrar for the student's permanent file.

B) 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 course master. 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 course master prior to the examination and to be evaluated by the Student Health Service. In the event the student cannot reach the relevant course master, the student should contact the Associate Dean for Student Affairs.

C) In order to continue their studies at 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.

D) 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.

E) 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 elective courses).

F) Prior to graduation, students are required to complete and pass all course work. Occasionally students are permitted to complete equivalent course work at other institutions with the permission of the responsible department and written notification to the Registrar.

G) 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.

Grading System in the First Year

For purposes of the official grade records of the School of Medicine, courses in the first-year curriculum are evaluated on a Pass (P)/Fail (F) basis. Incomplete (I) indicates that, because of a delay excused by the course master, the student has not completed the requirements to pass a course.

Grading System in the 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, as for first year

Tutorial Assistance Program

Students experiencing difficulty in any course may request tutorial assistance. Such requests should initially be directed toward the course masters and thereafter to the Associate Dean for Student Affairs. Students who are repeating courses will be offered the opportunity for tutorial assistance. CAES also may require that a student seek tutorial assistance. There is no charge to students for tutoring.

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 failure at any initial examination offered at the School, the student will be informed in writing of the options, depending upon the year of study (as detailed below), 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 a student's course master(s) or the Registrar's office.

D) 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 course work 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 course work required in the first year curriculum.

3. CAES shall notify the student in writing of the course(s) for which Academic Review is proposed and the date and time at which the CAES will address the matter. The Registrar or the course master(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. 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 and the Registrar's office.

5. 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.

6. The maximum number of attempts to pass any individual course during enrollment in the School, including time in an Individualized Study Program (ISP), will be three.

7. 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 Evaluating and Grading System Section C. 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.

8. Decisions of the CAES regarding a necessary course of action will be communicated to the student by the Associate Dean for Student Affairs, and written records of such communications shall be maintained by the Registrar in the student's file.

First Year

A) If a student has received a Fail/Incomplete grade in a single first-year course, the Registrar will advise, in writing, the student of the options for remediation as follows:

1. Take a reexamination in the course at a time prescribed by the course master before August of the following academic year, OR

2. Enroll in and successfully complete, at the level designated by the course master, a summer course at a different institution, such course being completed and passed by the beginning of classes for the second academic year.

3. A student who fails the reexamination or fails to complete and pass 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. Alternatively, the CAES may permit a reexamination. If the reexamination is failed, enrollment will be terminated.

B) 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.

C) For students referred to CAES, under First Year Section B above, the committee may decide to permit the student to take reexaminations, if a reexamination has not already been taken, in the courses for which Failed/Incomplete grades have been recorded. Such reexaminations will generally occur during the last week of the interacademic year break. If such a reexamination is failed, the student may be required to enter an ISP or be dismissed from enrollment in the School.

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.

If Fail/Incomplete grades have been recorded for more than two courses or a single reexamination, 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.

Second Year

A) Regarding courses of the second year, the Registrar will advise, in writing, students in the following categories of the requirement that they take a reexamination, according to the schedule listed under B, immediately below:

1. A student for whom a Fail/Incomplete grade has been recorded in a single complete yearlong course in the second-year curriculum OR

2. A student for whom a Fail/Incomplete grade has been recorded in one or two block-long courses.

B) Reexaminations in complete courses in Pathology or Clinical Medicine generally will be offered during the last week of the inter-academic year break, prior to entry into the third year. Reexaminations for students who have failed one or two block-long courses generally will be offered at a time determined by the course master and the Associate Dean for Student Affairs.

Students who fail a reexamination 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 yearlong courses, OR

2. Three or more block-long courses, OR

3. One complete yearlong course and two block-long courses.

4. A student for whom the Registrar has recorded a Fail/Incomplete grade in any reexamination.

D) At review by CAES for students referred to above Section C, the committee may decide to permit the student to take reexaminations, if a re-examination has not already been taken, in the courses for which Fail/Incomplete grades have been recorded. Such reexaminations will generally occur during the last week of the inter-academic year break. The CAES may allow the student to defer beginning the clinical rotations so that reexaminations 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 reexamination, CAES may require that a student enter an ISP or that enrollment in the School of Medicine be terminated. In the event that CAES decides not simply to permit reexamination, the CAES may require that the student enter an ISP as detailed below, or that enrollment in the School be terminated.

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

Third and Subsequent Years

A) Regarding performances beyond the second year, the Registrar will promptly advise, in writing, a student for whom a single Fail/Incomplete grade has been entered, regarding the requirements stipulated by the relevant course master to remediate the grade entered. Options will generally include a reexamination or repeating 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 reexamination or re-taking the course. If the course is failed a third time, enrollment in the School 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. Any student who fails to achieve a passing grade (defined as greater than or equal to 10th percentile as reported by the NBME) on 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.

C) For students referred to CAES, the Committee may endorse or amend the recommendations of course masters 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 course master 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 grades have been submitted for a course, enrollment will be terminated.

Individual Study Program (ISP)

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 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 ofthe student's academic performance at intervals throughout the curriculum. The student and the Associate Dean for Student Affairs may also initiate entry into an ISP.

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 course masters and the CAES. The specific recommendations of the CAES generally will 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 course work. 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/Incomplete grade is recorded for a student after entry into an ISP (including in a complete course or a section of Pathophysiology), a reexamination schedule will be determined by CAES. If a Fail/Incomplete grade is recorded for the reexamination of a single course for which two previous final examinations have been failed, enrollment in the School will be terminated. If a Fail/Incomplete grade 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.

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 also must 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 members.

Within 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 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 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 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.

Leave of Absence

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 leave of absence for medical reasons must submit a supporting letter from the Director of the Student Health Service. 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:

A) 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.

B) 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.

C) 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.

D) The student shall be given an opportunity to appear personally before the suspending authority within five 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:
1) Whether the suspending authority's information concerning the student's conduct is reliable; and
2) 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.

E) 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 prodeedings under these rules to convene a Disciplinary Committee.

F) A temporary suspension shall end when
1) rescinded by the suspending authority, or
2) upon the failure of the suspending authority to promptly file a statement of charges with the University Judicial Board or a Disciplinary Committee, or
3) 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.

Students receiving financial aid should be advised that at the end of 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.D./M.A.

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

Five-Year M.D. Program

Research Year Here: Student status is maintained throughout the approved research year. 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. (The student health coverage requirement will be waived if the student is eligible for employee health coverage as an employee of Washington University during the approved research year and if proof of health insurance is provided.)

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.

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 has replaced the National Board of Medical Examiners (NBME) exam and the Federation Licensing Exam (FLEX). 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 in June or September following the second-year curriculum, tests knowledge in the basic sciences; USMLE Step 2, generally taken in March or September 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, from the Registrar's Office, Room 100, McDonnell Sciences Building.

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 now 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 consul 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 i 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 $400-$650 per month, and purchase properties ranging from $80,000 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 St. 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 *Hot Docs*, now in its 18th year of existence, is a fully instrumented big band jazz ensemble. The group, composed predominantly of Washington University medical students, residents, and attending physicians, rehearses every other week and performs at concerts and dances throughout the year. The band's large repertoire spans several musical generations, with the music of Miller, Ellington, and Basie as well as more recent jazz and pop composers such as Gillespie and others. Many of these selections can be heard on the *Hot Docs* CD, "*Hot Docs I.*" *Code Blue* is an improvisational jazz combo now in its 5th year of existence. Originally formed as an offshoot of the *Hot Docs*, *Code Blue* has performed at a variety of venues around St. Louis, including, the Webster Jazz Festival, The Tap Room, B.B.'s Jazz Blues and Soups, and many others. The repertoire of *Code Blue* includes compositions by Charles Mingus and Art Blakey, among many others. The band primarily plays instrumental jazz, although a fine vocalist often is added for another dimension to the sound experience. Several years ago *Code Blue* recorded its first CD, "*Jazz for What Ails You.*" Both *Hot Docs* and *Code Blue* provide one of several ways students can continue to pursue longtime special interests in addition to their medical education. Check out the site at www.medicine.wustl.edu/~hotdocs/ or send e-mail to HotDocs@medicine.wustl.edu.

Celebrating its 24th year in 1999, 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 Theatre Project Company, City Players of St. Louis and the Black Repertory Theatre 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.

When the St. Louis city 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.

The ice hockey book in St. Louis began when the Blues moved here in 1967. They have a winning history and play in the Kiel Center, an indoor sports arena and entertainment facility. The Kiel Center hosts a number of other sports teams as well, including the Ambush, an indoor soccer squad, and the Vipers, St. Louis' in-line skate hockey team. St. Louis welcomed the NFL Rams to town in the fall of 1995, bringing professional football back to the city.

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, The Brown Group, Boeing, Pet and Ralston Purina. 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 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 new 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 STATS, Students Teaching AIDS to Students, 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 Washington University School of Medicine find apartments which range in price from $400-$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 6926 Millbrook Blvd., Campus Box 1059, 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. Shared cooking facilities are available. 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. Every effort is made to provide an atmosphere that not only aids them in meeting their study obligations, but also recognizes their privileges as graduate students. The rates for rooms during 1999-2000 are:

School Year: Late August-May (Nine Months)

Single room	$2,590.00
Large single	$3,104.00
Solo Suite	$3,439.00
Double room	$1,747.00*
Suite (2 students)	$2,720.00*

Summer 1999 (May 30th - August 8th)

Single room	$781.00
Large single	$963.00
Solo Suite	$1,069.00
Double room	$535.00*
Suite (2 students)	$781.00*

*Price per student

Security

Security at the School of Medicine is the responsibility of Protective Services. Uniformed security personnel are on duty 24 hours a day, seven days a week to provide for personal safety, reduce the opportunity for theft and to educate on crime awareness and prevention. Radio-dispatched Protective Services personnel respond immediately to calls to 362-HELP (4357).

The Medical School has an expanding access control program that makes campus facilities 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 also 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.

Each year the School publishes "Crime Awareness and Campus Security." This document outlines the many services and programs provided by Protective Services and includes the School's annual security report. It is distributed to faculty, staff and students. Individual copies are available on request by writing to Washington University School of Medicine, Protective Services Department, 660 S. Euclid Ave. - #8207, St. Louis, MO 63110, or by calling (314) 362-2698. Contact http://medschool.wustl.edu/~fmd/

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 new 1,500-space 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 or vanpooling, please contact our Rideshare Coordinator at 747-0706.

Check Cashing

Personal checks may be cashed at the Cashier's Office (Room 107, first floor McDonnell Sciences Building). Hours 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.

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
660 S. Euclid Ave., Box 8077
St. Louis, MO 63110

Student Health Service

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

Information/Appointments	362-3523
Nursing Staff	362-3524
Billing	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. 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, a designated physician's office or at the Hilltop Health Service in Umrath Hall on the Hilltop Campus. Call 362-3523 for more information. All records are confidential and may not be seen by anyone without the student's written consent.

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 726-2220 for more information.

Life Insurance

All students are covered by a $10,000 life insurance benefit. Call 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. In addition, student members of the AMA are active in the "Dinner with a Doctor" program and community-oriented activities such as Organ Donor Awareness.

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 non-denominational group which 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 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. Additionally, seminars are conducted dealing with special topics that future physicians will encounter. All are invited to attend Tuesday nights at 7:30 p.m. Meetings are held in the third classroom #314 in Olin Dorm.

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. The group has established a biweekly lecture series, a community service project with BJC Refugee Health Services, and a website (http://medicine.wustl.edu/~fihtm) of international contact and funding opportunities. 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. Opened just a few years ago, 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 312 of Olin Dorm. Cash or checks are accepted.

Operation Smile

A private, not-for-profit volunteer medical services organization, Operation Smile provides reconstructive surgery and related health care to indigent children and young adults in developing countries and the United States. The local student association raises awareness of the program and promotes domestic involvement through fundraising, sponsorship of a lecture series, and participation in Operation Smile missions.

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. The Pediatric Care Organization consists of two separate projects: the Pediatric Outreach Project (POP), and a Liver Support Group.

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 two-fold: first, to provide additional love and support to sick children and their families, and second, to allow students to experience first-hand the demands of coping with illness and its stress as it relates to children's everyday lives.

The Liver Support Group was formed in response to the needs and requests of patients in the care of a physician at St. Louis Children's Hospital. This physician's patients suffer from some form of chronic or acute liver disease and have expressed a need to reach out to other families who are in similar situations. Once a month, medical students mediate a Liver Support Group for these patients. The purpose of this group is to provide a forum for discussion of issues related to liver disease and to allow patients the opportunity to assemble a support network of other families to whom they can relate. Each session, the medical students begin with a short presentation about topics such as the healthy liver, liver transplantation, finances and insurance, and coping with the stress of chronic disease. In addition, the medical students provide constructive games and other activities for teens and older children in these families aimed at highlighting similar topics.

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 which 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 service the indigent.

Washington University Medical Center Housestaff Auxiliary (WUMCHA)

WUMCHA is an organization comprised of female residents and female spouses 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 *Guide to St. Louis*, as well as a directory of members. Annual dues are $20 and information about membership and applications can be obtained by calling Malissa Ungacta (454-3872) or Michelle Turner (862-1279).

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. One of the newer programs is the Reproductive Health Project which 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 clearing-house 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. *Auscultations*, the quarterly student-run newsletter, keeps students informed about school policy and curricular changes, and provides a forum for students to editorialize about these and other issues. The *Dis-Orientation Guide* is produced annually as a student-to-student guide to the curriculum and the city. *Hippocrene*, an arts and literary magazine, draws contributions of prose, poetry, photography and drawings from students and faculty.

Intramural Program

Students enrolled in the 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.

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. Students with academic encumbrances are not 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. Application should be made to Student Research Fellowships, Drs. C. Rovainen and E. Li, Box 8228.

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 women in the graduating class who have demonstrated outstanding leadership in service to or advancement of women in the community. The 1999 recipient: Arielle Doree Stanford.

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 1999 recipient: Jennifer M. Dunn.

Alpha Omega Alpha Book Prize. Awarded to a member of the graduating class with outstanding performance for the entire medical course. The 1999 recipient: David Christopher Miller.

American College of Physicians Goodenberger Book Award. Presented 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 1999 recipient: Stephen Daniel Skjei.

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 1999 recipients: Rebecca B. Hoover and Sarah C. Jost.

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 1999 recipient: Shana Leigh Birnbaum.

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 1999 recipients: Rakhee Kapadia Bhayani, Shana Leigh Birnbaum, Maria Cristina Dans, Melanie Diane Everitt, Susan Browning Greger, Rebecca Sue Hunt, Ariel Kathleen Smits and Angela Ruth Wong.

American Medical Women's Association Janet M. Glasgow Memorial Award. Presented to a woman who graduates first in her class.

Association for Academic Surgery Student Research Award. Recognizes outstanding research efforts by a senior medical student interested in a surgical career. The 1999 recipient: Shauna Lorenzo-Rivero.

Alexander Berg Prize. Awarded to the student presenting the best results in research in molecular microbiology. The 1999 recipient: William Jon Grossman.

Jacques J. Bronfenbrenner Prize. Provided by Dr. Bronfenbrenner's students in memory of his inspiration as a teacher and 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 1999 recipient: Karl Boynton Seydel.

Dr. Richard Brookings and Robert Carter Medical School Prizes. Provided for medical students through a bequest of Robert S. Brookings. The 1999 Dr. Richard S. Brookings recipients: Jennifer M. Dunn, William A. Frisella, David Christopher Miller and Ariel Kathleen Smits; the 1999 Robert Carter recipients: Melanie D. Everitt, Joseph P. Lee, Alix L. Rosenstein and Scott Shields Williams.

Dr. Harvey Butcher Prize in General Surgery. Awarded in memory of Dr. Harvey Butcher to the member of the graduating class who shows the greatest promise for a career in the field of general surgery. The 1999 recipient: Rebecca Sue Hunt.

Kebar S. Chouke Prize in Anatomy. Awarded at the end of the first year to a medical student who has demonstrated superior scholarship in anatomy. The 1999 recipient: Shawyon Shadman.

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 1999 recipient: Shefali A. Gandhi.

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 1999 recipient: Kenneth C. Cummings.

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 1999 recipient: Linda A. Cheng.

Elisabeth L. Demonchaux Prize in Pediatrics. Established in 1985, the prize is awarded to a graduating student who has done outstanding work in pediatrics. The 1999 recipient: Hayley Meredith Wurzel.

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 1999 recipients: Carla R. Ainsworth and Roy A. Clarke.

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 1999 recipient: Jennifer M. Quartarolo.

Dr. William Ellis Award. Established in 1990 by Dr. Ellis and awarded to a senior student in recognition of meritorious research in ophthalmology. The 1999 recipient: David Andrew Dorr.

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 1999 recipient: Michele Lynn Wilson.

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 1999 recipient: Susan Browning Greger.

George F. Gill Prizes. One prize awarded at the end of the first year to a member of the class who has demonstrated superior scholarship in anatomy; one prize awarded to a member of the graduating class who has demonstrated superior scholarship in pediatrics. The 1999 recipients: Shawyon Shadman and Mari Michele Nakamura.

Alfred Goldman Book Prize in Diseases of the Chest. Created in 1972 as an annual award to be given to a student selected by the faculty who has done outstanding clinical work or research in diseases of the chest or pulmonary physiology.

Max and Evelyn Grand Prize. Established in 1985 by Dr. M. Gilbert Grand, the prize is awarded to a student in the fourth-year class for excellence in ophthalmic research or clinical ophthalmology. The 1999 recipient: Marc Alan Leibole.

R.R. Hannas Award for Excellence in Emergency Medicine. Offered annually by the Missouri Chapter of the American College of Emergency Physicians. The 1999 recipient: Neal Kuman Sikka.

Dr. John E. Kirk Scholastic Award. Established in 1975 and awarded to a graduating student of high scholastic standing. The 1999 recipient: David Christopher Miller.

Louis and Dorothy Kovitz Senior Prize in Surgery. Senior award in surgery recognizing a member of the fourth-year class who has shown the most outstanding ability, zeal and interest in surgical problems. The 1999 recipient: Benjamin William Verdine.

Lange Medical Publications Book Award. Given to one graduating senior and one undergraduate for high scholastic standing. The 1999 recipients: Edward Brian Garon and Albert J. Yoo.

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 1999 recipient: Edward Brian Garon..

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 1999 recipient: Tracy Debra Lawrence.

Oliver H. Lowry Prize in Pharmacology. Awarded to a second-year medical student for academic excellence in pharmacology. The 1999 recipient: S. Andrew Josephson.

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 1999 recipient: Albert J. Yoo.

McGraw-Hill Book Prizes. Awarded annually to medical students for outstanding achievement in the first-year curriculum. The 1999 recipients: Gretchen A. Champion and Heather M. MacLennan.

Edward Massie Prize for Excellence in Cardiology. Awarded to the member of the graduating class who has done the most outstanding clinical or basic research work in the field of cardiovascular disease. The 1999 recipient: Grace Shirley Chen Huang.

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 1999 recipient: Jeffrey P. Simons.

Medical Fund Society Prizes. One prize awarded annually to a student of the fourth-year class 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 1999 recipients: Ramiro Jervis and Dan Eisenberg.

Merck Manual Awards. Given to three graduating medical students for scholastic achievement in medical studies. The 1999 recipients: Amanda Fishback Cashen, Ramiro Jervis and Shuaib Aziz Latif.

Missouri State Medical Association Award. Presented annually to an honor graduate of the senior class. The 1999 recipients: Christopher Patrick Carroll, Amy Sullivan Nordmann and Ginny Lyn Ryan.

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 1999 recipient: Esi M. Morgan Dewitt.

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 award is given to a member of the graduating class for outstanding research in pharmacology. The 1999 recipient: Rachael Mary Easton.

Novartis Pharmaceutical Award for Community Service. Presented annually to a second-year student who has performed laudable extracurricular activities within the community. The 1999 recipient: Alan E. Harzman.

James L. O'Leary Neuroscience Prize. Awarded annually to students who demonstrate the best accomplishments in the neuroscience course. The 1999 recipients: Kenneth C. Cummings, Sandra E. Klein and Deepu S. Nair.

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 1999 recipient: Allen B. Mendez.

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 1999 recipient: Robert Burnard West.

St. Louis Pediatric Society Senior Prize. Presented to the senior student showing the greatest promise in clinical pediatrics. The 1999 recipient: Melanie Diane Everitt.

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 1999 recipient: Maryam Afkarian.

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 1999 recipient: Shana Leigh Birnbaum.

Dr. Margaret G. Smith Award. Given to a woman medical student for outstanding achievement in the first two years of medical school. The 1999 recipient: Kristin M. Foley.

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 1999 recipient: Jolie Christine Holschen.

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 1999 recipient: Jennifer Helene Smith.

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 1999 recipients: Rebecca S. Hunt and Ginny L. Ryan.

Washington University American Heart Association Medical Student Research Fellowship Prize. Given for outstanding performance in the American Heart Association Medical Student Research Fellowship Program. The 1999 recipient: Amy Sullivan Nordmann.

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 1999 recipient: Peter Alan Crawford.

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 surgery. The 1999 recipient: Andrew Scott Goggin.

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 by the Program for the Humanities in Medicine to honor the centennial of Dr. White's birth. He was a distinguished pediatrician, social activist and pioneer teacher of medical ethics who introduced the first course on this subject to medical students in 1927. The prize is awarded to a first-year student for outstanding performance in the courses offered by the Program for the Humanities in Medicine. The 1999 recipient: Maria Cristina Dans.

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 1999 recipients: Jeffrey Ford Brent and John Chuch-Sheng Loh.

The Wynder Prize in Preventive Medicine. Established in 1994, it is awarded to senior medical students who have done the best research in preventive medicine. The 1999 recipients: Ginny Lyn Ryan and Ariel Kathleen Smits.

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 1999 recipient: Daniel Spencer Wendelin.

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 for our students. Thus, students in the third-year class are provided with general background information about the kinds of residencies available, special issues concerning certain extremely competitive residencies and help in identifying faculty members for further assistance. As the number of available residencies may gradually decrease to closely approximate the number of graduates applying, students must make their choices with considerable care.

The Career Counseling Office maintains a web site (http://medicine.wustl.edu/~residenc/spec/) where students can find information regarding 20 different residency specialities. 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 (1999) are identified in the Register of Students beginning on page 209.

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 which 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.

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.

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 formally met its obligations to this learning endeavor through the operation of the Office of Continuing Medical Education. The objectives of this program are to:

1. Provide high quality educational activities for alumni and faculty of Washington University School of Medicine and other physicians locally, regionally, nationally and, on occasion, internationally.

2. Encourage lifelong learning by a variety of educational methods appropriate to the learners' needs.

3. Provide for the acquisition of new knowledge and skills and to aid in acquiring efficient problem-solving techniques for ultimate improvement in patient care.

4. Provide a forum where academic and practicing physicians can jointly explore solutions to health care problems.

5. Translate the results of research and the habits of critical assessment of new data to the needs of practicing physicians.

6. Embark on newer areas of CME such as remedial education, electronic education, distance learning and self-study.

Each year more than 60 symposia and more than 120 academic rounds and conferences as well as videos and monographs are provided with CME credit by this office. About 4,000 registrants attend these courses annually and receive more than 6000 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.

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 Alumni Association assists students in a variety of ways. The Association makes a substantial financial commitment each year to support 16 Distinguished Alumni Scholars. Entering students are welcomed to the School at an event sponsored by the Association, which 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.

Many students and residents meet alumni informally during the admissions process. The Office of Medical Alumni and Development Programs coordinates an alumni resource bank which 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, supervise electives, assist with summer employment opportunities for first-year students, and provide overnight lodging to fourth-year students going on residency interviews.

Reunions and Other Events

The Annual Reunion is held in May for 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 to alumni. 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 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 allied health programs. Each year alumni and friends are solicited for gifts to the Annual Fund, which supports the School's departments, divisions and allied health 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.

Developing additional sources of student financial aid is a priority for the Alumni Association, whose members have established the Distinguished Alumni Scholarship program to provide full-tuition, four-year scholarships to promising medical students in honor of great teachers and mentors who were also alumni of the School of Medicine.

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. Six such chairs have been created thus far, one each in Pathology, Molecular Microbiology, Pediatrics, Molecular Biology and Pharmacology, Biochemistry and Molecular Biophysics, and Cell Biology and Physiology.

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 investigations. 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 the 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 April 1, 1996)*

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: Denise McCartney, 362-1936

Advisors: Leslie Kahl (complaints by students and others), 362-7481;

Judy Mahoney (complaints by faculty, staff and others), 362-4900;

Laurel Forsythe (complaints by 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 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 insure 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.

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; 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 between the Associate Dean for Student Affairs, the Associate Dean for Admissions or the Associate Dean for Undergraduate Medical 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 (three out of five votes), except when the motion is for recommending to the Dean dismissal from enrollment in the school, where four out of five 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 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 Executive Vice Chancellor of the

University according to the University Judicial Code. The decision of the Executive Vice Chancellor 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 (as detailed in the procedures described below).

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) 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. 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 this Constitution. Elections shall be held for each of the class officer positions according to the following format:
   1. Nominations: Nominations for each office shall be held at least one week prior to the election. Nominations shall be submitted in writing to the Election Official. Any student within the class may nominate him/herself or another class member who agrees to run.
   2. 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 after 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 eight 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 eight weeks prior to the completion of the second academic year. Each position carries a term of two academic years.
   3. Balloting: To be elected a candidate must receive a simple majority of a quorum of one-half of the class members. Write-in candidates shall be allowed on all ballots. Proxy ballots shall be allowed only if they are given in writing to the Election Official. Ballot counting shall be the responsibility of the Election Official with a witness agreeable to all candidates.
   4. 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.

5. Vacant Offices: If any office is vacated before its set term, an election for that office shall be held within three weeks of the vacancy. All students of a given group shall be eligible to run for the vacated office. If a current class officer runs for the vacated post, that officer must vacate the post he/she occupies.

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 have the same duties and responsibilities as a Class President and MER and shall be elected by the M.D./Ph.D. Students who are in the Ph.D. phase of their training. The election shall be held within eight weeks of the finish of the University's academic calendar under the conditions of Article II, Section C. The term shall be one year.

E. Representative to the Graduate Professional Council (GPC): There shall be a Representative with a two-year term chosen every year from the First-Year class to represent the School of Medicine at GPC meetings. The Representative 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 Rep shall be the liaison to the other programs within the School of Medicine. In addition, the Rep shall serve on the Professional and Graduate Student Coordinating Committee (PROGRADS).

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 University's Official Representative to the Organization of Student Representatives of the Association of American Medical Colleges. 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. Each member of the Student Government shall take on a Student Government approved project or program to the completed during the term of his/her office.
11. Upon completion of the academic year, each member of the Student Government shall prepare a summary brief of the activities undertaken during their term.
12. The Student Government shall meet regularly and at intervals of no more than six weeks.
13. The MERs 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 immediately following a given meeting of the MER. The responsibility for the brief can be distributed among the MERs at their discretion.
14. 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 Chair shall be responsible for overseeing and maintaining records of all financial transactions of the Student Government. The Chair 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 and appoint 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.
   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
Erik Wallace

Medical Education Representative
Ramsey Ellis

Social Chairs
Mike Pelle
Clare Pipkin
Geoff Uy

Third-Year Class Officers

President
Andy Josephson

Medical Education Representative
Heather Bufford

Social Chairs
Shaywon Shadman
Pankaj Gore
Jane Yoo

Second-Year Class Officers

President
Edy Kim

Medical Education Representative
Matthew Denny

Social Chairs
Yekaterina Karpitskaya
Altug Koymen
Roberto Miki

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. 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 or HBV 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 or HBV 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 Vice Chancellor for 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) — Title 20 of the United States Code, Section 1232g, as amended — 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.

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. The course in microscopic anatomy focuses on cell and tissue biology, with laboratory sessions paralleling the lectures in these areas. This course is closely coordinated with the Physiology course offered concurrently by the Department of Cell Biology and Physiology; together, these form the organ systems course in the first-year medical curriculum. 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 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 and Special Topics sessions that address selected issues in greater depth. 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. Limited space is available for non-medical students with instructor's permission. Non-medical students should register under the cross listed number L41 (Bio) 554 (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: *David N. Menton, Ph.D.*, 362-3593

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, preparations of fresh tissues 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 536 AUTONOMIC MECHANISMS IN DISEASED STATES

Instructor: *Arthur D. Loewy, Ph.D.*, 362-3930

The purpose of this elective is to discuss several topics related to autonomic dysfunction. Each student will present a paper dealing with new scientific ideas regarding the physiology of the autonomic nervous system. The focus of the discussion will be to address how particular disease processes may affect function of normal tissues. The topics covered will include sexual dysfunction, neurogenic inflammation, neural-immune interactions and selected autonomic nervous system diseases.

M04 536A MICROSURGERY OF THE AUTONOMIC NERVOUS SYSTEM

Instructor: *Arthur D. Loewy, Ph.D.*, 362-3930

The purpose of this course is to develop microsurgical skills. Particular components of the autonomic nervous system will be dissected and injections of various neuronal markers will be made. Attendance of two days per week will be necessary and prior contact with Dr. Loewy should be made.

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 which 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) 5404 MOLECULAR NEUROBIOLOGY
L41 (Bio) 5562 PRINCIPLES OF NEURAL DEVELOPMENT
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 four-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 faculty in teaching first-year medical students in the anatomy laboratory. Valid start weeks for four-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 and image analysis.

Nancy L. Baenziger, Ph.D., 362-2817
Up and down regulation of receptor systems for multifunctional mediators bradykinin and histamine in neuronal, vascular and connective tissue cells.

E. Richard Bischoff, Ph.D., 362-3548
Development and regeneration of skeletal muscle.

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
Functional organization of somatic sensory cortex.

James M. Cheverud, Ph.D., 362-4188
Evolutionary quantitative genetics, genetics of growth and morphology.

Glenn C. Conroy, Ph.D., 362-3397
Comparative primate anatomy and human evolution.

Gregory C. DeAngelis, Ph.D., 362-7043
Neural circuits underlying three-dimensional vision and object representation.

David I. Gottlieb, Ph.D., 362-2758
Gene regulation in the developing brain.

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
Neural basis of fight-or-flight response.

David N. Menton, Ph.D., 362-3593
Structure and function of the mammalian integument.

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.

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 limb forebrain, and the neuropathology of Alzheimer's disease.

Yi Rao, Ph.D., 362-9388
Molecular mechanism of neural development in Xenopus embryos.

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 parietal control of eye and arm movement.

Paul H. Taghert, Ph.D., 362-3641
Molecular genetic analysis of neuropeptide transmitters.

W. Thomas Thach Jr., M.D., 362-3538
Neural control of posture, movement and motor learning.

David C. Van Essen, Ph.D., 362-7043
Organization and function of visual cortex in primates.

Mark B. Willard, Ph.D., 362-3462
The transport of macromolecules and viruses in neurons.

Rachel O. L. Wong, Ph.D., 362-4941
Development of connections in the mammalian retina.

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

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.)

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 Departments of Neurology and Neurological Surgery and Department of Pediatrics.)

Steven E. Petersen, Ph.D., California Institute of Technology, 1981. (Neuropsychology) (See Departments of Neurology and Neurological Surgery and Department of Radiology.)

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 Pediatrics and Departments of Neurology and Neurological Surgery.)

Lawrence B. Salkoff, Ph.D., University of California, Berkeley, 1979. (See Department of Genetics.)

Joshua R. Sanes, Ph.D., Harvard University, 1976.

William D. Snider, M.D., University of North Carolina, 1977. (See Departments of Neurology and Neurological Surgery.)

Joseph H. Steinbach, Ph.D., University of California, San Diego, 1973. (See Department of Anesthesiology.)

W. Thomas Thach Jr., M.D., Harvard University, 1964. (See Department of Neurology and Program in Physical Therapy.)

Robert H. Waterston, M.D., Ph.D., The University of Chicago, 1972. (See Department of Genetics.)

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 Departments of Neurology and Neurological Surgery and Department of Cell Biology and Physiology.)

Charles F. Zorumski, M.D., St. Louis University, 1978. (See Departments of Neurology and Neurological Surgery and Department of Psychiatry.)

Research Professor

Charles H. Anderson, Ph.D., Harvard University, 1962.

Professor (Adjunct)

Richard W. Brand, D.D.S., University of Pittsburgh, 1958.

Associate Professors

Dora Angelaki, Ph.D., University of Minnesota, 1991.

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)

E. Richard Bischoff, Ph.D., Washington University, 1966.

Paul C. Bridgman, Ph.D., Purdue University, 1980.

Andreas H. Burkhalter, Ph.D., University of Zurich, 1977. (See Departments of Neurology and Neurological Surgery.)

Ann Marie Craig, Ph.D., University of Western Ontario, Canada, 1989.

John G. Csernansky, M.D., New York University, 1979. (See Department of Psychiatry.)

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.)

David N. Menton, Ph.D., Brown University, 1966.

Bruce L. Nock, Ph.D., Rutgers University, 1980. (See Department of Psychiatry.)

Joel S. Perlmutter, M.D., University of Missouri, 1979. (See Departments of Neurology and Neurological Surgery and Department of Radiology.)

Jane Phillips-Conroy, Ph.D., New York University, 1978. (Also Faculty of Arts and Sciences)

Keith M. Rich, M.D., Indiana University, 1977. (See Departments of Neurology and Neurological Surgery.)

Paul H. Taghert, Ph.D., University of Washington, 1981.

Lawrence Tychsen, M.D., Georgetown University, 1979. (See Department of Ophthalmology and Visual Sciences.)

Research Associate Professors

Nancy L. Baenziger, Ph.D., Washington University, 1971.

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

Amy Bastian, Ph.D., Washington University, 1995. (See Program in Physical Therapy.)

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.)

Gregory C. DeAngelis, Ph.D., University of California, Berkeley, 1992.

Laura L. Dugan, M.D., Ohio State University, 1987. (See Department of Medicine and Departments of Neurology and Neurological Surgery.)

Mark P. Goldberg, M.D., Columbia University, 1984. (See Departments of Neurology and Neurological Surgery.)

Luci Kohn, Ph.D., University of Wisconsin, Madison, 1989. (See Program in Occupational Therapy.)

Jonathan W. Mink, M.D., Ph.D., Washington University, 1989. (See Departments of Neurology and Neurological Surgery.)

Jeffrey J. Neil, M.D., Ph.D., Washington University, 1984. (See Departments of Neurology and Neurological Surgery and Department of Pediatrics.)

Michael L. Nonet, Ph.D., Massachusetts Institute of Technology, 1989.

Yi Rao, Ph.D., University of California, San Francisco, 1991.

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.

Rachel O.L. Wong, Ph.D., Australian National University, Canberra, 1985.

Min Zhuo, Ph.D., University of Iowa, 1992. (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.

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 in 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 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.; 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.; or Min Zhuo, Ph.D.

FOURTH YEAR
Electives

M10 805 ANESTHESIOLOGY

Instructor: *David J. Murray, M.D.*, 362-6584, 747-2136

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 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 also will include practical management of some common 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 811 CARDIOTHORACIC ANESTHESIOLOGY

Instructors: *Charles W. Hogue Jr., M.D.; Demetrios G. Lappas, M.D., Ph.D.* (both: 362-1196)

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 also will 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 the CTA Division and the Department of Anesthesiology. Presentation of a paper will be assigned. Valid start weeks for four-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.; Alice A. Edler, M.D.* (both: 454-6215)

The student will learn about differences between adults and children in relation to anatomy (airway), physiology and pharmacology as they pertain to anesthesia. By the end of the elective, students will be able to manage a routine pediatric anesthetic, including pre-anesthetic assessments and postoperative pain management, and will be able to perform tracheal intubation in anesthetized children. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 820 CRITICAL CARE

Instructors: *Walter A. Boyle III, M.D.*, 747-3581; *Timothy G. Buchman, Ph.D., M.D.*, 362-9347

This clinical elective is designed to familiarize the student with the management of the critically ill patient in the surgical intensive care unit at Barnes-Jewish Hospital. The student will receive individualized training in critical care management including invasive hemodynamic monitoring and airway management procedures. The student will function as an integral part of the surgical intensive care unit team, consisting of attending physicians with specialty training in critical care, critical care fellows, and house staff from surgery, anesthesiology and other specialties. The student actively will participate in daily rounds with members of the intensive care unit team and be involved in the management of patients from all the surgical specialties (except cardiothoracic) who have acute problems requiring intensive care management. Practical experience will be gained in both placement and interpretation of invasive and noninvasive 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, and management of fluids, electrolytes and nutrition. Valid start weeks for four-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.*, 362-8820

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 four-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.; C. Michael Crowder, M.D., Ph.D.* (all: 362-5604)

Application of principles of cerebral physiology. Airway management = direct and fiber-optic-guided intubation. Management of complicated neurosurgical patients, including electrophysiologic monitoring and hemodynamic monitoring (arterial line, central venous access, pulmonary artery catheter). Optional participation in ongoing clinical research protocols (six-week rotations). Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 823 OBSTETRICAL ANESTHESIA

Instructor: *Mark C. Norris, M.D.*, 362-5110

Students will gain an in-depth experience in obstetrical anesthesia. They will learn how the physiologic changes of pregnancy alter anesthetic management. Students will develop an understanding of labor pain and the methods available for its relief. They will participate in the provision of pain relief to laboring women. Valid start weeks for four-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.

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 Surgery.)

Demetrios G. Lappas, M.D., Aristotelian University, 1961; Ph.D., 1966.

Christopher J. Lingle, Ph.D., University of Oregon, 1979. (See Department of Anatomy and Neurobiology.)

David J. Murray, M.D., University of Saskatchewan, 1978.

Mark C. Norris, M.D., Jefferson Medical College, 1980. (See Department of Obstetrics and Gynecology.)

William D. Owens, M.D., University of Michigan, 1965.

J. Julio Pérez-Fontán, M.D., Universidad de Santiago, 1977. (See Department of Pediatrics.)

Peter Rock, M.D., The Johns Hopkins University, 1978. (See Department of Medicine.)

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

Walter A. Boyle III, M.D., University of California, San Francisco, 1977. (See Department of Surgery.)

Víctor G. Dávila-Román, M.D., F.A.C.C., University of Puerto Rico, 1981. (See Department of Medicine.)

Narasimhan Gautam, Ph.D., University of Bombay, 1983. (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.)

James J. Jenkins, M.D., University of North Carolina, 1970.

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.

Carey Ira Weiss, M.D., University of Illinois, 1979.

Associate Professor (Clinical)

Milton L. Cobb, M.D., University of Texas, Southwestern, 1968.

Assistant Professors

Nabil Abboud, M.D., St. Joseph's University, 1970.

Sharma Anshuman, M.D., All India Institute of Medical Sciences, New Delhi, India, 1990.

Ioanna Apostolidou, M.D., University of Athens, 1986.

Spomenko Bauer, M.D., University of Zagreb, 1968.

Maura C. Berkelhamer, M.D., Rush Medical College, 1988.

Matthew S. Bodner, M.D., Washington University, 1980.

Laila Bottros, M.D., Ain Shams University, Egypt, 1978.

Mary Ann Cheng, M.D., University of Michigan, 1980.
Ursula Class, M.D., University of Tübingen, 1982.
Jennifer W. Cole, M.D., Washington University, 1984.
C. Michael Crowder, M.D., Ph.D., Washington University, 1989. (See Department of Molecular Biology and Pharmacology.)
Mark H. Davis, M.D., UMDNJ, Robert Wood Johnson Medical School, 1990.
George Despotis, M.D., St. Louis University, 1985.
Michael N. Diringer, M.D., University of Kentucky, 1982. (See Department of Neurological Surgery and Program in Occupational Therapy.)
Alice A. Edler, M.D., St. Louis University, 1977.
James J. Fehr, M.D., University of Michigan, 1988. (See Department of Pediatrics.)
Barry A. Graff, M.D., St. Louis University, 1976.
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.
Peter E. Krucylak, M.D., University of Pennsylvania, 1987.
Andrea Kurz, M.D., University of Vienna, 1986.
Michael E. Leavell, M.D., University of Kansas, 1984.
Barry P. Markovitz, M.D., University of Pennsylvania, 1983. (See Department of Pediatrics.)
Theodore N. Marks, Ph.D., M.D., Case Western Reserve University, 1992.
John D. McAllister, M.D., University of Manitoba, 1980. (See Department of Pediatrics.)
Joan M. Niehoff, M.D., University of Missouri, Kansas City, 1982.
Deborah Ott, M.D., Washington University, 1991.
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.
Charles R. Schrock, M.D., University of Missouri, Columbia, 1991.
Hind Shabany-Bashiti, M.B.B.Ch., Ain Shams University, 1971.
Nikolaos J. Skubas, M.D., Aristotelian University of Thessaloniki, Greece, 1988.
Iris Soliman, M.B.B.Ch., Cairo University, 1977.
Raghu TerKonda, M.D., University of Missouri, 1987.
Vesna J. Todorovic, M.D., Ph.D., University of Belgrade, 1985.
Lawrence S. Waldbaum, M.D., Washington University, 1973.
Karen L. Weiss, M.D., Boston University, 1980.
Brett D. Wolff, M.D., Washington University, 1991.
Min Zhuo, Ph.D., University of Iowa, 1992. (See Department of Anatomy and Neurobiology.)

Assistant Professors (Clinical)

Margaret M. Oakley, M.D., St. Louis University, 1959. (Shriners Hospital)
Frederick E. Youngblood, M.D., Medical College of Georgia, 1968.

Instructors

Sirajuddin Agha, M.D., Liaquat Medical College, Jamshoro, SIND, Pakistan, 1969.
Linda L. Algra, M.D., University of The Witwatersrand, Johannesburg, South Africa, 1990.
Pamela Atkinson, M.D., Jefferson Medical College, 1993.
Matthew H. Bigham, M.D., Yale University, 1993.
Jan Boon, M.D., University of The Witwatersrand, 1990.
Michael T. Connor, M.D., Wayne State University, 1974. (See Department of Pediatrics.)
Friedrich C. Dalman, M.D., Ph.D., University of Michigan, 1992.
Hiroko Dalman, M.D., University of Michigan, 1992.
Bakul R. Dave, M.D., Gujarat University, India, 1984.
Catherine M. Dunn, M.D., University of Missouri, 1982.
Anthony H. Guarino, M.D., University of Maryland, 1993.
Hawpeng S. Hsu, M.D., Taipei Medical College, Taipei, Taiwan, 1983.
Matthew Barry Jones, M.D., UMDNJ, Robert Wood Johnson Medical School, 1987.
Ivan M. Kangrga, M.D., University of Belgrade, 1982; Ph.D., Iowa State University, 1991.
Menelaos Karanikolas, M.D., Athens University School of Medicine, Greece, 1988.
Gabriele Koschorke, M.D., Ruprecht-Karls-Universitaet Medical School, Germany, 1987.
Kenneth M. Mims, M.D., Wright State University, 1993.
Amrik S. Narula, M.B.B.S., H.P. Medical College, 1972.
Asad Qayum, M.D., Fatima Jinnah Medical College, Pakistan, 1993
Elaine V. Riegle, M.D., University of Iowa, 1967.
Eric M. Ruocco, M.D., University of Missouri, Kansas City, 1991.
Slobodan M. Todorovic, M.D., Ph.D., University of Belgrade, Yugoslavia, 1982.
Julian Yepes, M.D., Universidad Pontifica Bolivariana Medellin, Colombia, South America, 1984.

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. Specials 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
Biophysical chemistry of regulatory interactions in proteins and nucleic acids.

Wayne M. Barnes, Ph.D., 362-3351
Plant and DNA polymerase genetic engineering, and DNA technology improvement.

Peter M.J. Burgers, Ph.D., 362-3872
Molecular biology of yeast chromosomal DNA replication and DNA repair.

David P. Cistola, M.D., Ph.D., 362-4382
Structural biology of lipid- and drug-binding proteins, NMR spectroscopy, and molecular recognition.

Enrico Di Cera, M.D., 362-4185
Molecular recognition, and 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, properties of actin and actin-binding proteins, relationship of enzyme structure to function, and protein-protein interactions.

Kathleen Hall, Ph.D., 362-4196
RNA structure/function, RNA:protein interactions, and NMR spectroscopy.

Jo Holt, Ph.D., 362-4406
Kinetics and thermodynamics of ligand binding in hemeproteins, and FTIR spectroscopy.

Linda C. Kurz, Ph.D., 362-3401
Direct observation of enzymatic catalytic strategies.

Angel Wai-mun Lee, M.D., Ph.D., 362-4466
The role of receptor tyrosine kinases in normal cellular signaling and in disease states, and cell cycle deregulation in human breast cancers.

Timothy M. Lohman, Ph.D., 362-4393
Biophysical chemistry of proteins, nucleic acids and their mechanisms of interaction; helicases and helix destabilizing proteins; and polyelectrolyte properties of proteins and nucleic acids.

John E. Majors, Ph.D., 362-1135
Control of eukaryotic gene expression.

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, and protein engineering.

Gabriel Waksman, Ph.D., 362-4562
X-ray crystallographic studies of proteins involved in signal transduction and DNA replication.

Mark R. Wardell, Ph.D., 747-0725
Structure, function and pathology of proteins associated with atherosclerosis.

Faculty

ALUMNI ENDOWED PROFESSOR OF BIOCHEMISTRY AND MOLECULAR BIOPHYSICS AND INTERIM 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)

Elliot L. Elson, Ph.D., Stanford University, 1966.

William A. Frazier III, Ph.D., Washington University, 1973. (See Department of Cell Biology and Physiology.)

Rosalind H. Kornfeld, Ph.D., Washington University, 1961. (See Department of Medicine.)

Stuart A. Kornfeld, M.D., Washington University, 1962. (See Department of Medicine.)

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 Pharmacology and Institute for Biomedical Computing.)

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 Radiology and Department of Cell Biology and Physiology.)

J. Evan Sadler, M.D., Ph.D., Duke University, 1978; M.D., 1979. (See Department of Medicine.)

Associate Professor Emeritus

William F. Holmes, Ph.D., University of Pennsylvania, 1960. (See Institute for Biomedical Computing.)

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.

David J. States, M.D., Ph.D., Harvard University, 1983. (See Institute for Biomedical Computing.)

Gabriel Waksman, Ph.D., University of Paris, 1982.

Mark B. Willard, Ph.D., University of Wisconsin, 1971. (See Department of Anatomy and Neurobiology.)

Assistant Professors

Usha P. Andley, Ph.D., Jawaharlal Nehru University, 1977. (See Department of Ophthalmology and Visual Sciences.)

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, 1993. (See Department of Pathology.)

Angel Wai-mun Lee, M.D., Ph.D., Harvard University, 1984.

Jay W. Ponder, Ph.D., Harvard University, 1984.

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.)

Mark R. Wardell, Ph.D., Christchurch School of Medicine, University of Otago, 1986.

Research Assistant Professors

Jo Holt, Ph.D., Colorado State University, 1982.

Linda C. Kurz, Ph.D., Washington University, 1973.

Nader Sheibani-Karkhaneh, Ph.D., University of Nebraska, 1989.

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.

Yingwen Huang, Ph.D., Southern Illinois University, 1991.

John Jean, Ph.D., University of Texas, 1987.

James J. Toner Jr., Ph.D., St. Louis University, 1973.

DEPARTMENT OF CELL BIOLOGY AND PHYSIOLOGY

The department offers instruction to medical and graduate students. A Cell and Organ Systems Physiology course in the first year is designed to provide students with a foundation for their further study of clinical and applied physiology. 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 following research interests are represented in the department at the present time: the biology of extracellular-matrix and cell-matrix interactions; transport across cell membranes; membrane channels and G proteins; molecular biology of epithelial transport; membrane traffic including secretion and endocytosis; the cytoskeleton and the mechanisms of signal transduction across biological membranes; neurophysiology; signal transduction mechanisms (cell motility, cell cycle control, metabolism, ion channels, apoptosis); the mechanism of action in polypeptide hormones; cell biology and neurophysiology of nerve and muscle/structure and function studies; and the application of novel rapid freezing techniques to complex biological structures.

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 5015 PROBLEMS IN RESPIRATORY PHYSIOLOGY

Instructor: *Carl M. Rovainen, Ph.D.*, 362-2299

This elective complements the core curriculum on respiration in the first year Physiology course for those students who like to learn by problem-solving, for instance, as in undergraduate physics. Some (but not all) students say that the way they really learned respiration was by solving problems. Qualitative and quantitative problem sets in respiratory physiology will be assigned to teams of students who will solve them in class with advice from the instructor and then present the basic concepts and answers to the group as a whole. The instructor will give a mini-lecture on the theme of each session and will moderate the discussion.

This elective early in the semester will provide both a head start and greater depth of understanding for the core learning objectives in the regular course in respiratory physiology.

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; *Gregory D. Longmore, M.D.*, 362-8834

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 course is cross listed in Department of Medicine.

M04 534 MONOCYTES/MACROPHAGES PROGRESSIVE KIDNEY DISEASE

Instructor: *Jeremiah J. Morrissey, Ph.D.*, 454-7464

Infiltration of the kidney by monocytes which differentiate into tissue macrophages is a primary factor initiating or secondary factor exacerbating many kidney diseases. In this elective, we will explore the molecular events that cause monocytes to be activated by, attracted to and subsequently invade the diseased kidney. The events from transcription factor activation to tissue fibrosis are similar to those occurring during arteriosclerosis. Animal models to study the pathophysiology of kidney disease will be discussed along with the histologic examination of the kidneys at various stages in the development of end-stage renal disease. For those students interested, visits to the renal clinic with attending physicians will be arranged. Reversibility, cures and preventions/amelioration of kidney disease will be discussed. This course is cross listed in Department of Medicine.

M04 537 CARDIOVASCULAR CONTROL MECHANISMS

Instructors: *Jeffrey M. Gidday, Ph.D.*, 454-2817; *Dana R. Abendschein, Ph.D.*, 362-8925

A hands-on demonstration of various aspects of cardiovascular physiology in an anesthetized pig, as well as an interactive session on the patient simulator (based in Anesthesiology.) Topics covered in the pig lab 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, and effects of vagal stimulation on cardiopulmonary dynamics. Simulations on the computer-based patient model will include the effects of cardiac drugs and responses to myocardial ischemia and hypovolemia.

M04 561 BRAIN BLOOD VESSELS

Instructors: *Thomas A. Woolsey, M.D.*, 362-3600; *Carl M. Rovainen, Ph.D.*, 362-2299

This course considers structure, development, transport mechanisms, flow regulation and disease of cerebral blood vessels. Three general themes are: 1) the architecture of cerebral vessels and regulation of cerebral blood flow during neural activity with a demonstration of brain circulation in the rat model, 2) the blood-brain barrier, and 3) brain angiogenesis. Students select topics and papers for presentation from a diverse menu. For the final session, students study a clinical problem and present their reading to the rest of the group.

M04 5667 MICROCIRCULATION

Instructor: *Jeffrey M. Gidday, Ph.D.*, 454-2817

This elective introduces students to the pathophysiology of arterioles, capillaries and venules that compose the microcirculation. Informal discussions of key papers in the literature, laboratory demonstrations and student presentations will provide the format. An examination of basic principles such as endothelial regulation of tissue blood flow, capillary permeability, hemodynamic and rheologic effects of erythrocytes and leukocytes, and angiogenesis will provide the foundation for more focused examinations of a variety of microcirculatory pathologies. Topics to be covered in the latter category include stroke and myocardial ischemia, diabetes, inflammation, tumor angiogenesis, retinopathy of prematurity, and pulmonary edema. This course is cross listed in Departments of Neurology and 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 nervous ataxias, 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. Groups of three or four 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 the 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 INTERACTION

L41 (BIO) 5132 CELL MOTILITY AND CYTO-SKELETON 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 Training 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
Regulation of cell function by G protein signaling pathways.

John A. Cooper, M.D., Ph.D., 362-3964
The role of actin polymerization and actin-binding proteins in cell motility.

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.

Christopher F. Hardy, Ph.D., 747-1808
Cell cycle regulation of initiation of DNA replication and chromosome segregation (mitosis) using yeast as the model organism.

David A. Harris, M.D., Ph.D., 362-4690
Cell biology and biochemistry of prion diseases and Alzheimer's disease.

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
Signal transduction via GTP binding regulatory proteins. Biology and enzymology of protein palmitoylation.

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 tissue.

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.

Mike Max Mueckler, Ph.D., 362-4160
Molecular biology of mammalian glucose transporters. Gene structure, biosynthesis and regulation. Expression of transfected cDNA in foreign cells. Mechanism of insertion of 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.

Alan L. Pearlman, M.D., 362-6947
Early development of the mammalian cerebral cortex, with emphasis on the molecular and cellular mechanisms that guide migrating neurons and axonal growth cones to their proper location.

Helen Piwnica-Worms, Ph.D., 362-6812
Regulation of the eukaryotic cell cycle.

Carl M. Rovainen, Ph.D., 362-2299
Brain blood vessels. *In vivo* videomicroscopy of flowing RBC and fluorescent markers in arterioles and venules through cranial windows in anesthetized rodents. Computer-assisted image analysis. Micro-neurosurgery. Neural plasticity and long-term recovery from stroke. Models for ministrokes and local cerebral edema. Long-term remodeling of arterioles and recovery of blood flow.

Paul A. Schlesinger, M.D., 362-2223
Molecular mechanisms and regulation of acidification and ion transport by intracellular vesicles.

Philip D. Stahl, Ph.D., 362-6950
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.

Susan R. Wente, Ph.D., 362-2713
Structural and functional analysis of nuclear pore complexes in nucleocytoplasmic trafficking.

Robert S. Wilkinson, Ph.D., 362-2300
Cellular physiology and nerve-muscle synapses, especially the regulation of synaptic strength and the role of innervation in determining cell 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 Departments of Neurology and Neurological Surgery.)

Stanley Lang, Ph.D., The University of Chicago, 1953.

Albert Roos, M.D., University of Groningen, Netherlands, 1940.

Professors

Jacques U. Baenziger, M.D., Ph.D., Washington University, 1975. (See Department of Pathology.)

David C. Beebe, Ph.D., University of Virginia, 1974. (See Department of Ophthalmology and Visual Sciences.)

Eric J. Brown, M.D., Harvard University, 1975. (See Department of Medicine.)

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.)

F. Sessions Cole, M.D., Yale University, 1973. (See Department of Pediatrics.)

John A. Cooper, M.D., The Johns Hopkins University, 1982; Ph.D., 1983.

Jerome R. Cox Jr., Sc.D., Massachusetts Institute of Technology, 1954. (Biomedical Engineering) (See Institute for Biomedical Computing.) (Also School of Engineering and Applied Science)

William A. Frazier III, Ph.D., Washington University, 1973. (See Department of Biochemistry and Molecular Biophysics.)

John E. Heuser, M.D., Harvard University, 1969.

F. Scott Mathews, Ph.D., University of Minnesota, 1959. (See Department of Biochemistry and Molecular Biophysics.)

Robert P. Mecham, Ph.D., Boston University, 1976. (See Department of Medicine.)

Mike Max Mueckler, Ph.D., University of Wisconsin, Madison, 1982.

Alan L. Pearlman, M.D., Washington University, 1961. (See Departments of Neurology and Neurological Surgery.)

David H. Perlmutter, M.D., St. Louis University, 1978. (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.

Joseph L. Roti Roti, Ph.D., University of Rochester, 1972. (See Department of Radiology.)

Carl M. Rovainen, Ph.D., Harvard University, 1967.

Shirley A. Sahrmann, Ph.D., Washington University, 1973.

Linda J. Sandell, Ph.D., Northwestern University, 1980. (See Department of Orthopaedic Surgery.)

Louis Simchowitz, M.D., New York University, 1970. (See Department of Medicine.)

Thomas A. Woolsey, M.D., The Johns Hopkins University, 1969. (See Department of Anatomy and Neurobiology and Departments of Neurology and Neurological Surgery.)

Associate Professors

Dana R. Abendschein, Ph.D., Purdue University, 1978. (See Department of Medicine.)

Kendall J. Blumer, Ph.D., Duke University, 1986.

Douglas C. Dean, Ph.D., University of Kansas, 1984. (See Department of Medicine.)

Marc R. Hammerman, M.D., Washington University, 1972. (See Department of Medicine.)

David A. Harris, M.D., Ph.D., Columbia University, 1983.

Michael J. Holtzman, M.D., Northwestern University, 1975. (See Department of Medicine.)

Keith A. Hruska, M.D., Creighton University, 1969. (See Department of Medicine.)

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.) (Also Department of Physics)

Robert W. Mercer, Ph.D., Syracuse University, 1980.

Stanley Misler, Ph.D., New York University, 1977; M.D, 1978. (See Department of Medicine.)

Colin G. Nichols, Ph.D., University of Leeds, 1985.

William C. Parks, Ph.D., Medical College of Wisconsin, 1982. (See Department of Medicine.)

Paul A. Schlesinger, M.D., The University of Chicago, 1970; Ph.D., 1973.

Clay Semenkovich, M.D., Washington University, 1981. (See Department of Medicine.)

Steven Shapiro, M.D., The University of Chicago, 1983. (See Department of Medicine.)

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.)

Robert W. Thompson, M.D., University of Michigan, 1983. (See Department of Surgery.)

Susan R. Wente, Ph.D., University of California, Berkeley, 1988.

Robert S. Wilkinson, Ph.D., University of Texas, Austin, 1974.

Assistant Professors

Steven Bassnett, Ph.D., University of East Anglia, England, 1987. (See Department of Ophthalmology.)

Perry E. Bickel, M.D., University of Texas, Southwestern, 1988. (See Department of Medicine.)

Guojun Bu, Ph.D., Virginia Polytechnic Institute, 1990. (See Department of Pediatrics.)

Roberto Civitelli, M.D., University of Sienna, Italy, 1980. (See Department of Medicine.)

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.

Christopher Hardy, Ph.D., Columbia University, 1991.

Maurine Linder, Ph.D., University of Texas, Dallas, 1987.

Gregory D. Longmore, M.D., McGill University, 1983.

Jeffrey H. Miner, Ph.D., California Institute of Technology, 1991. (See Department of Anatomy and Neurobiology.)

Jeremiah J. Morrissey, Ph.D., St. Louis University, 1974.

Anthony J. Muslin, M.D., Harvard University, 1984. (See Department of Medicine.)

Richard A. Pierce, Ph.D., Rutgers University, 1990. (See Department of Medicine.)

Yoel Sadovsky, M.D., Hebrew University, 1985. (See Department of Obstetrics and Gynecology.)

Steven J. Weintraub, M.D., Medical College of Virginia, 1985. (See Department of Medicine.)

Research Assistant Professors

Stuart R. Adler, M.D., Ph.D., Duke University, 1982. (See Department of Obstetrics and Gynecology.)

Victor Gustavo Bianco, Ph.D., National University of Cordoba, 1985; M.D., 1990.

Richard C. Hresko, Ph.D., University of Virginia, 1986.

Anatoli Lopatin, Ph.D., Research Center of Molecular Diagnostics, 1990.

Sabire Ozcan, Ph.D., University of Dusseldorf, 1993.

Dorothy Schafer, Ph.D., University of Michigan, 1983.

Fernando Segade, Ph.D., University of Santiago, 1990.

Linton M. Traub, Ph.D., Weizmann Institute of Science, 1992. (See Department of Medicine.)

Ling Wei, M.D., Bejing Capital Institute of Medicine, 1977.

Instructor

J. William Harbour, M.D., The Johns Hopkins University, 1990. (See Department of Ophthalmology and Visual Sciences.)

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 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) 512 SELECTED TOPICS IN DEVELOPMENTAL BIOLOGY

L41 (BIO) 5491 ADVANCED 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.

Sean R. Eddy, Ph.D., 362-7666
Computational biology: RNA and protein structure prediction, and genome analysis.

Daniela S. Gerhard, Ph.D., 362-2736
Cloning of a cervical cancer predisposition gene, and determination of function of MEN1 gene. Identification of predisposition genes for major affective disorders.

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.

John D. McPherson, M.D., 286-1848
Genome mapping and analysis, and 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; and illumination of the mechanisms that form, pattern and specify the individual identities of the progenitor cells of the *Drosophila* embryonic CNS.

Robert H. Waterston, M.D., Ph.D., 362-2657
Muscle development and function in the nematode *Caenorhabditis elegans*, and genome analysis and large scale DNA sequencing.

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*; and development of novel technology for large scale DNA sequence analysis and genetic analysis.

Tanya Wolff, Ph.D., 362-1509
Cell polarization 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

JAMES S. MCDONNELL PROFESSOR OF GENETICS AND HEAD OF DEPARTMENT

Robert H. Waterston, M.D., Ph.D., The University of Chicago, 1972. (See Department of Anatomy and Neurobiology.)

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.

David D. Chaplin, M.D., Ph.D., Washington University, 1980. (See Department of Medicine and Department of Molecular Microbiology.)

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.)

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)

H. Mark Johnston, Ph.D., University of California, Berkeley, 1980.

Alan A. and Edith L. Wolff Professor in Medicine

Timothy J. Ley, M.D., Washington University, 1978. (See Department of Medicine.)

Michael Lovett, Ph.D., University of London, 1981.

Dabeeru C. Rao, Ph.D., Indian Statistical Institute, 1971. (See Department of Psychiatry and Division of Biostatistics.)

Theodore Reich, M.D., McGill University, 1963. (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)

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.)

Professor (Adjunct)

David Schlessinger, Ph.D., Harvard University, 1961. (See Department of Molecular Microbiology.)

Associate Professors

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)

Paul J. Goodfellow, Ph.D., Queens University, 1985. (See Department of Surgery.)

Andrew C. Heath, Ph.D., University of Oxford, 1983. (See Department of Psychiatry.)

J. Mark Petrash, Ph.D., University of Texas, Galveston, 1981. (See Department of Ophthalmology and Visual Sciences.)

Tim B. Schedl, Ph.D., University of Wisconsin, 1984.

David J. States, M.D., Ph.D., Harvard University, 1983. (See Institute for Biomedical Computing.)

Brian K. Suarez, Ph.D., University of California, Los Angeles, 1974. (See Department of Psychiatry.)

Richard K. Wilson, Ph.D., University of Oklahoma, 1986.

Michael S. Zuker, Ph.D., Massachusetts Institute of Technology, 1974. (See Institute for Biomedical Computing.)

Research Associate Professor

Janet M. Connolly, Ph.D., George Washington University, 1979.

Assistant Professors

Sean R. Eddy, Ph.D., University of Colorado, Boulder, 1991. (See Institute for Biomedical Computing.)

Timothy P. Fleming, Ph.D., University of Missouri, 1985. (See Department of Ophthalmology and Visual Sciences.)

Narasimhan Gautam, Ph.D., University of Bombay, 1983. (See Department of Anesthesiology.)

Warren R. Gish, Ph.D., University of California, Berkeley, 1988. (See Institute for Biomedical Computing.)

David H. Gutmann, Ph.D., The University of Michigan, 1984; M.D., 1986. (See Department of Neurology.)

Christopher Hardy, Ph.D., Columbia University, 1991. (See Department of Cell Biology and Physiology.)

Stephen L. Johnson, Ph.D., University of Washington, 1991.

Pui-Yan Kwok, Ph.D., The University of Chicago, 1985; M.D., 1987. (See Department of Medicine.)

John D. McPherson, Ph.D., Queen's University, Kingston, 1989.

Mark S. Sands, Ph.D., State University of New York, Stony Brook, 1990. (See Department of Medicine.)

Steven B. Scholnick, Ph.D., Cornell University, 1982.

Alan Shiels, Ph.D., University of London, 1983. (See Department of Ophthalmology and Visual Sciences.)

James B. Skeath, Ph.D., University of Wisconsin, 1993.

Michael S. Watson, Ph.D., University of Alabama, 1981. (See Department of Pediatrics.)

Tanya Wolff, Ph.D., Purdue University, 1992.

Research Assistant Professors

Daniela S. Gerhard, Ph.D., Cornell University, 1982.

Elaine Mardis, Ph.D., University of Oklahoma, 1989.

John G. Spieth, Ph.D., University of Washington, 1978.

Senior Research Scientist

Ladeana Hillier, M.S., Northwestern University, 1988.

Research Instructors

Stephanie L. Chissoe, Ph.D., University of Oklahoma, 1994.

Sandra W. Clifton, Ph.D., University of Oklahoma, 1993.

Pamela E. Hoppe, Ph.D., Princeton University, 1989.

Michelle C. Hresko, Ph.D., The Johns Hopkins University, 1990.

Marco A. Marra, Ph.D., Simon Fraser University, 1994.

David Parichy, Ph.D., University of California, Davis, 1997.

Jeffrey P. Woessner, Ph.D., Duke University, 1986.

JOHN MILLIKEN DEPARTMENT OF MEDICINE

The general medicine teaching services of the department at Barnes-Jewish Hospital and the Veterans Administration Medical Center (St. Louis) under the following directors:

Barnes-Jewish Hospital, *Dr. Schonfeld* (Chairman, Department of Medicine)
Veterans Administration Medical Center, *Dr. Chase*

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 directors:

Allergy and Clinical Immunology Diseases, *Dr. Chaplin*
Bone Marrow Transplantation and Stem Cell Biology, *Dr. DiPersio*
Bone and Mineral Diseases, *Dr. Avioli*
Cardiovascular Diseases, *Dr. Cain*
Center for Health Behavior Research, *Dr. Fisher*
Dermatology, *Dr. Eisen*
Education in Medicine, *Dr. Goodenberger*
Emergency Medicine, *Dr. Lewis*
Endocrinology, Diabetes and Metabolism, *Dr. Cryer*
Gastroenterology, *Dr. Davidson*
General Medical Sciences, *Dr. Evanoff*
Geriatrics and Gerontology, *Dr. Holloszy*
Hematology, *Drs. S. Kornfeld, Majerus*
Infectious Diseases, *Dr. Powderly*
Laboratory Medicine, *Drs. Landenson, Santoro*
Lipid Research, *Dr. Schonfeld*
Medical Oncology, *Dr. DiPersio*
Pulmonary and Critical Care Medicine, *Dr. Holtzman*
Renal Diseases, *Dr. Hammerman*
Rheumatology, *Dr. Yokoyama*

Instruction in Medicine is provided during all four years of the medical curriculum, beginning with human genetics and an introductory course 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 of a series of elective courses in the medical specialties.

FIRST YEAR

M25 502 CLINICAL MEDICINE I

Instructor: *Elliot E. Abbey, M.D.*, 362-2724

This is a course in interviewing technique and medical history taking. The primary goal is acquisition of fundamental interpersonal and clinical data collecting/recording skills, which the students will be called upon to adapt to diverse situations in their careers. Initially students observe their instructors with patients, then they go to the university-affiliated hospitals on their own. Videotapes of student-patient interviews are critiqued extensively by instructors in one-on-one sessions. Preparation for and attendance at clinicopathological conferences expands the clinical vocabulary and basic knowledge base.

During the spring semester, difficult areas of the physician-patient and family interaction are addressed. Students are able to observe Pediatric interviews by Children's Hospital staff. Case development problems, topics of which are coordinated with the Physiology course, are treated.

Selectives

M04 514 CARDIOVASCULAR BIOPHYSICS

Instructor: *Sándor J. Kovács, Ph.D., M.D.*, 454-8097

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 (1998-99.)

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. Pathophysiology courses are identified by "PP" between course number and name.

M25 602 CLINICAL MEDICINE II

Instructor: *Elliot E. Abbey, M.D.*, 362-2724

This course continues the development of medical history-taking skills in conjunction with techniques of the physical examination. Further emphasis will be placed on written documention and verbal presentation of the history and physical exam. Subsequently, the role of hospital admission laboratory tests and common imaging procedures in clinical decision making is integrated with the above. Course design includes lectures and practice sessions aimed at problem identification and differential diagnosis coupled with weekly patient interviews/ presentations. Students will attend those CPCs presented in the problem-solving format. During the second year, there will be brief introductory sessions in Pediatrics, Otolaryngology and Ophthalmology provided by members of the faculty of those departments.

M25 605A INFECTIOUS DISEASES & MEDICAL MICROBIOLOGY

Instructors: *Lawrence D. Gelb, M.D.; Gerald Medoff, M.D.* (both: 454-8354)

The infectious diseases course now includes a basic discussion of medical microbiology previously taught in the first year. The infectious diseases portion emphasizes both organism-specific and organ-specific approaches to disease caused by microbes. The course aims to expand on the material presented in the first year concerning bacteria, viruses, fungi and parasites and their involvement in causation of human disease. Educational methods include lecture and small group clinical case discussions.

M25 606A RHEUMATOLOGY

Instructor: *Leslie E. Kahl, M.D.*, 362-7481

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 are provided which emphasize the major areas of cardiac pathophysiology and pharmacology.

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 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: *Ray E. Clouse, M.D.,* 454-8200

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 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.

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.
Dr. Goodenberger, chief residents and medical staff; Dr. Debner and pathology staff

FOURTH YEAR
Electives

M25 801 HONORS MEDICINE — BARNES-JEWISH HOSPITAL

Instructor: *Thomas M. De Fer, M.D.,* 362-8050

M25 805 RHEUMATOLOGY

Instructor: *Richard D. Brasington, M.D.,* 454-7279

Students will be involved in the diagnostic workup 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 rheumatology conferences, held twice weekly. An extensive collection of self-study materials, including reprints, textbooks, slides and CD-ROM disks, is available. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 807 HONORS MEDICINE — VETERANS ADMINISTRATION 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, although state law requires that orders must be countersigned by a licensed physician. Subinterns take night call every fifth night with their team and participate in the teaching conferences of the Department of Medicine. Patients are followed by the same house staff team throughout acute hospitalization including wards and intensive care units. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 808 GENERAL INTERNAL MEDICINE — KEOKUK, IOWA

Instructors: *Wilson L. Davis Jr., M.D.; Thomas E. Hakes, M.D.; David J. Waddell, M.D.*
(all: 319-524-6274)

This course is a clerkship in General Internal Medicine in a small community without medical subspecialists (Keokuk, Iowa). Emphasis during this preceptorship will be on the practice of internal medicine as both a primary care and consultative specialty. In addition to ambulatory office-based care, students will participate in practice in which general internists perform endoscopy, pacemaker insertion, exercise studies, echocardiography and intensive care with ventilator management. Consultations are rendered to family practitioners and general surgeons. In an environment without resident

physicians, students assume a large amount of responsibility for the ongoing care of patients in all settings and have the opportunity to do various procedures. Extensive resources are available, including online medical search facilities, and housing and food are provided without charge. No pets allowed. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 809 HYPERBARIC MEDICINE AND PROBLEM WOUND MANAGEMENT

Instructors: *John D. Davidson, M.D., and staff,* 205-6552

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 specialities, 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 Dr. Davidson for more information. Valid start dates for two-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

Clinical geriatrics is available to one fourth-year student in four-week rotations throughout the year. Students will participate in care in the skilled nursing facility, the inpatient geriatric consultation service, the outpatient geriatric assessment center, podiatry, and the osteoporosis clinic. Attendance at scheduled research and clinical conferences in geriatric medicine, rehabilitation, geropsychiatry and hospice is required. Valid start weeks for four-week blocks are: Weeks, 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 811 CLINICAL INTERNAL MEDICINE

Instructor: *Mark Thoelke, M.D.*, 454-7106

This course allows the student to work one-on-one with the attending physician 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. The student 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 814 CLINICAL EMERGENCY MEDICINE — BARNES-JEWISH HOSPITAL SOUTH CAMPUS

Instructor: *Carolyn Haase, M.D.*, 747-4156

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 directly to 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 Dr. Larry Lewis, Chief of Emergency Medicine, must take the WUMS IV Emergency Medicine rotation. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 821 INPATIENT CARDIOLOGY

Instructors: *Craig K. Reiss, M.D.; Benico Barzilai, M.D.; Alan C. Braverman, M.D.; Mark S. Weinfeld, M.D.; Keith Mankowitz, M.D.* (all: 362-1292)

Students will participate as members of the Barnes-Jewish Cardiology Consultative Team at Washington University. The team is composed of faculty members, fellows, residents and nurse specialists that see a large population of cardiac patients and follow 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 823 CLINICAL CARDIOLOGY — VETERANS ADMINISTRATION MEDICAL CENTER

Instructor: *Wade H. Martin III, M.D.*, 289-6329

The major purpose of this elective in clinical cardiology at the Veterans Administration Medical Center will be to improve primary care skills in the diagnosis and treatment of cardiovascular disease varying over a wide spectrum of etiologies and severities. The emphasis will be on improving basic cardiovascular history and physical examination skills, interpreting electrocardiograms and evaluating inpatients and outpatients with cardiovascular illnesses. Students will have the opportunity to participate in echocardiographic reading sessions,

stress testing evaluations, and studies performed in the cardiac catheterization and exercise physiology laboratories; however, a major objective of the rotation will be to enhance the ability to evaluate patients in a primary care setting using relatively low technology approaches that do not require subspecialty consultation. Valid start weeks for four-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 hospitalized patients and outpatients 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 anti-arrhythmic 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 830 DERMATOLOGY

Instructors: *Dermatology staff*, 362-8180

The aim of this elective is to provide a guide for students so that they are able to appreciate Dermatology within the broader perspectives of medicine and biology. Stress will be placed on the dermatologic variations encountered in a normal physical examination of the skin, the identification of common skin diseases, dermatologic clues to systemic disease, as well as those dermatologic conditions that are life threatening. The student will participate in outpatient care in 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 four-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, including attending pediatric dermatology clinics and seeing consults. Enthusiastic students will have an opportunity to write up a case report if they wish. Students can take either this elective or M25 830 — not both. Valid start weeks for four-week blocks are: Weeks 17, 21, 25, 29, 33 and 37.

M25 835 CLINICAL GASTROENTEROLOGY

Instructors: *Ray E. Clouse, M.D.; Gary R. Zuckerman, D.O.* (both: 362-5673)

The GI elective is integrated into a very active consultation and endoscopy service at Barnes-Jewish Hospital. Students will participate in the evaluation of patients with a spectrum of gut disorders; will make daily patient rounds with the faculty and fellows; have responsibility for patients on whom consultations have been requested; observe biopsy, endoscopic and intubation techniques; and participate in outpatient clinic and GI conferences. Valid start weeks for four-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.; Stuart A. Kornfeld, M.D.* (both: 362-8801); *Morey A. Blinder, M.D.*, 362-8808

Activities planned include workup of patients at Barnes-Jewish Hospital under the supervision of the hematology fellow and his or her staff consultant, attendance at clinical rounds three hours weekly, participation in outpatient clinics and 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 847 BONE AND MINERAL DISEASES

Instructors: *Louis V. Avioli, M.D.; Michael Whyte, M.D.; Roberto Civitelli, M.D.; Roberto Pacifici, M.D.* (all: 454-7765)

The course is designed to acquaint the student with the clinical, radiological and pathological manifestations of skeletal disorders and to expose him/her to current concepts of therapy. The student will see patients at Barnes-Jewish and Children's hospitals and Shriners Hospital for Children.

Acquired and developmental bone diseases will be studied in context of derangements of mineral homeostasis with emphasis on vitamin D and peptide hormone metabolism. The role of the bone biopsy and more recent noninvasive methods for measuring bone mass in the diagnosis and management of skeletal diseases also will be stressed. Valid start weeks for four-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.; Michelle Z. Schultz, M.D.* (both: 289-6308)

The student will have major inpatient and outpatient exposure to the management of 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 four-week blocks to be announced.

M25 855 CLINICAL INFECTIOUS DISEASES

Instructor: *William G. Powderly, M.D.*, 362-4413

This elective, a study of patients with infectious diseases, 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, and they follow their own patients and play an important role in their management. Students are expected to read the literature about their patients and participate in clinical conferences. They also attend teaching rounds, conferences and lectures in infectious diseases. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 864 MULTIDISCIPLINARY INTENSIVE CARE MEDICINE

Instructors: *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 12 intensive care beds providing intensive nursing care and life-support technology. The patients represent a mixture of postoperative surgical cases and those 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 867 MEDICAL INTENSIVE CARE

Instructor: *Daniel P. Schuster, M.D.*, 362-3776

This elective is offered as an opportunity to gain additional experience in acute, primary care medicine. It 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 870 ENDOCRINOLOGY, DIABETES AND METABOLISM

Instructors: *Philip E. Cryer, 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 conducted at Barnes-Jewish Hospital. They also will 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 four-week blocks are: 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 872 ONCOLOGY I — BARNES-JEWISH HOSPITAL SOUTH

Instructor: *Matthew A. Arquette, M.D.*, 362-5268

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 tumors of the lung, breast, colon, lymphoma and myeloma. Management of hypercalcemia and other paraneoplastic syndromes, as well as cancer pain management, will be covered. Valid start weeks for four-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.; Wendy M. Kohrt, Ph.D.* (all: 362-3506)

This elective covers 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. Also addressed is exercise training, used to reverse physical frailty in elderly people in danger of losing their independence and in the treatment of hypertension, obesity,

osteoporosis and diabetes. Valid start weeks for four-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.*, 362-2392

Includes performance and interpretation of exercise testing, and measurement of oxygen uptake and cardiac output. Students will participate in the management of patients undergoing exercise training. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 880 PULMONARY MEDICINE — BARNES-JEWISH HOSPITAL SOUTH

Instructors: *Dan Schuller, M.D., and staff*, 362-8980

Students will acquire skills in the evaluation and management of patients with pulmonary diseases, interpretation of pulmonary function tests, outpatient pulmonary medicine clinic, attend regular pulmonary and critical care medicine conferences and, if desired, pursue a circumscribed clinical research project. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 882 PULMONARY MEDICINE — VETERANS ADMINISTRATION MEDICAL CENTER

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 four-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 four-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 immunoplenotyping. This rotation plans to provide motivated students with an ideal mix of clinical medicine and basic science. Valid start weeks for four-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.*, 454-8350

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 also are urged to contact Dr. Evanoff if they wish to participate in research projects concerning the epidemiology of work-related diseases. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 890 CLINICAL NEPHROLOGY

Instructors: *Director and staff*, 362-8231

Students assist in both the inpatient and outpatient areas, to diagnose and treat patients with acute and chronic renal failure, glomerulonephritis, electrolyte disorders and renal transplants. Students spend one full week in the outpatient setting, rotating through the General Renal Clinics, Renal Stone Clinic, Transplant Clinic and Peritoneal Dialysis Clinic. Five half-days during this week are reserved for assigned reading. The other three weeks, 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 attend daily teaching rounds, Renal Grand Rounds and Clinical Case Conference. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 893 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 Campus 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, the 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 dates for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M25 894 HEPATOLOGY

Instructor: *Lawton Schick, M.D.*, 454-8160

Outpatient and inpatient management and diagnosis of acute and chronic liver disease as well as liver transplantation. Valid start dates for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M80 810 AMBULATORY CARE MEDICINE

Instructor: *Robert C. Packman, M.D.*, 367-3113

Students will be expected to have half-day clinical sessions. It would be ideal to have two half-day sessions in both medicine and pediatrics, then half-day sessions chosen from ENT, ophthalmology, obstetrics/gynecology, neurology, Breast Health Center, orthopaedics, Bone and Mineral Metabolism Clinic, and other venues that the student may wish to pursue, with approval from the course master. The instructors will be Dr. Colon-Alcaraz in obstetrics/gynecology, Dr. Wallace in ENT, Dr. Levitt in internal medicine, Dr. Pearlman in neurology, Dr. Siegfried in ophthalmology, and Drs. McGann and Sharkey in pediatrics.

It is our perception that students will be exposed to a variety of outpatient problems, from minor to major chronic illness, interspersed with acute problems. This course will be pitched at a practical, not theoretical, level. The instructor will stress the importance of proper history taking, physical examination, differential diagnosis, judicious use of diagnostic tests, proper use of medications, medication interactions, proper communication with other physicians, proper communication with patient and family, proper instructions to patients regarding their illness, proper emotional support to the patient and the patient's family, all of this delivered in a cost-effective setting. Ethical management will be stressed.

In the sessions with the course master, the students will discuss patients in which there are difficulties or complexities in identifying problems and proper workup. Issues of cost, ethics, interpersonal relationships, delivery of care in the managed care environment, and other practical matters will be discussed. It is our intention to make the course instructive from the practical point of view and to make it fun for the student as well. Valid start weeks for four-week blocks are: Weeks 13, 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.

David H. Alpers, M.D., 362-8940

Cell biology of polarized small intestinal epithelium, synthesis and secretion of intestinal proteins, and regulation by dietary and hormonal factors *in vivo* and in cultured intestinal cells. Emphasis will be on unique secretory and transcellular pathways of alkaline phosphatase and cobalamin binding proteins (i.e., surfactant-like particle and receptor-mediated endocytosis). Methods include cDNA cloning and sequencing, cell fractionation, cDNA transfection, and protein synthesis and secretion.

John P. Atkinson, M.D., 362-8391

A research elective is offered in studies related to clinical, biochemical and molecular aspects of complement receptors and complement regulatory proteins. Current focus is on defining active sites and characterizing recently identified microbiologic connections.

Louis V. Avioli, M.D.; Roberto Civitelli, M.D.; Roberto Pacifici, M.D. (all: 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.

Michael E. Cain, M.D., 362-1508
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.

David D. Chaplin, M.D., Ph.D., 362-9047
Developmental regulation of peripheral lymphoid organ structure and function; definition of the natural functions of acute proinflammatory cytokines *in vivo*; and T cells and cytokines in asthma.

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.

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., 454-8350
Occupational medicine epidemiology research. My research involves the use of epidemiology methods to characterize associations between diseases and work-related exposures. I also am 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.

Gregory I. Goldberg, Ph.D., 362-8172
Role of secreted extracellular matrix metalloproteases in tissue remodeling. Structure and function of the metalloproteases.

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 synthesis of polypeptide growth factors in renal tissue and the role(s) of polypeptide growth factors in renal development, growth and physiology.

Jay W. Heinecke, M.D., 362-6923
The overall goal of our research is to understand the role of oxidative reactions executed by phagocytes in the pathogenesis of vascular disease. Novel lipid nucleic acid and protein oxidation products generated by phagocytes *in vitro* have been isolated and their structures determined using NMR and mass spectrometry. To establish the physiological relevance of such reactions, we have used mass spectrometry to demonstrate that these products are present in human atherosclerotic lesions.

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., 454-7771
Cellular mechanisms of bone remodeling and proximal tubular function. The student will participate in studies analyzing signal transduction by calcitropic hormones, the role of load-regulated ion channels and the mechanism of matrix/integrin mediated regulation.

Saulo Klahr, M.D., 454-7107
Mechanisms involved in the progression of renal disease. This section will provide the student with an understanding of the methodology used to assess renal function and different maneuvers utilized to prevent the progression of renal disease in experimental animal models. Research projects include: 1) effects of urinary tract obstruction on renal function and metabolism, 2) factors that are responsible for the progression of renal disease in experimental animals, and 3) questioning how obstruction of the urinary tract leads to progressive renal disease.

Saulo Klahr, M.D., 454-7107
The renal division offers a research elective of three to six months duration with emphasis on the pathophysiological consequences of ureteral obstruction and the mechanisms of progression of chronic renal disease. Techniques of molecular biology, radioimmunoassay, tissue culture, radioisotopic labeling and separation of lipids and proteins, and the production of animal models of renal disease will be emphasized.

George S. Kobayashi, Ph.D., 362-2998
Biochemical studies on the control of cellular differentiation of the medically important systemic mycotic agents, in particular *Histoplasma capsulatum*, are being carried out in the division. In the conversion of the unicellular (yeast-like) to multicellular (mold) and reverse systems, the changes caused by environmental stimuli can be followed and the relationships between induction, the biochemical change and morphological differentiation can be established. The opportunity to participate in studies of this phenomenon are available by an arrangement as an elective for one student for a period of 18 weeks.

Rosalind H. Kornfeld, Ph.D.; Stuart A. Kornfeld, M.D., 362-8803

1) Synthesis, processing and sorting of glycoproteins, including lysosomal enzymes; and 2) Intracellular protein trafficking.

Sándor J. Kovács, Ph.D., M.D., 454-7660

For students with math, physics and engineering backgrounds. Cardiovascular biophysics research elective concentrates on physiologic modeling and comparison of model predictions to *in vivo* human data. Ability to solve ordinary differential equations and familiarity with numerical methods at the level of "Numerical Recipes" is required. Minimum of 8 weeks of elective time.

Anthony Kulczycki Jr., M.D., 362-9042, 454-7360

Dietary antigens in infant colic, milk-induced colitis and "autoimmune" diseases. Allergens that cause chronic hives. NOD mice, which spontaneously develope Type I diabetes, infants with colic, nursing mothers with colicky infants and chronic urticana patients are being challenged with suspected antigens to identify etiologic substances and study mechanisms involved.

Pui-Yan Kwok, M.D., Ph.D., 362-8236

Automated genetic mapping. Projects are directed toward automation in the many areas of molecular genetics. Specifically, we are developing ways to detect DNA sequence variations efficiently, generating genetic markers that can be typed rapidly and studying large populations with these markers using automated methods. Opportunities to apply these methods to human diseases are available.

Jack H. Ladenson, Ph.D., 362-3186

Development and use of monoclonal antibodies to cardiac proteins.

Lawrence M. Lewis, M.D., 362-4362

This elective, Emergency Medicine Research, offers an opportunity to investigate a wide variety of clinical questions relevant to emergency medicine. Cardiopulmonary resuscitation, injury prevention, cost containment and the prehospital care of sick or injured patients are some areas of currently active research. 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.

Douglas M. Lublin, M.D., Ph.D., 362-8849

Lipid modifications of proteins, including glycophospholipid anchors and acylation, and their role in the structure and function of membrane proteins.

Philip W. Majerus, M.D., 362-8801

Biochemistry of platelets, regulation of lipid metabolism in tissue culture and mechanism of platelet thrombus formation.

Jeffrey D. Milbrandt, M.D., Ph.D., 362-4650

We are interested in a subset of genes, termed immediate-early genes, that are rapidly activated by a variety of extracellular stimuli including exposure to growth factors, membrane depolarization such as occurs during neuronal activity, or physiologic stress such as seizure, nerve injury, hypotension or exposure to endotoxin. Many of these genes, including those we have identified (NGFI-A, NGFI-B, NGFI-C), encode transcription factors which presumably guide the cellular responses to environmental change. Understanding the biological function of these proteins within the context of the nervous system is now being pursued via mutagenesis experiments and by determining their expression patterns in fetal and adult rats, both before and after stress or injury. The phenotype of transgenic mice containing either loss-of-function mutations of these genes or inappropriately high expression of these proteins is now being examined.

Steven B. Miller, M.D., 362-8232

Growth factors in renal pathology. Current studies examine the role of different growth factors in the pathogenesis of renal diseases, including acute and chronic renal failure. Investigations are underway utilizing growth factors as therapeutic agents for the treatment of renal disorders in animal models and patients.

Stanley Misler, M.D., Ph.D., 454-7719

Stimulus-secretion coupling in endocrine cells (B-islet cells and adrenal chromaffin cells) is examined using single cell assays of secretion (capacitance measurements, amperometery).

Aubrey R. Morrison, M.D., 362-2597

Regulation at a transcriptional and translational level of the cyclooxygenase gene(s) by the lymphokines IL-1 and TNF. Interactions of cyclooxygenase products with nitric oxide system in renal cells.

Jeremiah J. Morrissey, Ph.D., 454-7464

Experimental maneuvers that blunt the progression of kidney disease appear to blunt transcription factor NF-kappa B activation. New protein factors which bind to gene promoters containing NF-kappa B sites are induced by the maneuvers. These factors will be cloned using the yeast one and two hybrid systems and characterized with respect to minimizing and/or reversing kidney disease progression.

Richard E. Ostlund Jr., 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., 454-7053
The analytical techniques and theoretical concepts underlying the field of medical decision analysis are investigated. Critical review of the literature is combined with microcomputer application of the techniques to medical problems of interest.

M. Alan Permutt, M.D., 362-8680
Studies of genetic susceptibility to diabetes in man 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 underway in the United States, 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.

Samuel A. Santoro, M.D., Ph.D., 362-8849
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 using human engineered cells and engineered mice. Role of ethanol in atherosclerosis.

Daniel P. Schuster, M.D., 362-3776
Positron emission tomographic studies of acute lung injury. Students will be introduced to large animal models of acute lung injury and techniques involving positron emission tomography, nuclear medicine, mathematical modeling and pulmonary physiology. Specific projects involving questions relevant to pulmonary edema, gas exchange and lung metabolism will be assigned according to students' individual interests. Students with any expertise in bioengineering or computer science are especially invited to apply.

Jo Louise Seltzer, Ph.D., 362-8180
Regulation of matrix metalloproteinases, especially gelatinases. Regulation focuses on comparisons between different cellular environments, particularly emphasizing free-floating collagen matrices vs. monolayers. Investigating integrin-mediated regulation of matrix metalloproteinases in both normal and transformed cells, as well as signal transduction mediated by various agents. Comparisons between melanocytes and melanoma cells, as well as normal fibroblasts versus a fibroblastic breast cancer line.

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 and the role of fatty acids and triglycerides in atherogenesis.

Eduardo Slatopolsky, M.D., 362-8242
These studies investigate the interrelationships between vitamin D metabolites and parathyroid metabolism. Research projects include pathogenesis of secondary hyperparathyroidism. Characterization of receptors for 1,25-$(OH)_2$D3. Metabolic clearance rate and production rate of 1,25-$(OH)_2$D3 in renal failure. Extra renal production of 1,25-$(OH)_2$D3: The role of macrophages. Effect of vitamin D analogs on synthesis and secretion of parathyroid hormone. The effects of a low-phosphorus diet on p21, a negative regulator of the cell cycle in parathyroid glands.

Samuel L. Stanley Jr., M.D., 362-1071
This laboratory 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 between macrophages and other cells. In addition, we study the rapidly expanding class of receptors for extracellular ATP and their role in macrophage function. Methods include fluorescence video microscopy.

Douglas M. Tollefsen, M.D., Ph.D., 362-8830
Biochemical 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. Minimum of 12 weeks required.

John W. Turk, M.D., Ph.D., 362-8190
Phospholipid signaling mechanisms in pancreatic islets. Experience in mass spectrametric analysis of complex lipids is available.

H. James Wedner, M.D., 454-7937
Psychosocial aspects of asthma. 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.

Howard G. Welgus, M.D., 454-8290
Extracellular matrix turnover by metalloproteinases. The matrix metalloproteinases are a gene family of enzymes that control the turnover of connective tissues. Our research involves study of the structure, gene regulation and catalytic activity of several of these metalloenzymes. Particular emphasis is given to the role of these enzymes in wound healing and in the pathogenesis of pulmonary emphysema. We also study the production of specific inhibitors (TIMPs) released by cells to control the activity of the metalloproteinases.

Samuel A. Wickline, M.D., 454-8097
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 School of Medicine and the School of Engineering and Applied Science. Advanced imaging projects are available in: 1) cardiovascular magnetic resonance (Dr. Christine Lorenz, Director of Center for Cardiovascular Magnetic Resonance, 454-7459); 2) ultrasonics/physical acoustics (Dr. Samuel A. Wickline, Co-Director of Cardiovascular Division and Director of Medical Ultrasonics Laboratory, 454-8635); and 3) cardiovascular biophysics (Dr. Sándor J. Kovács, 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 mathematic 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

Gustav Schonfeld, M.D., Washington University, 1960.

Professors Emeriti

Elmer B. Brown, M.D., Washington University, 1950.

Hugh Chaplin Jr., M.D., Columbia University, 1947. (See Department of Pathology.)

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)

John A. Pierce, M.D., University of Arkansas, 1948.

Mabel L. Purkerson, M.D., Medical College of South Carolina, 1956. (See Administration and Department of Pediatrics.)

Edward H. Reinhard, M.D., Washington University, 1939. (See Department of Radiology.)

Robert E. Shank, M.D., Washington University, 1939. (Also formerly Professor Emeriti of Preventive Medicine and Public Health)

Professors

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.)

Sydney M. and Stella H. Shoenberg Professor

Louis V. Avioli, M.D., Yale University, 1957. (See Department of Orthopaedic Surgery.)

John P. Boineau, M.D., Duke University, 1959. (See Department of Surgery.)

George J. Broze Jr., M.D., Washington University, 1972.

Tobias and Hortense Lewin Professor of Cardiovascular Diseases

Michael E. Cain, M.D., George Washington University, 1975.

David D. Chaplin, M.D., Ph.D., Washington University, 1980. (Howard Hughes Medical Institute Associate Investigator) (See Department of Molecular Microbiology and Department of Genetics.)

Lewis R. Chase, M.D., Harvard University, 1964. (Chief, Washington University Medical Services, VA Medical Center)

Ray E. Clouse, M.D., Indiana University, 1976. (See Department of Psychiatry.)

Irene E. and Michael M. Karl Professor of Endocrinology and Metabolism

Philip E. Cryer, M.D., Northwestern University, 1965. (Clinical Research Center)

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.)

James A. Delmez, M.D., University of Rochester, 1973.

John F. DiPersio, M.D., Ph.D., University of Rochester, 1980.

Ali A. Ehsani, M.D., Tehran University, 1965. (See Irene Walter Johnson Institute of Rehabilitation.)

The Winfred A. and Emma R. Showman Professor of Dermatology

Arthur Z. Eisen, M.D., University of Pennsylvania, 1957. (Dermatology)

Alex S. Evers, M.D., New York University, 1978. (See Department of Anesthesiology and Department of Molecular Biology and Pharmacology.)

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 and Department of Molecular Microbiology.)

Lawrence T. Goodnough, M.D., University of Pennsylvania, 1975. (See Department of Pathology.)

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. (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.)

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.)

Ira M. Lang Professor of Nephrology

Keith A. Hruska, M.D., Creighton University, 1969. (See Department of Cell Biology and Physiology.)

Daniel Ihde, M.D., Stanford University, 1969.

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.

Samuel Klein, M.D., Temple University, 1979.

George S. Kobayashi, Ph.D., Tulane University, 1963. (Microbiology) (See Department of Molecular Microbiology.)

Rosalind H. Kornfeld, Ph.D., Washington University, 1961. (Biochemistry) (See Department of Biochemistry and Molecular Biophysics.)

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.)

Stephen S. Lefrak, M.D., State University of New York, Downstate, 1965. (See Administration.)

Timothy J. Ley, M.D., Washington University, 1978. (See Department of Genetics.)

Ellen Li, M.D., Ph.D., Washington University, 1980. (See Department of Biochemistry and Molecular Biophysics.)

J. Russell Little Jr., M.D., University of Rochester, 1956. (See Department of Molecular Microbiology.)

Philip A. Ludbrook, M.B.B.S., University of Adelaide, 1963. (See Department of Radiology.)

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.)

Senior Advisor to the Chair

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.)

Joseph P. Miletich, M.D., Ph.D., Washington University, 1979. (See Department of Pathology.)

Thalachallour Mohanakumar, Ph.D., Duke University, 1974. (See Department of Pathology and Department of Surgery.)

Aubrey R. Morrison, M.B.B.S., University of London, 1970. (See Department of Molecular Biology and Pharmacology.)

Patrick R. Murray, Ph.D., University of California, 1974. (Clinical Microbiology) (See Department of Pathology.)

Scott M. Nordlicht, M.D., State University of New York, Downstate, 1973.

Richard E. Ostlund Jr., M.D., University of Utah, 1970.

Charles W. Parker, M.D., Washington University, 1953. (See Department of Molecular Microbiology.)

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.)

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.)

Peter Rock, M.D., The Johns Hopkins University, 1978. (See Department of Anesthesiology.)

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.)

Shabbir H. Safdar, M.D., Nishtar Medical College, 1961.

Jeffrey E. Saffitz, Ph.D., Case Western Reserve University, 1977; M.D., 1978. (See Department of Pathology.)

Samuel A. Santoro, M.D., Ph.D., Vanderbilt University, 1979. (See Department of Pathology.)

David Schlessinger, Ph.D., Harvard University, 1960. (Microbiology) (See Department of Molecular Microbiology.)

Daniel P. Schuster, M.D., Yale University, 1976.

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.)

Louis Simchowitz, M.D., New York University, 1970. (See Department of Cell Biology and Physiology.)

Joseph Friedman Professor of Renal Diseases in Medicine

Eduardo Slatopolsky, M.D., University of Buenos Aires, 1959.

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.)

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.

Howard G. Welgus, M.D., Washington University, 1977. (Dermatology)

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 Program in 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.)

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 Jr., Ph.D., State University of New York, 1972. (Psychology) (Also Department of Psychology)

Irene E. Karl, Ph.D., University of Wisconsin, 1940.

James G. Miller, Ph.D., Washington University, 1969. (Also Faculty of Arts and Sciences)

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.

Paul O. Hagemann, M.D., Washington University, 1934.

Harold J. Joseph, M.D., University of Texas, 1950.

Norman P. Knowlton, M.D., Harvard University, 1945.

Marvin E. Levin, M.D., Washington University, 1951.

Virgil Loeb, M.D., Washington University, 1944.

Morris D. Marcus, M.D., Washington University, 1934. (Dermatology)

Ernest T. Rouse Jr., M.D., Washington University, 1943.

Llewellyn Sale Jr., M.D., Washington University, 1940.

Franz U. Steinberg, M.D., University of Berne, 1938. (See Department of Surgery.)

Professors (Clinical)

Benjamin A. Borowsky, M.D., Washington University, 1958.

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.

Larry Kristian Kvols, M.D., Baylor University, 1970.

Joseph Levitt, M.D., Washington University, 1949.

Charles C. Norland, M.D., Washington University, 1959.

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)

Benjamin Schwartz, M.D., Ph.D., Albert Einstein College of Medicine, 1972.

Burton A. Shatz, M.D., Washington University, 1943.

Alvin S. Wenneker, M.D., Washington University, 1953.

Professor (Visiting)

Donald G. Davies, Ph.D., The Johns Hopkins University, 1970.

Professors (Adjunct)

Clifton A. Baile, Ph.D., University of Missouri, 1965. (Adjunct Professor of Nutrition in Medicine)

Steven R. Bergmann, Ph.D., Hahnemann Medical College, 1977; M.D., Washington University, 1985. (Medical Physiology)

Bernard B. Davis, M.D., University of Pittsburgh, 1961.

Associate Professors

Dana R. Abendschein, Ph.D., Purdue University, 1978. (See Department of Cell Biology and Physiology.)

Thomas C. Bailey, M.D., Washington University, 1984.

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.

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.

Andrew C. Chan, M.D., Ph.D., Washington University, 1986. (Howard Hughes Medical Institute Assistant Investigator) (See Department of Pathology.)

Dane M. Chapman, Ph.D., Brigham Young University, 1985; M.D., University of Michigan, 1985.

Roberto Civitelli, M.D., Siena University, 1980. (See Department of Cell Biology and Physiology and Department of Orthopaedic Surgery.)

William E. Clutter, M.D., Ohio State University, 1975.

Daniel W. Coyne, M.D., Case Western Reserve University, 1983.

Samuel E. Dagogo-Jack, M.D., University of Ibadan, 1978.

Carlos C. Daughaday, M.D., Washington University, 1971.

Víctor G. Dávila-Román, M.D., University of Puerto Rico, 1981.

Douglas C. Dean, Ph.D., University of Kansas, 1982. (See Department of Cell Biology and Physiology.)

William C. Dunagan, M.D., Washington University, 1983.

Seth A. Eisen, M.D., Washington University, 1966.

Victoria Fraser, M.D., University of Missouri, 1983.

Mark E. Frisse, M.D., Washington University, 1978.

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.

Daniel M. Goodenberger, M.D., Duke University, 1974.

Samuel B. Guze, M.D., Washington University, 1945. (See Department of Psychiatry.)

Daniel L. Hamilos, M.D., Northwestern University, 1979.

Jay W. Heinecke, M.D., Washington University, 1981.

Scot G. Hickman, M.D., Washington University, 1970.

Barry Hong, Ph.D., St. Louis University, 1982. (Medical Psychology) (See Department of Psychiatry.) (Also Department of Psychology)

Richard S. Hotchkiss, M.D., University of Virginia, 1976. (See Department of Anesthesiology and Department of Surgery.)

George J. Hruza, M.D., New York University, 1982. (Dermatology) (See Department of Surgery and Department of Otolaryngology.)

Leslie E. Kahl, M.D., Albany Medical College, 1978.

Daniel P. Kelly, M.D., University of Illinois, 1982.

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.

Sándor J. Kovács, Ph.D., California Institute of Technology, 1977; M.D., University of Miami, 1979. (See Department of Cell Biology and Physiology.) (Also Department of Physics)

Anthony Kulczycki Jr., M.D., Harvard University, 1970. (See Department of Molecular Microbiology.)

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.

Benjamin Littenberg, M.D., Case Western Reserve University, 1983.

Douglas M. Lublin, Ph.D., Stanford University, 1976; M.D., University of California, Los Angeles, 1982. (See Department of Pathology.)

Janet B. McGill, M.D., Michigan State University, 1979. (See Department of Pediatrics.)

Steven B. Miller, M.D., University of Missouri, Kansas City, 1983.

Stanley Misler, M.D., Ph.D., New York University, 1977. (See Department of Cell Biology and Physiology.)

Joanne E. Mortimer, M.D., Loyola University, 1977.

Moon H. Nahm, M.D., Washington University, 1974. (See Department of Pathology.)

Robert Nease Jr., Ph.D., Stanford University, 1989.

Roberto Pacifici, M.D., Perugia University, 1981. (See Department of Radiology.)

William C. Parks, Ph.D., Medical College of Wisconsin, 1982.

Curtis A. Parvin, Ph.D., University of Minnesota, 1980. (Clinical, Computer Science) (See Department of Pathology and Division of Biostatistics.)

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.

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.

Dan Schuller, M.D., University Nacional Autonoma de Medicine, Mexico, 1985.

Clay F. Semenkovich, M.D., Washington University, 1981. (See Department of Cell Biology and Physiology.)

Steven Shapiro, M.D., The University of Chicago, 1983. (See Department of Pediatrics and Department of Cell Biology and Physiology.)

Joseph M. Smith, Ph.D., Massachusetts Institute of Technology, 1985; M.D., Harvard University, 1987. (See Program in Biomedical Engineering.)

Samuel L. Stanley Jr., M.D., Harvard University, 1980. (See Department of Molecular Microbiology.)

Thomas H. Steinberg, M.D., New York University, 1978. (See Department of Cell Biology and Physiology.)

Alan J. Tiefenbrunn, M.D., Washington University, 1974. (See Department of Radiology.)

Dwight Towler, M.D., Ph.D., Washington University, 1989.

Peter G. Tuteur, M.D., University of Illinois, 1966.

David Windus, M.D., Creighton University, 1978.

Robert S. Woodward, Ph.D., Washington University, 1972.

Gary R. Zuckerman, D.O., Kansas City College of Osteopathic Medicine, 1963.

Research Associate Professor Emeritus

Norma Fletcher, Ph.D., University of Copenhagen, 1965.

Research Associate Professors

H. Dieter Ambos, C.E.E., Washington University, 1973. (See Institute for Biomedical Computing.)

Alex J. Brown, Ph.D., University of Tennessee, 1982.

Fong Fu Hsu, Ph.D., University of Utah, 1986.

Osami Kanagawa, M.D., Okayama University, 1974; Ph.D., 1978. (See Department of Pathology.)

Wendy M. Kohrt, Ph.D., Arizona State University, 1986.

Bruce W. Patterson, Ph.D., University of Illinois, 1980.

Kenneth B. Schechtman, Ph.D., Washington University, 1978. (See Division of Biostatistics and Institute for Biomedical Computing.)

Jo Louise Seltzer, Ph.D., Washington University, 1969. (Dermatology)

Labras Sidossis, Ph.D., University of Texas Medical Branch, 1994.

Rai Ajit Srivastava, Ph.D., Gorakhpur University, India, 1983.

Associate Professors Emeriti (Clinical)

Janina M. Brajtburg, Ph.D., University of Lodz, 1968.

Mary L. Parker, M.D., Washington University, 1953.

James C. Sisk, M.D., Washington University, 1946. (Dermatology)

Associate Professors (Clinical)

Elliot E. Abbey, M.D., New York University, 1975. (Clinical Academic)

Gail A. Ahumada, M.D., University of California, San Diego, 1972.

Jack Barrow, M.D., Washington University, 1946.

Morey A. Blinder, M.D., St. Louis University, 1981. (See Department of Pathology.)
William G. Bowen, M.D., University of North Carolina, 1974.
Randy A. Brown, M.D., Case Western Reserve University, 1979.
Robert M. Bruce, M.D., University of Minnesota, 1968.
J. William Campbell, M.D., Washington University, 1977.
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.
Alexander Denes, M.D., University of Missouri, 1973.
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.
William G. Juergens Jr., M.D., Washington University, 1961.
Robert W. Karr, M.D., University of Texas, 1975.
John J. Kelly, M.D., St. Louis University, 1963.
Micki Klearman, M.D., Washington University, 1981.
David M. Lieberman, M.D., Vanderbilt University, 1949.
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.
Paul A. Mennes, M.D., Washington University, 1970.
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.
Joel Picus, M.D., Harvard University, 1984.
Daniel E. 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.
Bernard L. Shore, M.D., Washington University, 1977.
Robert B. Shuman, M.D., University of Missouri, 1981.
Donald A. Skor, M.D., Rush University, 1978.
Rand W. Sommer, M.D., Washington University, 1980.
Ross B. Sommer, M.D., Cornell University, 1949.
Paul M. Stein, M.D., St. Louis University, 1971.
Kongsak Tanphaichitr, M.D., Siraraj Hospital Medical School, 1970.
Robert M. Taxman, M.D., Washington University, 1964.
J. Allen Thiel, M.D., St. Louis University, 1960.
Stanley M. Wald, M.D., Washington University, 1946.
Elliot A. Wallach, M.D., St. Louis University, 1945. (Dermatology)
Leonard B. Weinstock, M.D. University of Rochester, 1981.
John A. Wood, M.D., University of Oklahoma, 1968.

Associate Professor (Visiting)

Bruno Maresca, Ph.D., University of Naples, 1974.

Associate Professors (Adjunct)

Robert E. Kraetsch, M.D., Washington University, 1969.
Elaine S. Krul, Ph.D., McGill University, 1982.
Marc D. Smith, Ph.D., St. Louis University, 1979.

Assistant Professor Emeritus

Allen P. Klippel, M.D., St. Louis University, 1946.

Assistant Professors

Douglas Adkins, M.D., Wright State University, 1986.
Giuseppe Aliperti, M.D., University of Naples, 1979.
Amir Arsham Amini, Ph.D., University of Michigan, 1990.
Thomas J. Baranski, M.D., Ph.D., Washington University, 1992. (See Department of Molecular Biology and Pharmacology.)
Nancy Bartlett, M.D., Washington University, 1986.
Michael A. Beardslee, M.D., St. Louis University, 1991.
Monica Bessler, M.D., Ph.D., University of London, 1994.
Eric C. Beyer, Ph.D., University of California, San Diego, 1981; M.D., 1982. (See Department of Cell Biology and Physiology and Department of Pediatrics.)
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.
Thomas M. Birkenmeier, M.D., Washington University, 1982.
Rainer K. Brachmann, M.D., Ludwig-Maximilians University, 1987.
Steven Brody, M.D., University of Michigan, 1980.
Lawrence Brown, M.D., Washington University, 1990.
Cary A. Caldwell, M.D., University of Pittsburgh, 1989.
Charles C. Carey, M.D., University of Missouri, Kansas City, 1991.
David B. Carr, M.D., University of Missouri, 1985.
Mario Castro, M.D., University of Missouri, Kansas City, 1988.
Lilibeth M. Cayabyab-Loe, M.D., University of Missouri, 1990.
Mary F. Chan, M.D., University of Alabama, 1986.

Douglas M. Char, M.D., University of Hawaii, 1989.

Alec M. Cheng, Ph.D., Washington University, 1993.

Lynn A. Cornelius, M.D., University of Missouri, 1980. (Dermatology)

Thomas M. De Fer, M.D., University of Missouri, 1989.

Brian Dieckgraefe, Ph.D., Washington University, 1987; M.D., 1988.

Kathryn M. Diemer, M.D., University of Missouri, 1985.

Laura L. Dugan, M.D., Ohio State University, 1987. (See Department of Neurology.)

John C. Edwards, Ph.D., The University of Chicago, 1983; M.D., 1985.

Richard and Elizabeth Henby Sutter Professor of Occupational, Industrial and Environmental Medicine

Bradley A. Evanoff, M.D., M.P.H., Washington University, 1986.

Carl J. Fichtenbaum, M.D., University of Missouri, 1985.

Larry E. Fields, M.D., Harvard University, 1980.

Karen E. Forsman, M.D., Rush Medical College, 1981. (Dermatology)

Paula M. Fracasso, M.D., Ph.D., Yale University, 1984.

Brian F. Gage, M.D., University of California, 1988.

Gary L. Gambill, M.D., University of Oregon, 1974.

Marye J. Gleva, M.D., University of Washington, 1988.

Ramaswamy Govindan, M.D., Stanley Medical College, 1987.

Jonathan M. Green, M.D., Wayne State University, 1986.

Marvin Grieff, M.D., McGill University, 1986.

Carolyn Haase, M.D., University of Missouri, 1987. (See Department of Surgery.)

Jonathan B. Hall, M.D., St. Louis University, 1991.

Austin Arthur Halle III, M.D., University of Tennessee, 1982.

Elizabeth Hilliker, M.D., Washington University, 1970.

Kevin Ho, M.D., Columbia University, 1987.

Mary M. Horgan, M.D., M.B.B.C.H, University College Dublin, 1986.

William T. Hosek, M.D., University of Buffalo, 1990.

Elizabeth Israel, M.D., Cornell University, 1988.

David Koh, M.D., University of Illinois, 1990.

Raphael Kopan, Ph.D., The University of Chicago, 1989.

Joshua Korzenik, M.D., Albert Einstein College of Medicine, 1987.

Attila Kovacs, M.D., Semmelweis University, Budapest, Hungary, 1985.

Howard I. Kurz, M.D., New York Medical College, 1984.

Pui-Yan Kwok, M.D., The University of Chicago, 1987. (Dermatology)

Gregory M. Lanza, M.D., Northwestern University, 1992.

Frederik Lindberg, M.D., Umea University, 1987.

Daniel C. Link, M.D., University of Wisconsin, 1985.

Michael B. Lippmann, M.D., State University of New York, 1977.

Gregory D. Longmore, M.D., McGill University, 1983. (See Department of Cell Biology and Physiology.)

Dwight Look, M.D., University of Missouri, 1985.

Christine H. Lorenz, Ph.D., Vanderbilt University, 1992.

Robinna G. Lorenz, M.D., Ph.D., Washington University, 1990. (See Department of Pathology.)

John P. Lynch, M.D., Georgetown University, 1989.

Keith Mankowitz, M.D., University of The Witwatersrand, 1989.

Ann Martin, M.D., Case Western Reserve University, 1981. (Dermatology)

Wade H. Martin III, M.D., University of Kansas, 1977.

Robert C. McKnight, M.D., Washington University, 1961. (See Department of Radiology.)

Brent W. Miller, M.D., Washington University, 1990.

Jeffrey H. Miner, Ph.D., California Institute of Technology, 1991.

Hector D. Molina-Vicenty, M.D., University of Puerto Rico, 1985. (See Department of Pathology.)

Linda M. Mundy, M.D., The Johns Hopkins University, 1988.

Anthony J. Muslin, M.D., Harvard University, 1984.

Rosanne Naunheim, M.D., The University of Chicago, 1978.

Daniel S. Ory, M.D., Harvard University, 1986.

Linda Peterson, M.D., Washington University, 1990.

John D. Pfeifer, Ph.D., University of California, 1987; M.D., 1988. (See Department of Pathology.)

Jay F. Piccirillo, M.D., University of Vermont, 1985. (See Department of Otolaryngology and Program in Occupational Therapy.)

Richard A. Pierce, Ph.D., Rutgers University, 1990. (Dermatology)

Associate Chair for Clinical Performance

Anne Pittman, M.D., St. Louis University, 1985.

Louis Polish, M.D., University of Vermont, 1981.

Simeon Prager, M.D., University of California, 1991.

Joseph Primrose, M.D., University of Illinois, 1968.

Michael I. Rauchman, M.D., McGill University, 1984.

Joseph G. Rogers, M.D., University of Nebraska, 1988.

Daniel Rosenbluth, M.D., Mt. Sinai School of Medicine, 1985.

Lisa R. Ross, M.D., University of Michigan, 1983.

Will R. Ross, M.D., Washington University, 1984.

Mark S. Sands, Ph.D., State University of New York, 1990.

Jean E. Schaffer, M.D., Harvard University, 1986. (See Department of Molecular Biology and Pharmacology.)

William D. Shannon, Ph.D., University of Pittsburgh, 1995.

James M. Shipley, Ph.D., St. Louis University, 1992.
Gary Singer, M.D., University of Toronto, 1987.
Stacy C. Smith, M.D., University of Southern California, 1986. (See Department of Pathology.)
Barbara B. Sterkel, M.D., St. Louis University, 1975.
Bradley Stoner, M.D., Ph.D., Indiana University, 1987.
Walton Sumner II, M.D., University of Texas, Southwestern, 1985.
Megumi Taniuchi, M.D., Ph.D., Washington University, 1988.
Pablo Tebas, M.D., Universidad Autonoma, Madrid, Spain, 1985.
Serguei Troianovski, Ph.D., All-Union Cancer Research Centre, 1981.
Dennis T. Villareal, M.D., Cebu Institute of Medicine, Philippines, 1982.
Oksana Volshteyn, M.D., Minsk State Medical Institute, 1976. (See Department of Neurology.)
Mark S. Weinfeld, M.D., Harvard University, 1991.
Steven J. Weintraub, M.D., Medical College of Virginia, 1985. (See Department of Cell Biology and Physiology.)
Alison J. Whelan, M.D., Washington University, 1986. (See Department of Pediatrics.)
Lynn K. White, M.D., Harvard University, 1984.
Megan Wren, M.D., Washington University, 1985.
Kathryn A. Yamada, Ph.D., Georgetown University, 1982.
Kevin E. Yarasheski, Ph.D., Kent State University, 1986.

Research Assistant Professor Emeritus

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.
Kenneth R. Boschert, D.V.M., Mississippi State University, 1984. (Comparative Medicine)
Ivan E. Collier, Ph.D., Florida State University, 1980.
Michael R. Courtois, M.A., University of Missouri, 1979.
Adriana Dusso, Ph.D., University of Rosari, 1985.
Kenton N. Fedde, Ph.D., The University of Chicago, 1983.
Stephen Gaioni, Ph.D., Princeton University, 1976.
Anandarup Gupta, Ph.D., University of Connecticut, 1990.
Xianlin Han, Ph.D., Washington University, 1990.
Dennis E. Hourcade, Ph.D., Harvard University, 1978.
Zhengmin Huang, Ph.D., University of Tennessee, 1992.
Malgorzata Krych, Ph.D., Polish Academy of Sciences, 1982.
Beth S. Lee, Ph.D., Stanford University, 1988.
Ben Wen Li, M.D., Zhonshan Medical University, 1975.
Joanne Markham, M.D., Washington University, 1973.
Babu Padanilam, Ph.D., Medical College of Georgia, 1985.
Sasanka Ramanadham, Ph.D., Texas Tech University, 1985.
Leonard Rifas, M.S., University of Missouri, 1973.
Mitchell G. Scott, Ph.D., Washington University, 1982. (Clinical) (See Department of Pathology.)
Linton M. Traub, M.S., University of The Witwatersrand, 1987.

Research Assistant Professors (Adjunct)

Ross C. Brownson, Ph.D., Colorado State, 1985.
Mary Anne Della-Fera, V.M.D., University of Pennsylvania, 1979; Ph.D., 1980.
Grace S. Lo, Ph.D., University of Texas, Austin, 1976.
Carol L. McLaughlin, Ph.D., University of Pennsylvania, 1981.

Assistant Professors Emeriti (Clinical)

Morris Alex, M.D., Washington University, 1943.
Greta Camel, M.D., University of Wisconsin, 1949.
Duane E. Cozart, M.D., Medical College of Virginia, 1959.
William K. Hall, M.D., Washington University, 1942. (Dermatology)
Bernard Hulbert, M.D., University of Wisconsin, 1941.
Robert C. Kingsland, M.D., Washington University, 1937.
Warren Lonergan, M.D., Vanderbilt University, 1941.
Leonard N. Newmark, M.D., Washington University, 1963.
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.
Ingrid R. Albert, M.D., Albert Einstein College of Medicine, 1971. (Dermatology)
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Howard J. Aylward Jr., M.D., Vanderbilt University, 1970.
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Frederick D. Bauschard, M.D., University of Pittsburgh, 1968. (Dermatology)
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.
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Clifford A. Birge, M.D., Washington University, 1961.
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Benjamin M. Goldstein, M.D., Washington University, 1964.

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Morris Joftus, M.D., University of Illinois, 1967.

Robert L. Kaufman, M.D., Washington University, 1963.

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Thomas F. Martin, M.D., St. Louis University, 1965.

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Instructors

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Edward B. Morgan, M.D., St. Louis University, 1970.
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Samuel A. Ockner, M.D., University of Cincinnati, 1984.
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Christine Pham, M.D., University of Florida, 1985.
Brian K. Pilcher, Ph.D., University of Oklahoma, 1994.
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Gabrielle Richards Reed, Ph.D., University of Rhode Island, 1995.
Stanley R. Rehm, M.D., University of Texas, Southwestern, 1972.
Tamara I.A. Roach, Ph.D., University of Nottingham, 1987.
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Raj Satyanarayana, M.D., University of Madras, India, 1982.
Konika Schallen, M.D., University of Michigan, 1994.
Mark Scheperle, M.D., University of Missouri, Kansas City, 1989.
Jeffrey S. Schorey, Ph.D., University of Texas, 1991.
Helena W. Schotland, M.D., Albert Einstein College of Medicine, 1988.
Michelle Z. Schultz, M.D., University of Massachusetts, 1988.
David B. Schwartz, Ph.D., Washington University, 1986; M.D., 1987.
Lawton Shick, M.D., Jefferson Medical College, 1991.
William D. Staatz, Ph.D., University of Edinburgh, 1976. (See Department of Pathology.)
Bala Subramanian, M.D., University of Delhi, India, 1986.
David J. Sullivan, M.D., University of Alabama, 1988.
Lisa M. Vinci, M.D., Washington University, 1992.
Robert L. Wade Jr., M.D., Boston University, 1991.
Mark Walker, Ph.D., University of Memphis, 1998.
Michael J. Walter, M.D., St. Louis University, 1990.
Deborah Wenkert, M.D., University of Texas, 1987.
Jeff Willis, M.D., Medical College of Virginia, 1990.
Keith F. Woeltje, M.D., University of Texas, Southwestern, 1991.
Roger D. Yusen, M.D., University of Illinois, 1990.

Research Instructors

H. Davis Adkisson, Ph.D., University of South Carolina, 1991.
Brian D. Bennett, Ph.D., University of Cincinnati, 1990.
Lala Chaudhary, Ph.D., Institute of Nutrician, Moscow, Russia, 1977.
Arasu Chellaiah, Ph.D., Madurai-Kamaraj University, India, 1985.
Meehakshi A. Chellaiah, Ph.D., Madurai-Kamaraj University, India, 1984.
May Mei Chen, B.S., Baker University, 1963.
Zhouji Chen, Ph.D., Michigan State University, 1994.
Su-Li Cheng, Ph.D., University of Louisville, 1978.
Lloyd Coleman, Ph.D., Iowa State University, 1984.
Anupma Dixit, Ph.D., University of West Indies, 1987.
Minxiang Gu, M.D., Shanghai Second Medical University, Shanghai, China, 1984.
Christopher S. Hall, Ph.D., Washington University, 1996.
Lexie Holliday, Ph.D., Florida State University, 1990.
Cheryl A. Houston, M.S., St. Louis University, 1990.
Norma J. Janes, M.S., State University of Iowa, 1964. (Also Clinical Research Center)
Robert Kimble, Ph.D., Washington State University, 1990.
Neil Kizer, Ph.D., University of Illinois, 1990.
Dale K. Kobayashi, M.B.A., University of Missouri, 1993.
Daniel R. Martin, M.S., University of Missouri, St. Louis, 1985.
Steven Mumm, Ph.D., St. Louis University, 1992.
Frank A. Norris, M.D., Clemson University, 1991.
Susan Racette, Ph.D., University of Chicago, 1994.
Terrence E. Riehl, Ph.D., Ohio University, 1980.
Sharon A. Rogers, M.S., Southern Illinois University, 1983.
Suresh D. Shah, M.S., St. Louis University, 1972. (Also Clinical Research Center)
David R. Sinacore, Ph.D., West Virginia University, 1992.
Christine Sorenson, Ph.D., University of Nebraska, 1989.
Phyllis K. Stein, Ph.D., University of Virginia, 1990.
Shui Ping Wang, Ph.D., Academy of China, 1989.
Carla J. Weinheimer, B.S., University of Illinois, 1984.

Magdelena Wozniak, Ph.D., University of Florida, 1992.

Hong Xian, Ph.D., Washington University, 1994.

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Instructors Emeriti (Clinical)

Axel R. Gronau, M.D., University of Naples, 1935.

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.

Herbert C. Wiegand, M.D., Washington University, 1943.

Instructors (Clinical)

Barry K. Abramson, M.D., University of Miami, 1985.

Susan R. Adams, M.D., University of Missouri, 1989.

Ann C. Agnew, M.D., University of Missouri, 1989.

Jorge M. Alegre, M.D., San Marcos University, 1965.

Ana M. Alvarez-Jacinto, M.D., Santiago de Compostela, Spain, 1981.

Frank K. Anderson, M.D., Northwestern University, 1980.

Scott J. Anderson, Ph.D., Duke University, 1981; M.D., 1982.

Milton F. Austin, M.D., Yale University, 1980.

James G. Avery, M.D., University of Tennessee, 1990.

Fred J. Balis, M.D., Washington University, 1989.

David Ban, M.D., University of Oregon, 1980.

Daniel B. Bauwens, M.D., Washington University, 1975.

Richard C. Bell, M.D., Washington University, 1988. (Dermatology)

William W. Benedict, M.D., Washington University, 1975.

Laurence A. Berarducci, M.D., Wayne State University, 1985.

Douglas R. Berson, M.D., Medical College of Pennsylvania, 1983.

Stanley I. Biel, M.D., University of Illinois, 1978.

William D. Birenbaum, M.D., University of Missouri, 1983.

Gail L. Birkenmeier, M.D., Washington University, 1987.

Richard Bligh, M.D., Ross University, 1993.

Joyce E. Boehmer, M.D., University of Missouri, 1979.

Michael Bolger, M.D., Washington University, 1981.

Dee C. Boswell, M.D., University of Illinois, 1963.

Scott A. Brodarick, M.D., University of Illinois, 1975.

Jeffrey S. Brooks, D.P.M., New York College of Podiatric Medicine, 1974. (Podiatry)

Kathleen S. Brunts, M.D., St. Louis University, 1981.

Stanley Buck, M.D., Washington University, 1977.

Donald Busiek, M.D., University of Missouri, 1983.

Stephen Carey, Ph.D., Harvard University, 1983; M.D., University of Southern California, 1987.

John M. Cary, M.D., St. Louis University, 1958.

Kae Pyng Chang, M.D., University of Missouri, 1995.

Duck Sung Chun, M.D., Seoul National University, 1969.

Kathleen M. Cizek, M.D., The University of Chicago, 1990.

Romnee S. Clark, M.D., Indiana University, 1991.

Frank Cohen, M.D., University of Toronto, 1939.

Shari Cohen, M.D., University of Missouri, 1987.

Danita L. Cole, M.D., University of Missouri, Kansas City, 1991.

John Costello, M.D., St. Louis University, 1977.

Charles Crecelius, Ph.D., St. Louis University, 1984; M.D., 1984.

Steven W. Cummings, M.D., St. Louis University, 1988.

Robert B. Cusworth, M.D., University of Rochester, 1974.

Laksham Darsi, M.D., Guntur Medical College, India, 1987.

L. Virgil Das, M.D., Southern Illinois University, 1989.

Wilson L. Davis Jr., M.D., University of Iowa, 1978.

Thomas A. Dew, M.D., University of Arkansas, 1967.

Jacquelyn M. Dilworth, M.D., Howard University, 1985. (Dermatology)

Marilyn Disch, M.D., University of Kansas, 1988.

Irl J. Don, M.D., Washington University, 1972.

James W. Donnelly, Washington University, 1986. (Dermatology)

Royal J. Eaton, M.D., University of Missouri, 1964.

Zamir Eidelman, M.D., Javeriama University, 1987.

James M. Epstein, M.D., Washington University, 1969.

Susan C. Ernst, M.D., Emory University, 1989.

Carol J. Evers, M.D., Brown University, 1977.

David Feldman, M.D., Washington University, 1943.

Bruce T. Forsyth, M.D., Washington University, 1947.

Michael P. Fuller, M.D., University of Utah, 1994.

Suzanne Furesz, M.D., University of Nebraska, 1995.

Daniel Gaitan, M.D., University of Mississippi, 1986.

Kathleen M. Garcia, M.D., Harvard University, 1980.

William M. Gee, M.D., Washington University, 1981.

Kenneth W. Gentsch, M.D., Washington University, 1958.

Connie F. Gibstine, M.D., University of Missouri, 1980. (Dermatology)

Andrew Gold, M.D., University of Iowa, 1989.

Michael Goldmeier, M.D., Ohio State University, 1986.

Ronald K. Grady, M.D., Washington University, 1966.

C. Bruce Graves, M.D., Washington University, 1988.

Aaron Greenspan, M.D., University of Pittsburgh, 1991.

Mark H. Gregory, M.D., University of Vermont, 1986.

V. Rahan Gunasingham, M.D., Christian Medical College, India, 1982.

Jitendra K. Gupta, M.B.B.S., King George Medical College, 1964.

Thomas E. Hakes, M.D., University of Iowa, 1978.

Rod Hartzel, M.D., Northwestern University, 1985.

Kristina L. Henderson, M.D., St. Louis University, 1991.

Anne Herron, M.B., B.Ch., Dublin University, 1965.

William E. Hinkley, M.D., Harvard University, 1969.

Sandra S. Hoffman, M.D., University of Kansas, 1976.

Barbra A. Horn, M.D., Washington University, 1982.

John W. Hubert, M.D., Washington University, 1975.

Linda S. Iqbal, M.D., St. Louis University, 1990.

Daryl L. Jacobs, M.D., Washington University, 1983.

Myron H. Jacobs, M.D., Louisiana State University, 1969.

Poonam Jain, M.D., University of Iowa, 1988.

David Jick, M.D., Washington University, 1982.

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Renee J. Kanan, M.D., Washington University, 1986.

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David Kelley, M.D., Howard University, 1980.

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Washington University, 1973.
(Dermatology)

Peter Weiss, M.D.,
Case Western Reserve University, 1980.

Deborah Wienski, M.D.,
Tufts University, 1983.

Nancy J. Williams, M.D.,
University of Kansas, 1987.

Wendell Williams, M.D.,
Baylor Medical College, 1982.

Edward M. Wolfe, M.D.,
Washington University, 1960.
(Dermatology)

Michelle Woodley, M.D.,
SUNY, Stony Brook, 1986.

Isasure L. Yates, M.D.,
Howard University, 1987.

Instructor (Adjunct)

John Hall, M.D.,
University of Illinois, Chicago, 1979.

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 and bio-organic chemistry to define mechanisms that regulate cell fate, differentiation and metabolism, 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 weekly discussions of recent papers in the literature as well as their own work and that of their colleagues.

SECOND YEAR

M70 670 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 course master to enroll in this course.

FOURTH YEAR

Electives

Description of the following course is shown in the Division of Biology and Biomedical Sciences.

L41 (BIO) 5461 MOLECULAR RECOGNITION

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

Research (M70 900)

Cross listed with L41 (Bio) 590

Irving Boime, Ph.D., 362-2556
Regulated expression of the 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 ion channel ligands.

George W. Gokel, Ph.D., 362-9297
Novel synthetic organic compounds for use as model systems for biological processes.

Jeffrey I. Gordon, M.D., 362-7243
Gut development; gut epithelial biology; host-microbial interactions in the gastrointestinal ecosystem; protein N-myristoylation.

Gregory A. Grant, Ph.D., 362-3367
Interaction of polypeptide inhibitors with acetylcholine receptors and 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.

Garland R. Marshall, Ph.D., 362-1567
Molecular recognition, computer-aided drug design, antivirals, peptidomimetics and protein structure prediction.

Jeanne M. Nerbonne, Ph.D., 362-2564
Regulation of membrane excitability; structure, function and regulation of voltage-dependent ion channels.

David M. Ornitz, Ph.D., M.D., 362-3908
Regulation of organogenesis in the mouse by members of the fibroblast growth factor family. Genes involved in inner ear development.

John H. Russell, Ph.D., 362-2558
Mechanisms of cell death in the regulation and function of lymphocyte response.

Dwight A. Towler, M.D., Ph.D., 362-9925
Transcriptional regulation of bone-specific genes by homeodomain proteins and polypeptide growth factors.

Faculty

ALUMNI 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., M.D., University of Rochester, 1941.

Professors

Irving Boime, Ph.D., Washington University, 1970. (See Department of Obstetrics and Gynecology.)

Douglas F. Covey, Ph.D., The Johns Hopkins University, 1973.

Nicholas O. Davidson, M.B.B.S., University of London, 1974. (See Department of Medicine.)

Alex S. Evers, M.D., New York University, 1978. (See Department of Anesthesiology.)

George W. Gokel, Ph.D., University of Southern California, 1971.

Gregory A. Grant, Ph.D., University of Wisconsin, 1975. (See Department of Medicine.)

Richard W. Gross, M.D., New York University, 1976; Ph.D., Washington University, 1982. (See Department of Medicine.) (Also Department of Chemistry)

Eugene M. Johnson Jr., Ph.D., University of Maryland, 1970. (See Departments of Neurology and Neurological Surgery.)

Garland R. Marshall, Ph.D., Rockefeller University, 1966. (See Department of Biochemistry and Molecular Biophysics and Institute for Biomedical Computing.)

Aubrey R. Morrison (Burroughs Wellcome Clinical Pharmacology Scholar), M.B.B.S., University of London, 1970. (See Department of Medicine.)

Jeanne M. Nerbonne, Ph.D., Georgetown University, 1978.

Arthur H. Neufeld, Ph.D., New York University, 1970. (See Department of Ophthalmology and Visual Sciences.)

John H. Russell, Ph.D., Washington University, 1974.

Alan L. Schwartz, Ph.D., Case Western Reserve, 1974; M.D., 1976. (See Department of Pediatrics.)

Arnold W. Strauss, M.D., Washington University, 1970. (See Department of Pediatrics.)

Michael J. Welch, Ph.D., University of London, 1965. (See Department of Radiology.)

Professors (Adjunct)

Peter B. Corr, Ph.D., Georgetown University, 1975.

James A. Ferrendelli, M.D., University of Colorado, 1962.

Research Professor (Adjunct)

Philip Needleman, Ph.D., University of Maryland, 1964.

Associate Professors

Jay W. Heinecke, M.D., Washington University, 1981. (See Department of Medicine.)

Daniel P. Kelly, M.D., University of Illinois, 1982. (See Department of Medicine.)

Mark E. Lowe, Ph.D., University of Pennsylvania, 1977; M.D., University of Miami, 1984. (See Department of Pediatrics.)

David M. Ornitz, Ph.D., University of Washington, 1987; M.D., 1988.

David R. Piwnica-Worms, M.D., Ph.D., Duke University, 1984. (See Department of Radiology.)

Kevin A. Roth, M.D., Ph.D., Stanford University, 1985. (See Department of Pathology.)

Dwight Towler, M.D., Ph.D., Washington University, 1989. (See Department of Medicine.)

David B. Wilson, M.D., Ph.D., Washington University, 1986. (See Department of Pediatrics.)

Associate Professor (Adjunct)

Daniel P. Getman, Ph.D., University of Minnesota, 1982.

Assistant Professors

Carolyn J. Anderson, Ph.D., Florida State University, 1990. (See Department of Radiology.)

Thomas J. Baranski, M.D., Ph.D., Washington University, 1992. (See Department of Medicine.)

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.

C. Michael Crowder, M.D., Ph.D., Washington University, 1989. (See Department of Anesthesiology.)

Robert O. Heuckeroth, M.D., Ph.D., Washington University, 1990. (See Department of Pediatrics.)

David M. Holtzman, M.D., Northwestern University, 1985. (See Department of Neurology.)

Raphael Kopan, Ph.D., The University of Chicago, 1989. (See Department of Medicine.)

Kerry Kornfeld, M.D., Ph.D., Stanford University, 1991.

Louis J. Muglia, Ph.D., The University of Chicago, 1986; M.D., 1988. (See Department of Pediatrics.)

Rajkumar V. Patil, Ph.D., National Chemical Laboratory, 1985. (See Department of Ophthalmology and Visual Sciences.)

Scott Saunders, M.D., Ph.D., Stanford University, 1990. (See Department of Pediatrics.)

Jean E. Schaffer, M.D., Harvard University, 1986. (See Department of Medicine.) (Cardiovascular Division)

Theodore C. Simon, Ph.D., George Washington University, 1990. (See Department of Pediatrics.)

Sergey M. Troyanovsky, Ph.D., Academy of Medical Sciences, Moscow, 1981. (See Department of Medicine.)

Jane Y. Wu, M.B., Shanghai Medical University, 1986; Ph.D., Stanford University, 1991. (See Department of Pediatrics.)

Assistant Professors (Adjunct)

Per Falk, M.D., Ph.D., University of Gothenburg, 1986; Ph.D., 1991.

Pamela T. Manning, Ph.D., Ohio State University, 1980.

Charles A. McWherter, Ph.D., Cornell University, 1984.

Research Instructor

Shiming Chen, Ph.D., SUNY Health Science Center, Syracuse, NY, 1992. (See Department of Ophthalmology and Visual Sciences.)

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: *Julian B. Fleischman, Ph.D.*, 362-2759

This course will familiarize the student with the diversity of pathogenic microbes and the different ways they can survive and cause disease. It is a concepts-based course, emphasizing the general principles of microbial pathogenesis. Selected pathogenic microbes are used as models to describe pathogen-host interactions in molecular detail. The laboratory will introduce the student to the principles and the basic techniques of diagnostic bacteriology.

Selectives

M04 526 NEW DISEASES, NEW PATHOGENS

Instructors: *Gregory A. Storch, M.D.*, 454-6079; *Penelope G. Shackelford, M.D.*, 454-6050; *Joseph W. St. Geme, M.D.*, 362-5401; *Kathleen A. McGann, M.D.*, 454-6050; *David B. Haslam, M.D.*, 454-6050; *Virginia L. Miller, Ph.D.*, 747-2132; *and Margaret R. MacDonald, M.D., Ph.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 processes by which a causative role is attributed to a newly discovered pathogen. Specific examples will probably include, but will not necessarily be limited to, Human herpesvirus 8 (Kaposi's sarcoma), Helicobacter, *Bartonella* (cat scratch disease), antibiotic-resistant *Streptoccus pneumoniae*, Lyme disease, *E. coli* 0:157, Bovine Spongiform Encephalopathy (BSE), also known as "mad cow" disease, and Ehrlichia. This selective is referenced in Department of Pediatrics.

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.

M04 589 TOPICS IN VIRAL PATHOGENESIS

Instructor: *Milton J. Schlesinger, Ph.D.*, 362-2762

This course is a tutorial-style program. Assigned papers will be discussed during one- to two-hour sessions for six to eight sessions. A general review of molecular virology and virus-host cell interactions will be conducted. Topics include viral hepatitis, influenza, viruses and cancer.

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. 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 in 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

Autoimmunity with an emphasis on the complement system and immune complex processing: clinical, genetic, biochemical and molecular analyses of complement receptors and regulatory proteins.

Douglas E. Berg, Ph.D., 362-2772

Helicobacter pylori: genome organization, and detection of genes involved in colonization or disease. Molecular epidemiology of *H. pylori* and other pathogens.

Stephen M. Beverley, Ph.D., 747-2630
Molecular genetics of protozoan parasites; and genomics, virulence and drug resistence.

Michael G. Caparon, Ph.D., 362-1485
Molecular genetics and pathogenicity of the streptococci and other pathogenic gram positive bacteria.

David D. Chaplin, M.D., Ph.D., 362-9047
Transgenic approaches for defining actions of acute inflammatory cytokines *in vivo*. Cytokine control of the development of peripheral lymphoid tissue structure.

Josephine E. Clark-Curtiss, Ph.D., 935-6869
Genetic and molecular studies on the pathogenesis of *Mycobacterium leprae, Mycobacterium tuberculosis* and *Mycobacterium avium*.

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 with particular attention to the Kuppfer cell.

Daniel E. Goldberg, M.D., Ph.D., 362-1514
Biochemistry of malaria.

Gregory I. Goldberg, Ph.D., 362-8180
Enzymology of connective tissue remodeling.

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
Regulation of gene expression, molecular biology of bacteria-host interactions, and evolutionary origins of virulence.

David B. Haslam, M.D., 454-6050
Glycolipids serve as the host-cell receptor for many pathogenic microbes and toxins. Our laboratory is examining the role of glycolipids in host-microbial interactions and eucaryotic cellular biology.

Henry V. Huang, Ph.D., 362-2755
RNA virus evolution, molecular biology of alphaviruses, alphavirus gene expression vectors, and antiviral drug design.

Scott J. Hultgren, Ph.D., 362-6772
Molecular basis of microbial pathogenesis and cross-talk at the host-pathogen interface; organelle biogenesis in pathogens; structure-function of chaperones, ushers and adhesins; and vaccine development and drug design.

George S. Kobayashi, Ph.D., 362-1548
Development of therapy for intracellular fungal infections.

Anthony Kulczycki Jr., M.D., 362-9043
Our interest is in the antigens and the mechanisms that are involved in various immunologic disorders such as infant colic, Type I diabetes and chronic urticaria.

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.

Frederik Lindberg, M.D., Ph.D., 362-9926
Integrin-Associated Protein (IAP/CD47) is a cell-surface receptor involved in leukocyte activation. IAP-knockout mice are defective in host defense, graft-vs.-host disease and dendritic cell function. In the elective, the student will investigate the function of IAP-deficient and control cells *in vitro* to determine the mechanism of IAP action. Hypotheses from this work will then be tested by rescuing IAP-deficient cells using retroviral introduction of mutant IAP genes.

Virginia L. Miller, Ph.D., 747-2132
Molecular basis of pathogenicity of the entire pathogens *Yersinia enterocolitica* and *Salmonella typhmurium*.

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.

Charles M. Rice, Ph.D., 362-2842
Molecular genetics of animal RNA viruses (alphaviruses and flaviviruses, in particular, hepatitis C virus): replication, packaging, virulence of vaccines and antiviral therapy.

David G. Russell, Ph.D., 362-3693
Infection and survival strategies of the intracellular pathogens *Leishmania* and *Mycobacteria*.

Sondra Schlesinger, Ph.D., 362-2746
Structure and replication of enveloped RNA animal viruses.

Robert D. Schreiber, Ph.D., 362-8748
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 H. Speck, Ph.D., 362-0367
Our research focuses on two gamma-herpesviruses, EBV and murine gamma-herpesvirus 68. Both are associated with the development of lymphomas in their natural host. We are interested in how these viruses control their genetic programs, such that they persist for life in the infected individual.

Joseph W. St. Geme, M.D., 362-5401
The molecular mechanism of nontypable *Haemophilus influenzae* pathogenicity. *H. influenzae* is an important cause of human respiratory tract diseases and a source of substantial morbidity. We are principally interested in characterizing the bacterial and host cell determinants of *H. influenzae* respiratory tract colonization, an essential step in the pathogenesis of disease. We anticipate that these studies will assist efforts to develop a strategy for preventing nontypable *Haemophilus* disease.

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.

Gregory A. Storch, M.D., 454-6079
The student, in this elective, will participate in a research project involving the application of techniques of molecular biology, especially the polymerase chain reaction, to the diagnosis of the infectious diseases. Infectious agents currently under investigation include human cytomegalovirus, Epstein-Barr virus, VZV, HSV, human parvovirus B19, JC virus, Ehrlichia and toxoplasma.

Matthew L. Thomas, Ph.D., 362-8722
Study of protein tyrosine phosphatases and the regulation of cellular differentiation, activation and adhesion.

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 which control infection and aspects of viral structure/genetics which contribute to virulence and disease. We study the pathogenesis and latency of the dsDNA enveloped murine cytomegalovirus and gamma herpes virus 68.

Joseph P. Vogel, Ph.D., 362-7059
Legionella pneumophila, the causative agent of Legionnaires' pneumonia, replicates inside alveolar macrophages by preventing phagosome-lysosome fusion.

Gary J. Weil, M.D., 454-7782
Filarial nematodes cause river blindness and elephantiasis in humans. We are working to develop improved diagnostic methods and vaccines for control and prevention of these diseases.

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.

Milton J. Schlesinger, Ph.D., University of Michigan, 1959.

Professors

John P. Atkinson, M.D., Kansas University, 1969. (See Department of Medicine.)

Alumni Professor in Molecular Microbiology

Douglas E. Berg, Ph.D., University of Washington, 1969. (See Department of Genetics.)

Susan E. Cullen, Ph.D., Albert Einstein College of Medicine, 1971. (See Department of Genetics.)

M. Wayne Flye, M.D., University of North Carolina, 1967; Ph.D., Duke University, 1980; M.A. (hon.), Yale University, 1985. (See Department of Surgery.)

William E. Goldman, Ph.D., University of North Carolina, 1980.

Scott J. Hultgren, Ph.D., Northwestern University, 1988.

George S. Kobayashi, Ph.D., Tulane University, 1963. (See Department of Medicine.)

J. Russell Little Jr., M.D., University of Rochester, 1956. (See Department of Medicine.)

Gerald Medoff, M.D., Washington University, 1962. (See Department of Medicine.)

Lee Ratner, M.D., Ph.D., Yale University, 1979. (See Department of Medicine.)

Charles M. Rice, Ph.D., California Institute of Technology, 1981.

David G. Russell, Ph.D., London University, 1982.

Sondra Schlesinger, Ph.D., University of Michigan, 1960.

Robert D. Schreiber, Ph.D., State University of New York, 1973. (See Department of Pathology.)

Research Professor

Staffan J. Normark, M.D., Ph.D, University of Umea, 1971.

Professors (Adjunct)

Joseph M. Davie, Ph.D., Indiana University, 1966; M.D., Washington University, 1968.

David Schlessinger, Ph.D., Harvard University, 1961. (See Department of Genetics.)

Associate Professor Emeritus

Julian B. Fleischman, Ph.D., Harvard University, 1960.

Associate Professors

Michael G. Caparon, Ph.D., University of Iowa, 1985.

David D. Chaplin, M.D., Ph.D., Washington University, 1980. (See Department of Medicine.)

Lawrence D. Gelb, M.D., Harvard University, 1967. (See Department of Medicine.)

Daniel E. Goldberg, M.D., Ph.D., Washington University, 1985. (See Department of Medicine.)

Eduardo A. Groisman, Ph.D., The University of Chicago, 1986.

Henry V. Huang, Ph.D., California Institute of Technology, 1977.

Anthony Kulczycki Jr., M.D., Harvard University, 1970. (See Department of Medicine.)

Hsiu-san Lin, M.D., National Taiwan University, 1960; Ph.D., The University of Chicago, 1968. (See Department of Radiology.)

Virginia L. Miller, Ph.D., Harvard University, 1985. (See Department of Pediatrics.)

Penelope G. Shackelford, M.D., Washington University, 1968. (See Department of Pediatrics.)

L. David Sibley, Ph.D., Louisiana State University, 1985.

Samuel H. Speck, Ph.D., Northwestern University, 1980. (See Department of Pathology.)

Joseph W. St. Geme, M.D., Harvard University, 1984. (See Department of Pediatrics.)

Samuel L. Stanley Jr., M.D., Harvard University, 1980. (See Department of Medicine.)

Gregory A. Storch, M.D., New York University, 1973. (See Department of Medicine and Department of Pediatrics.)

Herbert W. Virgin IV, M.D., Ph.D., Harvard University, 1985. (See Department of Pathology.)

Gary J. Weil, M.D., Harvard University, 1975. (See Department of Medicine.)

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

David B. Haslam, M.D., University of Calgary, 1987. (See Department of Pediatrics.)

David A. Leib, Ph.D., University of Liverpool, 1986. (See Department of Ophthalmology and Visual Sciences.)

Frederik Lindberg, M.D., Ph.D., University of Umea, 1987. (See Department of Medicine.)

Matthew L. Thomas, Ph.D., University of Utah, 1981. (See Department of Pathology.)

Joseph P. Vogel, Ph.D., Princeton University, 1993.

Research Assistant Professors

Bernard Brownstein, Ph.D., University of California, 1968.

Gregory I. Goldberg, Ph.D., Weizmann Institute of Science, 1977. (See Department of Medicine.)

Instructor

Linda G. Eissenberg, Ph.D., University of North Carolina, 1982.

DEPARTMENTS OF NEUROLOGY AND NEUROLOGICAL SURGERY

Neurology and Neurological Surgery concern themselves 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 and Neurological Surgery. In the second year, the Departments of Neurology and Neurological Surgery present the course in Diseases of the Nervous System in conjunction with the Departments of 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. 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.

Several divisions exist within Neurology and Neurological Surgery:

James L. O'Leary Division of Experimental Neurology and Neurological Surgery: *Dr. Woolsey* (Director)

Division of Neuropsychology: *Dr. Petersen* (Director), *Drs. Corbetta, Deuel, Miezin, Shulman*

Division of Pediatric Neurology: *Dr. Rothman* (Director), *Drs. Arnold, Brunstrom, Connolly, Deuel, Dodge, Dodson, Mink, Neil, Noetzel, Prensky, Thurston, Trevathan, Yamada*

Division of Pediatric Neurosurgery: *Drs. Kaufman, Park*

Division of Rehabilitation: *Drs. Baum, Dromerick, Sahrmann, Thach, Volshteyn*

In addition, several groups of faculty members are established for specialized research and teaching purposes. They include:

Center for the Study of Nervous System Injury: *Dr. Choi* (Director), *Drs. Babcock, Behrens, Cross, Diringer, Dugan, Goldberg, Gutmann, Holtzman, Hsu, Jacquin, Johnson, Kato, McDonald, Powers, Racke, Rothman, Snider, Trotter, Xu, Yamada, Yu*

Cerebrovascular Disease Section: *Dr. Hsu* (Director), *Drs. Diringer, Dromerick, Goldberg, Landau, J.M. Lee, Lowenkopf, Manno, Powers, Snider*

Clinical Neurophysiology Section:

EEG: Sleep and Evoked Potentials: *Drs. Arnold, Duntley, Prensky, Yamada*

EMG: *Drs. Al-Lozi, Connolly, Lopate*

Dementia and Aging Section: *Dr. Morris* (Director), *Drs. Buckles, Coats, Cohen, Dugan, Holtzman, Hosto, Johnson, Koepke, LaBarge, Storandt*

Epilepsy Section: *Drs. Arnold, Dodson, Dowling, Duntley, Rothman, Trevathan, Yamada*

Functional Neuroanatomy Section: *Drs. Powers and Raichle* (Section Co-Directors), *Drs. Carl, Corbetta, Miezin, Perlmutter, Petersen, Shulman, Videen*

Movement Disorders Section: *Dr. Perlmutter* (Director), *Drs. Black, Landau, Mink, Racette, Thach*

Neurological Critical Care Section: *Dr. Diringer* (Director), *Drs. Deibert, Manno*

Neurodevelopment Section: *Dr. Pearlman* (Director), *Drs. Brunstrom, Deuel, Gutmann, Jacquin, Johnson, Noetzel, Rothman, Woolsey*

Neuroimmunology Section: *Dr. Trotter* (Director), *Drs. Cross, Racke*

Neuromuscular Diseases Section: *Dr. Pestronk* (Director), *Drs. Al-Lozi, Connolly, Ms. Florence, Dr. Lopate*

Areas of Neurosurgical specialization include:

Epilepsy Surgery, *Dr. Dowling*

Cranial Base Surgery, *Drs. Chicoine, Grubb*

Pituitary Surgery, *Dr. Dacey*

Neuro-oncology, *Drs. Chicoine, Dacey, Rich*

Pediatric Neurosurgery, *Drs. Kaufman, Park*

Cerebrovascular Surgery, *Drs. Dacey, Grubb, Rich*

Spinal Neurosurgery, *Dr. Lauryssen*

Stereotactic Radiosurgery, *Drs. Chicoine, Dacey, Rich*

FIRST YEAR

Selectives

Neurological Surgery

MO4 5667 MICROCIRCULATION

Instructor: *Jeffrey M. Gidday, Ph.D.*, 454-2817

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 arterioles, capillaries and venules that comprise the microcirculation. Six 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 focus on basic physiology and clinically relevant pathophysiology. Basic 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, electromechanical coupling, control of capillary permeability and angiogenesis. Typically covered disease entities involving the microcirculation include: stroke and myocardial ischemia, diabetes, inflammation, tumor angiogenesis, retinopathy of prematurity and pulmonary edema, as well as adaptive responses such as to exercise and high altitude. (This selective is cross listed in Department of Cell Biology and Physiology.)

SECOND YEAR

Neurology

M25 632 DISEASES OF THE NERVOUS SYSTEM
Instructor: *Alan L. Pearlman, M.D.*, 362-6947

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

Neurology

M35 720 NEUROLOGY CLERKSHIP
Instructor: *Alan L. Pearlman, M.D.*, 362-3296

A full-time, four-week clerkship is provided on the neurology services at Barnes-Jewish Hospital South Campus. 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.

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.

Neurological Surgery

M40 730 NEUROLOGICAL SURGERY CLERKSHIP
Instructor: *Robert L. Grubb Jr., M.D.*, 362-3567

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

Electives

Neurology

M35 815 CONSULT NEUROLOGY
Instructor: *Alan L. Pearlman, 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/neurosurgery grand rounds. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M35 825 NEUROLOGY SUBINTERNSHIP — BARNES-JEWISH HOSPITAL SOUTH CAMPUS
Instructor: *Alan L. Pearlman, M.D.*, 362-3296

The student will share full primary physician responsibility with the first-year neurology resident, while the third-year neurology resident and attending physician provide supervision. Night call every fourth night, attending rounds six times per week, weekly clinical conferences and resident conferences. Valid start weeks for four-week blocks are: Weeks, 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M35 851 CLINICAL ASPECTS OF AGING AND DEMENTIA
Instructor: *John C. Morris, M.D.*, 454-5605

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 four-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 he or she 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 he or she 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 four-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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M35 862 PHYSICAL MEDICINE AND REHABILITATION

Instructor: *Anthony J. Margherita, M.D.*, 454-7757

A full-time clinical elective is offered for students interested in gaining knowledge, exposure and skill in musculoskeletal, spine and sports medicine. The student will gain practical clinical skills in evaluating musculoskeletal disorders, differential diagnosis and treatment. This rotation is useful for students interested in primary care, orthopaedics and rehabilitation. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M80 806 REHABILITATION — BARNES-JEWISH HOSPITAL NORTH CAMPUS

Instructor: *Oksana Volshteyn, M.D.*, 454-7757

The student will serve as an extern and as a full-fledged member of the department's medical rehabilitation team. Teaching and supervision are provided by six full-time physicians and senior resident physicians. The elective is designed to provide the student with a broad introduction to the field of physical medicine and rehabilitation. It will be useful for students who are planning to specialize in general internal medicine, rheumatology, neurology, orthopaedics or any other field that will require experience in the evaluation and management of patients with physical disabilities. It also will be useful for students who are considering physical medicine and rehabilitation as a career choice. The students work on the 64-bed inpatient service and see outpatients. The inpatient service will acquaint them with the management of patients with spinal cord lesions, head injuries, strokes, multiple sclerosis, neuropathies, arthritis, orthopaedic trauma and amputated limbs. The outpatient service will provide them with experience in examining, assessing and treating patients with myofascial pain, musculoskeletal disorders, such as acute or chronic back and neck problems, and peripheral joint disease. It also will teach them how to deal with neuromuscular disorders in patients who are still ambulatory and whose function can be improved by rehabilitation. The students will gain experience in the prescription of rehabilitation programs and they will follow and observe their patients in physical therapy, occupational therapy, speech therapy or other treatment modality as applicable. Valid start weeks for four-week blocks are: Weeks 9, 13, 17, 21, 29, 33, 37 and 41.

Neurological Surgery

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 the junior class, and weekly combined neurology, neurosurgery and neuropathology conferences. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M35 900)

Neurology

Dennis W. Choi, M.D., Ph.D., 362-9460

The cellular mechanisms underlying neuronal injury in neurological disease states. Our goal is to identify methods for blocking injury pathways that may prove to be clinically useful in treating brain or spinal cord damage.

David B. Clifford, M.D., 362-9731

Clinical treatment of neurologic manifestations of AIDS, including peripheral neuropathy, AIDS dementia, cytomegalovirus encephalitis, and progressive multifocal leukoencephalography. 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 function in patients with cognitive deficits (aphasia, neglect) and brain injury.

Anne H. 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.

Ruthmary K. Deuel, M.D., 454-6086
Research in developmental disorders of cognition: 1) functional neuroanatomic (fMRI) and neuropsychological study of dysgraphia, through the Imaging Research Center; and 2) acquired epileptic aphasia and related disorders, in collaboration with neuromuscular and epilepsy services.

Mark P. Goldberg, M.D., 362-3258
Cellular mechanisms of hypoxic and traumatic neuronal injury. Focus on disturbances of calcium homeostasis using conventional and confocal videomicroscopy.

David H. Gutmann, M.D., Ph.D., 362-7149
Our laboratory is studying the molecular biology of central nervous system tumor suppressor genes. These genes include neurofibromatosis 1 (NF1), neurofibromatosis 2 (NF2) and tuberous sclerosis (TSC2). All three genes are expressed in central nervous system tissues and are essential for normal embryonic development. The central themes explored in our laboratory revolve around: 1) determining how these tumor suppressor genes regulate cell growth, 2) determining the normal function of these gene products in cell differentiation and embryonic development, and 3) determining the relationship between the structure of these genes and their functions. Animal models for these diseases are presently being generated. In addition, we have been developing *in vitro* and *in vivo* models for human brain tumors based on studies ongoing in the laboratory aimed at determining what genetic and biochemical events underlie dysregulated cell growth. The object of all of our studies is an improved understanding of the molecular biology of nervous system tumors with an eye toward improved diagnosis and treatment.

Alan L. Pearlman, M.D., 362-6947
Early development of the mammalian cerebral cortex, with emphasis on the molecular and cellular mechanisms that guide migrating neurons and axonal growth cones to their proper location. To study these mechanisms, we determine the distribution of potential molecular guidance cues in the developing cortex, then perturb their function experimentally in an organotypic slice preparation maintained in culture for several days.

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.

John L. Trotter, M.D., 362-3293
Immunology of multiple sclerosis and human lymphocyte studies focusing on myelin antigens. Clinical research relevant to the care of the multiple sclerosis patient.

Research (M40 900)

Neurological Surgery

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, crainial 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. Studies focus on an examination of heterogeneity and responsiveness of intracerebral arterioles and venules to responses affecting the endothelial and smooth muscle cells in the muscle wall. *In vitro* techniques for studying isolated perfused microvessels are used in the laboratory with image processing techniques.

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, intracerebral hemorrhages and atherosclerotic carotid artery occlusive disease. Opportunities exist for the application of computer systems to biological modeling and data processing.

Bruce A. Kaufman, M.D., 454-2810
Dr. Kaufman is coordinator of the multidisciplinary pediatric neuro-oncology group, with primary responsibility for pediatric brain tumor patients. He is actively involved in the evaluation and treatment of these patients, including experimental treatment protocols. His clinical activities include development of neuro-endoscopy techniques and involvement with the division of neuroradiology in the evaluation of imaging techniques used in neurosurgery, particularly as applied to the patients with neoplasms and spinal dysraphism.

Carl Lauryssen, M.D., 362-3580
Major research interests include the pathophysiology and functional outcomes in patients with cervical spondylotic myelopathy, the role of embolization in spinal surgery, the use of electrical stimulation in augmenting bony fusion, contemporary management of spinal cord injuries, the use of magnetic resonance imaging to assess spinal cord blood flow, and the use of bone morphogenic protein in spinal fusion and reconstruction.

Tae Sung Park, M.D., 454-2811
Dr. Park investigates 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. He also investigates clinical outcome of selective dorsal rhizotomies for treatment of spastic cerebral palsy, and selective amygdalo-hippocampectomy 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 cell culture, bioassay for apoptosis with fluorescent staining, protein immunoblotting, PCR and clonigenic assays.

Faculty

Neurology

ANDREW B. AND GRETCHEN P. JONES PROFESSOR OF NEUROLOGY AND HEAD OF DEPARTMENT

Dennis W. Choi, M.D., Ph.D., Harvard University, 1978.

PROFESSOR OF NEUROLOGY AND VICE CHAIRMAN 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.

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)

Ruthmary K. Deuel, M.D., Columbia University, 1961. (See Department of Pediatrics.)

W. Edwin Dodson, M.D., Duke University, 1967. (See Department of Pediatrics.)

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 Professor of Neurology

John C. Morris, M.D., University of Rochester, 1974. (See Department of Pathology.)

Alan L. Pearlman, M.D., Washington University, 1961. (See Department of Cell Biology and Physiology.)

Alan Pestronk, M.D., The Johns Hopkins University, 1970. (See Department of Pathology.)

Steven E. Petersen, Ph.D., California Institute of Technology, 1981. (Neuropsychology) (See Department of Neurological Surgery, Department of Anatomy and Neurobiology and Department of Radiology.)

William J. Powers, M.D., Cornell University, 1975. (See Department of Radiology.)

Allen P. and Josephine B. Green Professor of Pediatric Neurology

Arthur L. Prensky, M.D., New York University, 1955. (See Department of Pediatrics.)

Marcus E. Raichle, M.D., University of Washington, 1964. (See Department of Radiology.)

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.)

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.)

John L. Trotter, M.D., Washington University, 1969. (Gordon R. and Thelma B. Coates Scholar in Neurology)

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 Neurological Surgery, Department of Anatomy and Neurobiology and Department of Cell Biology and Physiology.)

Research Professor

Mark F. Jacquin, Ph.D., City University of New York, 1980.

Professors (Clinical)

Herbert E. Rosenbaum, M.D., University of Oregon, 1949.

E. Robert Schultz, M.D., Washington University, 1955. (See Department of Psychiatry.)

Stuart Weiss, M.D., Washington University, 1954.

Professor (Adjunct)

John L. Burns, Ph.D., Columbia University, 1950.

Associate Professor Emeritus

Lawrence A. Coben, M.D., Case Western Reserve University, 1954.

Associate Professors

C. Robert Almli, Ph.D., Michigan State University, 1970. (See Program in Occupational Therapy.)

Anne H. Cross, M.D., University of Alabama, 1980.

Michael N. Diringer, M.D., University of Kentucky, 1982. (See Department of Neurological Surgery and Program in Occupational Therapy.)

Alexander W. Dromerick, M.D., University of Maryland, 1986. (See Program in Occupational Therapy.)

Mark P. Goldberg, M.D., Columbia University, 1984.

David H. Gutmann, M.D., Ph.D., University of Michigan, 1986. (See Department of Genetics and Department of Pediatrics.)

David M. Holtzman, M.D., Northwestern University, 1985. (See Department of Molecular Biology and Pharmacology.)

Anthony J. Margherita, M.D., Georgetown University, 1985.

Jeffrey J. Neil, M.D., Ph.D., Washington University, 1984. (See Department of Pediatrics.)

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 Radiology.)

Shirley A. Sahrmann, Ph.D., Washington University, 1973. (Neurophysiology) (See Department of Cell Biology and Physiology and Program in Physical Therapy.)

Richard S. Sohn, M.D., The University of Chicago, 1968.

Research Associate Professor

Shan Ping Yu, M.D., Ph.D., Capital Institute of Medicine, 1979.

Associate Professor Emeritus (Clinical)

Joseph M. Dooley Jr., M.D., St. Louis University, 1958.

Associate Professors (Clinical)

Joseph T. Black, M.D., State University of New York, Upstate, 1965.

Garrett C. Burris, M.D., University of Southwestern Louisiana, 1968. (See Department of Pediatrics.)

Walter Lemann, M.D., Tulane University, 1979.

James R. Rohrbaugh, M.D., Ohio State University, 1974. (See Department of Pediatrics.)

Associate Professor (Adjunct)

Warren E. Lux, M.D., New York University, 1970.

Assistant Professors

Muhammad T. Al-Lozi, M.D., King Edward Medical College, 1980.

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.)

M. Carolyn Baum, Ph.D., Washington University, 1993. (See Program in Occupational Therapy.)

Janice E. Brunstrom, M.D., Medical College of Virginia, 1987. (See Department of Pediatrics.)

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.)

Catherine J. Doty, M.D., University of Missouri, Kansas City, 1989.

Laura L. Dugan, M.D., Ohio State University, 1987. (See Department of Medicine.)

Stephen P. Duntley, M.D., University of Washington, 1988.

Dorothy F. Edwards, Ph.D., Washington University, 1980. (See Program in Occupational Therapy.)

John McDonald, M.D., Ph.D., University of Michigan, 1992.

Jonathan W. Mink, M.D., Ph.D., Washington University, 1989. (See Department of Anatomy and Neurobiology and Department of Pediatrics.)

Yvette I. Sheline, M.D., Boston University, 1979. (See Department of Psychiatry and Department of Radiology.)

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 Assistant Professors

Maria Margarita Behrens, Ph.D., Universidad Autonoma de Madrid, 1990.

Virginia D. Buckles, Ph.D., University of Wisconsin, Madison, 1981.

Julaine M. Florence, P.T., M.H.S., Washington University, 1983.

Kathleen Mann Koepke, Ph.D., University of North Carolina, 1983. (Psychology)

Hanneke van Mier, Ph.D., University of Nijmegen, The Netherlands, 1992. (See Department of Radiology.)

Tom O. Videen, Ph.D., University of Washington, 1981. (Neurophysiology) (See Department of Radiology.)

Ling Wei, M.D., Beijing Capital Institute of Medicine, Beijing, China, 1977.

Jian Xu, Ph.D., Shanghai Institute of Materia Medica, 1991.

Assistant Professors Emeriti (Clinical)

William B. Hardin, M.D., University of Texas, Galveston, 1957.

David Mendelson, M.D., Indiana University, 1948.

Assistant Professors (Clinical)

Denis I. Altman, M.B., B.Ch., University of The Witwatersrand, 1975. (See Department of Pediatrics.)

Lynn B. Blackburn, Ph.D., Indiana University, 1972.

Royal Grueneich, Ph.D., University of Minnesota, 1978.

Joseph Hanaway, M.D., McGill University, 1960.

J. Michael Hatlelid, M.D., Washington University, 1977.

John F. Mantovani, M.D., University of Missouri, 1974. (See Department of Pediatrics.)

Robert P. Margolis, M.D., St. Louis University, 1975.

David M. Reisler, M.D., Washington University, 1961.

Eli R. Shuter, M.D., Washington University, 1960.

Howard I. Weiss, M.D., Tulane University, 1972.

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., The Rockefeller University, 1977; M.D., State University of New York, Buffalo, 1981. (See Department of Radiology.)

Instructor Emerita

In-Sook Sunwoo, M.D., Woo Sok University, 1992.

Instructors

Lizette Alvarez, M.D., Ponce School of Medicine, Ponce, Puerto Rico, 1991.

Deborah Babcock, M.D., Ph.D., University of Illinois, 1988.

Kevin J. Black, M.D., Duke University, 1990. (See Department of Psychiatry.)

John Choi, M.D., Hahnemann University Medical School, 1992.

Holly Crowley, M.D., University of Mississippi, 1994.

Ellen Deibert, M.D., Temple University School of Medicine, 1993.

M. Zubair Kareem, M.D., Punjab University, Lahore, Pakistan, 1986.

Kongkiat Kulkantrakorn, M.D., Mahidol University, Bangkok, Thailand, 1993.

Ashok Kumar, M.D., Dow Medical College, Pakistan, 1985.

Jennifer Kwon, M.D., University of Michigan, 1989.

Jin-Moo Lee, M.D., Cornell University, 1993.

Michael Levin, M.D., Washington University, 1993.

Todd Levine, M.D., Duke University, 1993.

Glenn Lopate, M.D., Ohio State University, 1987.

Theodore Lowenkopf, M.D., Jefferson Medical College, 1993.

David Murphy, M.D., University of Arkansas, 1992.

Patricia Naslund, M.D., Duke University, 1994.

Abdullah Nassief, M.D., King Saud University, Riyadh, Saudi Arabia, 1990.

Heidi Prather, D.O., University of Health Sciences College, 1991.

Joy B. Snider, M.D., Ph.D., University of Texas, Southwestern, 1986.

Keith Tansey, M.D., Ph.D., University of Texas, Southwestern, 1994.

Kun Xu, M.D., Zhongshan Medical University, 1978.

Allyson Zazulia, M.D., Georgetown University, 1994.

Research Instructors

Juanita Carl, M.A., Washington University, 1962.

Mary A. Coats, B.S.N., Southern Illinois University, 1980.

Terri L. Hosto, M.S.W., University of Michigan, 1986.

Pamela E. Millsap, M.S.G., University of Texas, Arlington, 1989.

Joanne Norton, M.S.N., St. Louis University, 1992.

Janice Palmer, M.S.G., University of Missouri, St. Louis, 1994.

Maria Stehman, M.S.N., St. Louis University, 1994.

Instructors (Clinical)

Sylvia Awadalla, M.D., Ohio State University, 1985.

Max Benzaquen, M.D., Ph.D., San Marcos University, 1978.

James S. Bonner, M.D., University of Missouri, 1980. (See Department of Pediatrics.)

David J. Callahan, M.D., Washington University, 1986. (See Department of Pediatrics.)

Juan Escandon, M.D., Colombian School of Medicine, Bogota, Colombia, 1989.

Bennett D. Frank, M.D., Ph.D., Baylor College of Medicine, 1988.

Gerlyn Friesenhahn, M.D., University of Texas, San Antonio, 1986.

James M. Goldring, Ph.D., Washington University, 1977; M.D., 1986.

David Peeples, M.D., The University of Chicago, 1986.

Karen J. Pentella, M.D., Ohio State University, 1979.

Daniel Phillips, M.D., Washington University, 1980.

Sandra L. Tate, M.D., Southern Illinois University, 1987.

Neurological Surgery

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 Pediatrics and Department of Anatomy and Neurobiology.)

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 Neurology, Department of Anatomy and Neurobiology and Department of Cell Biology and Physiology.)

Associate Professors

Andreas H. Burkhalter, Ph.D., University of Zurich, 1977. (See Department of Anatomy and Neurobiology.)

Bruce A. Kaufman, M.D., Case Western Reserve University, 1982.

Steven E. Petersen, Ph.D., California Institute of Technology, 1981. (See Department of Neurology, Department of Anatomy and Neurobiology and Department of Radiology.)

Keith M. Rich, M.D., Indiana University, 1977. (See Department of Anatomy and Neurobiology and Department of Radiology.)

Research Associate Professor

Jack R. Engsberg, Ph.D., University of Iowa, 1985.

Assistant Professors

Michael R. Chicoine, M.D., University of California, Los Angeles, 1990.

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.

Robert E. Drzymala, Ph.D., University of Oklahoma, 1977. (See Department of Radiology.)

Jeffrey M. Gidday, Ph.D., University of Virginia, 1986. (See Department of Ophthalmology and Visual Sciences and Department of Cell Biology and Physiology.)

Carl Lauryssen, M.B., Ch.B., University of Cape Town, 1988.

Research Assistant Professors

Hans H. Dietrich, Ph.D., Max Planck Institute, Germany, 1986.

Bradley Miller, Ph.D., Cornell University, 1991.

Assistant Professor (Adjunct)

Matthew A. Howard, M.D., University of Cincinnati, 1984.

Research Scientists

Gary W. Harding, B.S., M.S.E., University of Washington, 1983. (See Department of Otolaryngology.)

Gordon L. Shulman, Ph.D., University of Oregon, 1979. (See Department of Neurology.) (Also Department of Psychology)

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

The Department of Obstetrics and Gynecology has clinical teaching services located at Barnes-Jewish Hospital, Missouri Baptist Hospital and Christian Hospital Northwest 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, Missouri Baptist: James A. Bartelsmeyer, M.D.
Maternal Fetal Medicine, Barnes-Jewish: D. Michael Nelson, M.D., Ph.D.
Reproductive Endocrinology and Infertility: Randall R. Odem, M.D.
Gynecology: Rebecca P. McAlister, M.D.
Ultrasound and Genetics: Jeffrey M. Dicke, 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 which 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 pediatrics 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 six-week 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, Missouri Baptist Hospital, Christian Hospital Northwest and Scott Air Force Base. 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.*, 362-3126

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 or 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 four-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.,* 286-2400

The subintern will participate (in the office and hospital) in the study and treatment of women with reproductive endocrine disorders and infertility. She or 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 also are available. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M45 830 GYN ONCOLOGY SUBINTERNSHIP

Instructor: *David G. Mutch, M.D.,* 362-3181

The subintern will take part in the workup of tumor patients prior to surgery and/or radiotherapy, assist in pelvic operations, help render postoperative care and review pathology specimens and slides. She or he will participate in GYN Tumor Clinic sessions, make hospital rounds with house staff, consultations and attend OB-GYN conferences. Opportunities for clinical or basic research project in gynecologic malignancy also are available. Valid start weeks for four-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

Sub-interns 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 and preterm labor. 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. The student will prepare a brief talk on a topic of his/her interest during the course of the rotation. Valid start weeks for four-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 also will observe specimen preparation in the cytogenetics laboratory and 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 two-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.

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.), and 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.

Yoel Sadovsky, M.D., 747-0937

1) Steroid receptors: We are investigating the mechanism of transcriptional activation by Steroidogenic Factor 1 (SF-1). This "orphan" nuclear receptor is essential for development of both female and male gonads, and the adrenal glands.
2) Placental injury: In collaboration with Michael Nelson, we are studying placental dysfunction in preeclampsia and fetal growth retardation.
We presently use molecular approaches to analyze the transcriptional regulation of cyclooxygenase (1 and 2) in normal and abnormal placentas.

Frederick Sweet, Ph.D., 362-3174

Estrogens and progesterone control the development and function of the female reproductive system. Laboratory research is focused on the biosynthesis, transport and mechanism of hormones with emphasis on the interactions between steroid hormones and macromolecules. New steroid hormone analogs are synthesized and tested for these studies. Most recently, new analogs of estrone and estradiol are tested as inhibitors of natural and recombinant estrogen-binding proteins.

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.)

Diane F. Merritt, M.D., New York University, 1975.

D. Michael Nelson, M.D., Ph.D., Washington University, 1977.

Mark C. Norris, M.D., Jefferson Medical College, 1980. (See Department of Anesthesiology.)

Kenneth L. Polakoski, Ph.D., University of Georgia, 1972.

Frederick Sweet, Ph.D., University of Alberta, 1968.

Professors Emeriti (Clinical)

S. Michael Freiman, M.D., Washington University, 1955.

John E. Hobbs, M.D., Washington University, 1927.

William H. Masters, M.D., University of Rochester, 1943. (See Department of Psychiatry.)

Professors (Clinical)

Robert Burstein, M.D., Washington University, 1948.

Andrew E. Galakatos, M.D., University of Missouri, 1965.

Marvin Rennard, M.D., Washington University, 1952.

Associate Professors

James A. Bartelsmeyer, M.D., University of Illinois, 1985.

Rita Basuray, Ph.D., University of Illinois, 1983.

Jeffrey M. Dicke, M.D., Ohio State University, 1978.

Deborah J. Gersell, M.D., Washington University, 1975. (See Department of Pathology.)

Paul J. Goodfellow, Ph.D., Queen's University, 1985. (See Department of Surgery.)

Diana L. Gray, M.D., University of Illinois, 1981. (See Department of Radiology.)

Asko I. Kivikoski, M.D., University of Turku, 1958; D.Sc., 1967.

David G. Mutch, M.D., Washington University, 1980.

Randall R. Odem, M.D., University of Iowa, 1981.

Michael J. Paul, M.D., Northwestern University, 1980.

Klaus J. Staisch, M.D., Free University of Berlin, 1966.

Daniel B. Williams, M.D., University of Missouri, 1985.

Associate Professors Emeriti (Clinical)

Robert S. Goell, M.D., Washington University, 1960.

J. Barlow Martin, M.D., Washington University, 1955.

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.

Godofredo M. Herzog, M.D., Washington University, 1957.

Jacob Klein, M.D., Jefferson Medical College, 1968.

Lee A. Rigg, M.D., Washington University, 1971.

Chotchai Srisuro, M.D., Siriraj Faculty of Medical Sciences, 1967.

Assistant Professors

Jan L. Albrecht-McClure, M.D., St. Louis University, 1989.

Lisa M. Bernhard, M.D., Louisiana State University, 1985.

Ronald J. Chod, M.D., University of Texas, 1983.

Alaa A. Elbendary, M.D., Loyola University, 1989.

Steven T. Fogel, M.D., University of Missouri, 1976. (See Department of Anesthesiology.)

Gilad A. Gross, M.D., St. Louis University, 1992.

Thomas J. Herzog, M.D., University of Cincinnati, 1986.

Fah Che Leong, M.D., Loyola University, 1989.

Rebecca P. McAlister, M.D., University of Kentucky, 1979.

Louis J. Muglia, Ph.D., The University of Chicago, 1986; M.D., 1988. (See Department of Pediatrics and Department of Molecular Biology and Pharmacology.)

Janet S. Rader, M.D., University of Missouri, 1983.

Valerie S. Ratts, M.D., The Johns Hopkins University, 1987.

Yoel Sadovsky, M.D., Hebrew University, 1985. (See Department of Cell Biology and Physiology.)

Andrea L.P. Stephens, M.D., University of California, Los Angeles, 1987.

Research Assistant Professor

James L. Thomas, Ph.D., University of Alabama, 1981.

Assistant Professor (Adjunct)

Lisa M. Olson, Ph.D., University of Illinois, 1986.

Assistant Professors Emeriti (Clinical)

William Berman, M.D., Washington University, 1935.

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.

Robert S. Cohen, M.D., State University of New York, 1962.

Cathleen R. Faris, M.D., University of Kansas, 1982.

Ira C. Gall, M.D., University of Cincinnati, 1951.

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.

Darwin C. Jackson, M.D., Washington University, 1976.

M. Katherine Jahnige, M.D., Harvard University, 1994; M.P.H., Yale University, 1994.

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.

Nathaniel H. Murdock, M.D., Meharry Medical College, 1963.

Gerald Newport, M.D., Washington University, 1953.

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.

David L. Weinstein, M.D., St. Louis University, 1985.

Instructors

Jack B. Basil, M.D., Ohio State University, 1993.

Lesley L. Breech, M.D., Ohio State University, 1994.

Nancy Cibulka, O.G.N.P., University of Wisconsin, 1978.

David Cohn, M.D., Georgetown University, 1994.

Renee D. Ewing, M.D., Southern Illinois University, 1984.

Sarah L. Keller, M.D., Southern Illinois University, 1989.

Gustavo F. Leguizamon, M.D., University of Buenos Aires, 1989.

Roni Levy, M.D., Ben Gurion University, Israel, 1990.

Kelle H. Moley, M.D., Yale University, 1988.

Anil Pinto, M.D., University of Bombay, India, 1986.

Matthew A. Powell, M.D., Michigan State University, 1995.

Jacqueline S. Turner, M.D., Tulane University, 1983.

Emanuel J. Vlastos, M.D., Creighton University, 1989.

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.

Enrique R. Bedia, M.D., University of Iowa, 1991.

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.

Christine M. Cernik, M.D., Rush University, 1983.

Nishan Chobanian, M.D., Brown University, 1992.

Scott L. Christensen, M.D., University of Rochester, 1992.

Francine L. Cosner, M.D., University of Cincinnati, 1992.

Michelle R. de Vera, M.D., Washington University, 1989.

Catherine L. Dean, M.D., University of Missouri, Kansas City, 1983.

Russell B. Dieterich, M.D., University of Illinois, 1970.

Josiah O. Ekunno, M.D., University of Ibadan, Nigeria, 1971.

Marsha N. Fisher, M.D., University of Missouri, 1992.

Gordon M. Goldman, M.D., St. Louis University, 1966.

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.

Laura R. Hulbert, M.D., Washington University, 1981.

Michael K. Johnson, M.D., St. Louis University, 1975.

Vernon L. Johnson, M.D., St. Louis University, 1985.

J. Hoon Kim, M.D., University of Missouri, Kansas City, 1990.

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.

Dennis Larsen, M.D., Loma Linda University, 1990.

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.
Gerard J. Malnar, M.D., St. Louis University, 1987.
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.
Isabelo J. Mercado, M.D., Cebu Institute of Medicine, Philippines, 1972.
Jerry N. Middleton, M.D., Washington University, 1963.
Sam Momtazee, M.D., Shiraz Medical School, 1961.
Alvaro Mora, M.D., Antioquia University, 1975.
Jeffrey S. Mormol, M.D., Washington University, 1991.
Seth A. Myles, M.D., Washington University, 1993.
Roy P. Neimark, M.D., University of Bologna, 1971.
Allen S. Palmer, D.O., Kansas City College of Osteopathy, 1967.
Anthony C. Pearlstone, M.D., Washington University, 1985.
Timothy C. Philpott, M.D., Washington University, 1994.
Aaron J. Pile, M.D., Eastern Virginia Medical School, 1983.
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.
Robert K. Sigman, M.D., University of Pittsburgh, 1972.
D. Elan Simckes, M.D., Hebrew University, 1989.
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.
Daniel G. Wagner, M.D., St. Louis University, 1989.
Gary M. Wasserman, M.D., University of Missouri, Kansas City, 1980.
Mark S. Wasserman, M.D., University of Missouri, Kansas City, 1984.
Anna C. Wolaniuk, M.D., Medical Academy of Lodz, 1975.
Laurel E. Wright, M.D., University of Iowa, 1992.

Instructors (Adjunct)

Elizabeth L. Bowers, B.S.N., Syracuse University, 1978.
Beth Ann Ewing, B.S.N., University of Wyoming, 1986.
Lori K. Irwin, M.S. (PCNS), University of California, San Francisco, 1992.
Patricia Lazaroff, C.N.M., St. Louis University, 1974.
Wendy L. Murray, B.S.N., University of Texas, San Antonio, 1988.
Janice E. Peebly, B.S.N., Pennsylvania State University, 1982.
Catherine Williamson, O.G.N.P., Harbor-UCLA Medical Center, 1988.

DEPARTMENT OF OPHTHALMOLOGY AND VISUAL SCIENCES

Instruction begins in the second year with examination of the eye and a series of lectures on various aspects of ocular disease. During the third year, students are given the opportunity during the surgery block to spend four weeks on the ophthalmology services. In the fourth year, six-week and 12-week clinical or research electives are offered.

SECOND YEAR

Introduction to clinical ophthalmology begins in the second year with a lecture and practicum (peer exam) on taking an ocular history and performing an ocular exam. Emphasis is on the fundus exam and the use of the ophthalmoscope. Additionally, during the second year, there is a series of lectures on various aspects of ocular disease. The emphasis is on ocular manifestations of common systemic diseases; e.g., diabetic retinopathy, hypertensive retinopathy, optic neuritis, papilledema, Grave's ophthalmopathy, as well as common eye diseases such as cataracts and glaucoma. This series of lectures is followed by case problems on which students work after the lecture. This problem-solving approach has proved to be more successful and informative than strict didactic lecture.
Carla Siegfried, M.D., and staff

THIRD YEAR

M50 740 OPHTHALMOLOGY CLERKSHIP
Instructor: *Carla Siegfried, M.D.*, 362-5722

In the third year, students are given the opportunity to spend four weeks of their surgery rotation on the ophthalmology service. At least two weeks are spent in the general ophthalmology clinic and the remaining two weeks are spent in subspecialty clinics of neuro-ophthalmology, pediatric ophthalmology, glaucoma, cornea and external disease or retina in the outpatient eye clinic examining patients with ophthalmology residents. 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 (chemical burns). During this rotation, there is again emphasis on the use of the ophthalmoscope and a comprehensive text is used by students during the rotation.

FOURTH YEAR
Electives

M50 801 OPHTHALMOLOGY
Instructor: *Carla Siegfried, M.D.*, 362-5722

Students may choose a subspecialty service after they rotate two weeks on the chief resident's service:

- Neuro-ophthalmology (Dr. Hart)
- Chief Resident's Service (Dr. Ramin Pirnazar)
- Pediatrics (Drs. Tychsen, Lueder)
- Glaucoma (Drs. Kass, Siegfried, Wax)

Valid start weeks for four-week blocks are:
Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M50 900)

Usha P. Andley, Ph.D., 362-7167
Roles of molecular chaperones in lens function and cataract.

Steven Bassnett, Ph.D., 362-1604
1) Lens cell biology, and 2) ocular gene therapy.

David C. Beebe, Ph.D., 362-1099
1) Molecular and cellular biology of anterior segment development and aging, 2) mechanisms of cataract formation and hereditary glaucoma, and 3) mechanisms regulating blood vessel growth and avascularity in the eye.

Nalini S. Bora, Ph.D., 747-4151
1) Etiology and pathophysiology of uveitis, and 2) complement regulation and interocular inflammation.

Shiming Chen, Ph.D., 747-4350
Regulation of gene expression in the retina.

Thomas A. Ferguson, Ph.D., 362-3745
Cellular and molecular regulation of the ocular immune response.

Timothy P. Fleming, Ph.D., 362-4981
1) Regeneration of corneal endothelium, and 2) genetics of corneal wound healing.

Mae E. 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, and 3) multicenter epidemiological study of keratoconus.

J. William Harbour, M.D., 747-1738
Tumorigenesis and regulation of cell growth.

William M. Hart Jr., M.D., Ph.D., 362-6446
1) Computer applications in visual fields, and 2) experimental perimetry and color vision in glaucoma and neuro-ophthalmology.

M. Rosario Hernandez, D.D.S., 747-1448
Molecular and cellular mechanisms underlying glaucomatous optic neuropathy in humans.

Henry J. Kaplan, M.D., 747-4152
1) Immunologic studies of uveitis (anterior uveitis, pars planitis), 2) retinal pigment epithelium and photoreceptor transplantation, and 3) etiology and pathophysiology of uveitis.

David A. Leib, Ph.D., 362-3826
Latency, pathogenesis and molecular genetics of neurotrophic herpes viruses.

Peter D. Lukasiewicz, Ph.D., 362-4284
Roles of receptors for inhibitory and excitatory amino acids in retina.

Arthur H. Neufeld, Ph.D., 747-1487
1) Ophthalmic pharmacology, and 2) pharmacologic neuroprotection of the optic nerve in glaucoma.

Rajkumar V. Patil, Ph.D., 747-3064
Molecular control of aqueous humor production.

Jay S. Pepose, M.D., Ph.D., 362-5895
Ocular inflammation and infection with focus on: 1) Molecular virology, pharmacology and immunology of herpes simplex; 2) cytokines and MHC class II activation in corneal allograft rejection; 3) ocular manifestations of AIDS; and 4) corneal transplantation and refractive surgery.

J. Mark Petrash, Ph.D., 362-1172
1) Molecular biology and genetics of cataracts, and 2) development of enzyme inhibitors for prevention of diabetic cataracts and retinopathy.

V. Nathan Ravi, M.D., Ph.D., 362-1395
Prevention and treatment of diabetic complications: synthesizing drugs as inhibitors of non-enzymatic glycosylation of proteins and DNA.

Carmelo Romano, Ph.D., 362-2676
Role of receptors for excitatory amino acids (EAAs) in the vertebrate retina.

Alan Shiels, Ph.D., 362-1637
Pathogenetics of cataract and refractive eye disease.

P. Michael Stuart, Ph.D., 362-9336
1) Mechanisms of corneal allograft and responses, and 2) mechanisms of microbial-lymphocyte interactions.

Andrei P. Sourgoatchev, Ph.D., 747-4430
1) Markers of retina and optic nerve degeneration, and 2) molecular and cell biology of synucleins in optic neural tissues.

Lawrence Tychsen, M.D., 454-6026
Pediatric ophthalmology: 1) development of the visual brain and eye alignment; and 2) visual cortex development, ocular alignment and strabismus.

Martin B. Wax, M.D., 362-3305
1) Cellular and immune mechanisms of glaucomatous optic neuropathy, and 2) aquaporins and fluid transport in the ocular anterior segment.

Faculty

INTERIM CHAIR OF DEPARTMENT AND PROFESSOR

Michael A. Kass, M.D., Northwestern University, 1966.

Professors Emeriti

Bernard Becker, M.D., Harvard University, 1944.

Robert A. Moses, M.D., University of Maryland, 1942.

Morton E. Smith, M.D., University of Maryland, 1960. (See Department of Pathology.)

Professors

David C. Beebe, Ph.D., University of Virginia, 1974.

William M. Hart Jr., Ph.D., University of Maryland, 1970; M.D., 1970.

Henry J. Kaplan, M.D., Cornell University, 1968.

Bernard Becker Research Professor

Arthur H. Neufeld, Ph.D., New York University, 1970.

Bernard Becker Clinical Professor

Jay S. Pepose, Ph.D., University of California, Los Angeles, 1980; M.D., 1982. (See Department of Pathology.)

Professors Emeriti (Clinical)

Benjamin Milder, M.D., Washington University, 1939.

Edward Okun, M.D., University of Vermont, 1956.

Professors (Clinical)

George M. Bohigian, M.D., St. Louis University, 1965.

Robert C. Drews, M.D., Washington University, 1955.

Jack Hartstein, M.D., University of Cincinnati, 1955.

Jack Kayes, M.D., Washington University, 1957.

Allan E. Kolker, M.D., Washington University, 1957.

Travis A. Meredith, M.D., The Johns Hopkins University, 1969.

James E. Miller, M.D., Medical College of Alabama, 1949. (See Department of Pediatrics.)

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.)

Philip L. Custer, M.D., Vanderbilt University, 1978.

Thomas A. Ferguson, Ph.D., University of Cincinnati, 1982. (See Department of Pathology.)

Mae E. Gordon, Ph.D., University of Wisconsin, 1978. (See Division of Biostatistics.)

M. Rosario Hernandez, D.D.S., University of Chile, 1973.

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.

Peter D. Lukasiewicz, Ph.D., University of Michigan, 1984. (See Department of Anatomy and Neurobiology.)

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.

Mitchel L. Wolf, M.D., Albert Einstein College of Medicine, 1968.

Research Associate Professors

Nalini S. Bora, Ph.D., All India Institute of Medical Science, 1981. (See Department of Pathology.)

Andrei P. Sourgoutchev, Ph.D., Cardiology Research Center, Russia, 1975; D.S., 1985.

Associate Professors Emeriti (Clinical)

Neva P. Arribas, M.D., Manila Central University, 1954.

Glen P. Johnston, M.D., Washington University, 1956.

Bernd Silver, M.D., University of Louisville, 1956.

Associate Professors (Clinical)

James C. Bobrow, M.D., The Johns Hopkins University, 1970.

Isaac Boniuk, M.D., Dalhousie University, 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.

Stephen A. Kamenetzky, M.D., Washington University, 1970.

Harry L. Knopf, M.D., Harvard Medical School, 1967.

Louis J. Rosenbaum, M.D., Washington University, 1963.

Matthew A. Thomas, M.D., Harvard University, 1981.

Assistant Professors

Steven Bassnett, Ph.D., University of East Anglia, 1987. (See Department of Medicine.)

Shiming Chen, Ph.D., SUNY Health Science Center, 1992. (See Department of Molecular Biology and Pharmacology.)

Timothy P. Fleming, Ph.D., University of Missouri, 1985. (See Department of Genetics.)

Jeffrey M. Gidday, Ph.D., University of Virginia, 1986. (See Department of Neurological Surgery.)

J. William Harbour, M.D., The Johns Hopkins University, 1990. (See Department of Cell Biology and Physiology.)

Gregg T. Lueder, M.D., University of Iowa, 1985. (See Department of Pediatrics.)

Rajkumar V. Patil, Ph.D., National Chemical Laboratory, 1985.

Carmelo Romano, Ph.D., Stanford University, 1981. (See Department of Anatomy and Neurobiology.)

Alan Shiels, Ph.D., University of London, 1983.

Carla Siegfried, M.D., University of Missouri, Kansas City, 1989.

Richard H. Wiedner, M.D., University of Illinois, 1986.

Research Assistant Professors

Irina G. Sourgoutcheva, Ph.D., Moscow State University, Russia, 1975.

P. Michael Stuart, Ph.D., Northwestern University, 1985.

Assistant Professor Emeritus (Clinical)

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.

Edward F. Berg, M.D., Washington University, 1964.

Ronald C. Bilchik, M.D., Washington University, 1967.

Samuel A. Canaan Jr., M.D., Meharry Medical College, 1954.

Lawrence A. Gans, M.D., Case Western Reserve University, 1977.

James M. Gordon, M.D., University of Minnesota, 1966.

Kenneth O. Green, M.D., University of Missouri, 1960.

Nancy Melberg Holekamp, M.D., The Johns Hopkins University, 1989.

Michael J. Isserman, M.D., Washington University, 1975.

William Steven Joffe, M.D., Washington University, 1963.

Robert L. Lamberg, M.D., Washington University, 1976.

Barry D. Milder, M.D., Washington University, 1973.

Duane L. Mitzel, M.D., Washington University, 1977.
Matthew Newman, M.D., Columbia University, 1959.
F. Thomas Ott, M.D., Washington University, 1965.
John C. Perlmutter, M.D., Cornell University, 1971.
Michael B. Rumelt, M.D., Washington University, 1966.
William L. Walter, M.D., Ohio State University, 1954.
Stephen A. Wexler, M.D., University of Michigan, 1982.

Instructors

Carrie S. Gaines, O.D., University of Missouri, 1988.
Daniel P. Joseph, Ph.D., University of California, Berkeley, 1988; M.D., Wayne State University, 1992.
Mary Migneco, O.D., University of Missouri, 1991.
Mark S. Rallo, O.D., University of Missouri, 1990.
V. Nathan Ravi, Ph.D., Virginia Tech, 1980; M.D., University of Miami, 1988.
William Ridgeway, M.D., University of Missouri, 1961.
Daniel D. Seibert, O.D., Illinois College of Optometry, 1979.
Walter R. Stafford, M.D., St. Louis University, 1957.
Russell N. Van Gelder, Ph.D., M.D., Stanford University, 1994.

Instructors Emeritus (Clinical)

Ruth S. Freedman, M.D., Washington University, 1942.
Maxwell Rachlin, M.D., University of Toronto, 1942.
Mickey L. Salmon, M.D., Louisiana State University, 1959.

Instructors (Clinical)

Levent Akduman, M.D., Harettepe University of Turkey, 1988.
William L. Becker, M.D., Washington University, 1987.
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.
Bruce H. Cohen, M.D., The Johns Hopkins University, 1980.
Nicholas N. Colosi, M.D., St. Louis University, 1968.
Bruce S. Frank, M.D., Washington University, 1976.
Michael S. Korenfeld, M.D., Washington University, 1986.
Donald S. Levy, M.D., Washington University, 1991.
Robert F. Munsch, M.D., St. Louis University, 1977.
Paul F. Nichols, M.D., University of California, 1982.
Mark A. Rothstein, M.D., University of Utah, 1991.
Steven M. Shields, M.D., Washington University, 1986.
Howard N. Short, M.D., St. Louis University, 1978.
Mark H. Spurrier, M.D., Washington University, 1980.
Ivan Suner, M.D., Yale University, 1992.

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.
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.
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.
Louis Gemoules, O.D., Illinois College of Optometry, 1954.
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.

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 Upper Extremity; Spine; Sports Medicine; Trauma; Foot and Ankle; 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, *Integrated Surgical Disciplines M95 790.* These include: Pediatric Orthopaedic Surgery at Shriners Hospital with Dr. Schoenecker, Pediatric Orthopaedic Surgery at St. Louis Children's Hospital with Dr. Gordon, General Orthopaedic Surgery at the Veterans Adminstration Medical Center with Dr. Miller, Sports Medicine at Barnes-Jewish Hospital with Dr. Matava, and General Orthopaedic Surgery at Barnes-Jewish Hospital North Campus with Dr. Wright. 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 time the student participates in orthopaedic conferences, outpatient clinics, surgical cases and patient rounds. Night call is optional but is advisable. The medical students electing this clerkship will serve as an active and integral part of the orthopaedic team. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 842 ORTHOPAEDIC SHOULDER/ELBOW SURGERY ELECTIVE

Instructor: *Ken D.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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 843 ORTHOPAEDIC HAND AND UPPER-EXTREMITY SURGERY ELECTIVE

Instructors: *Martin I.Boyer, M.D.; Richard H. Gelberman, M.D.* (both: 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 845 ORTHOPAEDIC HAND AND UPPER-EXTREMITY SURGERY ELECTIVE

Instructor: *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. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 846 ORTHOPAEDIC TRAUMA ELECTIVE

Instructor: *Joseph Borrelli Jr., 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 848 ORTHOPAEDIC PEDIATRIC SURGERY ELECTIVE

Instructor: *George S. Bassett, M.D.*, 454-6163

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 are required. Valid start weeks for four-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, 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. Night call is optional but is advisable. The medical students electing this clerkship will serve as an active and integral part of the orthopaedic team. Valid start weeks for four-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: *Kiebyun Daniel Riew, M.D.*, 747-2534

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 are activities in the OR and outpatient clinics. Attendance at and participation in the weekly orthopaedic and spinal conference activities are suggested. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 899 ORTHOPAEDIC SURGERY EXTERNSHIP (VISITING STUDENTS ONLY)

Instructor: *Martin I. Boyer, M.D.*, 747-2543

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, education coordinator for the department, for further information (see below). Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Donna DePond is the Education Coordinator for the Department of Orthopaedic Surgery and may be reached by phone (747-2543) or e-mail (depondd@msnotes.wustl.edu).

Research (M95 900)

Various Orthopaedic Surgery research opportunities are available with the following faculty attendings. If interested, please contact the physician at 747-2543.

Joseph Borrelli Jr., M.D.

Martin I. Boyer, M.D.

Richard H. Gelberman, M.D.

Jeffrey E. Johnson, M.D.

Lawrence G. Lenke, M.D.

Kiebyun Daniel Riew, M.D.

Linda J. Sandell, Ph.D.

Matthew J. Silva, Ph.D.

Rick W. Wright, M.D.

Ken D. Yamaguchi, M.D.

Faculty

FRED C. REYNOLDS PROFESSOR OF ORTHOPAEDIC SURGERY AND HEAD OF DEPARTMENT

Richard H. Gelberman, M.D., University of Tennessee, 1969.

Professor Emeritus

Lee T. Ford, M.D., University of Tennessee, 1940.

Professors

Louis V. Avioli, M.D., Yale University, 1957. (See Department of Medicine.)

Dr. Asa C. and Dorothy Jones Professor of Orthopaedic Surgery

Keith H. Bridwell, M.D., Washington University, 1977.

Paul R. Manske, M.D., Washington University, 1964.

Linda J. Sandell, Ph.D., Northwestern University, 1980. (See Department of Medicine.)

Perry L. Schoenecker, M.D., University of Wisconsin, 1968.

Associate Professors

Roberto Civitelli, M.D., Siena University, 1980. (See Department of Medicine.)

Jeffrey E. Johnson, M.D., Georgetown University, 1980.

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.

Gary A. Miller, M.D., Jefferson Medical College, 1977.

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, Ph.G., St. Louis College of Pharmacy, 1928; M.D., University of Louisville, 1937.

Assistant Professors

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.

Jerome J. Gilden, M.D., Washington University, 1952.

Matthew J. Matava, M.D., University of Missouri, Kansas City, 1987.

George A. Paletta Jr., M.D., The Johns Hopkins University, 1988.

Kiehyun Daniel Riew, M.D., Case Western Reserve University, 1984.

Robert A. Shively, M.D., University of Illinois, 1969.

Matthew J. Silva, Ph.D., Massachusetts Institute of Technology, 1996.

Ken D. Yamaguchi, M.D., George Washington University, 1989.

Research Assistant Professor

Jueren Lou, M.D., Kiangi Medical College, 1983.

Instructors

Leesa Galatz, M.D., George Washington University, 1993.

J. Eric Gordon, M.D., University of California, 1988.

William M. Ricci, M.D., Duke University, 1992.

Rick W. Wright, M.D., University of Missouri, 1988.

Instructor Emeritus (Clinical)

W. Edward Lansche, M.D., Washington University, 1952.

DEPARTMENT OF OTOLARYNGOLOGY

Otolaryngology is presented to students in the second-, third- and fourth-year classes. Clinically oriented lectures and a physical diagnosis workshop are presented to sophomores. 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 is offered to students headed for primary care which gives them comprehensive ambulatory experience.

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 and St. Louis Children's Hospital. 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 which 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.

SECOND YEAR

OTOLARYNGOLOGY AND PHYSICAL DIAGNOSIS
Lecturer: *Joel A. Goebel, M.D.,* 747-0553

Clinically oriented lectures in otolaryngology are given to the entire class. Subjects include ear disease, vertigo, nose, sinus and larynx problems, and head and neck cancer.

THIRD YEAR

M55 750 OTOLARYNGOLOGY CLERKSHIP
Instructor: *Joel A. Goebel, M.D.,* 747-0553

A two-week exposure to otolaryngology outpatient and inpatient management. Emphasis will be on ambulatory care evaluation and decision-making skills.

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 the Veterans Administration Medical Center is available. Valid start weeks for four-week blocks are: 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 exposes student to a broad spectrum of patients. At the Veterans Administration Medical Center, the emphasis is 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 and is involved in pre- and postoperative surgical care, as well as outpatient medical care.

Preceptorship — Student is assigned to a private practitioner's office, functioning there as well as on hospital service.

Other options can be entertained and formulated according to a 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 is expected. Valid start weeks for two-week blocks are: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

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 four-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 per 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 four-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 Dr. 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 the Veterans Administration Medical Center. 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 efficiently. Valid start weeks for four-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 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M80 815 CLINICAL EPIDEMIOLOGY AND BIOSTATISTICS FOR THE CLINICAL INVESTIGATOR

Instructor: *Jay F. Piccirillo, M.D.*, 362-7394

The goal for this course is to introduce the concepts of architecture of clinical research, biostatistics and data processing to medical students, residents and fellows. It builds and expands on topics introduced in the first-year course. Lecture topics include: principles of comparative research, goals of medical management, descriptive research, outcomes research, extraction of data from the medical records, measuring quality in medicine, biostatistics, and hypothesis testing. It is intended for all medical students who are planning to conduct clinical research during medical school or residency. Valid start weeks: Weeks 1-4 only.

Research (M55 900)

Barbara A. Bohne, Ph.D., 362-7497

Structure and function of the normal and abnormal inner ear. Normal mice and those with various inner-ear mutations are tested functionally by recording auditory evoked potential thresholds to clicks and frequency-specific tone pips. Their ears are then prepared for quantitative evaluation at the light and transmission electron microscopic level. The anatomical data are correlated with functional data. Currently, the following mice are under investigation: one that develops presbycusis at an early age and is very susceptible to noise-induced hearing loss; one with Alport's-like syndrome which has a collagen IV defect and develops progressive kidney

disease and occasionally sensorineural hearing loss; FGFR3 null, a mouse in which development of its organ of Corti arrests at the newborn stage; Tilted, a mouse that cannot swim because it lacks vestibular otoconia. Other studies utilize noise-exposed chinchillas as a model for humans with severe sensorineural hearing loss. In this case, we are developing strategies to deliver drugs and growth factors directly to the inner ear in an atraumatic fashion. The long-term goal is to stimulate nerve-fiber regeneration in the profoundly deaf ear prior to surgical placement of a cochlear prosthesis.

John M. Fredrickson, M.D., 362-7550
Research into the feasibility of a middle ear implantable hearing aid for patients with severe bilateral nerve hearing loss. Students will become familiar with evoked response studies in humans, temporal bone dissection, interpretation of special CT scanning and the fundamentals of biologically inert implants.

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.B., Ch.B., 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. 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.

Harlan R. Muntz, M.D., 454-6162
Evaluation and treatment methods for disorders of the velopharynx and larynx in children.

J. Gail Neely, M.D., 362-7344
Facial Motion Analysis Laboratory: Clinical research application of subtracted digitized image light reflectance. Students will participate in videotaping normal subjects and patients with facial paralysis and synkinesis, in using an unique computer program to analyze dynamic surface deformations during facial expression, and in using spreadsheet and statistical applications in order 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
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 current studies are focused on characterizing specific regions of chromosome arms 8p and 13q which appear to contain novel suppressor genes. Students will be exposed to a variety of molecular genetic techniques including those required for long range genomic cloning and contig assembly. Students also will be exposed to the statistical methods required to investigate associations between particular genetic lesions and prognosis.

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

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.

John M. Fredrickson, M.D., University of British Columbia, 1957; FRCS(C), 1963; Ph.D., (hon.), Sweden, 1975.

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.

Colin Painter, Ph.D., University of London, 1969.

Donald G. Sessions, M.D., Washington University, 1962.

Margaret W. Skinner, Ph.D., Washington University, 1976.

Gershon J. Spector, M.D., University of Maryland, 1964.

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)

Professors Emeriti (Clinical)

Benard C. Adler, M.D., Washington University, 1937.

David A. Bensinger, D.D.S., St. Louis University, 1948. (Periodontics)

Harold M. Cutler, M.D., Tufts University, 1937.

Morris Davidson, M.D., Indiana University, 1938.

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)

Donald W. Nielsen, Ph.D., Wayne State University, 1968.

Associate Professors

W. Donald Gay, D.D.S., University of Tennessee, 1966.

Joel A. Goebel, M.D., Washington University, 1980.

Bruce H. Haughey, M.B., Ch.B., University of Auckland, 1977.

Rodney P. Lusk, M.D., University of Missouri, 1977. (See Department of Pediatrics.)

Harlan R. Muntz, M.D., Washington University, 1977. (See Department of Pediatrics.)

Alec N. Salt, Ph.D., University of Birmingham, 1977.

Steven B. Scholnick, Ph.D., Cornell University, 1982.

Stanley E. Thawley, M.D., University of Texas Medical Branch, 1967.

Michael Valente, Ph.D., University of Illinois, 1975. (Audiology)

Research Associate Professors

Richard A. Baird, Ph.D., University of California, Berkeley, 1981.

A. Maynard Engebretson, D.Sc., Washington University, 1970.

Dwayne D. Simmons, Ph.D., Harvard University, 1986.

Isolde Thalmann, Ph.D., California Western University, 1982.

Research Associate Professor (Adjunct)

Roanne G. Karzon, Ph.D., Washington University, 1982. (Audiology)

Associate Professor Emeritus (Clinical)

Guerdan Hardy, M.D., Washington University, 1929.

Associate Professors (Clinical)

Samir K. El-Mofty, Ph.D., Temple University, 1975. (See Department of Pathology.)

Laurence A. Levine, M.D., Albany Medical College, 1971.

Edward H. Lyman, M.D., Washington University, 1937.

Philip L. Martin, M.D., St. Louis University, 1968.

Wayne A. Viers, M.D., University of Oklahoma, 1956.

Joseph W. West, M.D., Duke University, 1944.

Assistant Professors

Randall A. Clary, M.D., University of Illinois, 1984. (See Department of Pediatrics.)

James W. Forsen Jr., M.D. Washington University, 1988.

James M. Hartman, M.D., University of Missouri, Kansas City, 1988.

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.)

Brock D. Ridenour, M.D., Tulane University, 1985.

Mark S. Wallace, M.D., Louisiana State University, 1987.

Assistant Professors Emeriti (Clinical)

Donald R. Ingram, M.D., University of Illinois, 1956.

Herbert M. Smit, M.D., St. Louis University, 1933.

Assistant Professors (Clinical)

Louis S. Altshuler, D.D.S., Ohio State University, 1945.

Wallace P. Berkowitz, M.D., Boston University, 1967.

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.

George J. Hruza, M.D., New York University, 1982.

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

Brian T. Faddis, Ph.D., University of California, Davis, 1994.

Mark E. Warchol, Ph.D., Northwestern University, 1989.

Research Scientist

Gary W. Harding, B.S., M.S.E., University of Washington, 1983. (See Department of Neurological Surgery.)

Instructor

Carl F. Ehrlich, M.D., University of Missouri, 1965.

Instructors (Clinical)

Marc B. Abrams, D.D.S., University of Missouri, 1972.

Murray H. Appelbaum, D.M.D., Washington University, 1983.

Ellis M. Arjmand, M.D., Northwestern University, 1987.

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.

Steven D. Chod, D.D.S., University of Missouri, Kansas City, 1980.

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.

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.

Makwana Kamlesh, D.D.S., Marquette University School of Dentistry, 1996.

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.

Marshall S. Manne, D.D.S., Washington University, 1960.

Scott A. McClain, D.D.S., University of Missouri, Kansas City, 1991.

Murray D. McGrady, M.D., University of Illinois, 1986.

John W. McKinney, M.D., University of Missouri, 1979.

Stewart E. Mooreland, D.M.D., Washington University, 1983.

Michael J. Pernoud, D.D.S., University of Missouri, Kansas City, 1975.

Barry A. Polinksy, D.D.S., University of Missouri, Kansas City, 1987.

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.

Robert S. Simon, D.D.S., Washington University, 1953.

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 Instructors

John E. Demott, M.A., University of Missouri, 1978.

Yilong Ma, Ph.D., Wuhan University, China, 1982.

Allen F. Mensinger, Ph.D., Vanderbilt University, 1990.

DEPARTMENT OF PATHOLOGY

Modern pathology is concerned with the molecular and ultrastructural basis of disease. Historically, morphologic studies provided the foundations of our concepts of disease, and ultrastructural studies continue to add to our understanding, but modern pathology utilizes virtually all of the tools of basic science. Pathologists are involved in diagnostic, teaching and research activities.

In addition to the second year of pathology, the department conducts numerous combined conferences which third- and fourth-year students attend as part of individual clinical clerkships. These are described below.

Students, usually in their fourth year, may elect to participate in advanced courses or clerkships in autopsy or surgical pathology or laboratory medicine, or to pursue research in experimental pathology.

The department offers a course of study leading to the Ph.D. degree. Medical students who desire to combine graduate and medical programs of study should consult Dr. Jacques Baenziger.

For the purpose of teaching, research and service, the department is divided into specialty divisions under the following directors:

Division of Anatomic Pathology, *Dr. L. Dehner*
Division of Laboratory Medicine, *Dr. J. Miletich*
Division of Neuropathology, *Dr. R. Schmidt*
Center for Immunology, *Dr. R. Schreiber*
Autopsy Pathology Service, *Dr. J. Saffitz*
Graduate Program in Immunology, *Dr. R. Schreiber*
Pathology Course/Course Master, *Dr. E. Crouch*

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

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 which consist of POPS (Patient Oriented Problem-Solving System in Immunology). The POPS consist of workbooks that contain a clinical problem which 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. The third edition of *Immunobiology* by Janeway and Travers is used. For the small group discussion, the textbook *Case Studies in Immunology* by Rosen and Geha will be used. There will be two exams consisting of multiple choice 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, Ph.D., M.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 four-week blocks are: Weeks 1, 13, 17, 21, 25, 29, 33, 37 and 41.

M60 815 OB-GYN PATHOLOGY SUBINTERNSHIP

Instructor: *Deborah J. Gersell, M.D.,* 362-0115

This 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M60 820 SURGICAL PATHOLOGY — BARNES-JEWISH HOSPITAL SOUTH CAMPUS

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 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. Valid start weeks for four-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

This course is structured to give the student a full-time immersion in the specialty of Neuropathology. There are daily didactic sessions which 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: 35-40 hrs./week. Valid start weeks for four-week blocks are: Weeks 13, 17, 21, 29, 33, 37 and 41.

M60 841 PEDIATRIC PATHOLOGY

Instructor: *Frances V. White, M.D.,* 362-0147

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 and Barnes-Jewish hospitals. 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 Dr. White.

M60 850 SURGICAL PATHOLOGY — BARNES-JEWISH HOSPITAL NORTH CAMPUS

Instructors: *Steven L. Teitelbaum, M.D., and staff,* 454-8463

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 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M60 860 CLINICAL LABORATORY MEDICINE — BARNES-JEWISH HOSPITAL SOUTH CAMPUS

Instructor: *Joseph P. Miletich, 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 four-week blocks are: Weeks 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 indications for application of interventional hematology, such as photopheresis and peripheral stem cell harvest for marrow transplantation. Valid start weeks for four-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)

Cross listed with L41 (Bio) 590

Paul M. Allen, Ph.D., 362-8758

Research in immunology. The processing and presentation of self proteins and their relationship to self-tolerance and autoimmunity.

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

Investigations relating to the structure and function of collagenous carbohydrate binding proteins known as collectins. We actively are investigating the structure, function, synthesis, assembly and secretion of SP-D, a long surfactant associated collectin that has been implicated in the innate pulmonary host defense against a wide variety of important bacterial, fungal and viral pathogens. The laboratory currently is studying the human SP-D promoter and using site-directed mutagenesis to examine the structural requirements for assembly, secretion and biologic activity.

Jonathan D. Katz, Ph.D., 747-1221

Research in autoimmune diabetes. Type I or insulin-dependent diabetes mellitus is the autoimmune form of diabetes associated with lymphocyte infiltration of the islets of Langerhans. T lymphocytes play in the development of diabetes in humans and in the NOD mouse model for the disease. We use transgenic and knockout mouse approaches to dissect the role T cells play in disease induction and propagation.

Jack H. Ladenson, Ph.D., 362-3186

Development and use of monoclonal antibodies including single-chain antibodies and antibody libraries.

Robinna G. Lorenz, M.D., Ph.D., 362-3669

The focus of research in our laboratory is the cellular and molecular immunology of the gastrointestinal tract. The research focuses on the mechanisms which allow microorganisms and foreign proteins to initiate an immune response, while similar oral exposure to commensal microorganisms and food proteins results in tolerance. One area of our research focuses on a specialized epithelial transport cell, the M cell, which is thought to play a key role in achieving mucosal immunity to luminal antigens. Our second area of interest is oral tolerance. The cells involved in the induction of tolerance, as well as the molecular mechanisms, are currently under investigation.

Douglas M. Lublin, Ph.D., M.D., 362-8849

My laboratory is investigating membrane proteins that are modified by attachment of lipids. The role of the lipid is studied by biochemical, cellular and molecular biological approaches.

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 ß-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 ß-cells associated with Type II diabetes mellitus and to identify the mitogenic signaling pathways in growth factor and nutrient-mediated ß-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 ß-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 are interested in a subset of genes, termed immediate-early genes, that are rapidly activated by a variety of extracellular stimuli including exposure to growth factors, membrane depolarization such as occurs during neuronal activity, or physiologic stress such as seizure, nerve injury, hypotension or exposure to endotoxin. Many of these genes, including those we have identified (NGFI-A, NGFI-B, NGFI-C), encode transcription factors which presumably guide the cellular responses to environmental change. Understanding the biological function of these proteins within the context of the nervous system is now being pursued via mutagenesis experiments and, by determining their expression patterns in fetal and adult rats, both before and after stress or injury. The phenotype of transgenic mice containing either loss-of-function mutations of these genes or inappropriately high expression of these proteins is now being examined.

Joseph P. Miletich, M.D., Ph.D., 362-3110
Of all the proteins involved in blood coagulation, factor X is most centrally positioned for regulation. More than a dozen other plasma proteins can interact with factor X to effect its activation, local concentration, activity or inhibition. We are systematically studying the regions of the factor X molecule that mediate these interactions using a variety of traditional and novel cellular and molecular biological approaches, with particular emphasis on expression of recombinant proteins. The long-term goal is a better understanding of how coagulation is normally regulated and what goes wrong when clots form that block blood flow.

Curtis A. Parvin, Ph.D., 454-7053
The analytical techniques and theoretical concepts underlying the field of medical decision analysis are investigated. Critical review of the literature is combined with microcomputer application of the techniques to medical problems of interest.

Kevin A. Roth, M. D., Ph.D., 362-7449
The regulation of neuronal death during development and neuropathological conditions.

Jeffrey E. Saffitz, Ph.D., M.D., 362-7728
The goals of our research are to elucidate mechanisms of sudden cardiac death and, ultimately, to develop novel therapies to prevent lethal arrhythmias. Our research is focused on characterization of structural and molecular aspects of gap junction proteins (connexins) as determinants of conduction in the normal heart and the role of deranged intercellular coupling at gap junctions in the pathogenesis of sudden cardiac death. Our current research efforts involve the use of genetically altered mice to understand the functional roles of specific connexin gene products and to elucidate cellular and molecular mechanisms underlying remodeling of intercellular connections in the diseased heart that may predispose to the development of lethal ventricular arrhythmias.

Samuel A. Santoro, M.D., Ph.D., 362-8849
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; and 4) the response of axoplasmic transport to experimental injury, particularly the reversal of the polarity of axonal transport at the site of mechanical injury.

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.

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 pathogenes and prevention of diseases, such as osteoporosis. We focus on integrin and cytokine biology utilizing a variety of genetically manipulated mice.

Matthew L. Thomas, Ph.D., 362-8722
Biochemical and genetic analysis of lymphocyte and leukocyte activation and adhesion.

John W. Turk, M.D., Ph.D., 362-8190
Phospholipid-derived mediators insulin secretion. We are studying the process of glucose-induced insulin secretion by isolated pancreatic islets from rat and man. The focus of our current studies is on the involvement of phospholipid-derived mediators in islet signal transduction process including ionic movements. Such compounds include arachidonic acid and its metabolites, diaeylglycerols and inositol phosphates. The analytic work involves gas chromatography, mass spectrometry and dual wavelength microfluorometry, among other methods. We currently are engaged in attempting to clone a novel phospholipase from islets that may be a component of the beta cell fuel sensor apparatus.

Emil R. Unanue, M.D., 362-7440
Research in immunobiology/immunopathology. Examination of cellular interactions resulting in immune induction and cellular immunity. Emphasis is placed on the studies of the cell biology of macrophage and of lymphocyte activation, on the role of macrophages in promoting growth and differentiation of lymphocytes, and on the biochemistry of protein handling. These cellular interactions are being studied in normal and infectious processes and in autoimmune diseases.

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
Students will participate in studies directed toward the identification of novel tumor markers for human breast cancer. Techniques employed will include histopathological analysis and tissue microdissection of tumor tissue from patient biopsies, isolation of tumor-associated nucleic acid, and gene expression analysis using state-of-the-art molecular methods. Reading and discussion focused on current topics in molecular pathology as it relates to cancer diagnosis and treatment will complement research activities.

Terry A. Woodford-Thomas, Ph.D., 362-8768
Molecular and genetic studies on the role of specific protein tyrosine phosphatases in cell proliferation and differentiation.

Mary M. Zutter, M.D., 362-0114
Division of Anatomic Pathology. We focus on the cellular and molecular analysis of the $a_2ß_1$ integrin in normal epithelial and hematopoietic differentiation and in breast cancer biology. We use a number of *in vitro* and *in vivo* models of hematopoiesis and mammary gland morphogenesis.

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., Washington University, 1975; Ph.D., 1975. (See Department of Cell Biology and Physiology.)

Erika C. Crouch, Ph.D., University of Washington, 1978; M.D., 1979.

Louis P. Dehner, M.D., Washington University, 1966.

Timothy J. Eberlein, M.D., University of Pittsburgh, 1977. (See Department of Surgery.)

Deborah J. Gersell, M.D., Washington University, 1975.

Jonathan D. Gitlin, M.D., University of Pittsburgh, 1978. (See Department of Pediatrics.)

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)

John M. Kissane, M.D., Washington University, 1952. (See Department of Pediatrics.)

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.)

Joseph P. Miletich, M.D., Ph.D., Washington University, 1979. (See Department of Medicine.)

Thalachallour Mohanakumar, Ph.D., Duke University, 1974. (See Department of Medicine and Department of Surgery.)

Kenneth M. Murphy, Ph.D., The Johns Hopkins University, 1982; M.D., 1984.

Patrick R. Murray, Ph.D., University of California, 1974. (See Department of Medicine.)

John W. Olney, M.D., University of Iowa, 1963. (See Department of Psychiatry.)

Alan Pestronk, M.D., The Johns Hopkins University, 1970. (See Departments of Neurology and Neurological Surgery.)

Paul and Ellen Lacy Professor

Jeffrey E. Saffitz, Ph.D., Case Western Reserve University, 1977; M.D., 1978. (See Department of 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 of Pathology

Robert D. Schreiber, Ph.D., State University of New York, 1973. (See Department of Molecular Microbiology.)

Carl H. Smith, M.D., Yale University, 1959. (See Department of Pediatrics.)

Samuel H. Speck, Ph.D., Northwestern University, 1980. (See Department of Molecular Microbiology.)

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.)

Joseph R. Williamson, M.D., Washington University, 1958.

Wayne M. Yokoyama, M.D., University of Hawaii, 1978. (See Department of Medicine.)

Professor (Clinical)

Richard Torack, M.D., Georgetown University, 1952.

Associate Professors

Andrew C. Chan, M.D., Ph.D., Washington University, 1986. (See Department of Medicine.)

Talal A. Chatila, M.D., American University, 1984. (See Department of Pediatrics.)

Rosa Maria Davila, M.D., University of Puerto Rico, 1981.

John F. DiPersio, M.D., Ph.D., University of Rochester, 1980. (See Department of Medicine.)

Michael L. Dustin, Ph.D., Harvard University, 1990.

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.)

Peter A. Humphrey, M.D., Ph.D., University of Kansas, 1984.

Osami Kanagawa, M.D., Okayama University, 1974; Ph.D., 1978. (See Department of Medicine.)

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.

Jay S. Pepose, Ph.D., University of California, 1980; M.D., 1982. (See Department of Ophthalmology and Visual Sciences.)

Kevin A. Roth, M.D., Ph.D., Stanford University, 1985. (See Department of Molecular Biology and Pharmacology.)

Mitchell G. Scott, Ph.D., Washington University, 1982. (See Department of Medicine.)

Andrey S. Shaw, M.D., Columbia University, 1984.

Paul E. Swanson, M.D., Oregon Health Sciences University, 1984.

Matthew L. Thomas, Ph.D., University of Utah, 1981. (See Department of Molecular Microbiology.)

Herbert W. Virgin IV, M.D., Ph.D., Harvard University, 1985. (See Department of Medicine and Department of Molecular Microbiology.)

Mary M. Zutter, M.D., Tulane University, 1981.

Research Associate Professors

Frederick P. Ross, Ph.D., University of Warwick, 1976.

Barbara A. Zehnbauer, Ph.D., The University of Chicago, 1979. (See Department of Pediatrics.)

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

Yousef Abu-Amer, Ph.D., The Hebrew University, Israel, 1993.

Morey A. Blinder, M.D., St. Louis University, 1981. (See Department of Medicine.)

Leslie D. Boucher, M.D., University of Kentucky, 1989.

Rainer K. Brachmann, M.D., Ludwig-Maximilians University, 1987. (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.)

Steven F. Dowdy, Ph.D., University of California, 1990. (See Department of Medicine.)

Larry E. Fields, M.D., Harvard University, 1980. (See Department of Medicine.)

Daved H. Fremont, Ph.D., University of California, 1993.

Jonathan M. Green, M.D., Wayne State University, 1986. (See Department of Medicine.)

Ann M. Gronowski, Ph.D., University of Wisconsin, 1992.

Jay L. Hess, M.D., Ph.D., The Johns Hopkins University, 1989.

Phyllis C. Huettner, M.D., University of Pennsylvania, 1985.

Jonathan D. Katz, Ph.D., University of California, Los Angeles, 1990.

Madeline D. Kraus, M.D., Washington University, 1991.

Helen Liapis, M.D., University of Athens, 1972.

Daniel C. Link, M.D., University of Wisconsin, 1985. (See Department of Medicine.)

Robinna G. Lorenz, M.D., Ph.D., Washington University, 1990. (See Department of Medicine.)

Craig A. MacArthur, M.D., Ph.D., Washington University, 1987. (See Department of Pediatrics.)

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.)

John C. Morris, M.D., University of Rochester, 1974. (See Department of Neurology.)

Arie Perry, M.D., University of Texas, 1990.

John D. Pfeifer, Ph.D., University of California, San Diego, 1987; M.D., 1988. (See Department of Medicine.)

Jon R. Ritter, M.D., University of Minnesota, 1988.

Barry Sleckman, M.D., Ph.D., Harvard University, 1989.

Stacy C. Smith, M.D., University of Southern California, 1986. (See Department of Medicine.)

Mark A. Watson, M.D., Ph.D., Washington University, 1992.

Frances V. White, M.D., University of North Carolina, 1978.

Xiao-Feng S. Zheng, Ph.D., Harvard University, 1993.

Research Assistant Professors

Toshiyuki Araki, M.D., Osaka University, 1989; Ph.D., 1993.

Nalini S. Bora, Ph.D., All India Institute of Medical Science, 1981. (See Department of Ophthalmology and Visual Sciences.)

Kathleen C. Sheehan, Ph.D., St. Louis University, 1986.

Terry Woodford-Thomas, Ph.D., Virginia Polytech, 1982.

Instructors

David M. Baorto, Ph.D., Columbia University, 1992; M.D., 1993.

Suzanne M. Dintzis, M.D., Ph.D., Stanford University, 1993.

Anne C. Lind, M.D., Creighton University, 1989. (See Department of Medicine.)

Research Instructors

Dorothy J. Fiete, B.S., Marymount College, 1966.

Guim Kwon, Ph.D., University of Michigan, 1992.

Yvonne Landt, M.S., University of Illinois, 1972.

Theresa L. Murphy, Ph.D., The Johns Hopkins University, 1983.

Christopher A. Nelson, Ph.D., Washington University, 1995.

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 sophomore 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 802 GENERAL CLINICAL PEDIATRICS — ST. LOUIS CHILDREN'S HOSPITAL

Instructors: *Alan L. Schwartz, Ph.D., M.D.; James P. Keating, M.D.; Kathleen A. McGann, M.D.; Angela M. Sharkey, M.D.* (all: 454-6299)

The student will be assigned patients on a general pediatric division 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, including a wide variety of infectious disease, failure to thrive, acute asthma, poisoning, immune deficiency diseases and gastrointestinal disorders. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 808 PEDIATRIC ASTHMA AND ALLERGY

Instructor: *Leonard B. Bacharier, 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 four-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 four-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.; Frank J. Zimmerman, M.D.* (both: 454-6095)

This elective focuses on interpretation of hemodynamic and angiographic data acquired in the cardiac catheterization laboratory. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 818 PEDIATRIC CARDIOLOGY — INPATIENT SERVICE

Instructors: *Arnold W. Strauss, M.D.; Angela M. Sharkey, M.D.; Charles E. Canter, M.D.; Frank J. Zimmerman, M.D.; Martha L. Clabby, M.D.; R. Mark Grady, M.D.; Mark C. Johnson, M.D.; David T. Balzer, M.D.* (all: 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, for cardiac catheterization/intervention, and patients with significant congestive heart failure. The student has an opportunity to follow patients through these procedures. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 819 PEDIATRIC CARDIOLOGY — OUTPATIENT SERVICE

Instructors: *Arnold W. Strauss, M.D.; Angela M. Sharkey, M.D.; Charles E. Canter, M.D.; Mark C. Johnson, M.D.; David T. Balzer, M.D.* (all: 454-6095)

The student will see patients attending all of the outpatient clinics including both new referrals and follow-up visits. The student also will be responsible for the interpretation of electrocardiograms and 24-hour Holter monitor examinations performed in the cardiology noninvasive laboratory. Valid start weeks for four-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 four-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.; Talal A. Chatila, M.D.; Calvin B. Williams, M.D., Ph.D.* (all: 454-6124)

Opportunities are available to care for pediatric patients with a variety of immunologic and rheumatologic disorders. Students will see children in outpatient clinic and inpatient consultation. An in-depth approach to evaluating disorders of the immunologic system will be provided. Students also will participate in evaluation of new patients with rheumatologic disease at Shriners Hospital JRA clinic. Students may elect to participate in conferences and seminars. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 840 PEDIATRIC INFECTIOUS DISEASES

Instructors: *Penelope G. Shackelford, M.D.; Joseph W. St. Geme, M.D.; Gregory A. Storch, M.D.; Kathleen A. McGann, M.D.; David B. Haslam, M.D.; J. Neal Middelkamp, M.D.; Margaret R. MacDonald, M.D., Ph.D.* (all: 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 weekly pediatric infectious disease case conferences, a weekly joint clinical conference

with the adult infectious disease group, and a weekly journal club. Valid start weeks for four-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.; Linda M. Mundy, M.D.; Gregory A. Storch, M.D.; Victoria Fraser, M.D., and Infectious Diseases staff* (all: 454-6050)

This elective is designed to introduce students to the care of HIV-infected individuals (adults, adolescents and children) and HIV-exposed infants. Care of the HIV-infected patient encompasses not only the medical aspects of care, but also the psychosocial aspects. Students will rotate through several clinics, including the maternal-child clinic, pediatric and adolescent HIV clinics and several adult HIV clinic settings, along with participation in community-wide social services meetings, home visits and exposure to the Retrovirus laboratory and the AIDS Clinical Trials Unit. In addition, students will spend part of their time rotating in the general ambulatory infectious diseases clinics (pediatric and adult ID, TB clinic and the STD clinic). Valid start weeks for four-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 and fever.

Students will work either a day shift (7:30 a.m.-3 p.m.) or an evening shift (3 p.m.-11:00 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 30-minute presentation on a topic of his/her choosing. Valid start weeks for four-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 A. Marshall, M.D.; Louis J. Muglia, M.D.* (all: 454-6051)

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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 851 CLINICAL PEDIATRIC GI ELECTIVE

Instructor: *Jean Pappas Molleston, M.D.*, 454-6173

Opportunities to learn about inpatient pediatric GI, hepatology and nutrition are many. Time also is spent participating in endoscopic procedures. Outpatient GI clinic exposes students to ambulatory subspecialty pediatrics. Clinical research projects are also open for participation. This rotation encompasses a wide variety of pediatric experiences. Valid start weeks for four-week blocks are: 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 852 CLINICAL PEDIATRIC PULMONARY MEDICINE

Instructors: *Steven D. Shapiro, M.D.; Robert C. Strunk, M.D.; Stuart C. Sweet, M.D., Ph.D.* (all: 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, pulmonary functions, bronchoscopy with biopsy and lavage; and 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 four-week blocks are: 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, as well as 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 required.

Students during each rotation will be assigned to the special care nursery at St. Louis Children's Hospital and to the labor and delivery services at Barnes-Jewish Hospital. Students assigned to St. Louis Children's Hospital special care nursery 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 875 PEDIATRIC RENAL DISEASE

Instructors: *Barbara R. Cole, M.D.; Anne M. Beck, M.D.; S. Paul Hmiel, M.D., Ph.D.* (all: 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 he or she 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, including renal attending rounds, renal research rounds and journal clubs 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. The student will be required to present one or two in-depth reviews in areas of interest. Valid start weeks for four-week blocks are: 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M65 876 PEDIATRIC LUNG TRANSPLANTATION

Instructors: *George B. Mallory Jr., M.D.; Stuart C. Sweet, M.D., Ph.D.* (all: 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 fiber-optic 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 four-week blocks are: 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 McGann, M.D.* (both: 454-6299)

The clerkship in rural primary care pediatrics is designed to provide the student with firsthand 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, and evaluate patients in the emergency room. Students are asked to take call with the instructor. The objective of this elective is to provide the student with the actual experience of serving as a general pediatrician providing comprehensive health services in a rural community. Two-week blocks are available, though instructors prefer four-week rotations. Valid start weeks for 4-week blocks are: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

M25 831 PEDIATRIC DERMATOLOGY

Instructor: *Susan B. Mallory, M.D.*, 454-2714

This clinical rotation will be available to students interested in dermatology and/or pediatrics. Students will follow the dermatology rotation (M25 830) with an emphasis on pediatric dermatology by attending pediatric dermatology clinics and seeing consults. Enthusiastic students will have an opportunity to write up a case report if they wish. Students can take either this elective or M25 830 — not both. Valid start weeks for four-week blocks are: Weeks 17, 21, 25, 29, 33 and 37.

M80 870 CLERKSHIP IN PRIMARY CARE IN GENERAL PEDIATRICS

Instructors: *Paul S. Simons, M.D.; Jay S. Epstein, M.D.* (both: 535-7855)

The Clerkship in Primary Care in General Pediatrics is designed to provide the student with firsthand 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 behaviorally developmental, 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 broad-based population receiving care through various insurance systems. Valid start weeks for four-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) the molecular epidemiology of surfactant protein B deficiency.

Michael R. DeBaun, M.D., M.P.H., 454-4177
Dr. DeBaun is the principal investigator of the Pediatric Oncology Group at Washington University. As such, he is responsible for the organization and execution of more than 100 protocol studies at 36 major medical centers and 24 affiliate institutions in the United States, Canada and Europe, and more than 700 investigators who care for children with cancer. Additional research interests include: 1) clinical investigation of the natural history of stroke in sickle cell disease, and 2) genotype/phenotype analysis in pediatric overgrowth syndromes associated with cancer.

Thomas G. Diacovo, M.D., 454-4559
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 P. Hackett, Ph.D., M.D., 454-6231
Molecular biology of lung development. Research focuses 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., 454-6050
Role of glycolipids in health and disease. Despite the ubiquitous distribution of glycolipids among eucaryotic cells, their function in cell physiology remains unknown. Our laboratory is using genetic approaches to modify glycolipid expression both *in vitro* and *in vivo* and to examine the effects of normal biology and host-microbial interactions.

Robert J. Hayashi, M.D., 454-6128
Laboratory investigation is focused on the role of T lymphocytes in immune tolerance during viral and bacterial infection.

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.

Lori Luchtman-Jones, M.D., 454-6128
Investigative efforts are focused on clinical coagulation and sickle cell disease.

Craig A. MacArthur, M.D., Ph.D., 454-2547
Investigative interests are directed toward elucidation of the structure and function of regulatory oncoproteins in transgenic mouse models of malignancy.

Margaret R. MacDonald, M.D., Ph.D., 454-6050
Cytomegalovirus pathogenesis. We are using molecular and cell biological techniques, along with an animal model, to investigate the role of a virally encoded chemokine in the pathogenesis of disease due to murine cytomegalovirus.

George B. Mallory Jr., M.D., 454-2694
Clinical investigative interests: 1) uses of flexible fiber-optic bronchoscopy and bronchoalveolar lavage in pediatric lung disease, 2) pediatric lung transplantation, 3) sleep-associated breathing disorders, and 4) cystic fibrosis — correlations between genotype and phenotype.

Virginia L. Miller, Ph.D., 747-2132
Molecular basis of the pathogenesis of the entire pathogens *Yersinia enterocolitica* and *Salmonella typhimurium*.

Louis J. Muglia, Ph.D., M.D., 454-2382
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.

David H. Perlmutter, M.D., 454-6033
My laboratory is studying the cellular biochemistry of a genetic deficiency of alpha-1-antitrypsin. This deficiency is the most common metabolic cause of liver disease in infants and emphysema in adults. It results from an abnormally folded protein that is unable to traverse the secretory pathway and accumulates within the endoplasmic reticulum. The lab is studying how the mutant protein is degraded in the endoplasmic reticulum in order to develop new therapeutic strategies and to learn about the fundamental cell biology of the quality control

apparatus of the cell. My lab also is studying a specific cell-surface receptor, the SEC receptor, which recognizes alpha-1-AT-elastase and other serpin-enzyme complexes, mediates an increase in synthesis of alpha-1-AT, probably mediates clearance and catabolism of serpin-enzyme complexes and mediates the neutrophil chemotactic effects of serpin-enzyme complexes. The SEC receptor recognizes a highly conserved pentapeptide in the alpha-1-AT sequence and a homologous sequence in the amyloid-beta peptide and the tachykinins. It may, therefore, be important in the pathogenesis of Alzheimer's disease.

Scott Saunders, M.D., Ph.D., 454-4860
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 interest 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, Ph.D., M.D., 454-6005
Investigative efforts are aimed at understanding: 1) the cell 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., 454-6128
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. Molecular and functional approaches are used to investigate transport mechanisms in plasma membranes isolated specifically from the maternal- and fetal-facing surfaces and in trophoblast cells that differentiate in culture.

Joseph W. St. Geme, M.D., 454-6050
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 host cell factors involved in the pathogenesis of disease.

Gregory A. Storch, M.D.; Richard S. Buller, Ph.D.; and staff (all: 454-6079)
Rapid diagnosis of viral and other unconventional infections. The molecular diagnostics section of 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 simplex virus, cytomegalovirus, Epstein-Barr and JC virus, and the protozoan *Toxoplasma gondii* on cerebrospinal fluid; 2) the detection of cytomegalovirus and Epstein-Barr virus in the blood of organ transplant recipients; 3) the detection of parvovirus B19 in blood and amniotic fluid; and 4) the detection of Ehrlichia and Rickettsiae in blood. Future projects will explore 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.

Arnold W. Strauss, M.D., 454-6095
Studies concern molecular basis of human mitochondrial enzyme deficiency syndromes in totally acid oxidation causing liver disease, heart disease or sudden death. This research involves recombinant DNA technology, cloning of various DNA fragments and cell biological techniques.

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.

Stuart C. Sweet, M.D., Ph.D., 454-2694
Research involves using transgenic mouse models to investigate the mechanisms of acute rejection and chronic graft dysfunction in lung allografts.

Teresa J. Vietti, M.D., 367-3446
Research interests include chemotherapeutic agent trials for pediatric oncology.

David B. Wilson, M.D., Ph.D., 454-6128
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.

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 Departments of Neurology and Neurological Surgery.)

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 Departments of Neurology and Neurological Surgery.)

Professors

Park J. White M.D. Professor of Pediatrics

F. Sessions Cole, M.D., Yale University, 1973. (See Department of Cell Biology and Physiology.)

Louis P. Dehner, M.D., Washington University, 1966. (See Department of Pathology.)

Ruthmary K. Deuel, M.D., Columbia University, 1961. (See Departments of Neurology and Neurological Surgery.)

W. Edwin Dodson, M.D., Duke University, 1967. (See Departments of Neurology and Neurological Surgery.)

Jonathan D. Gitlin, M.D., University of Pittsburgh, 1978. (See Department of Pathology.)

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.

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.)

Tae Sung Park, M.D., Yonsei University, 1971. (See Department of Neurological Surgery.)

J. Julio Pérez-Fontán, M.D., Universidad de Santiago, 1977. (See Department of Anesthesiology.)

Donald Strominger Professor

David H. Perlmutter, M.D., St. Louis University, 1978. (See Department of Cell Biology and Physiology.)

Allen P. and Josephine B. Green Professor of Pediatric Neurology

Arthur L. Prensky, M.D., New York University, 1955. (See Departments of Neurology and Neurological Surgery.)

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 and Departments of Neurology and Neurological Surgery.)

Gary D. Shackelford, M.D., Washington University, 1968. (See Department of Radiology.)

Penelope G. Shackelford, M.D., Washington University, 1968. (See Department of Molecular Microbiology.)

Marilyn J. Siegel, M.D., State University of New York, Downstate, 1969. (See Department of Radiology.)

Carl H. Smith, M.D., Yale University, 1959. (See Department of Pathology.)

Gregory A. Storch, M.D., New York University, 1973. (See Department of Medicine and Department of Molecular Microbiology.)

Alumni Professor of Pediatrics

Arnold W. Strauss, M.D., Washington University, 1970. (See Department of Biochemistry and Molecular Biophysics.)

Robert C. Strunk, M.D., Northwestern University, 1968.

Bradley T. Thach, M.D., Washington University, 1968.

Michael S. Watson, Ph.D., University of Alabama, 1981. (See Department of Genetics.)

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.

Professors (Clinical)

Mohamad T. Amjad, M.D., University of Teheran, 1961.

Gordon R. Bloomberg, M.D., University of Illinois, 1959.

Elliot F. Gellman, M.D., University of Missouri, 1961.

Maurice J. Keller, M.D., Columbia University, 1940.

James E. Miller, M.D., Medical College of Alabama, 1949. (See Department of Ophthalmology and Visual Sciences.)

Homer E. Nash Jr., M.D., Meharry Medical College, 1951.

Frederick D. Peterson, M.D., Washington University, 1957.
Steven I. Plax, M.D., University of Missouri, 1961.
George Sato, M.D., Washington University, 1947.
Warren G. Sherman, M.D., Tulane University, 1969.

Associate Professor Emeritus

James K. Turner, M.D., Washington University, 1953.

Associate Professors

Charles E. Canter, M.D., St. Louis University, 1979.
Talal A. Chatila, M.D., American University, 1984.
Barbara R. Cole, M.D., University of Kansas, 1967.
Jeffrey G. Dawson, M.D., University of Louisville, 1982.
Robert P. Foglia, M.D., Georgetown University, 1974. (See Department of Surgery.)
Aaron Hamvas, M.D., Washington University, 1981.
Gary E. Hirshberg, M.D., Hahnemann Medical College, 1972. (See Department of Anesthesiology.)
Dee Hodge III, M.D., University of California, San Francisco, 1978.
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.)
Mark E. Lowe, M.D., University of Miami, 1984.
Rodney P. Lusk, M.D., University of Missouri, 1977. (See Department of Otolaryngology.)
Rick A. Martin, M.D., University of Utah, 1987.
Virginia L. Miller, Ph.D., Harvard University, 1985.
Michael J. Noetzel, M.D., University of Virginia, 1977. (See Departments of Neurology and Neurological Surgery.)
William C. Parks, Ph.D., Medical School of Wisconsin, 1982. (See Department of Cell Biology and Physiology.)
Paul S. Simons, M.D., Washington University, 1967.
Joseph W. St. Geme, M.D., Harvard University, 1984. (See Department of Molecular Microbiology.)
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.
David B. Wilson, M.D., Ph.D., Washington University, 1986. (See Department of Molecular Biology and Pharmacology.)

Research Associate Professors

Michael L. Landt, Ph.D., University of Oregon, 1976. (Laboratory Medicine) (See Department of Pathology.)
Barbara A. Zehnbauer, Ph.D., The University of Chicago, 1979. (See Department of Pathology.)

Associate Professors Emeriti (Clinical)

Helen M. Aff, 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.
C. Read Boles, M.D., Washington University, 1943.
Garrett C. Burris, M.D., Louisiana State University, 1968. (See Departments of Neurology and Neurological Surgery.)
James M. Corry, M.D., Washington University, 1974.
Charles H. Dougherty, M.D., University of Rochester, 1973.
Robert H. Friedman, M.D., Washington University, 1948.
Marshall B. Greenman, M.D., University of Illinois, 1948.
Kenneth A. Koerner, M.D., Washington University, 1941.
Richard L. Lazaroff, M.D., St. Louis University, 1978.
John C. Martz, M.D., Washington University, 1942.
Kevin J. Murphy, M.D., St. Louis University, 1978.
James R. Rohrbaugh, M.D., Ohio State University, 1974. (See Departments of Neurology and Neurological Surgery.)
William J. Ross, M.D., Washington University, 1972.
Mary A.T. Tillman, M.D., Howard University, 1960.
Gerald Wool, M.D., Washington University, 1962.

Assistant Professors

David T. Balzer, M.D., St. Louis University, 1985.
Guojun Bu, Ph.D., Virginia Polytechnic Institute, 1990. (See Department of Cell Biology and Physiology.)
Douglas W. Carlson, M.D., Southern Illinois University, 1984.
Randall A. Clary, M.D., University of Illinois, 1984. (See Department of Otolaryngology.)
Anne M. Connolly, M.D., Indiana University, 1984. (See Departments of Neurology and Neurological Surgery.)
Maite de la Morena, M.D., Complutense University, Madrid, Spain, 1992.
Michael R. DeBaun, M.D., Stanford University, 1987; M.P.H., The Johns Hopkins University, 1993. (See Division of Biostatistics.)
Thomas G. Diacovo, M.D., McGill University, Montreal, Canada, 1988.
Joan C. Downey, M.P.H., M.D., Harvard University, 1985.
Katherine A. Gnauck, M.D., Universite Libre de Bruxelles, 1985.

David H. Gutmann, Ph.D., University of Michigan, 1984; M.D., 1986. (See Departments of Neurology and Neurological Surgery.)

Brian P. Hackett, Ph.D., Boston University, 1984; M.D., 1986.

Z. Leah Harris, M.D., Chicago Medical School, 1987.

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.

Anne V. Hing, M.D., Washington University, 1985.

Russel Hirsch, M.B., Ch.B., University of Cape Town, 1988.

Abby L. Hollander, M.D., University of Cincinnati, 1986.

Mark C. Johnson, M.D., The Johns Hopkins University, 1982.

Fiona H. Levy, M.D., New York Medical College, 1987.

Jeffrey A. Lowell, M.D., Yale University, 1985. (See Department of Surgery.)

Lori Luchtman-Jones, M.D., University of California, San Diego, 1987.

Gregg T. Lueder, M.D., University of Iowa. (See Department of Ophthalmology and Visual Sciences.)

Craig A. MacArthur, M.D., Ph.D., Washington University, 1987.

Margaret R. MacDonald, M.D., Ph.D., Washington University, 1990. (See Department of Molecular Microbiology.)

Mark J. Manary, M.D., Washington University, 1982.

Barry P. Markovitz, M.D., University of Pennsylvania, 1983. (See Department of Anesthesiology.)

Bess A. Marshall, M.D., Vanderbilt University, 1986.

Victoria R. Masakowski, M.D., Ph.D., Washington University, 1990.

Ariane E. May, M.D., University of Medicine and Dentistry, New Jersey, 1987.

Kathleen A. McGann, M.D., University of Pennsylvania, 1985.

Jean Pappas Molleston, M.D., Washington University, 1986.

Louis J. Muglia, Ph.D., The University of Chicago, 1986; M.D., 1988. (See Department of Molecular Biology and Pharmacology.)

Harlan R. Muntz, M.D., Washington University, 1977. (See Department of Otolaryngology.)

Jeffrey J. Neil, M.D., Ph.D., Washington University, 1984. (See Department of Neurology.)

Robert T. Paschall, M.D., University of Tennessee, 1974.

Mabel L. Purkerson, M.D., Medical College of South Carolina, 1956. (See Administration and Department of Medicine.)

Joan L. Rosenbaum, M.D., University of Texas, 1983.

Scott Saunders, M.D., Ph.D., Stanford University, 1990. (See Department of Molecular Biology and Pharmacology.)

Angela M. Sharkey, M.D., St. Louis University, 1986.

Theodore C. Simon, Ph.D., George Washington University, 1990.

Jeffrey H. Teckman, M.D., Washington University, 1989.

Alison J. Whelan, M.D., Washington University, 1986. (See Department of Medicine.)

Lynn K. White, M.D., Harvard Medical School, 1984. (See Department of Medicine.)

Karen M. Wickline, M.D., St. Louis University, 1986.

Calvin B. Williams, M.D., Ph.D., University of California, Irvine, 1991.

Jane Y. Wu, M.D., Shanghai Medical University, 1986; Ph.D., Stanford University, 1991. (See Department of Molecular Biology and Pharmacology.)

Kelvin A. Yamada, M.D., Baylor College of Medicine, 1983. (See Departments of Neurology and Neurological Surgery.)

Research Assistant Professors

Max Q. Arens, Ph.D., Virginia Polytechnic Institute, 1971.

Carol L. Wilson, Ph.D., Princeton University, 1992.

Zhi-Fang Zhang, M.D., Shanghai Second Medical University, 1962.

Assistant Professors Emeriti (Clinical)

Martin Calodney, M.D., New York University, 1936.

Samuel W. Gollub, M.D., Washington University, 1941.

Alfred S. Schwartz, M.D., The Johns Hopkins University, 1936.

Assistant Professors (Clinical)

Denis I. Altman, M.B., B.Ch., University of The Witwatersrand, 1975. (See Departments of Neurology and Neurological Surgery.)

Patricia J. Amato, M.D., Medical College of Ohio, 1982.

Jill M. Baer, M.D., University of Kentucky, 1975.

Edward T. Barker, M.D., Washington University, 1957.

Susan L. Baumer, M.D., University of Pennsylvania, 1975.

Max H. Burgdorf, M.D., Washington University, 1974.

John C. Davis, M.D., University of Michigan, 1980.

Ray S. Davis, M.D., University of Louisville, 1978.

Tulay Dincer, M.D., Hacettepe University, 1977.

Jay S. Epstein, M.D., Emory University, 1983.

Ira J. Friedman, M.D., University of Arkansas, 1960.

Florentina U. Garcia, M.D., University of the Philippines, 1965.

Tessa D. Gardner, M.D., Harvard University, 1972.

James A. Gerst, M.D., University of Missouri, 1972.

Santosh Gupta, M.B., B.S., Lucknow University, 1963; D.C.H., University of London, 1966.

J. Larry Harwell, M.D., University of Missouri, 1961.

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, 1981.
Joseph A. Kahn, M.D., University of Missouri, 1977.
Michele E. Kemp, M.D., Washington University, 1981.
Shirley M. Knight, M.D., Washington University, 1980.
Henry L. Knock, M.D., The Johns Hopkins University, 1953.
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.
Barry Light, Ph.D., University of Missouri, 1977; M.D., 1980.
John F. Mantovani, M.D., University of Missouri, 1974. (See Departments of Neurology and Neurological Surgery.)
M. Michael Maurer, M.D., Washington University, 1972.
Thomas C. McKinney, M.D., Washington University, 1980.
Alison C. Nash, M.D., Baylor College of Medicine, 1981.
Susan Pittman, M.D., University of Missouri, 1963.
Jerry L. Rosenblum, M.D., Washington University, 1974.
Martin D. Rudloff, M.D., Washington University, 1981.
Richard W. Sato, M.D., Washington University, 1977.
Blaine M. Sayre, M.D., Washington University, 1968.
C. Jeffrey Sippel, Ph.D., St. Louis University, 1980; M.D., 1983.
Harold B. Sitrin, M.D., St. Louis University, 1971.
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.
Zila Welner, M.D., Hebrew University, 1961. (See Department of Psychiatry.)
George T. Wilkins Jr., M.D., University of Illinois, 1957.
Patricia B. Wolff, M.D., University of Minnesota, 1972.

Instructors

Etihad S. Alfalahi, M.D., University of Baghdad, 1984.
Sanjay Aurora, M.B.B.S., Jawnharial Institute of Postgraduate Medical Education and Research, 1986.
Leonard B. Bacharier, M.D., Washington University, 1992.
Anne M. Beck, M.D., Southern Illinois University, Springfield, 1988.
Leigh Ann Berry, Ph.D., University of Virginia, 1993.
Marsha E. Blume, M.D., University of Missouri, Kansas City, 1995.
Janice E. Brunstrom, M.D., Medical College of Virginia, 1987. (See Departments of Neurology and Neurological Surgery.)
Martha L. Clabby, M.D., State University of New York, Downstate, 1990.
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.)
Eric Crawford, Ph.D., University of Alabama, Birmingham, 1994.
Gaurov Dayal, M.D., Northwestern University, 1995.
R. Mark Grady, M.D., Washington University, 1989.
Michael R. Harris, Ph.D., St. Louis University, 1981; M.D., 1991.
Robert O. Heuckeroth, M.D., Ph.D., Washington University, 1990.
S. Paul Hmiel, M.D., Ph.D., Case Western Reserve University, 1989.
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.
Trina R. Johnson, M.D., Albany Medical College, 1996.
Erzsebet Jung, M.D., Semmelweis University, Hungary, 1987.
Andrew J. Kienstra, M.D., Southern Illinois University, 1996.
Hyung J. Kim, M.D., University of Michigan, 1995.
Allison King, M.D., University of Missouri, 1996.
Janet D. Luhmann, M.D., Loyola University, 1991.
Amit Mathur, M.D., AGRA University, India, 1986.
John K. McGuire, M.D., Northwestern University, 1993.
William A. McManus, M.D., St. Louis University, 1986.
Cynthia K. Powell, M.D., University of Oklahoma, 1984.
Kimberly S. Quayle, M.D., Washington University, 1988.
William L. Rives, M.D., University of Missouri, Columbia, 1996.
Shalini Shenoy, M.D., University of Mysore, 1981.
Sharon R. Smith, M.D., Wake Forest University, 1991.
Stuart C. Sweet, M.D., Ph.D., University of Michigan, 1989.
Elizabeth Chan Uong, M.D., University of Philippines, 1986.
Ralph Wuebeker, M.D., University of Missouri, Kansas City, 1994.
Dina J. Zand, M.D., Northwestern University, 1995.
Frank J. Zimmerman, M.D., Northwestern University, 1990.

Research Instructors

Richard S. Buller, Ph.D., University of Montana, 1983.
Sharon L. Pontious, Ph.D., New Mexico State University, 1980.

Instructors (Clinical)

Ivette N. Baker, M.D., Universidad Central del Caribe, 1984.
Johnie C. Baker, M.D., Universidad Central del Caribe, 1984.

Huldah C. Blamoville, M.D., Meharry Medical College, 1965.

Robert J. Bradshaw, M.D., St. Louis University, 1980.

Yolette V. Brown, M.D., Washington University, 1982.

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.

Tattamangalam P. Chandrika, M.S.B.S., Calicut Medical College, 1973.

Glenn S. Cheng, M.D., University of Texas, San Antonio, 1988.

Tammy S. Chi, M.D., University of California, Los Angeles, 1990.

Oliver H.P. Chrisler, M.D., The University of Chicago, 1991.

Douglas G. Cottrell, D.O., University Health Sciences College of Osteopathic Medicine, 1979.

Janet L. Cranshaw, M.D., Washington University, 1988.

Michael E. Danter, M.D., University of Illinois, 1987.

Alla Dorfman, M.D., Chernovtsy State Medical School, 1986.

Robert W. Edmonds, M.D., Washington University, 1960.

Diane M. Eschmann, M.D., University of Missouri, 1993.

Laura A. Esswein, M.D., University of Missouri, 1991.

Elliott H. Farberman, M.D., St. Louis University, 1973.

Anna M. Fitz-James, M.D., George Washington University, 1981.

Edward B. Fliesher, M.D., St. Louis University, 1978.

Joseph K. Goldenberg, M.D., University of Missouri, Kansas City, 1980.

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 Louisville, 1981.

David E. Hartenbach, M.D., University of Missouri, 1987.

Mary Ann Hollman, M.D., University of Alabama, Birmingham, 1988.

J. Joseph Horan, M.D., St. Louis University, 1971.

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.

Larry A. Jones, M.D., The Johns Hopkins University, 1976.

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.

Robert D. Lins, M.D., University of Missouri, 1969.

Robert J. Lobonc, M.D., Northwestern University, 1981.

Elaine Miller, M.D., Medical College of Alabama, 1949.

Suzanne L. Miller, M.D., University of Illinois, 1978.

Karen K. Norton, M.D., Louisiana State University, 1989.

Jerome H. O'Neil Jr., M.D., St. Louis University, 1981.

Eugenia M. Pierce, M.D., St. Louis University, 1958.

Daniel S. Plax, M.D., Washington University, 1993.

Juanita C. Polito, M.D., Southwestern University, 1979.

Joseph L. Portnoy, M.D., University of Kansas, 1974.

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.

George H. Rezabek, D.O., Chicago College of Osteopathic Medicine, 1971.

Janis B. Robinson, M.D., University of Pennsylvania, 1977.

Vernon J. Roden, M.D., St. Louis University, 1971.

Isabel L. Rosenbloom, M.D., University of Maryland, 1984.

Ella Rozin, M.D., Minsk State Medical School, 1980.

Diane M. Rup, M.D., Case Western Reserve University, 1986.

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.

Norman P. Steele, M.D., Indiana University, 1972.

Anita R. Stiffelman, M.D., New York University, 1987.

Robert W. Tolan, M.D., Washington University, 1987.

Jeanne M. Trimmer, M.D., Northwestern University, 1988.

Garland R. Tschudin, M.D., University of Missouri, 1975.

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.

Jeffrey M. Wright, M.D., Washington University, 1979.

Kathie R. Wuellner, M.D., St. Louis University, 1978.

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 in the last three years of the medical course. Emphasis is on teaching 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. Recognition of current limitations of knowledge, combined with an appreciation of what is known, leads to a spirit of constructive skepticism. This attitude permits the student to study psychiatry in depth and broadly without preconceived theories.

SECOND YEAR

M85 676A DISEASES OF THE NERVOUS SYSTEM: PSYCHIATRY

Instructor: *Laura Bierut, M.D.,* 362-3492

This course will emphasize the diagnosis of major psychiatric illnesses in adults and children. Psychiatric diseases 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 the mental status exam will be demonstrated by patient interviews.

THIRD YEAR

M85 770 PSYCHIATRY CLERKSHIP

Instructor: *Kevin J. Black, M.D.,* 747-2013

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 School of Medicine clinical faculty member which cover the psychiatric interview and topics in outpatient psychiatry, and complete other assigned learning experiences. See *http://imaging.wustl.edu/kevin/psy/WUMS3.htm* for current details or to review the goals of the clerkship.

M85 775 AMBULATORY CLERKSHIP: CONSULTATION/LIAISON PSYCHIATRY

Instructor: *Kevin J. Black, M.D.,* 747-2013

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 *http://www.imaging.wustl.edu/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 attending 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M85 810 OUTPATIENT COMMUNITY PSYCHIATRY

Instructor: *Theodore Reich, M.D.,* 362-2149

This is a flexible clerkship in which effort is made to tailor the activities to the students' interests. Students will assist in diagnosis and treatment of adult psychiatric clinic patients. The patients present with a wide variety of psychological and interpersonal problems, such as are 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.

M85 831 ELECTROCONVULSIVE THERAPY (ECT)

Instructors: *Keith E. Isenberg, M.D., and 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M85 836 CLINICAL PSYCHIATRY AT BARNES-JEWISH HOSPITAL SOUTH CAMPUS, INPATIENT PSYCHIATRIC SERVICE

Instructor: *Eugene H. Rubin, Ph.D., M.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 four-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 also is provided on the consultation service of St. Louis Children's Hospital. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M85 850 SUBSTANCE ABUSE

Instructor: *Wilson Compton III, M.D.*, 286-2261

The rotation gives the student the opportunity to learn about the inpatient and formal day or evening group treatment of alcohol and licit and illicit drug abuse. Students will be expected to become familiar with the theoretical basis of relapse prevention therapy, the conduct of therapy groups and the medical complications of substance abuse. Valid start weeks for four-week blocks are: Weeks 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M85 900)

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 *imaging.wustl.edu/kevin/* for examples of past research.

Linda B. Cottler, Ph.D., 286-2252

There are several NIH-funded projects pertaining to many broad areas of research: 1) psychiatric epidemiology, 2) factors leading to HIV high-risk behaviors in drug users, 3) work on the reliability and validity of the substance use disorders criteria, 4) assessment of substance abuse and dependence disorders, and 5) psychiatric disorders across the life span from prepuberty to old age.

John G. Csernansky, M.D., 362-2616

Schizophrenia and psychopharmacology. 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 in the techniques of brain imaging. Involvement in preclinical studies can involve training and experience in receptor binding and microdialysis.

Alison M. Goate, D.Phil., 362-8691

Genetic studies of neuropsychiatric disease. Projects will either involve the genetic analysis of a candidate gene for a neuropsychiatric disease (AD, alcoholism, bipolar disorder) or basic cell biology of the effect of disease mutations (AD only).

John W. Newcomer, M.D., 362-2459

Clinical memory research. This elective offers the student a broad exposure to clinical protocols related to the neuroendocrinology and neurochemistry of memory performance, 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 Dr. North in various aspects of ongoing research projects in psychiatric epidemiology and clinical studies. Potential activities include subject interviews, editing, data entry, data analysis, and writing papers for publication, depending on the student's capabilities and motivation. Subject matter may include, but is not limited to: disasters, the homeless, multiple personality, personality disorder and psychiatric aspects of medical disease.

Rumi K. Price, Ph.D., M.P.E., 286-2282

Data collection and analysis of surveys from a longitudinal national sample of Vietnam veterans and matched comparison members (N=1,226). Analysis of international epidemiologic data sets (N=20,000). Application of computer-intensive, but highly flexible, techniques such as neural-network models, genetic algorithms and the expert system to large-scale epidemiologic data. Genetic epidemiology of the "flushing syndrome."

Note— There are always a number of ongoing research projects in the Department of Psychiatry. For additional information, contact Eugene H. Rubin, Ph.D., M.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.

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. (Medical Psychology) (Also Department of Psychology)

Theodore J. Cicero, Ph.D., Purdue University, 1968. (Neuro-pharmacology) (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.) (Also Department of Psychology)

Ray E. Clouse, M.D., Indiana University, 1976. (Medicine) (See Department of Medicine.)

Linda B. Cottler, Ph.D., Washington University, 1987. (Epidemiology) (See Health Administration.)

Gregory B. Couch Professor

John G. Csernansky, M.D., New York University, 1979. (See Department of Anatomy and Neurobiology.)

Alison M. Goate, D.Phil., University of Oxford, 1983. (Genetics) (See Department of Genetics.)

Spencer T. Olin Professor

Samuel B. Guze, M.D., Washington University, 1945. (See Department of Medicine.)

Andrew C. Heath, D.Phil., University of Oxford, 1983. (Psychology) (See Department of Genetics.) (Also Department of Psychology)

Richard W. Hudgens, M.D., Washington University, 1956.

Patrick J. Lustman, Ph.D., Michigan State University, 1980. (Medical Psychology) (Also Department of Psychology)

John W. Olney, M.D., Iowa University, 1963. (See Department of Pathology.)

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.)

John P. Rice, Ph.D., Washington University, 1975. (Mathematics) (See Division of Biostatistics.)

Lee N. Robins, Ph.D., Radcliffe College, 1951. (Sociology) (Also Faculty of Arts and Sciences)

Eugene H. Rubin, Ph.D., Washington University, 1977; M.D., 1978.

Brian K. Suarez, Ph.D., University of California, Los Angeles, 1974. (Genetics) (See Department of Genetics.)

Richard D. Wetzel, Ph.D., St. Louis University, 1974. (Medical Psychology) (See Departments of Neurology and Neurological Surgery.)

Research Professor

Madelon T. Price, Ph.D., Washington University, 1973. (Neurobiology)

Professors Emeriti (Clinical)

Sydney B. Maughs, M.D., Washington University, 1935.

Patricia L. O'Neal, M.D., Washington University, 1948.

Professor (Clinical)

Marcel T. Saghir, M.D., American University, 1963.

Professor (Adjunct)

Norman Sartorius, M.D., University of Zagreb, 1958.

Associate Professors

Kenneth E. Freedland, Ph.D., University of Hawaii, 1982. (Medical Psychology) (Also Department of Psychology)

Barry Hong, Ph.D., St. Louis University, 1982. (Medical Psychology) (See Department of Medicine.) (Also Department of Psychology)

Keith E. Isenberg, M.D., Indiana University, 1978.

Michael R. Jarvis, Ph.D., University of Illinois, 1982; M.D., Washington University, 1985.

Collins E. Lewis, M.D., Harvard University, 1971.

Mark A. Mintun, M.D., Washington University, 1981. (See Department of Radiology.)

Bruce L. Nock, Ph.D., Rutgers University, 1980. (Neurobiology) (See Department of Anatomy and Neurobiology.)

Carol S. North, M.D., Washington University, 1983.

Daniel D. Pugh, M.D., Washington University, 1964.

Thomas F. Richardson, M.D., Washington University, 1963.

John Rohrbaugh, Ph.D., University of Illinois, 1973. (Psychology) (Also Department of Psychology)

Research Associate Professor

Kathleen K. Bucholz, Ph.D., Yale University, 1986. (Epidemiology)

Associate Professor Emeritus (Clinical)

Edward H. Kowert, M.D., Washington University, 1943.

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.

Joseph McKinney, M.D., Washington University, 1958.

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.

William M. Riedesel II, M.D., Cornell University, 1973.

E. Robert Schultz, M.D., Washington University, 1955. (See Departments of Neurology and Neurological Surgery.)

Daniel Silverman, M.D., Northwestern University, 1972; M.P.H., Harvard University, 1995.

James B. Smith, M.D., University of Missouri, 1967.

Harold D. Wolff, M.D., State University of Iowa, 1955.

Associate Professors (Adjunct)

Christer Allgulander, M.D., Karolinska Institute, 1973.

Aleksandar Janca, M.D., University of Novi Sad, 1977.

Assistant Professors

Laura Bierut, M.D., Washington University, 1987.

Kevin J. Black, M.D., Duke University, 1990. (See Department of Neurology and Department of Radiology.)

Wilson Compton III, M.D., Washington University, 1986.

Nuri Farber, M.D., Washington University, 1989.

Daniela S. Gerhard, Ph.D., Cornell University, 1982. (See Department of Genetics.)

Luis A. Giuffra, M.D., Universidad Peruana Cayetano Meredia, Peru, 1986; Ph.D., Yale University, 1991.

Elliot Nelson, M.D., University of Illinois, 1986.

John W. Newcomer, M.D., Wayne State University, 1985.

Joel Posener, M.D., McGill University, 1987.

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.

Vesna J. Todorovic, M.D., University of Belgrade, 1985; Ph.D., University of Illinois, 1990. (See Department of Anesthesiology.)

Sean Yutzy, M.D., Eastern Virginia Medical School, 1982.

Research Assistant Professors

Mark Bardgett, Ph.D., University of Missouri, 1991. (Neurobiology)

Renee M. Cunningham-Williams, Ph.D., Washington University, 1994. (Social Work)

Yukitoshi Izumi, M.D., Yamagata University, 1985; Ph.D., 1989. (Neurobiology)

Pamela Madden, Ph.D., University of Pittsburgh, 1992. (Psychology)

Rosalind J. Neuman, Ph.D., Washington University, 1981. (Mathematics)

Rumi K. Price, Ph.D., University of California, 1988. (Epidemiology)

Thomas Przybeck, Ph.D., Washington University, 1983. (Anthropology)

Alexandre A. Todorov, Ph.D., Louisiana State University, 1992. (Biostatistics)

David Wozniak, Ph.D., Washington University, 1984. (Neurobiology) (Also Department of Psychology)

Assistant Professor Emeritus (Clinical)

Hyman H. Fingert, M.D., State University of Iowa, 1934.

Assistant Professors (Clinical)

Ahmad Ardekani, M.D., Pahlavi University, 1974.

William W. Clendenin, M.D., University of Tennessee, 1963.

Juan C. Corvalan, M.D., Argentina National University, 1965.

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.

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)

Saaid Khojasteh, M.D., Shiraz University, 1981.

Ervin Lipschitz, M.D., Washington University, 1949.

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.

Elizabeth F. Pribor, M.D., St. Louis University, 1985.

Diane Rankin, M.D., University of Colorado, 1968.

Randall Rosenthal, M.D., Washington University, 1967.
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)

Peter Holmans, Ph.D., Cambridge University, 1994. (Genetics)

Instructors

Susan Boyer, M.D., University of Missouri, 1993.
Debra Gusnard, M.D., The University of Chicago, 1982.
Devna Rastogi-Cruz, M.D., Washington University, 1991.
Stephen L. Ristvedt, Ph.D., University of Pennsylvania, 1989. (Medical Psychology)
Laura Sherman, M.D., University of Illinois, 1995.

Research Instructors

Andrey Anokhin, Ph.D., Russian Academy of Sciences, 1987. (Psychology)
Erik Sirevaag, Ph.D., University of Illinois, 1994. (Psychology)
Nenad M. Svrakic, Ph.D., University of Illinois, 1979. (Mathematics)

Instructors (Clinical)

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.
Ronald Beach, M.D., St. Louis University, 1974.
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.
David J. Goldmeier, M.D., Washington University, 1982.
Steven Harvey, M.D. Washington University, 1992.
Linda S. Horne, M.D., Ohio State University, 1986.
Virgil L. Malmberg, M.D., University of Missouri, 1978.
Gregory Mattingly, M.D., Washington University, 1989.
Douglas McCoy, M.D., Southern Illinois University, 1990.
Stacey L. Smith, M.D., Northwestern University, 1991.

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

Richard Mattison, M.D., Cornell University, 1972. (Child Psychiatry)

Research Associate Professor

Gwendolyn G. Reich, Ph.D., Washington University, 1978. (Anthropology) (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

Kelly N. Botteron, M.D., University of Kansas, 1988. (Child Psychiatry) (See Department of Radiology.)
Gary Boxer, M.D., University of Colorado, 1980.
John N. Constantino, M.D., Washington University, 1988. (Child Psychiatry) (See Department of Pediatrics.)
Joan Luby, M.D., Wayne State University, 1985. (Child Psychiatry)
Barbara S. Silverstein, Ph.D., St. Louis University, 1994; M.S.W., Washington University, 1981. (Social Work)

Assistant Professors (Clinical)

James E. Edwards, M.D., University of Tennessee, 1962. (Child Psychiatry)
Syed Raza, M.D., University of Karachi, Pakistan, 1960. (Child Psychiatry)
Jagdish Suri, M.D., King George Medical College, 1964. (Child Psychiatry)

Instructor

Anne Glowinski, M.D.,
Baylor College of Medicine, 1992.

Instructors (Clinical)

Michael R. Banton, M.D.,
St. Louis University, 1985.
(Child Psychiatry)

James W. Byrd, D.O.,
University of Osteopathic
Medicine and Health Sciences,
1991. (Child Psychiatry)

Kimberli McCallum, M.D.,
Yale University, 1986.
(Child Psychiatry)

Vinod Suri, M.D.,
Punjab University, 1962.
(Hawthorn Children's
Psychiatric Hospital)

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 radiological 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
- integration of CT and MR scans with three-dimensional technology
- application of modern 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 vascular and interventional radiology center
- application of PET for measuring metabolic activity in relation to cardiac blood flow
- development of a three-dimensional treatment planning program for cancer
- collaboration on the development and installation of the world's first Tandem Cascade Accelerator

The Institute occupies more than 400,000 total square feet, comprising its own 13-story building with satellite facilities in Barnes-Jewish, Barnard, St. Louis Children's and Wohl hospitals; the Clinical Sciences Research, Forest Park and East buildings; and the Scott Avenue Imaging Center. The department provides diagnostic radiology, nuclear medicine, radiation physics and radiation oncology services for all hospitals in the Washington University Medical Center, Barnes-Jewish Hospital West County and Barnes-Jewish Hospital St. Peters.

The first floor of the Institute houses a film library, reception and scheduling areas, consultation viewing rooms and the 118-seat Scarpellino Auditorium.

Clinical facilities for the Radiation Oncology Center at Barnes-Jewish Hospital South Campus are on the ground and first floors of the Institute, on the ground floor of the Waldheim Building at Barnes-Jewish Hospital North Campus, in Barnard Hospital, and in the Barnes-Jewish Hospital West Pavilion. Therapy equipment consists of six state-of-the-art, computer-controlled medical linear accelerators with the latest fittings, including multileaf collimators. Three state-of-the-art simulators, a CT simulator, and advanced three-dimensional treatment planning systems for 3-D conformal therapy are available. Brachytherapy facilities include both low- and high-dose rate remote afterloaders and image-guided prostate seed brachytherapy. Interstitial and external hyperthermia treatments also are available. Both linac-based and Gamma Knife® stereotactic radiosurgery programs are in operation. An advanced form of 3-D conformal therapy called intensity modulated radiation therapy (IMRT) is the latest addition to the Radiation Oncology's armamentarium.

MIR clinical facilities are on the second floor (chest radiology, body computed tomography, operating room imaging, computed radiography); third floor (neuroradiology, angiography, MRI); fourth floor (gastrointestinal and genitourinary radiology); and the fifth floor (MRI). PET clinical and research facilities are available on the seventh floor. A comprehensive vascular and interventional radiology center occupies the eighth floor. Nuclear medicine is on the ninth floor of the Barnes-Jewish Hospital West Pavilion. The 10th floor of the West Pavilion houses ultrasonography and outpatient radiology, including a breast diagnostic facility. A mammography screening center is on the fifth floor of Barnes-Jewish Hospital North Campus. In the north wing of St. Louis Children's Hospital, the first floor houses a complete pediatric radiology facility offering ultrasound, nuclear medicine, CT and MRI. The recently renovated diagnostic radiology facilities at Barnes-Jewish Hospital north offer state-of-the-art equipment and a staff of talented specialists in abdominal and chest radiology, musculoskeletal radiology, MR, nuclear medicine, and vascular and interventional radiology.

The Institute has 102 examination rooms for diagnostic radiology, nine CT scanners (six with spiral CT capability), four PET scanners, 10 MR scanners (five devoted to research), 16 ultrasound machines, six mammography units and six linear accelerators. 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 on the third (brachytherapy) and sixth (physics) floors of Barnard Hospital, in the Clinical Sciences Research Building (radiation oncology, radiological sciences), in the East Building (electronic radiology, image processing) and in the Scott Avenue Imaging Center (neurological PET, molecular radiopharmacology, MR imaging).

Administrative, teaching and support functions occupy the sixth floor and the ninth through 12th floors of the Institute. The Forest Park Building houses the Radiation Oncology Center's administrative offices, cancer biology and the oncology data and computer center.

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, two 4.7 Tesla MR scanners, two Siemens Vision 1.5 Tesla MR scanners with Echo Planar Imaging capability, two medical cyclotrons, a Tandem Cascade Accelerator, *in vivo* MR spectroscopy, radiopharmaceutical laboratories, animal care facilities, a neuropsychology laboratory, electrical engineering laboratories for image reconstruction, a three-dimensional image processing laboratory, high-end graphics workstations and a Siemens Somatom Plus Spiral CT Diagnostic Image Evaluation/ Reconstruction console. The Imaging Center also houses sophisticated computer facilities that are utilized for clinical, research and teaching applications.

FIRST YEAR

In their first year, medical students are introduced to radiology in two separate ways. 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.

The second form of contact with radiology is a five-week elective seminar. This course seeks to reinforce the first semester anatomy experience by relating previously learned anatomical information to radiographic images. Radiologists from different subspecialties moderate these seminars in which students work in small groups. Each group presents selected radiological topics to the remainder of the students taking the elective.

Selectives

M04 501 ANATOMY THROUGH THE EYES OF THE RADIOLOGIST

Coordinator: *Linda J. Macker,* 362-2916

A five-week seminar that seeks to reinforce the first semester anatomy experience by relating previously learned anatomical information to radiographic images. As a by-product, 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.

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.; Douglas R. Spitz, Ph.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	Pediatric Radiology
GI Radiology	Neuroradiology
GU Radiology	Nuclear Medicine
Skeletal Radiology/ER	Radiation Oncology
Cross-Sectional Imaging	Interventional Radiology

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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M90 806 RADIOLOGY — BARNES-JEWISH HOSPITAL NORTH CAMPUS

Instructor: *Lawrence M. Kotner Jr., M.D.*, 454-7400

The course consists of daily teaching sessions emphasizing the principles of film interpretation and the use of imaging in the solution of clinical diagnostic problems. There will be opportunity for observing fluoroscopy and nuclear medicine procedures as well as CT and MRI. Audiovisual teaching aids are available for use. Emphasis is placed on radiologic-pathologic correlation. Valid start weeks for four-week blocks are: Weeks 1, 5, 13, 17, 21, 25, 37 and 41.

M90 820 CLINICAL NUCLEAR MEDICINE

Instructor: *Tom R. Miller, Ph.D., M.D.*, 362-2807

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 radionuclide 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M90 840 CLINICAL RADIATION ONCOLOGY

Instructors: *Joseph R. Simpson, Ph.D., M.D.*, 362-8516; *Carlos A. Perez, M.D.*, 362-8500

The clinical section offers an elective with emphasis on the evaluation, planning 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M90 841 CLINICAL AND INVESTIGATIVE RADIATION ONCOLOGY

Instructors: *Joseph R. Simpson, Ph.D., M.D.*, 362-8516; *Carlos A. Perez, M.D.*, 362-9709

A multifaceted working group of clinicians, physicists, computer scientists and biologists interested in meaningful applications to improve results of radiation treatments. Under the leadership of several clinical staff and Dr. Purdy, research projects are available in computer applications, three-dimensional treatment planning and clinical studies. Current computer research includes: 1) development of three-dimensional display software for three-dimensional treatment planning and quantitative plan evaluation, 2) development of dose calculational algorithms, and 3) development of software for on-line electronic portal imaging. Previous computer experience is essential for computer-related research.

In collaboration with Dr. Roti Roti, there are numerous research opportunities in the Section of Cancer Biology, including: 1) the role of the nuclear matrix in the response of mammalian cells to ionizing radiation; 2) the cellular and molecular aspects of the response of mammalian cells to elevated temperatures; 3) heat shock protein function and regulation with emphasis on roles in genetic disease and cancer therapy; 4) DNA repair and GI cell-cycle arrest in irradiated cells; 5) molecular mechanisms of killing of cells exposed to long duration, moderate hyperthermia; 6) the production and consequences of free radicals involved in the effects of ionizing radiation, hyperthermia, oxygen toxicity, nitric oxide-induced toxicity, and tumor cell resistance to therapy and chemotherapy; 7) regulation of gene expression in the eukaryotic cell cycle under perturbed conditions; and 8) identification of parameters useful in identifying disease outcome or therapeutic response and the role of adaptation in radiobiology and cancer treatments.

Projects also are available involving retrospective reviews of various aspects of irradiation in the management of patients with carcinoma of the head and neck, lung, breast, prostate and gynecological organs. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research (M90 900)

G. James Blaine III, D.Sc., 362-6965

Active research projects at the Electronic Radiology Laboratory include digital image acquisition and display of radiology and non-radiology modalities, information management, telecommunications

utilizing ATM high-speed local and wide-area technologies, medical video, and image processing in support of clinical research in radiology.

Jeffrey 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) cerebral perfusion and diffusion imaging, MR imaging of brain functional activation and development of MR contrast agents.

Farrokh Dehdashti, M.D., 362-7418
Research projects relating to positron emission tomography are available in the following areas: 1) non-invasive assessment of response to hormone therapy in patients with estrogen-receptors positive advanced breast cancer; 2) the role of imaging in detecting neoplasm in pre-liver transcript patients (comparison of FDG-PET, MRI, CT and ultrasound); 3) the role of FDG-PET in staging patients with breast cancer; 4) non-invasive assessment of somatostatin receptors status of the neuroendocrine tumors utilizing a radiolabeled somatostatin analogue with PET; 5) FDG-PET imaging in cervical cancer; and 6) delineation of hyponic regions in tumors by PET.

Robert J. Gropler, M.D., 362-7418
In this laboratory, conventional single photon and positron emission tomographic imaging, magnetic resonance imaging and echocardiography are used to investigate the following: 1) the relationship between myocardial perfusion, intermediary metabolism and mechanical function in humans; 2) the impact of various disease states, particularly acute and chronic coronary syndromes on myocardial energy production and transduction; and 3) the effects of various therapeutic interventions for these syndromes on myocardial energy production and transduction.

E. Mark Haacke, Ph.D., 362-2737
The MR research group has interests in cardiovascular and brain functional imaging. Projects cover technical aspects of MR methodology and clinical applications of methodology.

Charles F. Hildebolt, D.D.S., Ph.D., 362-8410
The assessment of alveolar bone loss by digital radiographic imaging, including the determination of whether or not there is an interrelationship between alveolar and post-cranial bone loss after menopause and the assessment of alveolar bone by phosphor radiography.

R. Gilbert Jost, M.D., 362-7130
The Mallinckrodt Institute of Radiology is actively engaged in picture archiving and communication systems (PACS) research, development and deployment. Opportunities exist in the Electronic Radiology Laboratory for work related to the storage, high-speed distribution and electronic display of medical images.

Weili Lin, Ph.D., 362-2737
The MR research group has interests in cardiovascular and brain functional imaging. Projects convert technical aspects of MR methodology and clinical applications of the methodology.

Timothy J. McCarthy, Ph.D., 362-8429
Synthesis and evaluation of novel radiopharmaceuticals suitable for Positron Emission Tomography. Primarily using fluorine-18 and carbon-11 as radiolabels, and adapting modern organic chemistry to the "carrier-free" level. Biological areas of interest include enzyme inhibition (NOS and COX) and novel steroidal compounds.

Tom R. Miller, Ph.D., M.D., 362-2807
Research projects are available in computer applications, evaluation of new radiopharmaceuticals and clinical studies. Current computer research includes: 1) development of three-dimensional display software for tomographic imaging, 2) quantitative analysis of cardiac PET studies, and 3) use of three-dimensional display of PET studies in cervical cancer to guide radiation therapy treatment planning. Some previous computer experience is essential for the computer-related research.

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 using *in vivo* imaging of large animals and tracer kinetic modeling. The final step in the transition of a radiochemical into a labeled drug takes into account determination of radiation dosimetry, pharmaceutical quality and the development of automated production to streamline delivery to human subjects. Each of these aspects are researched, with a primary interest in novel agents for examination of neurological processes by PET.

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 planning in radiation therapy; 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 project.

David R. Piwnica-Worms, M.D., Ph.D., 362-9356
The multidrug resistance P-glycoprotein, a 170 kDa plasma membrane protein encoded by the human multidrug resistance gene (MDRI), functions as an energy-dependent efflux pump of many of the most potent chemotherapeutic drugs in cancer treatment. This transporter and highly homologous ATP-binding cassette membrane transporters involved in parasitic and bacterial drug resistance, immune response and cystic fibrosis are targets for development of novel metallopharmaceuticals used in characterizing transport regulation, evaluating structure/activity relationships, and when radiolabeled, enabling functional imaging of the expression of these gene products *in vivo.*

William J. Powers, M.D., 362-7116
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, diabetes mellitus and newborn infants.

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.

Barry A. Siegel, M.D., 362-2809
Research projects are available relating to oncologic applications of positron emission tomography (PET), including ongoing studies of breast cancer imaging. Individual projects to analyze clinical results of nuclear medicine examinations (case series review) can be arranged.

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 flouorine-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.

Faculty

ELIZABETH E. MALLINCKRODT PROFESSOR, HEAD OF DEPARTMENT AND DIRECTOR OF THE MALLINCKRODT INSTITUTE OF RADIOLOGY

Ronald G. Evens, M.D., Washington University, 1964. (Also Department of Economics)

Professor Emeritus and Lecturer

Fred J. Hodges III, M.D., University of Wisconsin, 1946.

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. (See Institute for Biomedical Computing.)

Harold Burton, Ph.D., University of Wisconsin, 1968. (See Department of Anatomy and Neurobiology and Department of Cell Biology and Physiology.)

Ralph V. Clayman, M.D., University of California, 1973. (See Department of Surgery.)

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.)

John O. Eichling, Ph.D., Washington University, 1970.

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.

Robert L. Grubb Jr., M.D., University of North Carolina, 1965. (See Departments of Neurology and Neurological Surgery.)

E. Mark Haacke, Ph.D., University of Toronto, 1978.

Jay P. Heiken, M.D., Columbia University, 1978.

R. Gilbert Jost, M.D., Yale University, 1969. (Also School of Engineering and Applied Science, Department of Computer Science)

Daniel K. Kido, M.D., Loma Linda University, 1965.

Philip A. Ludbrook, M.B.B.S., University of Adelaide, 1963. (See Department of Medicine.)

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)

Barbara S. Monsees, M.D., Washington University, 1975.

Michael K. Pasque, M.D., University of Oklahoma, 1989. (See Department of Surgery.)

Steven E. Petersen, Ph.D., California Institute of Technology, 1982. (See Departments of Neurology and Neurological Surgery.)

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 Departments of Neurology and Neurological Surgery.)

Marcus E. Raichle, M.D., University of Washington, 1964. (See Department of Neurology, Department of Anatomy and Neurobiology, and Program in Biomedical Engineering.)

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.)

Gary D. Shackelford, M.D., Washington University, 1968. (See Department of Pediatrics.)

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.)

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)

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.) (Also Department of Chemistry)

Professor (Clinical)

Noah Susman, M.D., Washington University, 1952.

Associate Professors

Brent T. Allen, M.D., Washington University, 1979. (See Department of Surgery.)

Premsri T. Barton, M.D., Mahidol University, Thailand, 1973.

Jeffrey J. Brown, M.D., University of California, San Diego, 1983.

DeWitte T. Cross III, M.D, University of Alabama, 1980.

Michael D. Darcy, M.D., Ohio State University, 1979. (See Department of Surgery.)

William B. Dawson, M.D., University of Oklahoma, 1973.

Farrokh Dehdashti, M.D., Pahlavi University, Iran, 1977.

Keith C. Fischer, M.D., The Johns Hopkins University, 1971.

Diana L. Gray, M.D., University of Illinois, 1981. (See Department of Obstetrics and Gynecology.)

Robert J. Gropler, M.D., University of Cincinnati, 1981. (See Department of Medicine.)

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.

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.

Robert C. McKnight, M.D., Washington University, 1961. (See Department of Medicine.)

Mark A. Mintun, M.D., Washington University, 1981. (See Program in Biomedical Engineering.)

Scott A. Mirowitz, M.D., Washington University, 1985.

Stephen M. Moerlein, Ph.D., Washington University, 1982. (See Department of Biochemistry and Molecular Biophysics.)

Christopher J. Moran, M.D., St. Louis University, 1974.

Joseph A. O'Sullivan, Ph.D., University of Notre Dame, 1986. (Also Department of Electrical Engineering)

Joel S. Perlmutter, M.D., University of Missouri, 1979. (See Departments of Neurology and Neurological Surgery.)

William R. Reinus, M.D., New York University, 1979. (See Department of Medicine.)

Sharlene A. Teefey, M.D., University of Hawaii, 1980.

Robert W. Thompson, M.D., University of Michigan, 1983. (See Department of Surgery.)

Thomas M. Vesely, M.D., Mayo Medical School, 1986. (See Department of Surgery.)

Jerold W. Wallis, M.D., Stanford University, 1981.

Franz J. Wippold II, M.D., St. Louis University, 1977.

Associate Professors (Clinical)

Sumner Holtz, M.D., St. Louis University, 1948.

Philip J. Weyman, M.D., Yale University, 1972.

Associate Professor (Adjunct)

Celette Sugg Skinner, Ph.D., University of North Carolina, Chapel Hill, 1991.

Assistant Professor Emeritus

Armand Diaz, R.N., R.T., Havana University, 1948.

Assistant Professors

Carolyn J. Anderson, Ph.D., Florida State University, 1990. (See Department of Molecular Biology and Pharmacology.)

Carlos F. Aquino-Aponte, M.D., University of Puerto Rico, 1985.

Kyongtae T. Bae, Ph.D., University of Pennsylvania, 1988; M.D., University of Chicago, 1992.

Mark M. Bahn, M.D., University of Minnesota, 1981; Ph.D., University of California, Los Angeles, 1988.

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.

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)

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.

P. Duffy Cutler, Ph.D., University of California, Los Angeles, 1992.

Colin P. Derdeyn, M.D., University of Virginia, 1988.

Steven Don, M.D., Vanderbilt University, 1985.

David A. Feinberg, Ph.D., University of California, Berkeley, 1982; M.D., University of Miami, 1988.

Edward M. Geltman, M.D., New York University, 1971. (See Department of Medicine.)

David S. Gierada, M.D., Wayne State University, 1988.

David M. Hovsepian, M.D., Columbia University, 1986. (See Department of Surgery.)

Weili Lin, Ph.D., Case Western Reserve University, 1993.

Eric S. Malden, M.D., Washington University, 1992. (See Department of Surgery.)

Timothy J. McCarthy, Ph.D., University of Liverpool, 1989.

Elizabeth Gerard McFarland, M.D., University of California, San Diego, 1987.

Robert C. McKinstry III, Ph.D., Massachusetts Institute of Technology, 1991; M.D., Harvard Medical School, 1992.

William B. Mehard, M.D., Medical University of South Carolina, 1990.

Mary A. Middleton, M.D., Medical College of Wisconsin, 1982.

Jeffrey J. Neil, M.D., Ph.D., Washington University, 1984.

Roberto Pacifici, M.D., Perugia University, 1981. (See Department of Medicine.)

Linda King Proctor, M.D., University of Pennsylvania, 1989.

Tracy L. Roberts, M.D., University of South Carolina, 1986.

Douglas D. Robertson Jr., M.D., Ph.D., Georgetown University, 1982. (See Department of Orthopaedic Surgery.)

Brian G. Rubin, M.D., University of Vermont, 1984. (See Department of Surgery.)

David A. Rubin, M.D., University of Pennsylvania, 1988.

Douglas C. Schmidt, Ph.D., University of California, Irvine, 1994. (Also Department of Computer Science)

Maria E. Schmidt, M.D., Yale University, 1983.

Janice W. Semenkovich, M.D., Washington University, 1981.

Yvette I. Sheline, M.D., Boston University, 1979. (See Department of Psychiatry.)

Peter E. Shile, M.D., Yale University, 1985. (See Department of Medicine.)

Cary L. Siegel, M.D., University of Michigan, 1987.

Richard M. Slone, M.D., University of Florida, 1989.

Emily L. Smith, M.D., Washington University, 1968.

Alan J. Tiefenbrunn, M.D., Washington University, 1974. (See Department of Medicine.)

Suresh Vedantham, M.D., The University of Chicago, 1992.

Pamela K. Woodard, M.D., Duke University, 1990.

Dmitriy A. Yablonskiy, Ph.D., Ukrainian Academy of Sciences, 1981.

Research Assistant Professors

Stephen M. Moore, M.S., Washington University, 1984.

John M. Ollinger, D.Sc., Washington University, 1986. (See Institute for Biomedical Computing.)

Vijay Sharma, Ph.D., Panjab University, 1987.

Hanneke van Mier, Ph.D., University of Nijmegen, The Netherlands, 1992. (See Department of Neurology.)

Tom O. Videen, Ph.D., University of Washington, 1981. (See Department of Neurology.)

Assistant Professors (Clinical)

John L. Bardsley, M.D., University of Illinois, 1964.

Gene L. Davis Jr., M.D., University of Virginia, 1972.

James W. Debnam Jr., M.D., University of Louisville, 1962.

Guillermo C. Geisse, M.D., University of Chile, 1965.

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.

Allan H. McCown, M.D., Washington University, 1964.

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 Professors (Adjunct)

Linda L. Fletcher, M.D., Harvard University, 1986.
Joseph A. Pierro, M.D., SUNY, Buffalo, 1981.

Research Scientists

Pilar Herrero, M.S., Washington University, 1997.
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.
Juan M. Franquiz, Ph.D., University of Florida, 1997.
Daniel J. Hightower, M.D., University of Missouri, 1989.
William James, M.D., University of Missouri, 1993.
Keith A. Kronemer, M.D., Tulane University, 1990.
Gary D. Luker, M.D., Washington University, 1991.
Vamsidhar Rao Narra, M.D., Osmania University, India, 1990.
Thomas K. Pilgram, Ph.D., University of California, Berkeley, 1982.
Sandy A. Ruhs, M.D., University of Iowa, 1994.
Ali Shaibani, M.D., Northeastern Ohio University, 1992.
Christopher O. Thornton, M.D., University of Missouri, Kansas City, 1994.
Bruce R. Whiting, Ph.D., Carnegie-Mellon University, 1977.

Research Instructors

Erbil Akbudak, Ph.D., Washington University, 1996.
Carmen S. Dence, M.S., Florida State University, 1972.
David E.C. Reichert, Ph.D., University of Illinois, 1994.
Sally Wagner Schwarz, M.S., University of Southern California, 1976.

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.

Division of Radiation Oncology

Professor and Director

Carlos A. Perez, M.D., University of 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) (See Institute for Biomedical Computing.)
Joseph L. Roti Roti, Ph.D., University of Rochester, 1972. (Cancer Biology) (See Department of Cell Biology and Physiology and Department of Biochemistry and Molecular Biophysics.)
Todd H. Wasserman, M.D., University of Rochester School of Medicine and Dentistry, 1972.
Jeffrey F. Williamson, Ph.D., University of Minnesota, 1982. (Radiation Physics)

Professor Emeritus

Teresa J. Vietti, M.D., Baylor University, 1953. (Radiation Oncology) (See Department of Pediatrics.)

Associate Professors

Andrei Laszlo, Ph.D., University of California, 1981. (Cancer Biology)
Gilbert H. Nussbaum, Ph.D., Harvard University, 1967. (Radiation Physics)
Keith M. Rich, M.D., Indiana University, 1977. (See Departments of Neurology and Neurological Surgery and Department of Anatomy and Neurobiology.)
Joseph R. Simpson, Ph.D., The University of Chicago, 1967; M.D., Harvard University, 1973.

Associate Professors (Clinical)

Venkata R. Devineni, M.D., Osmania Medical College, 1974.
Bruce J. Walz, M.D., Washington University, 1966.

Assistant Professors

Clifford K.S. Chao, M.D., Kaohsiung Medical College, 1982.
Robert E. Drzymala, Ph.D., University of Oklahoma, 1977. (Radiation Physics) (See Department of Neurological Surgery.)
Prabhat Goswami, Ph.D., Gauhati University, 1983. (Cancer Biology)
Clayton Hunt, Ph.D., The University of Chicago, 1979. (Cancer Biology)
Eric E. Klein, M.S., University of Massachusetts, 1985. (Radiation Physics)
Daniel A. Low, Ph.D., Indiana University, 1988. (Radiation Physics)

Michael A. Mackey, Ph.D., University of California, San Francisco, 1987. (Cancer Biology)

Jeff M. Michalski, M.D., Medical College of Wisconsin, 1986.

Eduardo G. Moros, Ph.D., University of Arizona, Tucson, 1990. (Radiation Physics)

Jason W. Sohn, Ph.D., Medical College of Ohio, 1998. (Radiation Physics)

Douglas R. Spitz, Ph.D., University of Iowa, 1984. (Cancer Biology)

Research Assistant Professors

Ryuji Higashikubo, Ph.D., Bowling Green State University, 1978. (Cancer Biology)

Fiorenza Ianzini, Ph.D., University of Rome, 1980. (Cancer Biology)

Assistant Professor (Clinical)

MacDonald B. Logie, M.D., Northwestern University, 1967.

Instructors

Walter R. Bosch, D.Sc., Washington University, 1990. (Radiation Physics)

Jeffrey D. Bradley, M.D., University of Arkansas, 1993.

Ming-shun Chen, Ph.D., Kansas State University, 1991. (Cancer Biology)

Seymour Fox, Ph.D., University of Oklahoma, 1977. (Computer Sciences)

David Gius, Ph.D., The University of Chicago, 1989; M.D., Loyola University, 1992.

Todd E. Grigereit, Ph.D., Montana State University, 1993. (Radiation Physics)

William B. Harms Sr., B.S., University of Missouri, 1979. (Radiation Physics)

Assen S. Kirov, Ph.D., University Sofia, Bulgaria, 1993. (Radiation Physics)

John W. Matthews, D.Sc., Washington University, 1980. (Computer Sciences) (See Institute for Biomedical Computing.)

Daniel F. Mullen, D.D.S., University of Missouri, Kansas City, 1977.

Sasa Mutic, M.S., University of Colorado, 1996. (Radiation Physics)

William L. Straube, M.S., Washington University, 1992. (Radiation Physics)

Marie E. Taylor, M.D., University of Washington, Seattle, 1982.

Instructor (Clinical)

Gary A. Ratkin, M.D., Washington University, 1967. (See Department of Medicine.)

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 or a preceptorship elective in 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

Instructor: *Thomas E. Read, M.D.*, 362-8029

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 are opportunities for fourth-year student rotations within each division in the Department of Surgery. The student is encouraged to consult with the Surgery course master in planning his or her fourth-year rotation so that resources and faculty expertise within the department can be maximally utilized during the rotation. Generally, the minimum duration of a fourth-year rotation in the Department of Surgery is four weeks.

Electives

M95 801 GENERAL SURGERY SUBINTERNSHIP — BARNES-JEWISH HOSPITAL SOUTH CAMPUS

Instructor: *Thomas E. Read, M.D.*, 362-8029

Each student will function as a member of one of the general surgery teams (Surgical Oncology/ Endocrine Surgery, Hepatobiliary/Pancreatic/ Gastrointestinal Surgery, or Burns, Trauma and Surgical Critical Care), sharing most of the duties of an intern. The student will share night call under supervision of first- and second-year residents in rotation with the two ward interns. The structure of the subinternship is flexible to accommodate the individual student's interests within the department. The student may spend the entire elective period on a single service or arrangements can be made for the student to rotate on more than one service. Students attend weekly grand rounds and general surgery conferences given by the Department of Surgery. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 803 CHRISTIAN HOSPITAL SURGICAL CLERKSHIP

Instructor: *Kevin J. Mitchell, M.D.*, 355-0310

This student surgical clerkship allows senior medical students to participate in a wide range of general, trauma and vascular surgical patient care. Students work closely with general surgeons in a community hospital setting. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 807 GENERAL SURGERY CLERKSHIP (RURAL PRACTICE) — KEOKUK AREA HOSPITAL

Instructor: *Ronald Kinateder, M.D.* (319-524-4642)

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 1/2 hours north of St. Louis and is accessible by car. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 811 COLON AND RECTAL SURGERY PRECEPTORSHIP — BARNES-JEWISH HOSPITAL NORTH

Instructor: *Ira J. Kodner, M.D.*, 454-7177

A four-week preceptorship is offered in Colon and Rectal Surgery. This consists of an intensive outpatient and inpatient experience with the senior faculty. Surgical problems are evaluated and planning for immediate and long-term care is undertaken. The student will acquire a comprehensive understanding of a wide range of benign and malignant colorectal disease. The student is expected to attend and participate in all conferences. There is exposure to radiation oncology and the specialized areas of nursing related to care of patients with colorectal cancer and inflammatory bowel disease. Specifics of the elective should be planned in advance with Dr. Kodner. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 813 UNIT III TRAUMA — ELECTIVE ROTATION

Instructor: *Timothy G. Buchman, Ph.D., M.D.*, 362-9347

The student will function as a subintern on the Trauma and Emergency Surgery Service, which includes the Trauma Service. It is a busy inpatient service. The student will be involved with the comprehensive management of emergency and trauma patients. The student also will be involved in patient care in the Emergency Department, the Operating Room, the Intensive Care Units and in the general surgery divisions. Practical experience will be obtained in the initial evaluation and resuscitation of traumatized patients and other emergency care patients. The student also will have ample opportunity to participate in operative care. The experience will include regular participation in the outpatient clinics. The student will attend regular rounds, conferences and other activities of the service, including regular in-house call. At the conclusion of the rotation, the student will have a systematic approach to the management of the traumatized and otherwise critically ill surgical patient. The student will be able to manage most routine problems in perioperative surgical care. Valid start weeks for four-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.; Thomas B. Ferguson Sr., M.D.; Alec Patterson, M.D.; Michael K. Pasque, M.D.; Charles L. Roper, M.D.; Thoralf M. Sundt III, M.D.; Charles B. Huddleston, M.D.; William A. Gay Jr., M.D.; Eric N. Mendeloff, M.D.; Bryan F. Meyers, M.D.; Marc R. Moon, M.D.* (all: 362-8008)

The senior elective in Cardiothoracic Surgery is a four-week clinical rotation. Time on this rotation will be evenly divided between adult cardiac, pediatric cardiac, and general thoracic surgery. While on the cardiothoracic surgery service, students will participate in morning work rounds with the cardiothoracic surgery house staff, attend the operative procedures of their choice, attend weekly cardiothoracic surgery conference, and attend teaching rounds and cardiac catheterization conference (combined Cardiology and Cardiothoracic Surgery). The students will be introduced not only to the surgical techniques involved in cardiothoracic surgery, but emphasis also will be placed on postoperative care. In addition, the principles of cardiopulmonary bypass, left and right heart assist devices, intra-aortic balloon counterpulsation, cardiac transplantation, lung transplantation, cardiac arrhythmia surgery, coronary artery bypass surgery, valve repair and replacement, and pulmonary and esophageal neoplastic disorders will be emphasized. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 830 PLASTIC RECONSTRUCTIVE SURGERY

Instructor: *Susan E. Mackinnon, M.D.*, 362-7388

The period on plastic surgery may either be spent as a clinical clerk 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. 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 831 PLASTIC SURGERY AMBULATORY CARE

Instructor: *Susan E. Mackinnon, M.D.*, 362-4586

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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 850 UROLOGY

Instructor: *William J. Catalona, M.D.*, 362-8205

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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 861 SURGICAL ONCOLOGY AND ENDOCRINE SURGERY

Instructor: *Jeffrey F. Moley, M.D.*, 362-5210

Clinical exposure will be to thyroid, parathyroid, and adrenal surgery, as well as breast oncology, GI oncology, and soft tissue sarcomas. Basic science laboratory correlation is available through Dr. Moley's laboratory which is performing translational research developing new therapies for metastatic medullary thyroid cancer through tyrosine kinase inhibitors, and glucose transporter expression in cancer. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 880 PEDIATRIC SURGERY

Instructor: *Robert P. 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, emergency room care, pediatric oncology conference, weekly conferences including mortality and morbidity, radiology, pathology, and monthly trauma and medical surgical GI conferences, as well as daily contact with Pediatric Radiology, are expected. Students are encouraged to undertake clinical investigations if elective time permits. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 891 ORGAN TRANSPLANTATION

Instructors: *Todd K. Howard, M.D.*, 362-5701; *Jeffrey A. Lowell, M.D.*, 362-2820; *Surendra Shenoy, M.D., Ph.D.*, 362-4338

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 kidney, liver or organ grafts procured from cadaveric or living related donors and participation in the operative management of these patients. Emphasis also is 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 892 MINIMALLY INVASIVE SURGERY

Instructor: *Nathaniel J. Soper, M.D.*, 454-8877

An elective rotation in minimally invasive surgery is being offered by the Division of General Surgery. The coordinator for the rotation is Nathaniel J. Soper, M.D., a member of the division's Hepatobiliary Pancreatic (HPB) Section. 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 also will 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, including Endocrine/Oncology (Drs. Doherty and Brunt), Colorectal Surgery (Dr. Fleshman) and Urologic Surgery (Drs. Clayman and McDougall). 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. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 896A PRECEPTORSHIP IN GENERAL SURGERY WITH DR. TIMOTHY G. BUCHMAN

Instructor: *Timothy G. Buchman, Ph.D., M.D.*, 362-9347

The student will work closely with Dr. Buchman 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. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 896B PRECEPTORSHIP IN GENERAL AND VASCULAR SURGERY WITH DR. BRENT T. ALLEN

Instructor: *Brent T. Allen, M.D.*, 362-7408

The student will work closely with Dr. Allen within the Vascular Section in the Division of General Surgery. Student involvement in all aspects of clinical surgery is accomplished by student attendance in the outpatient office, preoperative patient evaluation, in-hospital patient management, surgery,

and postoperative outpatient follow-up after discharge. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 896C PRECEPTORSHIP IN GENERAL SURGERY WITH DR. GERARD M. DOHERTY

Instructor: *Gerard M. Doherty, M.D.*, 362-8370

The student will work closely with Dr. Doherty within the Oncology and Endocrine Section in the Division of General Surgery. 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. Clinical exposure includes the Breast Health Center, as well as thyroid, parathyroid, pancreas and adrenal surgeries. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 896D PRECEPTORSHIP IN GENERAL SURGERY WITH DR. JEFFREY A. LOWELL

Instructor: *Jeffrey A. Lowell, M.D.*, 362-2820

The student will work closely with Dr. Lowell within the Transplant Section in the Division of General Surgery. 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. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 896E PRECEPTORSHIP IN GENERAL SURGERY WITH DR. JEFFREY F. MOLEY

Instructor: *Jeffrey F. Moley, M.D.*, 362-5210

The student will work closely with Dr. Moley within the Oncology and Endocrine Section in the Division of General Surgery. 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. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 896F PRECEPTORSHIP IN GENERAL SURGERY WITH DR. GREGORIO A. SICARD

Instructor: *Gregorio A. Sicard, M.D.*, 362-7841

The student will work closely with Dr. Sicard within the Vascular Section in the Division of General Surgery. 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 operating room and postoperative outpatient follow-up after discharge. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M95 898 PRECEPTORSHIP IN GENERAL SURGERY WITH DR. STEVEN M. STRASBERG

Instructor: *Steven M. Strasberg, M.D.*, 362-7147

The student will work closely with Dr. Strasberg within the Hepatobiliary Pancreatic Section in the Division of General Surgery. 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. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

M10 820 CRITICAL CARE

Instructors: *Walter A. Boyle III, M.D.*, 747-3581; *Timothy G. Buchman, Ph.D., M.D.*, 362-9347

This clinical elective is designed to familiarize the student with the management of the critically ill patient in the surgical intensive care unit at Barnes-Jewish Hospital. The student will receive individualized training in critical care management including invasive hemodynamic monitoring and airway management procedures. The student will function as an integral part of the surgical intensive care unit team, consisting of attending physicians with specialty training in critical care, critical care fellows, and house staff from Surgery, Anesthesiology and other specialties. The student will actively participate in daily rounds with members of the intensive care unit team and will be actively involved in the management of patients from all the surgical specialties (except cardiothoracic) who have acute problems requiring intensive care management. Practical experience will be gained in both 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, and management of fluids, electrolytes and nutrition. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Research M95 (900)

Gerard M. Doherty, M.D., 362-8370
Cytokine and Tumor Biology Laboratory/Surgical Oncology. Minimum rotation length: three months. This laboratory focuses on the role of interferon gamma in endogenous tumor immunity. The principle techniques utilized for the study of *in vitro* cell culture and *in vivo* models of tumor growth include plasmid vector construction and over-expression of cytokines, cytokine receptors and transcription factors.

James W. Fleshman Jr., M.D., 454-7177
Research in laparoscopy of colorectal disease. Minimum rotation length: three months. Ongoing projects in the laboratory are focused on defining the effects of laparoscopic techniques on tumor implantation. Other projects in which the student may participate include delineation of tumor cell desquamation within the abdominal cavity after colectomy for cancer and manipulation of the instrumentation site incision to prevent tumor implantation. The student will work under the direct supervision of Dr. James Fleshman and Dr. Judith Connett. The student will have the opportunity to gain familiarity with radioimmunoassay techniques and histologic techniques, as well as to participate directly in small animal surgical procedures.

Susan E. Mackinnon, M.D., 362-4587
Peripheral nerve surgical research. Investigation of nerve injury and regeneration, including nerve transplantation. Students are encouraged to design and complete research studies 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 Drs. Higgs, Kraemer, Mackinnon, Marsh, Witt or Young. A project will be designed with the student prior to his or 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) fabrication of body parts using tissue flaps and peptide growth factors; 4) *in vivo* tissue generation and tissue differentiation; 5) the mechanical, structural and biochemical effects of stress on scar tissue maturation; 6) *in vivo* anatomy of craniofacial deformities; 7) microvascular thrombosis research; and 8) 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. The student may choose a specific staff member's research project or participate in several different projects. These investigators and their projects include: Nathaniel J. Soper, M.D., physiology of Nissen fundoplication and ergonomies of laparoscopic surgery; James W. Fleshman Jr., M.D., influence of pneumoperitoneum on intraperitoneal spread of colorectal cancer; L. Michael Brunt, M.D., application of endoscopic surgery to the neck and axilla; and Jacob C. Langer, M.D., endoscopic fetal surgery and laparoscopic repair of rectal prolapse.

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.)

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 Schoenberg Professor

William A. Gay Jr., M.D., Duke University, 1961.

Jacqueline and William Maritz Professor

Thalachallour Mohanakumar, Ph.D., Duke University, 1974. (See Department of Medicine and Department of Pathology.)

Michael K. Pasque, M.D., University of Oklahoma, 1978.

Joseph C. Bancroft Professor

Alec Patterson, M.D., Queen's University, 1974.

Associate Professor

Charles B. Huddleston, M.D., Vanderbilt University, 1978.

Research Associate Professor

Richard B. Schuessler, Ph.D., Clemson University, 1977. (See Program in Biomedical Engineering.)

Associate Professor (Clinical)

Martin Bergman, M.D., Washington University, 1945.

Assistant Professors

Lawrence L. Creswell, M.D., The Johns Hopkins University, 1988.

Eric N. Mendeloff, M.D., University of California, Los Angeles, 1985.

Bryan F. Meyers, M.D., The University of Chicago, 1986.

Marc R. Moon, M.D., Stanford University, 1998.

Thoralf M. Sundt III, M.D., The Johns Hopkins University, 1984.

Instructor

Christina C. Pasque, M.D., University of California, Los Angeles, 1980.

Division of General Surgery

Professor and Head of Division

Gregorio A. Sicard, M.D., University of Puerto Rico, 1972. (See Department of Radiology.)

Professors Emeriti

Charles B. Anderson, M.D., Yale University, 1962.

Walter F. Ballinger, M.D., University of Pennsylvania, 1948.

Eugene M. Bricker, M.D., Washington University, 1934.

William W. Monafo Jr., M.D., Tufts University, 1957.

Gordon W. Philpott, M.D., Washington University, 1961.

Professors

Harry Edison Professor of Surgery

Timothy G. Buchman, Ph.D., University of Chicago, 1978; M.D., 1980. (See Department of Anesthesiology.)

M. Wayne Flye, M.D., University of North Carolina, 1967; Ph.D., Duke University, 1980. (See Department of Molecular Microbiology and Department of Radiology.)

Solon and Bettie Gershman Professor

Ira J. Kodner, M.D., Washington University, 1967.

Daniel D. Picus, M.D., The University of Chicago, 1981. (See Department of Radiology.)

Nathaniel J. Soper, M.D., University of Iowa, 1980.

Steven M. Strasberg, M.D., University of Toronto, 1963.

Samuel A. Wells Jr., M.D., Emory University, 1961.

Associate Professors

Brent T. Allen, M.D., Washington University, 1979. (See Department of Radiology.)

Dorothy A. Andriole, M.D., New York University, 1980.

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.

Michael D. Darcy, M.D., Ohio State University, 1979. (See Department of Radiology.)

Gerard M. Doherty, M.D., Yale University, 1986.

James W. Fleshman Jr., M.D., Washington University, 1980.

Paul J. Goodfellow, Ph.D., Queens University, 1985. (See Department of Obstetrics and Gynecology.)

Virginia Herrmann, M.D., St. Louis University, 1974.

Richard S. Hotchkiss, M.D., University of Virginia, 1976. (See Department of Anesthesiology and Department of Medicine.)

Todd K. Howard, M.D., University of Cincinnati, 1981.

Jeffrey A. Lowell, M.D., Yale University, 1985.

Jeffrey F. Moley, M.D., Columbia University, 1980.

Robert W. Thompson, M.D., University of Michigan, 1983. (See Department of Radiology.)
Thomas M. Vesely, M.D., Mayo Medical School, 1986. (See Department of Radiology.)

Associate Professors Emeriti (Clinical)

Richard V. Bradley, M.D., Washington University, 1952.
Leo A. Sachar, M.D., Washington University, 1940.
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 Professor

William G. Dilley, Ph.D., University of California, 1970.

Assistant Professors

Rebecca Aft, M.D., Ph.D., University of Wisconsin, Madison, 1983; M.D., Washington University, 1992.
Elisa H. Birnbaum, M.D., University of Illinois, 1985.
J. Perren Cobb, M.D., University of Louisville, 1986.
Jeffrey A. Drebin, M.D., Ph.D., Harvard University, 1987.
J. Christopher Eagon, M.D., Harvard University, 1988.
Bradley D. Freeman, M.D., Duke University, 1988.
Peter S. Goedegebuure, Ph.D., Erasmus University, Rotterdam, Netherlands, 1989.
David M. Hovsepian, M.D., Columbia University, 1986. (See Department of Radiology.)
Terry C. Lairmore, M.D., Vanderbilt University, 1988.
Eric S. Malden, M.D., Washington University, 1992. (See Department of Radiology.)
Thomas E. Read, M.D., University of California, San Francisco, 1988.
Brian G. Rubin, M.D., University of Vermont, 1984. (See Department of Radiology.)
Robert E. Schmieg Jr., M.D., The Johns Hopkins University, 1989.
Surendra Shenoy, M.D., Ph.D., Kasturba Medical College, 1975.
Suresh Vendanthan, M.D., The University of Chicago, 1992. (See Department of Radiology.)

Research Assistant Professors

Judith M. Connett, Ph.D., Washington University, 1979.
Nancy J. Poindexter, Ph.D., University of Minnesota, 1985.

Assistant Professors (Clinical)

Kenneth J. Arnold, M.D., Washington University, 1968.
Ronald Kinateder, M.D., University of Missouri, 1966.
Jerome F. Levy, M.D., Washington University, 1958.
Stanley L. London, M.D., Washington University, 1949.
Jerry R. Meyers, M.D., Washington University, 1966.
Shale M. Rifkin, M.D., Washington University, 1948.
Andrew D. Spencer, M.D., Indiana University, 1954.
Leonard B. Weinstock, M.D., University of Rochester, 1981.

Instructors

Patrick J. Geraghty, M.D., Northwestern University, 1991.
Venkataraman Ramachandran, M.D., Jipmer University, India, 1983.
Laurence Yee, M.D., University of Pittsburgh, 1990.
H. Michael Yin-Hu, M.D., University of Minnesota, 1989.

Research Instructor

Yael G. Alevy, Ph.D., Albert Einstein College of Medicine, 1975.

Instructors (Clinical)

Jerry L. Beguelin, M.D., Washington University, 1962.
John B. Buettner, M.D., Washington University, 1967.
Ronald J. Gaskin, M.D., Washington University, 1970.
Jay W. Haines, M.D., Chicago Medical School, 1974.
Elizabeth Hilliker, M.D., Washington University, 1970.
Robert J. Kingsbury, M.D., University of Michigan, 1960.
David P. Krajcovic, M.D., Washington University, 1969.
G. Lynn Krause Jr., M.D., University of Pennsylvania, 1954.
Eric H. Lindenblad, M.D., University of Missouri, 1981.
Alan M. Londe, M.D., Washington University, 1961.
Mark A. Ludwig, M.D., The University of Chicago, 1976.
Hubert S. Mickel, M.D., Harvard University, 1962.
Julian C. Mosley Jr., M.D., Washington University, 1972.
George A. Oliver, M.D., Washington University, 1952.
Charles L. Parks, M.D., Washington University, 1969.
Jon Peterson, M.D., University of Southern California, 1978.
Frank O. Richards, M.D., Howard University, 1947.
Donald C. Sauer, M.D., Washington University, 1960.
Marlys E. Schuh, M.D., Washington University, 1979.
Erik P. Thyssen, M.D., Michael Reese Hospital, 1990.

Division of Pediatric Surgery

Head of Division and Associate Professor

Robert P. Foglia, M.D., Georgetown University, 1974.

Professor Emeritus

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.

Robert K. Minkes, M.D., Tulane University, 1992.

Division of Plastic and Reconstructive Surgery

Head of Division and Professor

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. (See Irene Walter Johnson Institute of Rehabilitation.)

Professors

Jeffrey L. Marsh, M.D., The Johns Hopkins University, 1970. (See Department of Pediatrics.)

V. Leroy Young, M.D., University of Kentucky, 1970.

Associate Professors

Keith E. Brandt, M.D., University of Texas, Houston, 1983.

Donald V. Huebener, D.D.S., Washington University, 1969.

Bruce A. Kraemer, M.D., Washington University, 1979.

Assistant Professors

Judith M. Gurley, M.D., University of North Carolina, 1990.

Philip E. Higgs, M.D., University of Florida, 1974.

George J. Hruza, M.D., New York University, 1982. (See Department of Medicine.)

Helen E. Tadjalli, M.D., University of Navarra, Spain, 1983.

Michael W. Vannier, M.D., University of Kentucky, 1979. (See Department of Radiology.)

Peter D. Witt, M.D., Case Western Reserve University, 1983.

Research Assistant Professor

Christine B. Novak, M.S., University of Toronto, 1992.

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.

Instructor

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.

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.

Ralph V. Clayman, M.D., University of California, San Diego, 1973. (See Department of Radiology.)

Professor Emeritus (Clinical)

Robert K. Royce, M.D., Washington University, 1942.

Associate Professors

Carl G. Klutke, M.D., University of Michigan, 1983.

Elspeth M. McDougall, M.D., University of Calgary, 1979.

Associate Professors Emeriti (Clinical)

William T. Bowles, M.D., Stanford University, 1955.

M. Richard Carlin, M.D., Yale University, 1947.

Assistant Professors

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.

Chandru P. Sundaram, M.D., Madras Medical College, India, 1985.

Yan Yan, M.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.

Franz U. Steinberg, M.D., University of Berne, 1938. (See Department of Medicine.)

Assistant Professor (Clinical)

James G. Bucy, M.D.,
Northwestern University, 1962.

Instructors

Robert S. Figenshau, M.D.,
University of Minnesota, 1987.

Charles H. Nicolai, M.D.,
Washington University, 1946.

Instructors (Clinical)

Saul Klein, M.D.,
Syracuse University, 1959.

Neal Neuman, M.D.,
St. Louis University, 1971.

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.

TEACHING AND RESEARCH DIVISIONS, INSTITUTES 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 predoctoral and postdoctoral 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 a major 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, providing 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 factors such as lipids, lipoproteins, apolipoproteins, obesity, blood pressure, sex hormones and glucose tolerance; 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.

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 response to exercise training (HERITAGE); a coordinating center for a multicenter NETWORK study on the genetics of hypertension (HyperGEN); a coordinating center for a trial in ocular hypertensives (OHTS); studies in psychiatric epidemiology; studies of the epidemiology of falls, hip fracture and osteoporosis; studies of Alzheimer's disease; studies on ischemic heart disease; three epidemiological research projects developing methods for increasing public awareness and utilization of measures which are known to decrease the likelihood of developing heart disease and for encouraging behaviors which will improve prognosis following a heart attack; study of pre-eclampsia and genetic risk factors (including AGT); and epidemiological genetics and family studies of mental disorders including schizophrenia and alcoholism.

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.

FOURTH YEAR

Electives

M80 871 BIOSTATISTICS FOR RESEARCH WORKERS

Instructors: *Michael A. Province, Ph.D., and staff,* 362-3616

This course is designed for those researchers who want to expand their knowledge of practical methods in statistics. It is oriented toward statistical and epidemiological concepts, applications, practical hints and a hands-on approach to data, rather than theory or derivation of formulas. Heavy use is made of SAS/PC (a statistical analysis package for the PC computer, which is required for this course) for in-class examples and homework problems. The course begins with a basic overview of common statistical techniques, including: simpler, classical methods (e.g., t-test, chi-square, correlation); multivariate methods (regression, logistic models, ANOVA, survival analysis); and study design. These plus other selected topics (e.g., reliability, factor analysis, survey and sampling, research design) are then covered in greater detail in additional modules. Many faculty from different departments and backgrounds provide the instruction. Cross listed with L41 (Bio) 5066 and MPE Program.

Research (M80 900)

Dabeeru C. Rao, Ph.D., 362-3606

Genetic Epidemiology. After being introduced to current approaches in genetic epidemiology, interested students will be supervised on research projects dealing with methodological development and application of the techniques. Topics to be included are path analysis, variance components, segregation analysis, linkage and association.

Faculty

PROFESSOR AND DIRECTOR

Dabeeru C. Rao, Ph.D., Indian Statistical Institute, 1971. (See Department of Psychiatry and Department of Genetics.)

Professors

J. Philip Miller, A.B., Washington University, 1965.

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 Professors

Mae E. Gordon, Ph.D., University of Wisconsin, 1978. (See Department of Ophthalmology and Visual Sciences.)

Kenneth B. Schechtman, Ph.D., Washington University, 1978. (See Department of Medicine.)

Research Associate Professors

Ingrid B. Borecki, Ph.D., University of Hawaii, 1981.

Treva K. Rice, Ph.D., University of Colorado, 1987.

Paul A. Thompson, Ph.D., University of North Carolina, 1983.

Assistant Professor Emeritus

Barbara B. Hixon, B.S., University of Illinois, 1941.

Assistant Professors

Michael R. DeBaun, M.D., Stanford University, 1987; M.P.H., The Johns Hopkins University, 1993. (See Department of Pediatrics.)

Curtis A. Parvin, Ph.D. University of Minnesota, 1980. (See Department of Pathology and Department of Medicine.)

William D. Shannon, Ph.D., University of Pittsburgh, 1995. (Also Division of General Medical Sciences)

Research Assistant Professors

Chi Gu, Ph.D., Washington University, 1992.

Yuling Hong, M.D., Ph.D., Karolinska Institute, Stockholm, Sweden, 1997.

Research Instructors

Ping An, M.D., Shanghai Medical University, Shanghai, China, 1987.

Mary Feitosa, Ph.D., University of de São Paulo, São Paulo, Brazil, 1990.

INSTITUTE FOR BIOMEDICAL COMPUTING

The Institute for Biomedical Computing is an inter-school faculty unit with a mission to advance biomedical science through the application of advanced computing technology. The Institute serves as a focal point for interdisciplinary teaching and student research in areas not yet included in conventional curricula. Institute activities include research, training and collaborations with both the School of Medicine and the School of Engineering and Applied Science. The Institute now includes the Biomedical Computer Laboratory (BCL), the Center for Molecular Design (CMD), and the Center for Computational Biology (CCB).

The Biomedical Computer Laboratory (BCL) emphasizes the development of computer hardware and software systems for use in the solution of research problems in biomedicine. Several systems have seen a progression from exploratory pilot studies through major development projects to public availability through commercial distribution. In general, BCL focuses on biomedical research applications that require solutions employing approaches to digital computing not available from commercial vendors or through other computing facilities at Washington University. Such applications often require the integration of computers with digital communication networks for data and information sharing with local and national collaborators as well as to provide access to specialized computational and image display resources. The BCL sustains an active role in the development, support and extension of these networks, as well as computational and display technologies, especially on the medical campus.

The Center for Molecular Design (CMD) provides a core facility with research in the development and application of theoretical chemistry and biophysics to problems at the molecular level. A long-term association among Institute components, Computer Science and Pharmacology in the area of molecular recognition and drug design provides the base for industrial collaboration and strong interactions with other departments at Washington University.

The Center for Computational Biology (CCB) focuses on databases of biological information and analysis of metabolic systems. Research involves algorithm development, database design and data analysis, with emphasis on biochemical and neuromuscular structure and function. The center is also involved in technology development and informatics support for genome mapping and sequencing.

Research activities of the Institute for Biomedical Computing span a wide range from basic biological science and clinical research to topics in biomedical engineering, signal processing, image processing, genome mapping, drug design and databases. In addition to collaborations with researchers in the basic science and clinical departments of the School of Medicine or in the Departments of Computer Science and Electrical Engineering of the School of Engineering and Applied Science, the Institute also works with the Institute of Biological and Medical Engineering (IBME) and the Department of Biomedical Engineering. Course numbers for research opportunities are listed within the appropriate departments.

Major collaborative projects in BCL include research in algorithms for computational light microscopic optical sectioning and confocal fluorescent microscopy. *Drs. Rosenberger and Conchello*

Research opportunities in the CMD center on algorithm development in molecular modeling, simulations and structure-based *de novo* drug design, data analysis and presentation of molecular comparisons, interpretation of NMR experimental data, modeling of integral membrane proteins including G protein coupled receptors, three-dimensional quantitative structure-activity relationships and predictions of protein tertiary structure. *Drs. Marshall and Nikiforovich*

Research in the CCB focuses on computational aspects of molecular biology, including molecular sequence interpretation, RNA structure prediction, design and analysis of databases of biological information, and analysis of metabolic systems. Research involves algorithm development, database design and database analysis, with a particular emphasis on biochemical and neuromuscular structure and function. The center also is involved in technology development and informatics support for genome mapping and sequencing. *Drs. States, Kazic and Zuker*

For additional information, see: *http://www.ibc.wustl.edu*

FOURTH YEAR
Research (M80 900)

David J. States, M.D., Ph.D., 362-2135
The Institute for Biomedical Computing (IBC) offers research opportunities in computational molecular biology, genome analysis, computational support for genome mapping and sequencing, electrophoretic gel image analysis, and molecular design and macromolecular biophysics. Inquiries are encouraged, and placements within the IBC's program are arranged on an *ad hoc* basis according to student interests and background. Minimum period 12 weeks; 18 weeks preferred.

Frederick U. Rosenberger, D.Sc., 362-2135
Special projects are offered in a wide variety of application areas coinciding with ongoing research projects. Current activities include computational optical sectioning microscopy and quantitative biomedical imaging and biomedical computing broadly. Opportunities are matched to the student's area of interest, capabilities and objectives, through consultation in advance of the elective period. Minimum period 12 weeks; 18 weeks preferred.

Faculty

ASSOCIATE PROFESSOR AND DIRECTOR OF THE INSTITUTE FOR BIOMEDICAL COMPUTING, AND DIRECTOR OF BIOMEDICAL ENGINEERING

David J. States, M.D., Ph.D., Harvard University, 1983. (See Department of Genetics and Department of Biochemistry and Molecular Biophysics.) (Also School of Engineering and Applied Science)

PROFESSOR AND DIRECTOR OF CENTER FOR MOLECULAR DESIGN

Garland R. Marshall, Ph.D., Rockefeller University, 1966. (See Department of Molecular Biology and Pharmacology.)

ASSOCIATE PROFESSOR AND ASSOCIATE DIRECTOR OF IBC

Frederick U. Rosenberger, D.Sc., New York University, 1969. (Also School of Engineering and Applied Science)

Professors Emeriti

Harold W. Shipton, C.Eng., Shrewsbury Technical College, 1949. (Also School of Engineering and Applied Science)

Lewis J. Thomas Jr., M.D., Washington University, 1957. (See Department of Cell Biology and Physiology.) (Also School of Engineering and Applied Science)

Professors

Jerome R. Cox Jr., Sc.D., Massachusetts Institute of Technology, 1954. (See Department of Cell Biology and Physiology.) (Also School of Engineering and Applied Science)

James A. Purdy, Ph.D., University of Texas, 1971. (Radiation Physics)

Donald L. Snyder, Ph.D., Massachusetts Institute of Technology, 1966. (Also School of Engineering and Applied Science)

Research Professor

Gregory V. Nikiforovich, Ph.D., Byelorussian University, 1972.

Associate Professors

G. James Blaine III, D.Sc., Washington University, 1974. (See Department of Radiology.) (Also School of Engineering and Applied Science)

Mark E. Frisse, M.D., Washington University, 1978. (See Bernard Becker Medical Library and Department of Medicine.)

Michael S. Zuker, Ph.D., Massachusetts Institute of Technology, 1974.

Research Associate Professor

Jack R. Engsberg, Ph.D., University of Iowa, 1985. (See Department of Neurological Surgery.)

Assistant Professors

José-Angel Conchello, Ph.D., Dartmouth College, 1991.

Christine H. Lorenz, Ph.D., Vanderbilt University, 1992.

Joseph M. Smith, M.D., Harvard Medical School, 1987. (See Department of Medicine.)

Research Assistant Professors

Volker Nowotny, Ph.D., Technische Universitat, 1981.

John M. Ollinger, D.Sc., Washington University, 1986. (See Department of Radiology.)

Instructor

Toni M. Kazic, Ph.D., University of Pennsylvania, 1984.

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.

M80 541 TOPICS IN MEDICINE/MEDICAL HUMANITIES

Instructors: *Stephen S. Lefrak, M.D.*, 454-7116; *Thomas H. Gallagher, M.D., 454-8664; and staff*

This is a required course given throughout 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 two courses from the menu.

M80 542 MEDICINE AND HUMAN VALUES/ PHYSICIANS AND PATIENTS

Instructors: *Stephen S. Lefrak, M.D.*, 454-7116; *Thomas H. Gallagher, M.D.*, 454-8664; *and staff*

This is a required course given throughout the first two years of medical school. The paradigm for this course is the basic science education in medical school, which serves as the foundation for continuing education in the clinical sciences. The Medical Humanities course serves to provide a broad overview of basic issues which will affect the clinical and academic practice of medicine in the future. The areas selected for study emphasize ethics, history of medicine, health care policy and jurisprudence. Each of these areas is developed by a section leader of renown in the field who is responsible to the course master for developing curriculum, format and examination questions to evaluate achievement of learning objectives.

OTHER COURSES

M04 582 ALZHEIMER'S DISEASE

Instructors: *John C. Morris, M.D.; Alison M. Goate, D.Phil.; David H. Holtzman, M.D.; Eugene M. Johnson Jr., Ph.D.; Daniel W. McKeel Jr., M.D.* (all: 454-5605)

Alzheimer's disease affects more than 4 million Americans. The cost of caring for these patients has been estimated at $100 billion each year. The population most vulnerable to Alzheimer's disease, those over 65 years of age, is predicted to increase significantly in the near future, ensuring that it will continue to be a public health problem of enormous proportions. In this elective, we will explore the current state of both clinical and basic research into the causes and treatment of Alzheimer's disease by discussion of critical aspects of aging and dementia and review of relevant literature. The elective will involve visits to a clinical research office where patient assessments are performed and to a neuropathological laboratory to look at the characteristic lesions of the illness. In all these experiences, the comparison of Alzheimer's disease with normal aging will be emphasized.

M04 584 MEDICAL ASPECTS OF DOMESTIC VIOLENCE

Instructor: *Sue Dersch, R.N.*, 362-9200

This elective is an opportunity to learn how physicians can address this societal problem on an individual level. General information about domestic violence and community resources will be provided. More importantly, participants will gain the practical skills needed to *routinely* address the health risk of violence during patient interviews and to care for patients who are living with abuse. Legal issues such as mandatory reporting and legal options for the patient will be discussed. The importance of medical documentation and photography of injuries will be demonstrated. *The Physician's Guide to Domestic Violence* by Salber and Taliaferro will be provided. Class sessions are interactive and case presentations are emphasized.

If you have any questions or suggestions, please contact the student coordinator, Denise Flinn, WUMS III at 361-5092.

M04 587A PHYSICIAN AS HEALTH PROTECTOR AND PATIENT ADVOCATE

Instructors: *Angela L. Brown, M.D.; Jorge M. Alegre, M.D.; Gail L. Birkenmeier, M.D.; Donald Busiek, M.D.; Virgil Das, M.D.; Ann Herron, M.B., B.Ch.; Tsishwaka Kayembe, M.D.; Robert Paine, M.D.; Will R. Ross, M.D.; Erik Stabell, M.D.* (all: 747-1397)

This course is designed to give freshman and sophomore medical students direct patient contact. Students assume guided responsibility for patients under the supervision of physician faculty in a clinic setting at St. Louis Regional Medical Center (ConnectCare), Veterans Administration Medical Center and Family Care Health Center. From their first clinic meeting, first-year students take an active part in the management of their patients and are the intermediaries between patients and physicians. Long-term association between students and patients is maintained by regular office visits and systematic telephone follow-up and by care during urgent and emergency episodes. Students are given complete records of their patients updated after each encounter, and their reports and comments are included in the patients' ongoing records. Students develop their skills in history-taking and physical examination. The importance of complete knowledge of the lives of their patients is emphasized. Knowledge obtained from other medical school courses is integrated with the detailed knowledge of their patient. As the student advances into the second year, further correlation of those courses is made with medical, personal, family, social and economic factors affecting the individual. Freshmen meet their patients on Tuesday afternoons; sophomores meet their patients on Wednesday afternoons. Each class is divided into three sections — each section meeting every third Tuesday or Wednesday. All of this is accomplished without making excessive demands on the students' time. Eighteen students are accepted.

M80 501 CLINICAL EPIDEMIOLOGY AND BIOSTATISTICS

Instructor: *Jay F. Piccirillo, M.D.*, 362-7394

This required course will be presented in the first year by clinicians and will emphasize important principles of applying biostatistics and epidemiology to the study of human diseases. Practical applications of statistical tools in biomedical and clinical settings will be discussed along with other subjects such as clinical study design. This course will consist of formal lectures followed by a discussion session in which students will meet in small groups to discuss pertinent papers with particular emphasis on methodologies.

M80 856 HEALTH ADMINISTRATION I

Instructor: *Dennis L. Lambert, Ph.D.,* 362-3266

During the 1990s, the American health care system has undergone dynamic change as never before. Socioeconomic changes are resulting in new forms of health care delivery. The goal of this elective is to expose the senior medical student to the history of health care organization in the United States, currently involving large health care systems. It also will explore the impact of these new health care systems, such as managed care and capitation. The elective will be conducted by senior faculty using a seminar approach, drawing upon background textbooks, monographs, timely topical articles and current research publications to focus the weekly discussions. The medical student also will have the opportunity to audit Health Administration Program classes of their choice in finance, human resource management, health law, health policy, management information systems and case studies. This will be arranged according to individual interests and schedules. An interview with the course master to arrange an optimal program is suggested in advance of enrollment. Valid start weeks for four-week or longer blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

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 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 11 broad training programs: Biochemistry, Bioorganic Chemistry, Developmental Biology, Evolutionary 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 151 students pursuing both the Ph.D. and the M.D. through the Medical Scientist Training Program (see page 19). Requirements for the Ph.D. include a series of courses tailored to a student's background and interests, qualifying examinations usually taken during the second year, 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 11 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 January 1 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 website "dbbs.wustl.edu" or by writing to the Director of Admissions, Washington University School of Medicine, 660 S. Euclid Ave., Campus Box 8226, St. Louis, Missouri 63110-1093 (e-mail: dbbsoff@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 19).

Students admitted to the graduate programs are guaranteed full stipend and tuition support contingent upon satisfactory performance. The stipend for the 1999-2000 academic year will be $15,500 annually. Tuition remission is provided to all students, and life, disability and health insurance also is provided. This provides coverage 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 Healtn.

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 501 Gross Anatomy.

L41 (BIO) 5011 ETHICS AND RESEARCH SCIENCE

Instructor: *Robert W. Mercer, Ph.D.*, 362-6924

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. Eight 90-minute sessions. Credit 1 unit.

L41 (BIO) 5051 FOUNDATIONS OF IMMUNOLOGY

Instructor: *Matthew L. Thomas, Ph.D.*, 362-8722

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 1-2 p.m. Prerequisite: Introductory Biochemistry and/or Genetics helpful. Permission of instructor. This course is referenced in the Department of Pathology. Credit 4 units.

L41 (BIO) 5062 CENTRAL QUESTIONS IN CELL BIOLOGY

Instructor: *Maurine Linder, Ph.D.*, 362-6040

This course explores areas of cell biology under active investigation. Topics include biogenesis of organelles, cytoskeleton, apoptosis, cell differentiation, and cell physiology. 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 Department of Cell Biology and Physiology. Credit 2 units.

L41 (BIO) 5064 INTRODUCTION TO MODERN TECHNIQUES OF ELECTRON MICROSCOPY

Instructor: *John Heuser, M.D.*, 362-6948

A practical course for those students who anticipate using electron microscopy (EM) in their research. Lectures and demonstrations compare and contrast the various methods of sample preparation and specimen viewing currently in use, emphasizing the pros and cons of each. Students learn to evaluate works in the EM literature critically and to design meaningful EM experiments. Lab exposure includes overseeing freeze-etch techniques and individual time working with an electron microscope. Three hours of lecture/lab one day per week. Credit 3 units.

L41 (BIO) 5065 CELL BIOLOGY OF THE STRESS RESPONSE

Instructor: *Joseph L. Roti Roti, Ph.D.*, 362-9771

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' M80 871.

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 courses in the core curriculum for the graduate programs in Cell and Molecular Biology. It integrates basic protein biochemistry into a fundamental molecular analysis of cell structure and function. The overall tone of the course is strongly research-based and experimental strategy oriented. Broad areas covered in this course include protein structure analysis, protein purification, membranes, protein and vesicular trafficking, enzyme kinetics, channel electrophysiology, signal transduction, cell motility, cell-cell interactions and extracellular matrix. The format includes both lectures and small-group discussion sections directed by faculty from the Division. Original articles from the research literature will be discussed in detail in the sections, and homework problems will be given. Exams will be in the format of take-home over-the-weekend. Undergraduate and graduate students in other programs require permission of the coursemaster to enroll. This is referenced in the Department of Cell Biology and Physiology. Credit 4 units.

L41 (BIO) 5071 BIOORGANIC CHEMISTRY I: FUNDAMENTALS OF MOLECULAR INTERACTIONS AND CHEMICAL CATALYSIS

Instructors: *Douglas F. Covey, Ph.D.*, 362-1724; *George W. Gokel, Ph.D.*, 362-9297

Basic principles of physical organic chemistry from the biological perspective. Molecular interactions including H-bonding and hydrophobic forces, and introduction to methods of assessment. Kinetics and mechanisms of catalysis. Prerequisites: two semesters of organic chemistry; one semester of physical chemistry recommended. Two 75-minute lectures per week. Credit 3 units.

L41 (BIO) 5072 SYNTHESIS FOR BIOORGANIC CHEMISTS

Instructor: *George W. Gokel, Ph.D.*, 362-9297

Survey of modern methodology (tactics) and strategies in organic synthesis with emphasis on molecules of biological relevance such as nucleic acids, peptides, lipids, etc. Prerequisites: Bioorganic Chemistry I, Chem 451 or Chem 556. Three hours per week. Credit 3 units.

L41 (BIO) 5073 BIOORGANIC CHEMISTRY JOURNAL CLUB

Instructor: *Michael Welch, Ph.D.*, 362-8436

Discussion of recent literature and research topics in Bioorganic Chemistry. Credit 1 unit.

L41 (BIO) 5092 MOLECULAR AND DEVELOPMENTAL BIOLOGY JOURNAL CLUB

Instructor: *Ross L. Cagan, Ph.D.*, 362-7796

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. Advisers for the course will be Drs. Ornitz and Cagan. Credit 1 unit.

L41 (BIO) 512 SELECTED TOPICS IN DEVELOPMENTAL BIOLOGY

Instructors: *David M. Ornitz, M.D., Ph.D., and staff*, 362-3908

Faculty lectures and student presentations, supplemented by extensive readings from current literature. One-two 2-hour presentations per student. Prerequisite: permission of the instructor. This is cross listed in Department of Genetics. Credit 2 units.

L41 (BIO) 5122 CELL-MATRIX INTERACTIONS

Instructors: *Robert P. Mecham, Ph.D.*, 362-2254; *William Parks, Ph.D.*, 454-7543

Current research in extracellular matrix biology with an emphasis on cell-matrix interactions. Specific topics include structure and composition of ECM, receptors for ECM and the role of cell-matrix interactions in development, inflammation and disease. Prerequisite: Basic Biochemistry/Cell Biology. This is referenced in the Department of Cell Biology and Physiology. Credit 2 units.

L41 (BIO) 5124 CELL BIOLOGY JOURNAL CLUB

Instructor: *Robert W. Mercer, Ph.D.*, 362-6924

Discussion of key papers on all aspects of cell biology. Emphasis on recent papers that have addressed fundamental questions relevant to cell biology. Credit 1 unit, contingent upon regular attendance and one presentation.

L41 (BIO) 5125 STUDENT-RUN CELL BIOLOGY JOURNAL CLUB

Instructor: *Philip Stahl, Ph.D.*, 362-6950

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) 5127 PATHOBIOLOGY JOURNAL CLUB

Instructor: *Jacques U. Baenziger, M.D., Ph.D.*, 362-8730

Participants (students, faculty and postdoctorates) present summaries of current research published in various journals in the general fields of cell and developmental biology. A large component of this journal club includes coaching in oral presentation. Students receive 1 credit for one presentation during the semester.

L41 (BIO) 5128 EXTRACELLULAR MATRIX AND CELL MATRIX INTERACTIONS JOURNAL CLUB

Instructor: *William C. Parks, Ph.D.*, 454-7543

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 three presentations.

L41 (BIO) 5132 CELL MOTILITY AND CYTOSKELETON JOURNAL CLUB

Instructor: *Elliot L. Elson, Ph.D.*, 362-3346

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) 5136 TOPICS IN HERPES VIROLOGY AND NEUROVIROLOGY

Instructor: *David A. Leib, Ph.D.*, 362-3826

Participants present summaries of current research published in various journals predominantly in the field of herpes virology. A large component of this journal club includes coaching in oral presentation. Prerequisite: graduate standing. Credit 1 unit contingent upon regular attendance and one presentation.

L41 (BIO) 5142 CELL AND MOLECULAR BIOLOGY OF BONE

Instructor: *Keith A. Hruska, M.D.*, 454-7771

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: Biol 5068 or consent of course master. Credit 1 unit.

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 (tentative dates 1/6 - 3/20.) 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

Instructor: *Timothy J. Ley, M.D.*, 362-8831

Two or 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 might 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

Instructor: *Stephen F. Dowdy, Ph.D.*, 362-1722

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) 5196 SPECIAL EMPHASIS PATHWAY IN CANCER BIOLOGY

Instructor: *David B. Wilson, M.D., Ph.D.*, 454-6128

This course is designed to present pre- and postdoctoral trainees with an organized educational format to explore major contemporary topics in cancer biology. The elective will provide an integrated view of cancer research including basic science, translational science, and clinical investigation. Approximately 60 minutes will be devoted to a didactic presentation by a faculty member with interaction by the participants. The remaining 30 minutes will be used to discuss a pivotal research paper from this field, preselected by the faculty member. Outside reading (30-60 min/week) will be required. 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. Credit 2 units. This is referenced in the Department of Molecular Microbiology.

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) 5261 MOLECULAR MECHANISMS OF DISEASE

Instructor: *Herbert W. Virgin IV, M.D., Ph.D.*, 362-9223

Lectures and student presentations covering a wide range of topics on clinical immunology including inflammation, microbial immunity, immunodeficiencies, immunopharmacology, neuroimmunology, autoimmunity and lymphoid malignancies. Prerequisite: Foundations in Immunology or permission of instructor. Credit 2 units. This is referenced in the Department of Pathology.

L41 (BIO) 5272 ADVANCED TOPICS IN MOLECULAR IMMUNOLOGY

Instructors: *Jonathan Katz, Ph.D.*, 747-1221; *Robinna Lorenz, M.D., Ph.D.*, 362-3669

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 or permission of instructor. Credit 2 units. This is referenced in the Department of Pathology.

L41 (BIO) 5281 DEVELOPMENTAL GENETICS

Instructor: *Tim Schedl, Ph.D.*, 362-6162

Genetics of developmental events including sex determination, pattern formation, cell fate and regulation of tissue-specific genes. Emphasis will be placed on the use of genetics to investigate these phenomena in organisms such as yeast, *Volvox*, *C. elegans*, *Drosophila* and mouse. Prerequisite: L41 (Bio) 301 or equivalent Genetics courses and permission of instructor. Credit 3 units.

L41 (BIO) 5288 SPECIAL TOPICS IN MOLECULAR GENETICS

Instructor: *Steven B. Scholnick, Ph.D.*, 362-7549

This literature based course will cover selected topics in the genetics and molecular biology of cancer including: oncogenes and growth factors, tumor suppressor genes, signaling pathways, the genetics of metastasis, genetic instability, cancer progression, model organisms, etc. Each session will consist of short introductory lecture and student led discussions of key papers in that area of the field. 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, analysis of binding isotherms, enzyme catalysis and mechanism, steady-state and pre-steady state kinetics, kinetic simulation and isotope effects. Prerequisite: Physical Chemistry, Biochemistry, Calculus and Organic Chemistry. Three class hours per week, 3 units credit.

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. This course is cross listed in the Department of Biochemistry and Molecular Biophysics' M15 502 (Molecular Foundations of Medicine). Credit 3 units.

L41 (BIO) 5324 FOCUS ON VASCULAR PATHOBIOLOGY

Instructor: *Dana R. Abendschein, Ph.D.*, 362-8909

The course will provide an integrated view of vascular pathobiology including basic science, animal preparations and models of disease and clinical investigation. Prerequisite: For graduate students - DBBS core and one advanced elective (or equivalents); for others - permission of coursemaster. Contact hours: Course will meet once per week for 90 minutes with 60 minutes devoted to presentation by faculty member interacting with participants. The remaining time will be used to discuss a pivotal research paper in the field. Outside reading (one hour per week) will be required. Credit 2 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) 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, 2 units credit.

L41 (BIO) 5352 DEVELOPMENTAL BIOLOGY

Instructor: *Ian Duncan, Ph.D.*, 935-6719

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) 536 PHYSICAL CHEMISTRY OF MACROMOLECULES

Instructor: *Alfred Holtzer, Ph.D.*, 935-6572

Application of physical chemistry to proteins, nucleic acids and other natural and synthetic polymers. Polymer chains statistics, thermodynamics and statistical mechanics of macromolecular solutions, conformational transitions and molecular interpretation of light scattering, viscosity, sedimentation, diffusion and circular dichroism experiments. Prerequisite: two semesters of Physical Chemistry or permission of the instructor. Credit 3 units. Same as Chem 577, offered every other year.

L41 (BIO) 5361 SITE-SPECIFIC THERMODYNAMICS

Instructor: *Enrico Di Cera, M.D.*, 362-0268

Basic principles of cooperativity in ligand binding, molecular recognition and mutational effects of biological macromolecules. Credit 2 units.

L41 (BIO) 5381 MECHANISMS OF PROTEIN TARGETING AND INTERCOMPARTMENTAL TRANSPORT

Instructor: *Philip 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/ BIOCHEMISTRY OF MEMBRANES

Instructor: *William A. Frazier, Ph.D.*, 362-3348

This course is an advanced analysis of current approaches to the study of membranes' mediated processes including membrane structure (both lipid and protein components), the biosynthesis of membrane components, the structure and function of receptors, signal transduction elements such as G proteins, kinases and phosphatases, and the roles of protooncogenes in cellular signaling processes. Prerequisites: L41 (Bio) 548 and/or L41 (Bio) 5068. Credit 3 units.

L41 (BIO) 5391 MOLECULAR VIROLOGY

Instructors: *Charles Rice, Ph.D.*, 362-2842; *Henry 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

Instructor: *John E. Majors, Ph.D.*, 362-1135

Journal club with a minimum of one student presentation with faculty critique. Prerequisite: permission of instructor. Credit 1 unit.

L41 (BIO) 5404 MOLECULAR NEUROBIOLOGY

Instructor: *Michael L. Nonet, Ph.D.*, 747-1176

A general introduction to molecular biology as applied to understanding neuronal cell function. The course will emphasize developing a conceptual understanding of the general genetic and molecular principles operating in all cells and the methods used in characterization of mechanisms regulating neural signaling. Specific topics covered will include synaptic transmission, second messenger signaling and transcriptional regulation. The course is intended especially for graduate students without extensive molecular biology training. Two lectures, one methods discussion section, and one literature discussion section per week. Prerequisite: graduate standing. Credit 4 units.

L41 (BIO) 5416 MOLECULAR MICROBIOLOGY AND PATHOGENESIS JOURNAL CLUB

Instructor: *Scott J. Hultgren, Ph.D.*, 362-6772

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) 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

Instructor: *Garland R. Marshall, Ph.D.*, 935-4678 (a.m.), 362-2286 (p.m.)

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. 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. Prerequisites: 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

Instructor: *David P. Cistola, M.D., Ph.D.*, 362-4382

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 3 units.

L41 (BIO) 5468 CARDIOVASCULAR BIOPHYSICS JOURNAL CLUB

Instructor: *Sándor J. Kovács, Ph.D., M.D.*, 454-8097

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) 5478 BIOMOLECULAR NMR

Instructor: *David P. Cistola,* M.D., Ph.D., 362-4382

This advanced elective will cover some of the basic concepts and experiments used for characterizing biological macromolecules using multi-dimensional NMR spectroscopy. Topics will include fundamental concepts such as spin echoes, polarization transfer, multiple-quantum NMR, as well as experimental and practical considerations in characterizing the structures and dynamics of macromolecules. Prerequisites: Bio 5325 or permission of instructor. Credit 1 unit.

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. Prerequisites: 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 Department of Biochemistry and Molecular Biophysics. Credit 1 unit.

L41 (BIO) 5484 GENETICS & 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) 5491 ADVANCED GENETICS

Instructor: *Tim B. Schedl, Ph.D.*, 362-6162

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. Credit 3 units. This is cross listed in Department of Genetics.

L41 (BIO) 5494 QUANTITATIVE CARDIOVASCULAR PHYSIOLOGY

Instructor: *Sándor J. Kovács, Ph.D, M.D.*, 454-7665

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. Credit 3 units.

L41 (BIO) 5496 SEMINAR IN COMPUTATIONAL MOLECULAR BIOLOGY

Same as E61 CS 6804.

L41 (BIO) 5498 ADVANCED GENETICS: AN INTRODUCTION TO GENOMIC ANALYSIS

Instructor: *Paul J. Goodfellow, Ph.D.*, 362-8106

Formal lectures will serve to highlight the role that genomic analysis currently plays in all areas of genetics. A series of lectures and demonstrations will introduce the students to many of the techniques presently used in genomic analysis. Prerequisite: Nucleic Acids L41 (Bio) 548 or permission of course master. One-hour lecture and one-hour laboratory demonstration/lecture each week. 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. Credit 2 units. Prerequisite: an introductory genetics course, and permission of the instructor. This is cross listed with Department of Genetics' M30 510A Molecular and Medical Genetics.

L41 (BIO) 5502 MOLECULAR ASPECTS OF VISION

Instructor: *J. Mark Petrash, Ph.D.*, 362-1172

Seminar on useful research strategies used to elucidate the molecular basis of light detection including the biochemical, biophysical and electrophysiological events. Discussions of the molecular basis of inherited ocular cancer, color blindness and retinitis pigmentosis included. Prerequisite: 3 units of Biochemistry. Credit 1 unit.

L41 (BIO) 5503 MOLECULAR PATHOBIOLOGY OF VISUAL DISORDERS

Instructor: *J. Mark Petrash, Ph.D.*, 362-1172

The fundamental basis, diagnosis and management of diseases affecting the visual system, with emphasis on genetic and immunologic factors. Each topic addressed in two sessions; the first covers the fundamental etiology, the second is led by a clinician-scientist experienced in diagnosis and management of affected patients. Credit 3 units.

L41 (BIO) 5511 MOLEKOOLZ

Instructor: *Ross L. Cagan, Ph.D.*, 362-7796

Behind in your reading? Molekoolz is dedicated to bringing you the hot stories of the past year. We have chosen fifteen "hot" molecules and bring you the biology behind the hype. Come join us as we explore the Notch pathway, the TGFf1 family, the intrepid Hedgehog, those sneaky Wnt's, the latest in circadian rhythms, killer stuff on cell death and protein degradation, pumping up with steroid receptors, and many more of your favorites.

We'll update you on DNA chip arrays, single cell libraries, cloning of animals, antisense, and more techno-fun. All are welcome, but it will aimed at advanced graduate students, postdox, and faculty. We aim to make it more fun than actually doing the reading yourself. Credit 2 units.

L41 (BIO) 5522 MEMORY

Instructor: *Jeffery Lichtman, M.D., Ph.D.*, 362-2504

A seminar exploring experimental and theoretical approaches to understanding the biological basis of memory. Participants will read and discuss original literature with the goal of deciding what are (and are not) useful avenues into this poorly understood phenomenon. Not taught every year. Prerequisite: permission of instructor. 3 units.

L41 (BIO) 5533 MULTIDRUG RESISTANCE JOURNAL CLUB

Instructor: *David R. Piwnica-Worms, M.D., Ph.D.*, 362-9356

The multidrug resistance (MDRI) P-glycoprotein and ATP-binding cassette family members function as energy-dependent efflux pumps of a wide variety of natural and xenobiotic substrates, including anti-cancer drugs. A journal club format will enable study and discussion of topics broadly based on any and all aspects of the multidrug resistance family of transporters: cell and molecular biology, biochemistry, genetics, pharmacology, bioorganic chemistry and pharmaceutics, imaging and clinical correlates of multidrug resistance in cancer and infectious disease are relevant. One and one-half contact hours per month; last Monday of each month. Credit 1 unit.

L41 (BIO) 554 NEURAL SCIENCES

For full description, see Department of Anatomy and Neurobiology's M35 554 Neural Sciences.

L41 (BIO) 5562 PRINCIPLES OF NEURAL DEVELOPMENT

Instructors: *Yi Rao, Ph.D.*, 362-9388; *Rachel O. Wong, Ph.D.*, 362-4941; *Alan L. Pearlman, M.D.*, 362-6947

An introduction to the development of the nervous system. Prerequisite: graduate status or permission of instructors. Credit 4 units.

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

A survey of the basic principles of nerve cell structure and function, including quantitative analysis of voltage and chemically gated ion channels, synaptic transmission, and sensory transduction. Lectures and conferences supplemented with reading of classic and contemporary papers. Prerequisite: matriculation in the Division of Biology and Biomedical Sciences or in the medical school, advanced undergraduate standing, or permission of instructor. Two hours of lecture, one hour discussion a week. Credit 4 units.

L41 (BIO) 5581 NEURAL BASIS OF ACOUSTIC COMMUNICATION

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) 3341 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) 5601 TOPICS IN COGNITIVE NEUROSCIENCE

Instructor: *Steven E. Petersen, Ph.D.*, 362-3399

How the brain organizes behavior, emphasizing higher functions such as perception, language, and attention. Aim is a useful integration of information from neurobiological approaches (e.g., single-unit recording, lesion-behavior experiments) and information-processing approaches (e.g., cognitive psychological models, connectionist models). Prerequisite: Psych 340 or 441. Credit 3 units. Same as Psychology 6111.

L41 (BIO) 5641 COMPUTATIONAL NEUROSCIENCE

Instructor: *Charles H. Anderson, Ph.D.*, 362-1999

This course provides a unified framework for understanding neurobiological systems based on principles of computation and information theory. The goal is to give students the tools to enable them to design and evaluate physiological and psychological experiments that focus on the critical elements of how neuronal systems encode and process information. A computer laboratory gives hands-on experience with numerical modeling of neurons and neuronal circuits. Two hours of lectures and two hours of computer lab. Prerequisites: Linear Algebra and Calculus. Credit 3 units.

L41 (BIO) 5651 NEURAL SYSTEMS

Instructor: *Joseph L. Price, Ph.D.*, 362-2587

Introduction to the structure and function of the major systems within the central nervous system. Selected topics are chosen to provide an overview of the brain with emphasis on major general concepts. Laboratories and readings of the primary literature are an integral part of this course. Prerequisite: matriculation as a graduate or medical student, or

advanced undergraduate standing with satisfactory performance in L41 (Bio) 3411, L41 (Bio) 3421, and permission of instructor. Two hours of lecture, one and one-half hours of discussion and three hours of laboratory per week. Credit 4 units.

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. Prerequisites: graduate standing or permission of instructor. Audit only by prior arrangement with instructor. Enrollment for laboratory section limited to six. Two class hours per week. Laboratory: Six two-hour sessions. Credit 3 units.

L41 (BIO) 567 ADVANCED TUTORIALS IN NEURAL SCIENCES

Instructor: *Joshua R. Sanes, Ph.D.*, 362-2507; *and 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 for six weeks. Two class hours per week for six weeks, 1 unit. Credit 1-3 units, depending on how many sessions taken. Offered in both fall and spring semesters. Open to all students interested in the neurosciences program. Prerequisite: consent of instructor for non-neurosciences students.

L41 (BIO) 5681 PATHOGENESIS OF NEUROLOGIC DISEASES

Instructor: *William D. Snider, M.D.*, 362-7149

This course will offer an in-depth description of recent scientific advances relevant to the causes of neurological disease. Lectures will be followed by discussions involving preclinical and clinical faculty members whose research is relevant to the disease being considered. The course will meet two hours per week for 15 weeks in alternate years. Credit 2 units.

L41 (BIO) 572 SEMINAR IN PLANT BIOLOGY

Instructor: *Eric J. Richards, Ph.D.*, 935-7196

A consideration of modern plant biology, emphasizing critical analysis of research literature in a selected area (e.g., plant development, biochemistry, physiology.) Course registrants are required to present at least one seminar and actively participate in the weekly discussions. To be offered every year, Spring semester only. One two-hour session per week, TBA. Credit 2 units.

L41 (BIO) 5721 STUDENT-RUN PLANT BIOLOGY JOURNAL CLUB

Instructors: *Barbara N. Kunkel, Ph.D.*, 935-7284; *Craig S. Pikaard, Ph.D.*, 935-7569; *Eric J. Richards, Ph.D.*, 935-7196

Students of the Plant Biology Program are responsible for organizing this journal club which highlights new papers that significantly advance our understanding of plants. Students arranging to give presentations should consult with one of the faculty organizers at least one week in advance of their talk to gain approval of their topic and the paper chosen. Students taking the journal club for credit are expected to attend regularly and to make one presentation per semester. Course meets on alternate Fridays. No prerequisites, open to all graduate students and to undergraduates who obtain permission from one of the faculty advisors. Credit 1 unit.

L41 (BIO) 575 ADVANCED STUDIES IN PLANT SYSTEMATICS

Instructor: *Walter H. Lewis, Ph.D.*, 935-6841

Seminars in specific topics with main emphasis in economic botany, emphasizing ethnomedicine. Prerequisite: L41 (Bio) 3261 or permission of instructor. One seminar alternate weeks. Credit 1 unit per semester.

L41 (BIO) 580 SEMINAR IN POPULATION BIOLOGY

Instructors: *Garland E. Allen*, 935-6806; *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) 581 SEMINAR IN TECHNIQUES IN FIELD BIOLOGY

Instructor: *Jonathan Losos, Ph.D.*, 935-6706

Planning and presentation of techniques in selected areas of population biology. Prerequisite: permission of instructor. Credit 3 units.

L41 (BIO) 5821 THEORETICAL POPULATION GENETICS

Instructor: *Alan R. Templeton, Ph.D.*, 935-6868

A rigorous introduction to the theoretical basis of population genetics and evolutionary mechanisms. Quantitative genetics, population structure and molecular evolution will be investigated first, followed by an examination of how selection, population structure and ecological factors interact in determining the evolutionary fate of a population. Will be taught every four years. Prerequisite: L41 (Bio) 301, Math 118 and either 217 or 320. Credit 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.

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 application of engineering methods to biological science and medical practice. It is concerned with mathematical models, instruments, informatics, biomaterials and medical devices and strives to provide increased quantitative understanding of complex living organisms. Through this increased understanding, biomedical engineers can contribute to the conduct of biomedical research, to improvements in health care and to the utilization of natural rather than artificial processes in meeting society's goals.

In many areas of medicine and biology, advances are being driven by information technology. For example, modern computer technology is fundamental to the new fields of computational molecular biology, genome analysis and computational neuroanatomy. 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 bioresorbable 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.

These discoveries will open new opportunities for M.S. and D.Sc. graduates that go beyond those presently available in academic research, teaching and health care. Growth of a new industrial sector concerned with biomaterials and medical devices will create many new jobs for biomedical engineering graduates in the next century.

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 in 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, from 15 departments in the School of Medicine, and also from the College of Arts & Sciences, this network facilitates and promotes the graduate educational training of Washington University. These activities have been organized through the Institute into a number of specialized programs to provide research opportunities for graduate study. 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 the Graduate Program 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 capable of acting independently and directing novel applications of 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:
BMed 500 Independent Study
BMed 501 Graduate Seminar
BMed 502 Mathematical Methods in Biophysics
BMed 537 Computational Molecular Biology
BMed 546 Algorithms for Computational Biology
BMed 547 Biological Mass and Momentum Transfer
BMed 559 Introduction to Biomechanics
BMed 560A Biomechanics
BMed 561 Muscle Mechanics and Contractility
BMed 566 Cardiac Electrophysiology
BMed 567 Cardiac Mechanics
BMed 568 Medical Computer Vision
BMed 582A Instrumentation
BMed 583 Models of Sensory Communication
BMed 585 Ion Selective Channels in Cell Membranes
BMed 590B Medical Computer Vision
BMed 590C Cardiovascular Magnetic Resonance Imaging
BMed 590D Mechanics of Growth and Development
BMed 5494 Quantitative Cardiovascular Physiology
BMed 599 Master's Research
BMed 600 Doctoral Research
BMed 651 Science of Synthetic Biological Polymers
BMed 693 Special Topics

For additional related courses, see Biomedical Computer Laboratory in this Bulletin and 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. (See Institute for Biomedical Computing.)

Lewis J. Thomas Jr., M.D., Washington University 1957. (See Institute for Biomedical Computing.)

Professors

R. Martin Arthur, Ph.D., University of Pennsylvania, 1968.

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.)

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.

E. Mark Haacke, Ph.D., University of Toronto, 1978. (See Department of Radiology.)

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.)

Robert P. Mecham, Ph.D., Boston University, 1976. (See Department of Cell Biology and Physiology and Department of Medicine.)

James G. Miller, Ph.D., Washington University, 1969. (See Department of Medicine.)

Tom 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.

Linda J. Sandell, Ph.D., Northwestern University, 1980.

Donald L. Snyder, Ph.D., Massachusetts Institute of Technology, 1966. (See Department of Radiology and Institute for Biomedical Computing.)

Joseph H. Steinbach, Ph.D., University of California, San Diego, 1973. (See Department of Anatomy and Neurobiology and Department of Anesthesiology.)

Salvatore P. Sutera, Ph.D., California Institute of Technology, 1960.

Barna A. Szabo, Ph.D., State University of New York, 1969.

Larry A. Taber, Ph.D., Stanford University, 1979.

Tzyh-Jong Tarn, D.Sc., Washington University, 1968.

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.)

Robert H. Waterston, M.D., Ph.D., The University of Chicago, 1972. (See Department of Anatomy and Neurobiology and Department of Genetics.)

Michael J. Welch, Ph.D., University of London, 1965. (See Department of Molecular Biology and Pharmacology and Department of Radiology.)

Thomas A. Woolsey, M.D., The Johns Hopkins University, 1969.

George I. Zahalak, Eng. Sc.D., Columbia University, 1972.

Research Professor

Charles H. Anderson, Ph.D., Harvard University, 1962. (See Department of Anatomy and Neurobiology and Institute for Biomedical Computing.)

Associate Professors

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. Furhmann, Ph.D., Princeton University, 1984.

Will D. Gillett, Ph.D., University of Illinois, Urbana, 1977.

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.)

Mark A. Mintun, M.D., Washington University, 1981.

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. (See Institute for Biomedical Computing.)

David J. States, M.D., Ph.D., Harvard University, 1983. (See Department of Biochemistry and Molecular Biophysics, Department of Genetics and Institute for Biomedical Computing.)

Subhash Suri, Ph.D., The Johns Hopkins University, 1987.

M. Victor Wickerhauser, Ph.D., Yale University, 1985.

Samuel A. Wickline, M.D., University of Hawaii, 1980. (See Department of Medicine.)

Michael S. Zuker, Ph.D., Massachusetts Institute of Technology, 1976. (See Department of Genetics and Institute for Biomedical Computing.)

Research Associate Professors

Jack R. Engsberg, Ph.D., University of Iowa, 1985.

Joseph W. Klaesner, Ph.D., Vanderbilt University, 1995.

Richard B. Schuessler, Ph.D., Clemson University, 1977. (See Department of Surgery.)

Assistant Professors

Amir Arsham Amini, D.Sc., University of Michigan, 1990.

Kyongtae T. Bae, Ph.D., University of Pennsylvania, 1988; M.D., The University of Chicago, 1992.

Philip V. Bayly, Ph.D., Duke University, 1993.

José-Angel Conchello, Ph.D., Dartmouth College, 1991. (See Institute for Biomedical Computing.)

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.)

Robert H. Deusinger, Ph.D., University of Iowa, 1981.

Michael L. Dustin, Ph.D., Harvard University, 1990.

Sean R. Eddy, Ph.D., University of Colorado, 1991. (See Department of Genetics.)

Warren R. Gish, Ph.D., University of California, Berkeley, 1988. (See Department of Genetics and Institute for Biomedical Computing.)

Julius M. Guccione, Ph.D., University of California, San Diego, 1990.

James E. Huettner, Ph.D., Harvard University, 1987. (See Department of Cell Biology and Physiology.)

Weili Lin, Ph.D., Case Western Reserve University, 1993. (See Department of Radiology.)

Christine H. Lorenz, Ph.D., Vanderbilt University, 1992. (See Department of Medicine and Institute for Biomedical Computing.)

Scott D. Minor, Ph.D., University of Iowa, 1987.

Michael J. Mueller, Ph.D., Washington University, 1992.

Ruth Okamoto, D.Sc., Washington University, 1997.

Jay W. Ponder, Ph.D., Harvard University, 1984. (See Department of Biochemistry and Molecular Biophysics.)

Jin-Yu Shao, Ph.D., Duke University, 1997.

Joseph M. Smith, Ph.D., Massachusetts Institute of Technology, 1985; M.D., Harvard Medical School, 1987. (See Department of Medicine and Institute for Biomedical Computing.)

Stefano Soatto, Ph.D., California Institute of Technology, 1996.

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 and Institute for Biomedical Computing.)

DeQuan Zou, D.Sc., Washington University, 1993.

Instructor

Matthew J. Silva, Ph.D., Massachusetts Institute of Technology, 1996.

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 be involved. 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 65 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 performance 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 between the Health Administration Program and the School of Law, a dual M.H.A.-M.B.A. degree between the Health Administration Program and the Graduate School of Business Administration and a dual M.H.A.-M.I.M. degree between the Health Administration Program and the School of Engineering. Dual degrees are also offered between the Health Administration Program and the George Warren Brown School of Social Work (M.H.A.-M.S.W.) and with the School of Arts and Sciences in Human Resource Management (M.H.A.-M.A.) through University College. A dual M.H.A./M.D. degree option is also available.

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 conferred by Washington University. 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 Washington University. 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 postgraduate 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 preceptor, and the fellow reviews his/her learning progression at the end of the fellowship in a report to HAP's director. The preceptor also 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. 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	$10,500
Books and supplies (per semester)	450
Application fee (nonrefundable)	30

FOURTH YEAR

Medical Student Elective

M80 856 HEALTH ADMINISTRATION I

This elective is described in the Teaching and Research Divisions, Institutes and Programs chapter.

Faculty

PROFESSOR AND DIRECTOR

James O. Hepner, Ph.D., University of Iowa, 1964.

ASSOCIATE PROFESSOR AND DEPUTY DIRECTOR

Stuart B. Boxerman, D.Sc., Washington University, 1970.

Associate Professor

Robert S. Woodward, Ph.D., Washington University, 1972. (See Department of Medicine.)

Assistant Professor

Ronald E. Gribbins, Ph.D., University of Wisconsin, 1975.

Instructor

Dennis L. Lambert, Ph.D., Washington University, 1994.

Research Instructor

Mark A. Schnitzler, Ph.D., Washington University, 1997.

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 AND PROFESSOR OF PSYCHOLOGY

Edwin B. Fisher Jr., Ph.D., State University of New York, 1972. (Head, Division of Health Behavior Research)
(See Department of Medicine.)

ASSOCIATE DIRECTOR/ PROGRAM INSTRUCTOR

Jan Munro, M.Ed., University of Missouri, St. Louis, 1991. (Research Patient Coordinator, Division of Health Behavior Research)

Instructors

Wendy Auslander, Ph.D., Washington University, 1986. (Associate Professor, George Warren Brown School of Social Work)

Carol Dyer, Ph.D., Washington University, 1997.

Kelly Everard, Ph.D., University of Kentucky, 1995. (Research Associate, Division of Health Behavior Research)

Joan Heins, M.A., Washington University, 1990. (Research Patient Coordinator, Division of Health Behavior Research)

Cheryl A. Houston, M.S., St. Louis University, 1990. (Director of Dietetics, Program of Dietetics, Department of Environmental Sciences, Fontbonne College)

Donna B. Jeffe, Ph.D., Washington University, 1993. (Instructor in Medicine, Division of Health Behavior Research)

Gabrielle Richards Reed, Ph.D., University of Rhode Island, 1995. (Instructor in Medicine, Division of Health Behavior Research)

Donald Richert, Ph.D., St. Louis University, 1984. (Professor, St. Louis College of Pharmacy)

Carol Stubblefield, Ph.D., St. Louis University, 1996. (Associate Professor, Jewish Hospital School of Nursing)

Mark Walker, Ph.D., University of Memphis, 1998. (Instructor in Medicine, Division of Health Behavior Research)

PROGRAM IN OCCUPATIONAL THERAPY

The mission of the Program in Occupational Therapy is to provide excellence in teaching, research, practice and professional development related to promoting occupational performance for persons with, or at risk for, disabilities. Occupational therapists assist people with disabilities to become as independent as possible in the performance of activities necessary to function in their home, school, community or work environments.

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 for entry level into the Occupational Therapy profession. The curriculum focuses on occupational performance, which is the dynamic interaction of client, environment and occupational factors that enables persons to fulfill roles, to maximize function and to enhance quality of life. Applicants must hold a bachelor's degree or be a participant in an approved three-two program and have completed prerequisites from an accredited college or university.

Each candidate for a Master of Science in Occupational Therapy degree must complete the professional curriculum, which consists of 76 hours of coursework, plus optional elective coursework. The degree is usually accomplished in five semesters of academic study (two academic years and the intervening summer). The student must meet professional development requirements, complete an assistantship and a master's project during the five semester program. Six months of supervised clinical internship is required following coursework.

Tuition (graduate) per semester	$10,275
Fee, clinical internship	$4,000

Faculty

ELIAS MICHAEL DIRECTOR

M. Carolyn Baum, Ph.D., Washington University, 1993.

ASSOCIATE DIRECTOR, PROFESSIONAL EDUCATION

Mary Ann Bruce, Ph.D., University of Southern California, 1997.

ASSOCIATE DIRECTOR, COMMUNITY HEALTH

Carol A. Brownson, M.S.P.H., University of Missouri, 1979.

COORDINATOR OF STUDENT CLINICAL AND PROFESSIONAL DEVELOPMENT

Donna Whitehouse, M.H.A., University of Missouri, Columbia, 1996.

STUDENT ACTIVITY COORDINATOR

Kathleen Kniepmann, M.P.H., Harvard University, 1981.

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.

Janet Duchek, Ph.D., University of South Carolina, 1982.

Assistant Professors

Ellen F. Binder, M.D., Washington University, 1981.

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.)

Bradley A. Evanoff, M.D., Washington University, 1986.

Philip E. Higgs, M.D., University of Florida, 1974.

Luci Kohn, Ph.D., University of Wisconsin, 1989.

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.)

Research Assistant Professors

Dorothy F. Edwards, Ph.D., Washington University, 1980.

Holly Hollingsworth, Ph.D., University of Illinois, Urbana, 1975.

Assistant Professor (Adjunct)

Mary M. Evert, M.B.A., National University, 1980.

Instructors

Cynthia R. Ballentine, M.S., Washington University, 1991.

Christine Berg, M.S., Boston University, 1979.

Paula C. Bohr, Ph.D., University of Oklahoma, 1993.

Jeanenne Dallas, M.A., Webster University, 1993.

Susan Davis, O.T.D., Creighton University, 1998.

Shan-Pin Fanchiang, M.S., University of Southern California, 1988.

David B. Gray, Ph.D., University of Minnesota, 1974.

Kathleen Kniepmann, M.P.H., Harvard University, 1981.

Patricia D. La Vesser, M.A.A.T., Webster University, 1987.

Peggy A. Neufeld, M.A., New York University, 1976.

Karen Parker-Davis, M.A., Webster University, 1983.

Margaret Perlinsson, Ph.D., University of California, 1989.

Monica Perlmutter, M.A., Washington University, 1989.

Gerald R. Popelka, Ph.D., CCC-A, University of Wisconsin, 1974.

Mary K. Seaton, M.H.S., Washington University, 1996.

Susan Stark, Ph.D., University of Missouri, Columbia, 1998.

PROGRAM IN PHYSICAL THERAPY

The Program in Physical Therapy at the School of Medicine offers three formal curricula which collectively foster opportunities for lifelong learning and comprehensive career development. The professional curriculum is an intensive two and one-half year experience leading to the degree Master of Science in Physical Therapy. The principle focus in professional education is to develop clinical expertise in the diagnosis and treatment of movement-related conditions. This requires the integration of humanistic attributes such as compassion and empathy with skills in clinical decision making, interpersonal communications and patient advocacy. Applicants for admission must have completed: 1) a bachelor's degree at an accredited institution, and 2) prerequisite courses in English, psychology, biology, mathematics, physics, chemistry and social sciences. The post-professional curriculum, which leads to a Master of Health Science in Physical Therapy degree, offers practicing physical therapists an opportunity to enhance knowledge and skills necessary for continued competence in practice. Admissions requirements include previous graduation from an accredited professional physical therapy curriculum, eligibility for licensure as a physical therapist in the state of Missouri and an acceptable grade point average in previous academic endeavors. 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 its 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 and encourages integrity, creativity, initiative and a strong belief in the potential for physical therapy intervention to promote health. In these ways, all individuals associated with the Program in Physical Therapy may achieve their highest personal and professional potential.

Tuition: Professional curriculum
$10,570 per semester

Post-professional curriculum
$365 per credit

Doctoral curriculum
$11,700 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, Missouri, 63108. Phone: 314-286-1400; Fax: 314-286-1410; e-mail: ptprog@medicine.wustl.edu; www.medicine.wustl.edu/~ptprog/

Faculty

DIRECTOR AND ASSOCIATE PROFESSOR

Susan S. Deusinger, Ph.D., Washington University, 1987.

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 Departments of Neurology and Neurological Surgery and Department of Cell Biology and Physiology.)

Paul S.G. Stein, Ph.D., Stanford University, 1970. (See 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 Program in Biomedical Engineering.)

Associate Professors

Marybeth Brown, Ph.D., University of Southern California, 1984.

Michael J. Mueller, Ph.D., Washington University, 1992.

Research Associate Professor

Julaine M. Florence, M.S., Washington University, 1983.

Assistant Professors Emeriti

Robert J. Hickok, M.H.A., Washington University, 1971. (See Administration and Health Administration Program.)

Lorraine F. Lake, Ph.D., Washington University, 1962.

Stanley Lang, Ph.D., The University of Chicago, 1953.

Assistant Professors

Amy Bastian, Ph.D., Washington University, 1995.

Robert H. Deusinger, Ph.D., University of Iowa, 1981.

Scott D. Minor, Ph.D., University of Iowa, 1987.

Barbara J. Norton, Ph.D., Washington University, 1996.

David R. Sinacore, Ph.D., University of West Virginia, 1992.

Linda Van Dillen, Ph.D., Washington University, 1994.

Research Assistant Professors

Joseph W. Klaesner, Ph.D., Vanderbilt University, 1995.

Wendy M. Kohrt, Ph.D., Arizona State University, 1986. (See Department of Medicine.)

DeQuan Zou, D.Sc., Washington University, 1993.

Instructors

Tamara Burlis, M.H.S./P.T., Washington University, 1993.

Cheryl Caldwell, M.H.S./P.T., Washington University, 1989.

B. Ruth Clark, Ph.D., St. Louis University, 1988.

Suzanne M. Cornbleet, M.A., Washington University, 1987.

Catherine Crandell, M.S., Washington University, 1989.

Kathleen Dixon, M.Ed., The Johns Hopkins University, 1969.

Debra Fleming, M.S.P.T., Washington University, 1990.

Mary Hastings, M.S.P.T., Washington University, 1993.

Mary Kate McDonnell, M.H.S./P.T., Washington University, 1985.

Patricia Scheets, M.H.S./P.T., Washington University, 1996.

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Nancy J. Woolsey, M.S., Washington University, 1979.

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The degree of Master of Psychiatric Epidemiology (MPE) is typically earned in two years.

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Professors

Theodore J. Cicero, Ph.D., Purdue University, 1968. (See Department of Psychiatry and Administration.)

C. Robert Cloninger, M.D., Washington University, 1970. (See Department of Psychiatry and Department of Genetics.)

Linda B. Cottler, Ph.D., Washington University, 1987. (See Department of Psychiatry.)

Andrew C. Heath, D.Phil., University of Oxford, 1983. (See Department of Psychiatry and Department of Genetics.) (Also Department of Psychology)

J. Philip Miller, A.B., Washington University, 1965. (See Division of Biostatistics.)

Dabeeru C. Rao, Ph.D., Indian Statistical Institute, 1971. (See Department of Genetics, Department of Psychiatry and Division of Biostatistics.)

Theodore Reich, M.D., McGill University, 1963. (See Department of Psychiatry and Department of Genetics.)

John P. Rice, Ph.D., Washington University, 1975. (See Department of Psychiatry and Division of Biostatistics.)

Lee N. Robins, Ph.D., Radcliffe College, 1951. (Sociology) (University Professor of Social Science and Professor of Social Science)

Edward L. Spitznagel Jr., Ph.D., The University of Chicago, 1965. (See Division of Biostatistics.) (Also Department of Mathematics)

Arlene Stiffman, Ph.D., Washington University, 1980. (Also George Warren Brown School of Social Work)

Associate Professors

Collins E. Lewis, M.D., Harvard University, 1971. (See Department of Psychiatry.)

Carol S. North, M.D., Washington University, 1983; M.P.E., 1993. (See Department of Psychiatry.)

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Crawford, Peter Alan
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B.S., Duke University, '91
Internal Medicine
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B.A., Harvard University, '91
Deferring residency

Schreiber, Matthew A.
Cleveland Heights, OH
B.S., Case Western Reserve, '88
Psychiatry
University of Washington
Seattle, Washington

Sedlak, Thomas William[3]
Cherry Hill, NJ
B.A., Case Western Reserve University, '91
Psychiatry
The Johns Hopkins University
Baltimore, MD

Seydel, Karl Boynton
Redwood City, CA
B.S., M.S., Stanford University, '89
Internal Medicine
Stanford University
Stanford, CA

Shindler, Kenneth Scott
Greenlawn, NY
B.S., Brown University, '91
Transitional
University of Pennsylvania Medical Center
Philadelphia, PA
Ophthalmology
Scheie Eye Institute,
University of Pennsylvania
Philadelphia, PA

Doctor of Medicine and Master of Arts Degrees

Adler, Pablo
Howard, MD
B.S., Brown University, '93
Internal Medicine-Preliminary
Albert Einstein Medical Center
Philadelphia, PA
Anesthesiology
Hospital of the University of Pennsylvania
Philadelphia, PA

Clarke, Roy Adrian
New York, NY
B.A., Princeton University, '94
Pediatrics
Baylor College of Medicine
Houston, TX

Freeman, Brian Jason
Nassau, NY
B.S., Massachusetts Institute of Technology, '90
Neurology
University of Pennsylvania Medical Center
Philadelphia, PA

Leibole, Marc Alan
Midland, MI
B.A., Northwestern University, '94
Transitional
St. John's Mercy Hospital
St. Louis, MO
Ophthalmology
Washington University
St. Louis, MO

Nordmann, Amy Marie
St. Louis, MO
B.S., Washington University, '94
Transitional
St. John's Mercy Hospital
St. Louis, MO
Diagnostic Radiology
Barnes-Jewish Hospital
St. Louis, MO

Preddie, Dean Clinton
Berrien Springs, MI
B.S., Andrews University, '93
Internal Medicine
Wayne State University
Detroit Medical Center
Detroit, MI

Doctor of Medicine Degrees

Ainsworth, Carla R.
Gambier, OH
B.A., Kenyon College, '95
Deferring Residency

Akom, Michael C.
Tallahassee, FL
B.S., University of Florida, '95
Internal Medicine
University of Maryland Hospital
Baltimore, MD

Amusa, Gbolahan
Durham, NC
B.S.E., Duke University, '95
Entering MBA Program

Beyer, Devra
Waltham, MA
B.A., Brandeis University, '94
Plastic Surgery
Barnes-Jewish Hospital
St. Louis, MO

Bhayani, Rakhee Kapadia
Durham, NC
B.S., Duke University, '95
Internal Medicine
Barnes-Jewish Hospital
St. Louis, MO

Birnbaum, Shana L.
Sudbury, MA
B.A., Harvard University, '94
Internal Medicine-Primary
Massachusetts General Hospital
Boston, MA

Brent, Jeffrey F.
Shawnee Mission, KS
B.S., Duke University, '95
Transitional
St. John's Mercy Hospital
St. Louis, MO
Diagnostic Radiology
Barnes-Jewish Hospital
St. Louis, MO

Carroll, Christopher P.
Baltimore, MD
B.A., The Johns Hopkins University, '95
Psychiatry
The Johns Hopkins University
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Cashen, Amanda S.
Louisville, KY
B.S., Yale University, '95
Internal Medicine
Barnes-Jewish Hospital
St. Louis, MO

Chandler, Kalaokalani
Clayton, MO
B.A., Washington University, '95
Obstetrics/Gynecology
University of Southern California
Los Angeles, CA

Chen, Calvin K.
Portage, OH
B.A., Washington University, '94
Pediatrics
University of Wisconsin Hospital/Clinics
Madison, WI

Chen, Delphine L.
Cambridge, MA
B.A., Harvard University, '95
Plastic Surgery
Barnes-Jewish Hospital
St. Louis, MO

Cheng, Andrea L.
Cambridge, MA
B.S., Harvard University, '95
Internal Medicine-Preliminary
Barnes-Jewish Hospital
St. Louis, MO
Neurology
Washington University
St. Louis, MO

Crebo, Richard Emory[1]
Tipton, IN
B.A., Northwestern University, '93
Deferring residency

Dans, Maria C.
Cockeysville, MD
B.A., Princeton University, '89
Internal Medicine
Stanford University
Stanford, CA

Dorr, David
Beaverton, OR
B.A., Washington University, '94
Internal Medicine
Oregon Health Science University
Portland, OR

Dworkin, Lydia Lane
Hohenwald, TN
B.S., Vanderbilt University, '92
Transitional
St. John's Mercy Hospital
St. Louis, MO
Ophthalmology
Washington University
St. Louis, MO

Eisenberg, Dan
Farmington, CT
B.S., M.S., Yale University, '94
General Surgery
Yale-New Haven Medical Center
New Haven, CT

Erickson, Christopher John
Alameda, CA
B.A., University of California, Berkeley, '92
Internal Medicine
University of Minnesota
Minneapolis, MN

Everitt, Melanie Diane
Searcy, AR
B.S., University of Arkansas, '95
Pediatrics
St. Louis Children's Hospital
St. Louis, MO

Farrell, Maureen E.
Alexandria, VA
B.S., U.S. Naval Academy, '93
Obstetrics/Gynecology
U.S. Naval Hospital of San Diego
San Diego, CA

Fox, Douglas J.
Creve Coeur, MO
B.S., Wake Forest University, '95
Surgery-Preliminary
Barnes-Jewish Hospital
St. Louis, MO
Neurological Surgery
Washington University
St. Louis, MO

Freed, Jana L.
Wooster, OH
B.A., College of Wooster, '94
Family Practice
Health Partners Institute for Medical Education
Bloomington, MN

Garon, Edward B.
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B.S., Massachusetts Institute of Technology, '95
Internal Medicine
The University of Chicago
Chicago, IL

Gladstone, Laura J.
Philadelphia, PA
B.A., University of Pennsylvania, '95
General Surgery
St. Lukes-Roosevelt
New York, NY

Goggin, Andrew S.
Greenville, IL
B.A., Greenville College, '91
General Surgery
Henry Ford Hospital
Detroit, MI

Greger, Susan Browning
Logan, UT
B.A., Utah State University, '95
Family Practice
UCLA Medical Center
Los Angeles, CA

Grosvenor, Julie D.
Logan, IA
B.S., University of Iowa, '94
Orthopaedic Surgery-Preliminary
George Washington University
Washington, DC
Orthopaedic Surgery
George Washington University
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Guitierrez, Ernesto
Gambier, OH
B.A., Kenyon College, '95
Internal Medicine
Barnes-Jewish Hospital
St. Louis, MO

Heidemann, Amanda J.
St. Charles, MO
B.A., Baylor University, '95
Family Practice
St. John's Mercy Hospital
St. Louis, MO

Hiestand, Jenna A.
River Ridge, LA
B.S., Tulane University, '95
Psychiatry
Barnes-Jewish Hospital
St. Louis, MO

Hoffman, John Langston
Dane, WI
B.A., University of Wisconsin,
Madison, '94
Internal Medicine-Primary
Barnes-Jewish Hospital
St. Louis, MO

Holschen, Jolie C.
Florissant, MO
B.A., Washington University '95
Emergency Medicine
The University of Chicago
Chicago, IL

Hsu, Joyce J.
Berkeley, CA
B.A., University of California,
Berkeley, '95
Pediatrics
UCLA Medical Center
Los Angeles, CA

Hu, Edward P.
Dover, DE
B.S., University of Delaware, '95
Internal Medicine
Duke University
Durham, NC

Huang, Grace S.
Charlotte, NC
B.A., Stanford University, '95
Internal Medicine
Beth Israel-Deaconess
Medical Center
Boston, MA

Hui, Jennifer S.
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B.S., Cornell University, '95
Internal Medicine-Preliminary
The University of Chicago
Chicago, IL
Neurology
Rush-Presbyterian-St. Luke's
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Hunt, Rebecca Sue
Omro, WI
B.S., Drake University, '95
General Surgery
University of Wisconsin
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Internal Medicine
Mt. Sinai Hospital
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Kachalia, Allen B.
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B.S., University of California,
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Internal Medicine
University of Michigan Hospitals
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Kelsey, Sekou K.
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B.A., University of California,
Berkeley, '94
Obstetrics/Gynecology
Kaiser Permanente Medical
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Klassen, Lisa B.
Ann Arbor, MI
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Ann Arbor, '95
Pediatrics
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Internal Medicine
California Pacific Medical Center
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Pediatrics
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Internal Medicine
University of Colorado Health
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B.A., William Marsh Rice
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Internal Medicine
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Internal Medicine
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Internal Medicine-Preliminary
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Dermatology
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General Surgery
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General Surgery
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Transitional
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Dermatology
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Psychiatry
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Internal Medicine-Preliminary
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Surgery-Preliminary
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Urology
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B.S., Pennsylvania State University, '92
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Deferring residency

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Family Practice
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Pediatrics
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Psychiatry
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B.S., Illinois Wesleyan University, '95
Orthopaedic Surgery
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Pediatrics
Vanderbilt University Medical Center
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Orthopaedic Surgery
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General Surgery
Cleveland Clinic Foundation
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Price, Virginia S.
St. Louis, MO
B.A., Haverford College, '94
Internal Medicine-Preliminary
St. Mary's Health Center
St. Louis, MO
Anesthesiology
Barnes-Jewish Hospital
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Internal Medicine-Primary
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St. Louis, MO

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Obstetrics/Gynecology
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Rave, Lelach
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Pediatrics
St. Louis University
St. Louis, MO

Richards, Megan Ringwald
New Haven, CT
B.H., McGill University, '95
Pediatrics
University of Rochester/Strong Memorial Medical Center
Rochester, NY

Rockers, Kyle M.
Paola, KS
B.S., U.S. Air Force Academy, '95
Urology
University of Iowa Hospitals and Clinics
Iowa City, IA

Root, Timothy D.
Trumbull, CT
B.S., Hobart College, '87
Emergency Medicine
Indiana University Medical Center
Indianapolis, IN

Ryan, Ginny L.
Ithaca, NY
B.S., Cornell University, '95
Obstetrics/Gynecology
University of Iowa Hospitals and Clinics
Iowa City, IA

Salimi, Kayvon
St. Louis, MO
B.A., Princeton University, '93
Deferring residency

Sharp, Gregory E.
E. Grand Rapids, MI
B.A., Hope College, '95
Family Practice
University of Missouri
Columbia, MO

Sikka, Neal K.
Oak Ridge, TN
B.S., University of Illinois, Urbana, '95
Internal Medicine-Preliminary
Barnes-Jewish Hospital
St. Louis, MO
Emergency Medicine
George Washington University
Washington, DC

Singh, Anurag K.
Fairport, NY
B.S., Yale University, '95
Medicine-Preliminary
Barnes-Jewish Hospital
St. Louis, MO
Radiation Oncology
Barnes-Jewish Hospital
St. Louis, MO

Skjei, Stephen D.
Charlottesville, VA
B.A., University of Virginia, '95
Internal Medicine
The University of Chicago
Chicago, IL

Smith, Jennifer H.
San Diego, CA
B.S., University of California, Los Angeles, '95
Obstetrics/Gynecology
Barnes-Jewish Hospital
St. Louis, MO

Smits, Ariel Kathleen
Oakland, MI
B.S., University of Michigan, Ann Arbor, '93
Family Practice/Preventive Medicine
Oregon Health Sciences University
Portland, OR

Song, Edward W.
Vestal, NY
B.A., Harvard University, '95
Orthopaedic Surgery
The Johns Hopkins University
Baltimore, MD

Stanford, Arielle Doree
Washington, DC
B.S., Brown University, '93
Psychiatry
New York Hospital-Columbia Presbyterian
New York, NY

Stanley, Shawn A.[4]
San Diego, CA
B.S., University of California, San Diego, '95

Stein, Adam B.
Topeka, KS
B.S., Brown University, '93
Internal Medicine-Primary
Barnes-Jewish Hospital
St. Louis, MO

Tam, Richard C.
Moreland Hills, OH
B.A., Case Western Reserve University, '95
Internal Medicine-Preliminary
The University of Chicago/Weiss Memorial
Chicago, IL
Ophthalmology
Cleveland Clinic Foundation
Cleveland, OH

Tang, Dagang
College Station, TX
B.S., Texas A&M University, '95
Internal Medicine-Preliminary
Barnes-Jewish Hospital
St. Louis, MO
Diagnostic Radiology
Barnes-Jewish Hospital
St. Louis, MO

Van Cleave, Jeanne M.
Lawrence, KS
B.A., University of Kansas, '95
Pediatrics
University of Michigan Hospitals
Ann Arbor, MI

Verdine, Benjamin W.
Washington, MO
B.S., Washington University, '95
General Surgery
Barnes-Jewish Hospital
St. Louis, MO

Wang, Lori A.
Charlottesville, VA
B.A., University of Virginia, '95
Internal Medicine
New York University
New York, NY

Wendelin, Daniel S.
Corydon, IN
B.S., Ohio State University, '95
Internal Medicine-Preliminary
Barnes-Jewish Hospital
St. Louis, MO
Dermatology
Barnes-Jewish Hospital
St. Louis, MO

West, Robert Burnard
La Jolla, CA
B.S., Brown University, '90
Pathology
Stanford University
Stanford, CA

Whiteside, Karen[1]
Chesterfield, MO
B.A., Washington University, '93
Pediatrics
St. Louis Children's Hospital
St. Louis, MO

Williams, Monique M.
Rockville, MD
B.A., Washington University, '95
Internal Medicine-Primary
Barnes-Jewish Hospital
St. Louis, MO

Williams, Scott S.
Tuskegee, AL
B.S., Morehouse College, '95
Pediatrics
Children's Memorial Hospital of Chicago
Chicago, IL

Wilson, Michele L.
Castro Valley, CA
B.S., Saint Mary's College, '95
Internal Medicine
University of California
San Diego, CA

Wong, Angela R.
New Haven, CT
B.A., Yale University, '95
Pediatrics-Primary
University of California
San Francisco, CA

Woolf, Karen Elizabeth
Providence, RI
B.S., Brown University, '95
Pediatrics
University of Wisconsin
Madison, WI

Wurzel, Hayley Meredith
Providence, RI
B.S., Brown University, '95
Pediatrics
St. Louis Children's Hospital
St. Louis, MO

Yue, Patrick
Pasadena, CA
B.S., California Institute of Technology, '95
Internal Medicine
Beth Israel-Deaconess Medical Center
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[1]Degree conferred in December, 1998
[2]Degree conferred in August, 1998
[3]Degree conferred in June, 1999
[4]Degree conferred posthumously

Medical Scientist Training Program (M.D. and Ph.D. Degrees)

Twelfth-Year Trainee

Silbert, Seth Cheng
Clayton, MO
B.S., Harvard University, '86

Tenth-Year Trainee

Colvin, Jennifer Susan
Towson, MD
A.B., Harvard University, '87

Ninth-Year Trainees

Bhatnagar, Rajiv Sahai
Burlingame, CA
B.S., A.B., University of California, Berkeley, '89

Martin, Tod Andrew
Carbondale, IL
B.A., Vanderbilt University, '90

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Eighth-Year Trainees

Benvensite, Ronald J.
Miami Beach, FL
B.S., University of Miami, '91

Lee, Christopher W.
San Jose, CA
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Pruett, John Robert
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B.A., Princeton University, '90

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B.S., University of California, Davis, '90

Seventh-Year Trainees

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Amherst, MA
B.A., University of Colorado, Boulder, '92

Frohnert, Paul
Frankfurt, A.M. Germany
B.S., Macalester College, '92

Garabedian, Emily
New York, NY
B.S., University of Michigan, '92

Ho, Albert
Boston, MA
B.S., California Institute of Technology, '92

Jacobson, Nils
Ann Arbor, MI
B.A., University of California, Berkeley, '92

Kundra, Robin
Atlanta, GA
B.S., University of Georgia, '92

Minning, Dena
Melbourne, FL
B.S., University of Florida, '92

Randolph, David
Gainesville, FL
B.S., University of Colorado, '90

Saulino, Evan
Marshfield, WI
B.A., University of California, San Diego, '92

Soto, Gabriel
Boston, MA
B.A., Wesleyan University, '92

Trask, Timothy
Philadelphia, PA
B.A., University of Pennsylvania, '91

Verbsky, James
Madison, WI
B.S., University of Wisconsin, Madison, '92

Sixth-Year Trainees

Chu, Dortha T.
Taiwan, Republic of China
B.A., University of California, Berkeley, '92

Chuang, Hubert
Louisville, KY
B.S., Yale University, '92

Clements, Mark Allen
Plymouth, IN
B.S., Butler University, '93

Fisher, Daniel
Burlingame, CA
B.S., University of Washington, '91

Hill, Matthew
Urbana, IL
A.B., Washington University, '93

Payne, Aimee
Corvallis, OR
B.S., Stanford University, '93

Peterson, Daniel
Lincoln, NE
B.S., University of Nebraska, '93

Putcha, Girish
Bhilai, India
B.A., Rice University, '91

Saifee, Owais
Karachi, Pakistan
B.S., Northwestern University, '93

Simpson, Joseph
Boston, MA
B.A., Harvard University, '92

Wang, Lawrence
Arlington, MA
B.S., Harvard University, '93

Zarrin, Amy
New York City, NY
B.S., Cornell University, '93

Fifth-Year Trainees

Banerjee, Dolly
Williamson, IL
B.S., Washington University, '94

Banerjee, Ritu
Bergen, NJ
B.A., Swarthmore College, '94

Basu, Devraj
Davidson, TN
B.S., Brown University, '94

Bernstein, Michael Lyn
Woodbury, IA
B.A., The Johns Hopkins University, '94

Bubeck-Wardenburg, Juliane
Will, IL
B.A., Washington University, '93

Dalcanto, Albert John
Cook, IL
B.A., Northwestern University, '94

Drake, Matthew Truman
Blue Earth, MN
B.A., Harvard University, '93

Erinjeri, Joseph Patrick
Oakland, MI
B.S., University of Michigan, Ann Arbor, '94

Farazi, Thalia Andrea
Nicosia, Cyprus
B.A., Brandeis University, '94

Hasbani, Josh Mayer
New Haven, CT
B.A., The Johns Hopkins University, '94

Henderson, Jeffrey Parker
Olmsted, MN
B.S., University of Wisconsin, Madison, '94

Madden, John Crane
Middlesex, MA
B.S., Yale University, '94

Murata, Haruhiko
Clark, WA
B.A., Washington University, '94

Nagarajan, Rakesh
Henrico, VA
B.A., University of Virginia, '94

Ongur, Dost
Istanbul, Turkey
B.A., Oberlin College, '92

Presti, Rachel Margaret
King, WA
B.A., Scripps College, '94

Shankaran, Vijay
Cuyahoga, OH
B.A., Dartmouth College, '94

Wong, Wai Thong
Republic of Singapore
B.S., Massachusetts Institute of Technology, '94

Fourth-Year Trainees

Afkarian, Maryam
Teheran, Iran
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Baloh, Robert Harris
Santa Monica, CA
Sc.B., Brown University, '95

Bruce, Allen Thomas
North Attleboro, MA
B.A., The Johns Hopkins University, '95

Cole, John Charles
Keokuk, IA
B.S., Washington University, '95

Dahiya, Anjali
Virginia Beach, VA
B.A., Princeton University, '95

Edelson, Brian Todd
Rosylyn, NY
Sc.B., Brown University, '95

Gimenez, Mary Ann Tan
Greendale, WI
B.S., University of Wisconsin, '95

Harris, Charles Andrew
Stony Brook, NY
Sc.B., Brown University, '94

Ho, Alan L.
Des Plaines, IA
B.S., Stanford University, '95

Ho, Emily L.
Rochester, NY
B.S., Yale University, '95

Johnson, Hillary Danielle
Iowa City, IA
B.S., University of Iowa, '95

Kerchner, Geoffrey A.
Oak Ridge, TN
B.A., Harvard University, '94

Klekotka, Paul Alan
Mesa, AZ
B.S., University of Arizona, '95

Lin, Shao Pow
Houston, TX
B.S., Stanford University, '93

Schwarz, Julie Kristina
Lafayette, LA
B.S., Duke University, '95

Wei, Michael Ching-sun
Urbana, IL
B.S., University of Illinois, '95

Yu, Jennifer Tong-Young
Ann Arbor, MI
B.S., University of Michigan, '95

Yuan, Alex
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Third-Year Trainees

Bartnikas, Thomas B.
Ithaca, NY
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Brewer, Judson A.
Princeton, NJ
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Burlingame, Oname O.
Claremont, CA
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Cukras, Catherine A.
Scarsdale, NY
B.S., Princeton University, '96

Fink, Doran L.
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B.S., Stanford University, '96

Gaut, Joseph
Springfield, MO
B.A., Washington University, '96

Gavin, Mark R.
Chicago, IL
B.A., Washington University, '95

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New Haven, CT
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Hofling, August A.
Cream Ridge, NJ
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Jacoby, Meagan A.
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King, Katherine Y.
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Kozel, Beth A.
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Schilling, Joel D.
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Second-Year Trainees

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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

Magiera, Holly Marie
Glyndon, MD
B.A., University of Pennsylvania, '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

First-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

Evason, Kimberley Jane
Brookfield, WI
B.S., University of Iowa, '98

Ippolito, Joseph Edward
Ft. 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

Mahoney, Heather Jeanine
Flower Mound, TX
B.S., Texas A&M University, '97

Marrus, Scott Benjamin
University City, MO
B.A., Brandeis University, '96

McClellan, James Scott
Anniston, AL
B.S., Birmingham-Southern College, '97

Montalvo, Valerie Hope
St. Louis, MO
B.A., Washington University, '98

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

Wee, Raymond
Lake Forest, IL
B.S. and M.A., Yale University, '98

Wetzel, Dawn Marie
Toms River, NJ
B.A., The Johns Hopkins University, '98

M.A. and M.D. Degrees Trainees

Frisella, William A.
Somerville, MA
B.A., Harvard University, '95

Phillips, Kacy A.
Harvey, LA
B.S., Xavier University of Louisiana, '96

Selznick, Lee A.
East Brunswick, NY
B.A., Rutgers University,'96

Uy, Geoffrey L.
Ithaca, NY
B.A., Cornell University, '96

Four Schools Program

Nundy, Surajit
New Haven, CT
B.A., Manhattanville College, '93

Shih, David C.
Lake Forest, IL
B.S., Brown University, '95

M.D. Degree Trainees

Third-Year Class

Allen, Tracy L.
Schwartz Creek, MI
B.H., University of Michigan, '90

Antommaria, Armand H.
Valparaiso, IN
B.S., Valparaiso University, '87

Berg, Daniel R.
St. Louis, MO
B.S., Brown University, '94

Bohl, Daniel L.
Cambridge, MA
B.S., Massachusetts Institute of Technology, '96

Bourgeois, Florence T.
New Haven, CT
B.S., Yale University, '96

Brookmeyer, Peter
St. Louis, MO
B.A., Washington University, '96

Calvert, George
Philadelphia, PA
B.A., University of Pennsylvania, '95

Champion, Gretchen A.
Frankfort, IL
B.S., University of Michigan, Ann Arbor, '95

Chang, Ben
St. Louis, MO
B.S., Boston University, '97

Chapman, Teresa
Bellevue, WA
B.A., University of Colorado, Boulder, '94

Chen, Grace P.
Stanford, CA
B.A., Stanford University, '96

Chen, Vincent Y.
Chino Hills, CA
B.A., University of California, Berkeley, '95

Cho, Daniel C.
New Haven, CT
B.S., Yale University, '96

Corriere, Mark D.
Ellicott City, MD
B.S., University of Notre Dame, '96

Cummings, Terri L.
East Elmhurst, NY
B.A., Princeton University, '96

Delaney, Carolyn A.
North Caldwell, NJ
B.A., William Marsh Rice University, '96

DeSai, Bimal R.
Charlotte, NC
B.S., Emory University, '95

Diskin, Emily B.
Chicago, IL
B.A., The University of Chicago, '95

Djordjevic, Andelka
Lyons, IL
B.A., Northwestern University, '96

Doughty, Cara B.
Houston, TX
B.A., William Marsh Rice University, '96

Dow, Alan W.
Greenville, DE
B.A., University of Virginia, '96

Dunn, Jennifer M.
Hyattsville, MD
B.S., Duke University, '96

Ealovega, Mark W.
Canton, MI
B.S., University of Michigan, Ann Arbor, '95

Echols, Daalon B.
Princeton, NJ
B.A., Princeton University, '96

Elfiky, Aymen A.
Westbury, NY
B.S., SUNY, Stony Brook, '96

Ellis, Ramsey A.
Brookline, MA
B.A., Colby College, '94

Fabian, Steven Louis
Troy, MI
B.S., University of Michigan, '93

Fahnestock, Peter A.
Wilmington, DE
B.A., The Johns Hopkins University, '95

Feliz, Brady J.
Carmichael, CA
B.S., University of California, Davis, '95

Flinn, Denise R.
Georgetown, TX
B.A., Southwestern University, '96

Foley, Kristin M.
Columbus, OH
B.A., Yale University, '91

Fong, Christina M.
San Francisco, CA
B.A., University of California, Berkeley, '95

Fowler, Natalie L.
St. Louis, MO
B.A., Washington University, '92

Gross, Elizabeth K.
Storrs, CT
B.S., University of Connecticut, '96

Hakimian, Shahin
Los Angeles, CA
B.S., University of California, Los Angeles, '95

Hanna, Eyad M.
Gates Mills, OH
B.S., Case Western Reserve University, '96

Hannallah, David
Washington, DC
B.S., Brown University, '94

Henry, Norah L.
Redwood City, CA
B.S., Louisiana State University, Baton Rouge, '91

Herant, Marc E.
Santa Fe, NM
B.S., California Institute of Technology, '86;
Ph.D., Harvard University, '92

Hermann, Catherine A.
St. Louis, MO
B.A., Northeast Missouri State University, '92

Holland, Derek W.
Houston, TX
B.A., William Marsh Rice University, '95

Hoover, Rebecca B.
Trumansburg, NY
B.A., Cornell University, '96

Houseman, Andrew L.
Phoenix, AZ
B.A., Wabash College, '88

Hulbert, Monica Durkin
Bloomington, IN
B.S., Indiana University, '96

Hungspreugs, Patsa
Edina, MN
B.A., Dartmouth College, '96

Husain, Ali J.
Champaign, IL
B.S., University of Iowa, '94
B.A., Oxford University, '96

Jacob, Jason Sanford
Olympia, WA
B.A., Washington University, '94

Johnson, Michelle M.
Raleigh, NC
B.S., Duke University, '94

Jost, Sarah C.
St. Louis, MO
B.A., Princeton University, '96

Kappelman, Michael D.
Fort Lauderdale, FL
B.S., Brown University, '96

Kimura, Joe
St. Louis, MO
B.S., Stanford University, '95

Kinzie, Daniel J.
Seattle, WA
B.S., Massachusetts Institute of Technology, '88
M.S., Stanford University, '89

Kuhn, Ann-Marie M.
Shorewood, WI
University of Wisconsin, Milwaukee, '96

Kulkarni, Nita S.
St. Louis, MO
B.A., Washington University, '96

Leary, Scott P.
Provo, UT
B.A., Brigham Young University, '96

Lee, Joseph P.
Seattle, WA
B.S., California Institute of Technology, '95

Leeman, Beth A.
Ann Arbor, MI
B.S., University of Michigan, Ann Arbor, '94

Lehman, David Henry
New York, NY
B.A., Wesleyan University, '92

Li, Renee
Gaithersburg, MD
B.S., University of Texas, Austin, '96

MacLennan, Heather M.
Cambridge, MA
B.A., Harvard University, '96

Mercer, Kelly W.
Alexandria, VA
B.S., Georgetown University, '96

Moosikasuwan, Josh
Bronx, NY
B.A., Columbia University, '94

Mueller, Margaret M.
Champaign, IL
B.S., University of Illinois, Urbana, '96

Newmark, Chayim Y.
Baltimore, MD
B.A., Ner Israel Rabbinical College, '94

Nissing, Matthew H.
St. Charles, MO
B.S., Washington University, '96

Onifade, Moyosore K.
St. Louis, MO
B.S., Stanford University, '95

Paek, Sandra C.
Cambridge, MA
B.S., Harvard University, '96

Pavlovic, Christopher R.
Winnetka, IL
B.S., Washington University, '96

Peelle, Michael W.
Locust Valley, NY
B.S., Duke University, '96

Pipkin, Clare A.
Raleigh, NC
B.S., Duke University, '95

Raybuck, Paula K.
State College, PA
B.S., Pennsylvania State University, '96

Reader, Nathan B.
Minnetonka, MN
B.S., University of Minnesota, Twin Cities, '96

Reploeg, Mark D.
Excelsior, MN
B.S., Duke University, '96

Rhee, Kyunghwa
Staten Island, NY
B.A., Harvard University, '96

Rosenstein, Alix L.
New York, NY
B.A., Columbia University, '94

Sakurai, Maromi L.
Cambridge, MA
B.S., Massachusetts Institute of Technology, '96

Sanders, Gregory J.
Cincinnati, OH
B.A., University of Virginia, '96

Santillan, Cynthia V.
Boston, MA
B.S., Massachusetts Institute of Technology, '96

Sawhney, Navin S.
Danville, CA
B.S., University of California, '95

Sharp, Heather A.
Manitou Springs, CO
B.A., University of Colorado, Boulder, '95

Shih, Marianne T.
Ithaca, NY
B.A., Cornell University, '96

Simons, Jeffrey P.
Durham, NC
B.S., Duke University, '96

Smith, Marna Recene
Quincy, IL
B.S., Drake University, '95

Staveteig, Paul T.
Louisville, KY
B.S., Northwestern University, '96

Taniguchi, Jennifer
Bloomington, MN
B.A., Northwestern University, '94

Thomas, Laura J.
New Albany, OH
B.S., Ohio State University, '96

Vataru, Eddy S.
Los Angeles, CA
B.S., California Institute of Technology, '95

Wagner, Chloe
Athens, OH
B.S., Ohio University, '96

Wallace, Erik A.
Tacoma, WA
B.S., University of Washington, Puget Sound, '96

Wei, Shih J.
Omaha, NE
B.A., Washington University, '96

Weilbach, Heidi
Williamstown, MA
B.S., Williams College, '96

White, Paul
Oak Park, IL
B.A., Thomas Aquinas College, '95

Wood III, Cecil G.
St. Louis, MO
B.S., Washington University, '96

Yoo, Albert J.
St. Louis, MO
B.A., Washington University, '96

Second-Year Class

Abrahams, Matthew Spencer
Denver, CO
B.A., Williams College, '96

Ahmad, Mueed
Oklahoma City, OK
B.S., Unviersity of Oklahoma, '97

Beukelman, Timothy Glenn
Urbana, IL
B.S., University of Illinois, Urbana, '97

Bishop, Monica Elane
Philadelphia, PA
B.A., University of Pennsylvania, '95

Blanton, Robert Morris
St. Louis, MO
B.A., Washington University, '97

Blood, Belinda Jean
Orlando, FL
B.S., University of Florida, '96

Braun, Kari Lynn
University City, MO
B.A., Washington University, '97

Brophy, Robert Henry
Palo Alto, CA
B.A., Stanford University, '94

Bufford, Heather Lynn
West Linn, OR
B.A., Williamette University, '92

Burwell, Lauren Anne
Charlottesville, VA
B.A., Williams College, '96

Calfee, Ryan Patrick
Gainesville, FL
B.A., University of Virginia, '97

Chen, Joseph
Stanford, CA
B.S., Stanford University, '96

Chen, Tinghsu
Troy, MI
B.S., Case Western Reserve University, '97

Cheng, Linda Alice
Cambridge, MA
B.A., Harvard University, '97

Cheung, Gilbert Yannick
Cambridge, MA
B.S., Massachusetts Institute of Technology, '97

Chokshi, Nikhil Kanu
Clayton, MO
B.A., Washington University, '96

Chong, Wincha Helen
Worcester, MA
B.S., Brown University, '96

Chun, Jonathan S.
St. Louis, MO
B.A., Washington University, '96

Cohen, Daniel Todd
Frontenac, MO
B.A., Washington University, '97

Combs, Christopher John
Crawfordsville, IN
B.A., Wabash University, '97

Cooper, Jonas Aaron
St. Louis, MO
B.A., Harvard University, '97

Cronbach, Emily Justine
San Francisco, CA
B.A., San Francisco State University, '93

Cummings, Kenneth Clark
Overland Park, KS
B.A., Washington University, '97

Davis, Amy Elizabeth
Gorham, ME
B.A., Ohio Wesleyan University, '97

Doi, Mary
Chandler, AZ
B.A., Northwestern University, '96

Dritz, Jay Harris
Pasadena, CA
B.A., Harvard University, '95

Echols, Roderick Evans
Madison, WI
B.S., University of Texas, Houston, '90

Eertmoed, Alison Leston
Chicago, IL
B.S., University of Illinois, Urbana, '90

Elbash, Mohammed
Bayside, NY
B.A., University of Pennsylvania, '97

Eldridge, Amy Elizabeth
Ames, IA
B.S., Iowa State University, '97

Engelland, Emily Lynn
St. Louis, MO
B.A., Washington University, '96

Flinn, Denise Renea
Georgetown, TX
B.A., Southwestern University, '96

Fong, Thomas Homing
Baltimore, MD
B.S., Cornell University, '97

Gandhi, Shefali Anupkumar
Nashville, TN
B.A., Vanderbilt University, '97

Gerber, Paula Anne
Ithaca, NY
B.A., Cornell University, '97

Goel, Archna
Cleveland, OH
B.A., Case Western Reserve University, '97

Gore, Pankaj Anil
McLean, VA
B.A., University of Virginia, '96

Gregush, Ronald Valerian
Hanover, NH
B.A., Dartmouth College, '97

Harmon, Abigail Wittmack
Des Moines, IA
B.S., Duke University, '94

Harrod, Katherine Elizabeth
Hopewell, NJ
B.A., Swarthmore College, '97

Harzman, Alan Eldon
Nashville, TN
B.S., Vanderbilt University, '97

Hasbani, Sharon Motzkin
Newton, MA
B.A., The University of Chicago, '92

Ho, Dora Yukwai
Mountain View, CA
B.A., University of California, San Diego, '84

Hsu, Alice Lynn
St. Louis, MO
B.S., Washington University, '97

Huang, Michael Juichi
Littleton, CO
B.A., University of Pennsylvania, '97

James, Dustin Garth
Victor, NY
B.S., Cornell University, '97

Josephson, Scott Andrew
Carmel, IN
B.H., Stanford University, '97

Kaplan, Carol Irene
Durham, NC
B.S., Duke University, '97

Karp, Elena R.
Merion, PA
B.A., Amherst College, '96

Kim, Helen Young
Arlington, TX
B.A., Southern Methodist University, '97

Kim, Hyung Soo
Duluth, GA
B.S., Massachusetts Institute of Technology, '96

Kim, Paul San
Durham, NC
B.A., Duke University, '97

Klein, Sandra Elizabeth
St. Louis, MO
B.S., University of Missouri, Rolla, '94

Kolb, Jason Todd
Hudsdon, OH
B.S., Wheaton College, '96

Korngold, Ethan Chauncey
Shaker Heights, OH
B.A., Harvard University, '97

Krem, Maxwell Masters
Chesterfield, MO
B.A., Washington University, '97

Lamb, Michael William
Provo, UT
B.S., Brigham Young University, '92

Langsdorf, Jennifer Allyson
Middletown, DE
B.A., University of Delaware, '94

Lee, Joan Waichung
Columbus, OH
B.S., Ohio State University, '97

Lee, Kevin Daniel
Claremont, CA
B.A., Pomona College, '97

Lin, Aaron Chengtung
Stanford, CA
B.S., Stanford University, '97

Lin, Lilie Leming
St. Louis, MO
B.A., Washington University, '96

Liu, Judy Shengsen
Alhambra, CA
B.S., University of California, Los Angeles, '97

Lofgren, Samuel David
San Diego, CA
B.S, University of Utah, '96

Long, Erin Mason
Oklahoma City, OK
B.H., Princeton University, '97

MacPherson, Glen Douglas
Shawnee, KS
B.A., Dartmouth College, '93

Madden, Tessa Elaine
San Francisco, CA
B.A., Smith College, '95

Marshall, Melissa Vine
San Diego, CA
B.A., Stanford University, '92

May, Kathryn Elizabeth
Washington, DC
B.A., Georgetown University, '97

Mendez, Allen Brent
Urbana, IL
B.S., University of Illinois, Urbana, '97

Nair, Deepu S.
Cambridge, Ma
B.A., Harvard University, '97

Nakamura, Sterling M.
Burlingame, CA
B.S., University of California, Los Angeles, '96

Oda, Joanna J.
Honolulu, HI
B.A., Princeton University, '95

Parikh, Parag Jitendra
Northville, MI
B.S., Case Western Reserve University, '97

Potts, Matthew Edward
Redlands, CA
B.S., Pacific Union College, '97

Revelle, Amy Kathleen
Metamora, IN
B.A., Washington University, '97

Rothbaum, Lia Susan
Carmel, IN
B.A., Brown University, '96

Rymarquis, Lara Ann
Edgewood, KY
B.A., Miami University, '97

Sachs, Jessica Allyson
Newton, MA
B.S., Duke University, '96

Samarasinghe, Shanika Prajani
Erie, PA
B.A., University of Pennsylvania, '97

Saville, Brian James
St. Louis, MO
B.S., Washington University, '97

Serraiocco, Gina Lillian
La Canada, CA
B.S., California Institute of Technology, '97

Shadman, Shawyon
Barrington, IL
B.S., Duke University, '96

Shah, Sonal
Scarsdale, NY
B.A., Brown University, '95

Shaw, Tania Mila
Santa Barbara, CA
B.A., Williams College, '96

Sheehan, Daniel Joseph
Durham, NC
B.A., Duke University, '97

Shen, Peggy
Los Angeles, CA
B.S., University of California, Los Angeles, '97

Shirk, Amy Leanne
Norman, OK
B.S., University of Oklahoma, Norman, '97

Sterling, Kevin Adrian
Hackensack, NJ
B.S., Rutgers University, Newark, '97

Stuebe, Alison Mann
New York, NY
B.S., Duke University, '95

Subramanian, Vinodhini, M.
Manlius, NY
B.S., Brown University, '95

Sullivan, Shelby Ann
Jefferson, WI
B.S., University of Wisconsin, Madison, '97

Tataria, Monika
Troy, MI
B.A., University of Pennsylvania, '96

Thahane, Lineo Keneuoe
Princeton, NJ
B.A., Princeton University, '97

Thorne, Marc Christian
Clifton Park, NY
B.S., Cornell University, '97

Tierney, Shannon Noelle
Lexington, KY
B.A., Transylvania University, '97

Tilley, Ann Elizabeth
Bloomington, IN
B.S., Indiana University, '97

Tomlinson, Tracy M.
Charlottesville, VA
B.A., University of Virginia, '96

Vos, Jeremy Dan
Iowa City, IA
B.A., University of Iowa, '96

Waldman, Zev Leon
Baltimore, MD
B.S., Massachusetts Institute of Technology, '90

Walton, Colleen Maire
Notre Dame, IN
B.S., University of Notre Dame, '97

Weeks, Amanda Megan
St. Louis, MO
B.A., Washington University, '97

Welch, Kristin Irene
Williamsburg, VA
B.S., Duke University, '96

Willey, Marianne Monet
Durham, NC
B.S., Duke University, '97

Woodruff, Lauren Louise
Flourtown, PA
B.S., Duke University, '96

Yeoh, Cindy Bengimm
Ithaca, NY
B.A., Cornell University, '97

Yoo, Jane
Williamstown, MA
B.A., Williams College, '97

Young, Ann Elizabeth
University City, MO
B.A., Emory University, '96

Zemany, Laura Hyeson
Cambridge, MA
B.A., Harvard University, '97

First-Year Class

Abedin, Sakena
El Paso, TX
B.A., Harvard University, '95; M.S., Stanford University, '96; M.A., '97

Ahmad, Saad
Bartlett, IL
B.S., Duke University, '98

Aveyard, Caitlin Elizabeth
Greenville, DE
B.S., University of Illinois, Urbana, '98

Bang, Daehee
Mill Creek, WA
B.A., University of Pennsylvania, '98

Bartlett, Allison Humes
Madison, WI
B.A., Princeton University, '98

Benedict, Christina Hood
St. Louis, MO
B.S., University of Illinois, Urbana, '98

Brown, Ty David
Harrisburg, PA
B.A., University of Delaware, '98

Button, Jeanne Helen
Portland, OR
B.S., Georgetown University, '98

Chandra, Ritik Satish
Louisville, KY
B.A., Washington University, '97

Chen, Judy Ling
St. Louis, MO
B.S., Stanford University, '98

Cheng, Shan Li
Dallas, TX
B.A., Brown University, '98

Cheong, Monica Kakay
Sherwood Park, Alberta, Canada
B.S., Stanford University, '98

Chi, Tienhsin Cynthia
Irvine, CA
B.A., Harvard University, '97

Cizauskas, Carrie Ann
Greenfield, WI
B.S., University of Wisconsin, Madison, '98

Cloran, Francis Joseph
Salem, OR
B.S., University of Notre Dame, '97; M.S., '99

Denny, Matthew Richard
Seven Hills, OH
B.A., Amherst College, '97

Dorff, Jonathan David
Beverly Hills, CA
B.A., Brown University, '97

Ellis, Katherine Elena
St. Louis, MO
B.A., Boise State University, '94

Elseby, Susan
Downey, CA
B.S., University of California, Los Angeles, '98

Feng, Felix Yichung
Palo Alto, CA
B.S., Stanford University, '98

Fisher, Emily Jo
Edgewood, KY
B.A., University of Southern California, '96

Fleming, Sara Anne
Herndon, VA
B.S., Cornell University, '98

Foran, Erin Joan
Newark, OH
B.S., Denison University, '98

Frasier, Michael Anthony
Nashville, TN
B.S., Hampton University, '98

Freer, Phoebe Elizabeth
St. Louis, MO
B.A., Amherst College, '96

Gal-or, Anat
Pittsburgh, PA
B.S., B.A., Carnegie-Mellon University, '97

Gelberman, Sara Courtney
St. Louis, MO
B.A., Williams College, '94

Ghiz, Adam Fredrick
Sandy, UT
B.S., Brigham Young University, '98

Glatz, Andrew Charles
St. Louis, MO
B.A., Princeton University, '96

Grayswain, Margaret Rosanna
Ashland City, TN
B.A., Washington University, '97

Guillory, Robin Kelly
Baton Rouge, LA
B.H., Tulane University, '98

Gur-Lavi, Joy Gabriella
Atlanta, GA
B.S., Emory University, '98

Hadland, Brandon Kenneth
Las Vegas, NV
B.S., Harvey Mudd College, '98

Hall, Kristen Lynn
Elwood, IL
B.S., University of Illinois, Urbana, '98

Hampton, David Akinyele
Bellevue, WA
B.S., M.B., Massachusetts Institute of Technology, '97

Heaton, Jennifer Jill
Tulsa, OK
B.A., Pomona College, '98

Henderson, Jessica Nicole
Oakton, VA
B.A., Harvard University, '98

Huang, Jennifer Tingwei
Kinnelon, NJ
B.A., Brown University, '98

Hunt, Darrell Lamont
Miami, FL
B.S., University of North Carolina, Chapel Hill, '98

Hurst, Eva Ann
Flippin, AR
B.A., Hendrix College, '98

Imholt, Kristina Marie
Oregon City, OR
B.A., Linfield College, '98

Jaggars, Marissa Morningstar
Apple Valley, MN
B.S., University of Wisconsin, Madison, '98

Johnston, James Michael
Littleton, CO
B.A., Washington and Lee University, '95

Karpitskaya, Yekaterina
Ballwin, MO
B.A., M.A., Washington University, '98

Kimani, Kabuiya Ruth
Nairobi, Kenya
B.A., University of Pennsylvania, '98

King, Erin Lee
St Louis, MO
B.A., Stanford University, '97

Kirksey, Duane Erron
Bolingbrook, IL
B.S., Xavier University, '98

Klein, Jennifer Margaret
Albany, CA
B.A., University of California, Berkeley, '97

Klenk, Alison Sue
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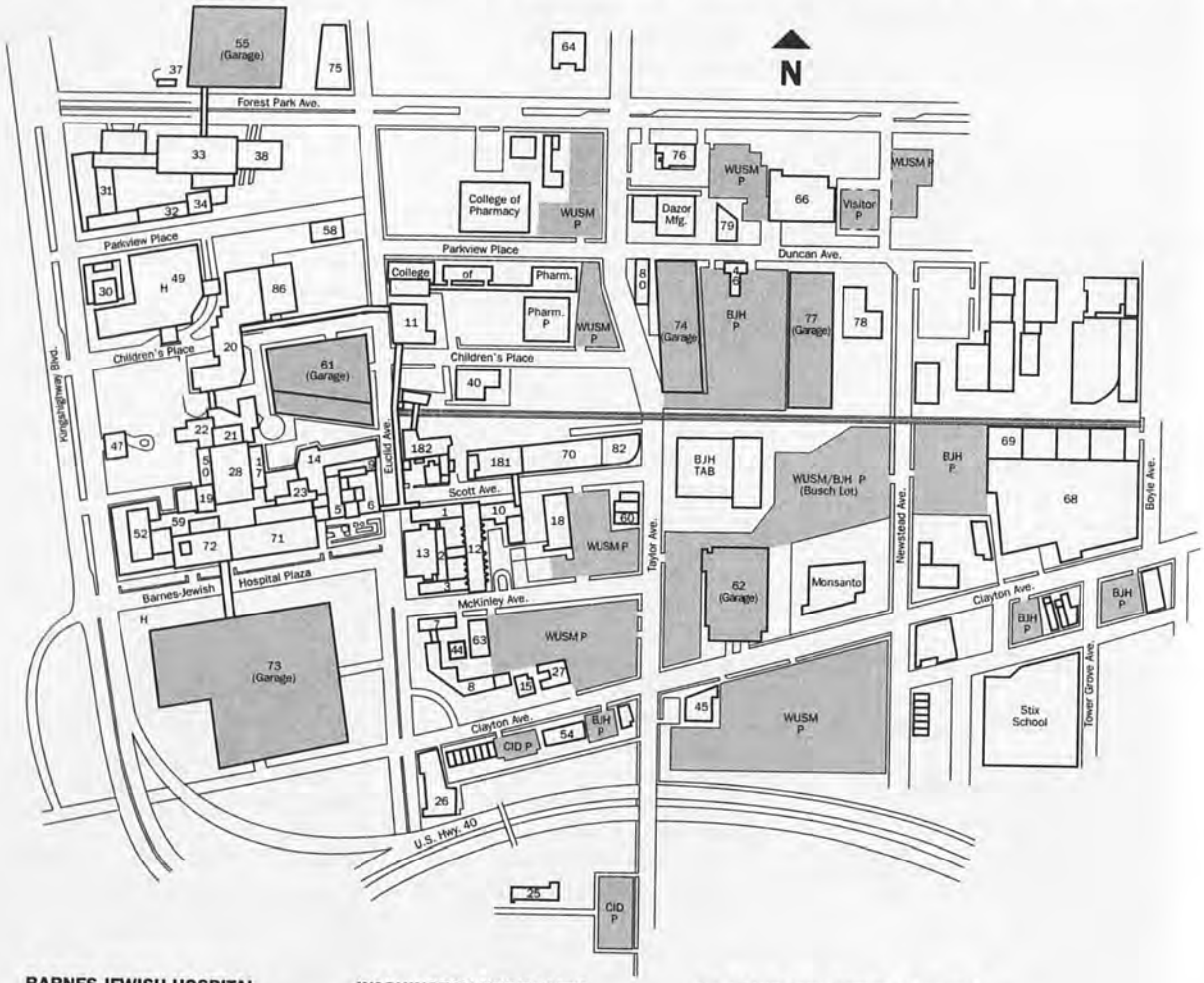

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31 Kingshighway Building
32 Steinberg Building
33 Shoenberg Pavilion
34 Yalem Research Building
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46 Material Management/Purchasing
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58 Power Plant
59 Rand Johnson
68 Clayton Avenue Building
69 Employee Day Care Facility
71 East Pavilion
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11 Eric P. Newman Education Center

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1 North Building
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77 Parking Garage
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BJH P Barnes-Jewish Hospital
CID P Central Institute
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