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# Bulletin of Washington University

School of  
Medicine  
1982/1983



**BULLETIN OF WASHINGTON UNIVERSITY (USPS: 078-340)**

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# Bulletin of Washington University

St. Louis

School of Medicine  
1982/83

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**Y**ou must always be students,  
learning and unlearning till  
your life's end, and if . . . you are  
not prepared to follow your  
profession in this spirit, I implore  
you to leave its ranks and betake  
yourself to some third-class trade.

Joseph, Lord Lister  
(1827-1912)



---

**T**o gather knowledge and to find out new knowledge is the noblest occupation of the physician. To apply that knowledge . . . with sympathy born of understanding, to the relief of human suffering, is his loveliest occupation.

**Edward Archibald**  
(1872-1945)



---

A few places—perhaps the only place—where one can see the entire exciting process of the mind of man working at its best from start to finish . . . the birth of an idea; the establishment of its validity; the placing it in a usable concept; the teaching of it to others; the testing it for practical utility; the careful weighing of the moral and ethical questions that inevitably arise concerning its use; and its discriminating application for the benefit of a particular human being.

Walsh McDermott  
(1909- )

*Journal of Chronic Diseases*  
16:108, 1963





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Most of the knowledge and much of the genius of the research worker lie behind his selection of what is worth observing. It is a crucial choice, often determining the success or failure of months of work, often differentiating the brilliant discoverer from the . . . plodder.

Alan Gregg  
(1890-1957)

*The Furtherance of  
Medical Research*



---

**I**t is no forced extrapolation to state that every physician is perforce also a potential clinical investigator when he soundly fulfills his responsibilities for each patient.

**David Seegal**  
(1899-1972)

*The Pharos of Alpha Omega*  
*Alpha 26:7, 1963*





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One of the most valuable experiences the student may have from a pedagogical point of view is to be required to perform a complete physical examination on a patient under the eye of a senior instructor.

**Yale Kneeland, Jr.**  
(1901-1970)

**and Robert F. Loeb**  
(1895-1973)

*Martini's Principles and Practice  
of Physical Diagnosis, Ch. 7*







---

The needs of children should  
not be made to wait.

**John F. Kennedy**  
(1917-1963)

*Message to Congress on the  
Nation's Youth,*  
February 14, 1963



Until homo sapiens becomes more sapient I can see no prospect of his ever avoiding the foolishness of war or of his learning that two automobiles cannot occupy the same spot at the same time, especially when they come from opposite directions. Broken bones and lacerated wounds are therefore likely to require surgical attention for as long as this would-be clairvoyant can see into the future.

Evarts A. Graham  
(1883-1957)

*Postgraduate Medicine*  
7:154, 1950



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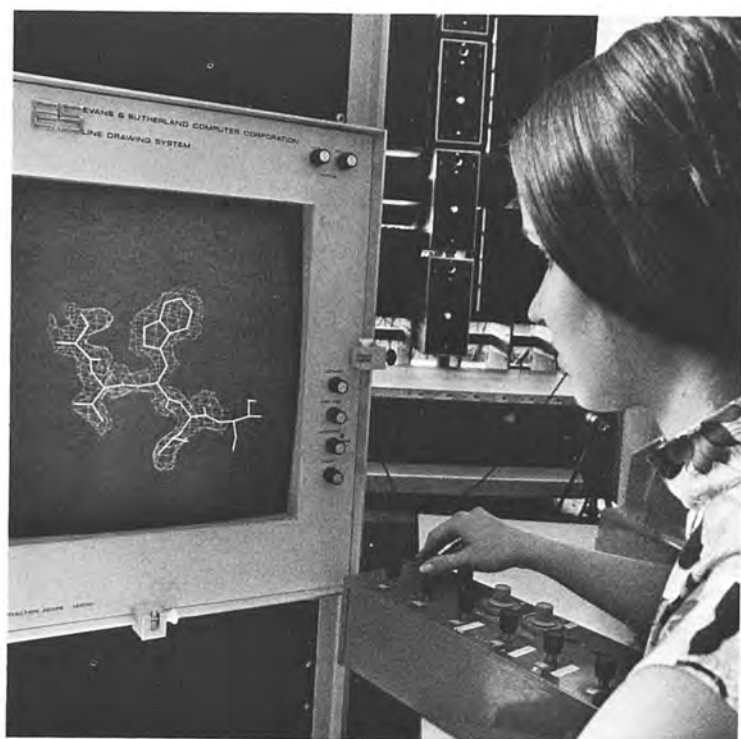
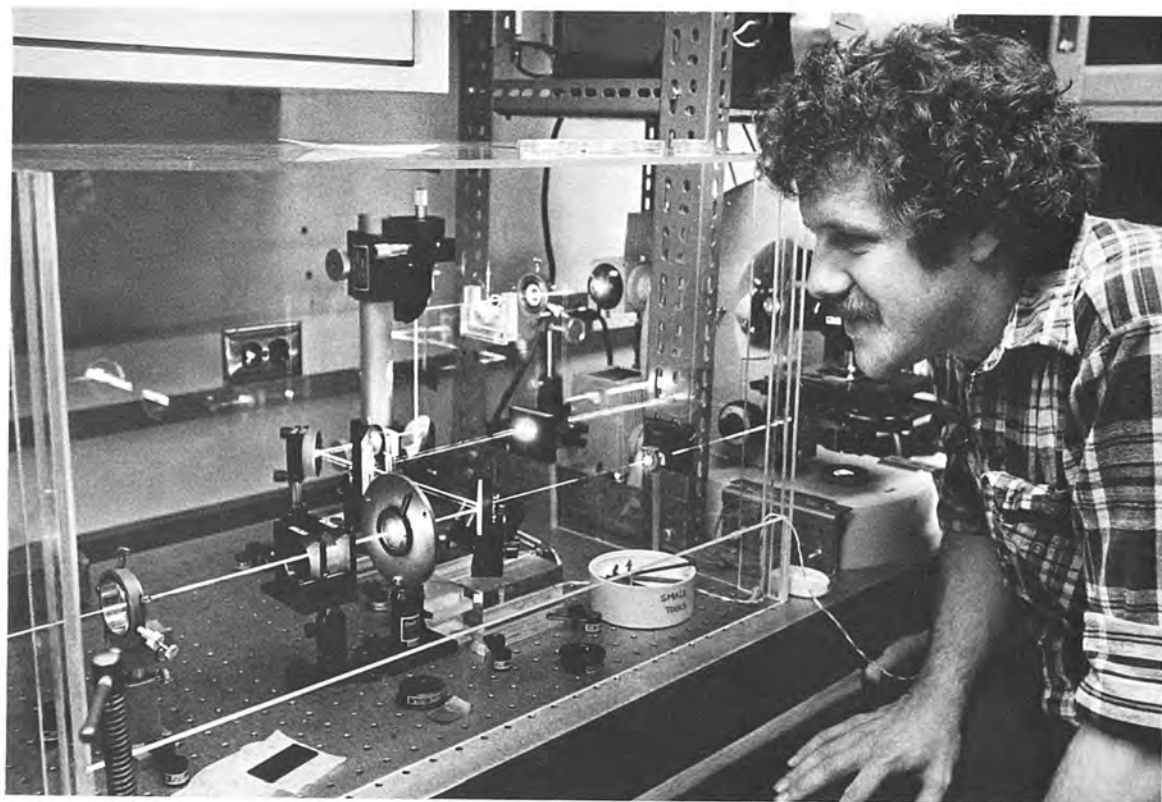
Scientific discovery is not a monopoly of the fully matured investigator. It is not unusual for a student to present interesting and promising ideas. Best was a medical student when he was associated with Banting in the experiment which led to the discovery of insulin. Cannon was a medical student when he suggested the use of bismuth for visualization of hollow organs by X ray. It is never too soon to be alert and to question all rules as well as all exceptions.

**David and Beatrice C. Seegal**

(1899-1972) (1898- )

*The Diplomat* 22:125, 1950





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# Calendar 1982/83

## 1982

### June

7 Monday  
8, 9 Tuesday, Wednesday  
11 Friday

Academic year begins for the third- and fourth-year classes.  
National Board Examination, Part I.  
Deadline for registration and initial payment of tuition and fees for the third- and fourth-year classes.

### July

5 Monday

Independence Day observance.

### August

23 Monday  
25 Wednesday  
27 Friday  
30 Monday

Academic year begins for the second-year class.  
Orientation, matriculation, and initial payment of tuition and fees for the first-year class.  
Deadline for registration and initial payment of tuition and fees for the second-year class.  
Academic year begins for the first-year class.

### September

6 Monday  
8, 9 Wednesday, Thursday  
28, 29 Tuesday, Wednesday

Labor Day holiday.  
National Board Examination, Part I.  
National Board Examination, Part II.

### November

19 Friday  
25 Thursday  
26 Friday

Deadline for payment of the balance of tuition and fees for the third- and fourth-year classes.  
Thanksgiving Day observance.  
Holiday for first- and second-year classes.

### December

18 Saturday

Winter recess begins at 1:00 p.m.

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**1983****January**

3	Monday	Winter recess ends at 8:00 a.m.
7	Friday	First semester for the second-year class ends at 5:00 p.m.
10	Monday	Second semester for the second-year class begins at 8:00 a.m.
14	Friday	Deadline for payment of the balance of tuition and fees due for medical students enrolled in the second-year class.
14	Friday	First semester for the first-year class ends at 5:00 p.m.
17	Monday	Second semester for the first-year class begins at 8:00 a.m.
21	Friday	Deadline for payment of the balance of tuition and fees due for medical students enrolled in the first-year class.

**March**

18	Friday	Spring recess begins at 5:00 p.m. for the first- and second-year classes.
28	Monday	Spring recess ends at 8:00 a.m. for the first- and second-year classes.

**April**

1-3	Friday through Sunday	Holiday for the third- and fourth-year classes.
6, 7	Wednesday, Thursday	National Board Examination, Part II.

**May**

13	Friday	Academic year ends at 5:00 p.m. for the second-year class.
19	Thursday	Academic year ends at 5:00 p.m. for graduating students.
20	Friday	Commencement.
21	Saturday	Academic year ends for the third-year class.
27	Friday	Academic year ends at 5:00 p.m. for the first-year class.
30	Monday	Memorial Day holiday.

**Clerkship- and Elective-Period Intervals: 1982/83**

Period	Begins	Period	Begins
I	Monday, June 7, 1982	V	Monday, November 22, 1982
II	Monday, July 19, 1982	VI	Monday, January 17, 1983
III	Monday, August 30, 1982	VII	Monday, February 28, 1983
IV	Monday, October 11, 1982	VIII	Monday, April 11, 1983



# The Study of Medicine

## PHILOSOPHY AND OBJECTIVES

Washington University encourages application from and gives full consideration to all applicants for admission and financial aid without respect to sex, race, handicap, color, creed, or national or ethnic origin. University policies and programs are nondiscriminatory. The School of Medicine is committed to recruiting, enrolling, and educating an increased number of students from racial minority and educationally deprived groups. Masculine pronouns are used in this book for succinctness only; they are intended to refer to both women and men.

The efforts of the School of Medicine are directed toward providing able students with a stimulating and challenging milieu in which they may acquire a thorough background in scientific medicine, as well as a deep understanding of the meaning of comprehensive medical care. In a field that is developing as rapidly as is medicine, education begun in medical school must serve as the foundation for a lifelong course of learning. As Sir William Osler pointed out some decades ago, a faculty, no matter how talented, can "only instill principles, put the student in the right path, give him methods, teach him how to study, and early to discern between essentials and nonessentials."

Today's student is preparing to cope with a changing world, to contribute, in a constructive, considered way, to resolving problems of medicine and of health care. To assist in that preparation, the faculty's mission is to preserve the joy of learning and to foster a spirit of discrimination and creativity. It is hoped that each student will achieve this grounding during his years in the School of Medicine.

## 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 reevaluated.

The curriculum includes a core experience based upon a sequence of courses that will introduce the student 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 the student select the career best suited to his abilities and goals.

The elective program helps the student to decide where his major interests lie. It also enables him to benefit from the wide range of specialized knowledge and skills found in the faculty. As there is not enough time for each student to be introduced to each of today's areas of specialization, the elective program permits him to select, according to his own desires, the areas he wishes to explore or to study in depth.



# Table of Required Hours 1982-83

As reported to the Liaison Committee on Medical Education, representing the Council on Medical Education of the American Medical Association and the Executive Council of the Association of American Medical Colleges, credit hours for courses are expressed in terms of clock hours—the scheduled hours per year of actual lecture and laboratory contact between faculty and students. These clock hours are not to be interpreted as semester or quarter hours.

*First-year courses* are taught during the 36-week academic year.

Gross Anatomy .....	198
Microscopic Anatomy .....	149
General Biochemistry* .....	93
Advanced Biochemistry* .....	(93)
Medical Genetics .....	36
Topics in Clinical Medicine .....	36
Medical Microbiology .....	180
Neural Science .....	131
General Physiology .....	198
Biomedical Statistics .....	18
Medicine in Modern Society .....	36
Total clock hours for the year .....	1,075

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

Introduction to Clinical Medicine .....	124
Ophthalmology Lectures .....	9
Otolaryngology Lectures .....	9
Pathology .....	303
Pharmacology .....	180
Human Sexuality .....	19
Introduction to Clinical Psychiatry .....	49
Radiology Lectures .....	36
Surgery Lectures .....	36
Pathophysiology	
PP Infectious Diseases .....	54
PP Rheumatology .....	9
PP Heart .....	24
PP Lung .....	18
PP Kidney .....	22
PP Metabolism-Endocrinology .....	32
PP Gastroenterology .....	28
PP Hematology .....	30
PP Oncology .....	23
PP Neurophysiology .....	58
PP Developmental Biology .....	58
Total clock hours for the year .....	1,121

\*Student's course level determined by Department of Biochemistry.

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

Medicine Clerkship .....	462
Neurology/Neurosurgery Clerkship .....	154
Obstetrics/Gynecology Clerkship .....	231
Ophthalmology Clerkship .....	38.5
Otolaryngology Clerkship .....	38.5
Pediatrics Clerkship .....	231
Psychiatry Clerkship .....	231
Surgery Clerkship .....	462
Total clock hours for the year .....	1,848

*Elective (Fourth) Year* is a 48-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 Curriculum. Students must take a clinical elective for at least six weeks and a research elective for a minimum of 12 weeks to receive academic credit.

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 Curriculum and the standing subcommittee of the Committee on Academic Review and Promotions (CARP) II for approval of the plan of study. Absolutely no credit will be granted for electives undertaken prior to subcommittee approval.

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 sophomore class, the student is a duly registered, full-time student for a minimum of two years and nine months and tuition is paid for three complete academic years; or (c) if transferring into the junior 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.

Total clock hours for the year .....	1,386
Total clock hours for four years .....	5,430

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



## DEGREE PROGRAMS

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

### Doctor of Medicine, Four-Year Program

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 degree doctor of medicine 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 twenty-one years of age and must have completed four entire academic years in the study of medicine.

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 (M.A.-M.D. Program)

In addition to the regular four-year program leading to the M.D. degree, students are permitted to spend one additional year in investigative or research concentration. The program must be arranged subject to the approval of the Committee on Medical Education. Students who desire a serious exposure to research may apply for participation in the M.A.-M.D. Program.

### M.A.-M.D. Program

Students who are interested in obtaining a significant research experience during their M.D. training may apply for admission to the M.A.-M.D. Program. This program allows selected students to spend one full year (12-15 months) in a research laboratory. Participating students will be expected to write a thesis at the end of their research time to qualify for receipt of a master's degree in biological science which will be conferred along with the M.D. degree upon graduation. It is expected that the research year will usually take place between the first and second year of the regular medical school curriculum. During the research time, students accepted into this program will qualify for receipt of a graduate stipend currently \$5,500. Additional information can be obtained by contacting Mrs. Barbara Fox in the office of MSTP/Graduate Affairs.

### M.D./Ph.D. Medical Scientist Training Program (MSTP)

The School of Medicine offers a combined M.D./Ph.D. program within the Division of Biology and Biomedical Sciences, designed for selected students who are interested in a research career and whose undergraduate education has placed major emphasis on science. The program permits the student to obtain both the M.D. and the Ph.D. degree, usually within six years of study. The major purpose of the program is to train medical scientists for careers on clinical and preclinical faculties of schools of medicine. Financial support in the form of stipends (currently \$5,500 a year) and tuition remission will be available for a period of six years to all students admitted to the program. Support obtained from National Institutes of Health grants is subject to their policies governing funding. The program maintains a population of approximately 80 students.

The program consists of three segments: 1) the first two years of the usual medical curriculum, 2) three or more years of work in the graduate school portion of the program as outlined below, and 3) a final year which is the usual clinical year of the medical curriculum, individually adjusted to each student's requirements and career goals. This sequence may be modified to fit individual needs. For example, students may wish to begin their research after the first year of the regular medical curriculum. Completion of this sequence or its equivalent will satisfy requirements for both the Ph.D. and M.D. degree.

While the Medical Scientist Training Program includes all those courses required for the M.D. degree, it incorporates a high degree of flexibility for individual students through a wide range of electives and the large number of thesis programs available at Washington University.

The members of the Medical Scientist Training Program Committee are available to students to help them decide in which elective courses and laboratories they will participate.



Students begin their training on July 1 of the year they enter the School of Medicine. The first two weeks of the summer will be spent visiting faculty in the various departments in order to select a laboratory for summer research. Students will also spend the summer between their first and second years doing research. There is no obligation that the laboratory selected for summer research be the same as that ultimately chosen for the Ph.D. portion of the program.

A student who passes a qualifying examination in any of the regularly offered preclinical courses will be allowed to substitute either advanced course work or laboratory research in the time made available. In this way students can have the opportunity to do supervised research in free periods during the first two years. In addition to normal medical school courses, there are special tutorials for students in the combined degree program.

The performance of each student will be reviewed annually. Students are expected to maintain a high scholastic standard as well as a commitment to research.

Usually the following courses are taken in the first two years.

#### *Year 1*

First Semester: Gross Anatomy, Biochemistry, Medical Microbiology, Medicine in Modern Society

Second Semester: Microscopic Anatomy, Physiology, Neural Sciences, Medical Genetics, Topics in Clinical Medicine, Biomedical Statistics

#### *Year 2*

Third Semester: Pathology, Pathophysiology, Pharmacology, Introduction to Clinical Medicine

Fourth Semester: Pathology, Pathophysiology, Pharmacology, Radiology, Neurology, Surgery, Ophthalmology, Otolaryngology, Introduction to Clinical Psychiatry, Introduction to Clinical Medicine, Human Sexuality

#### *Years, 3,4,5*

The student will spend the third, fourth, and fifth years in satisfying the requirements of the Graduate School of Arts and Sciences for the Ph.D. degree.

The formal requirements for the Ph.D. degree include (1) completion of course work, (2) successful performance in a qualifying examination, usually at the end of the third year, (3) execution of original research suitable for a dissertation, and (4) defense of the thesis. Students are also required to do a teaching assistantship for a semester in one course. Before beginning the third year, the student will select a faculty advisor under whom he will do his thesis research and the training program or department in which he will obtain his Ph.D. degree.

For purposes of graduate training, the Division of Biology and Biomedical Sciences is divided into the following programs: Integrative and Cell Biology, Molecular Biology, Neural Sciences, Plant Biology, and Population Biology. The programs are taught by faculty from all of the preclinical departments of the School of Medicine and from the Department of Biology of the Faculty of

Arts and Sciences. These programs provide maximum flexibility for student training and, by providing for inter-departmental teaching, not only avoid duplication but assure that each course is taught by the most qualified faculty, regardless of departmental affiliation. Therefore, course requirements reflect the student's background and interests rather than a rigid course sequence. Students may also receive their training by special arrangement in other graduate science departments within the University.

A detailed listing of the various courses available in the Division of Biology and Biomedical Sciences can be found on page as well as in the sections describing the various departments of the School of Medicine.

A program of special monthly seminars will be arranged for students during the research years. Conducted by medical scientists of both clinical and preclinical departments of the School of Medicine, these seminars are aimed at stimulating student interest in clinical medicine and at increasing awareness of major research problems in clinical medicine.

#### *Final Year in Clinical Medicine*

The sixth year is the clinical year of the normal medical curriculum. Transition into this year is facilitated



by a special two-week course, Introduction to Clinical Medicine. The intensive clinical training provided in this year is the last formal requirement for the M.D. degree. Since one year of the normal medical school curriculum is completely elective, the medical scientist will have taken the equivalent of that year during the period assigned to graduate work. The Ph.D. and M.D. degrees will be granted simultaneously at the end of the final clinical year.

### Doctor of Philosophy Programs

The Washington University Graduate School of Arts and Sciences, through the Division of Biology and Biomedical Sciences, offers programs in cellular and developmental biology, evolutionary biology and ecology, molecular biology, neural sciences, and plant biology leading to the Ph.D. degree. Study is organized on an interdepartmental basis using the faculty of the seven preclinical departments of the School of Medicine, as well as the Biology Department of the Graduate School. Additional information and the application for admission may be obtained by writing to:

Office of Graduate Student Affairs  
Campus Box 8072  
Washington University School of Medicine  
660 South Euclid Avenue  
St. Louis, Missouri 63110

## TUTORIALS AND INDIVIDUALIZED PROGRAMS

The educational program is designed to meet the needs of all medical students in an individual and a personalized way. To help students who may be having academic difficulty or who may wish to reinforce their studies, individual tutorials are offered. The School's experience is that tutorials enable students to handle course work with improved proficiency. Students who are found to have difficulties in handling the normal academic course load will be asked to take an individualized program which would require five rather than four years to complete.

## GRADES

In order to assist the student in evaluating his progress, he is graded in each course by the faculty. In the clinical and elective years, grades are accompanied by detailed descriptive comments characterizing each student's performance. This type of evaluative data is of considerable assistance to the student applying for internship or residency training, since it permits the Assistant Dean for Postgraduate Training to give each hospital to which the student has applied a meaningful, comprehensive summary of the candidate's attributes, abilities, and performance.

A Pass/Fail grading system is employed for the first semester of the first year. At the conclusion of each academic year every student receives a grade report that indicates achievement in each course taken. When all the

official grades have been received, the official transcript, in addition to listing courses and grades achieved, gives the grade distribution in each course with the exception of elective courses.

Grades are:

H = Honors  
HP = High Pass  
P = Pass  
F = Fail  
DF = Deferred  
INC = Incomplete

"Honors" is given for a truly outstanding performance, "High Pass" for very good work, and "Pass" for satisfactory work. "Fail" signifies clearly unsatisfactory performance. "Deferred" indicates a marginal performance with some deficiency that must be removed, and "Incomplete" denotes that course work has not been completed.

If a departmental coursemaster submits a grade of "Incomplete," "Deferred," or "Fail" for a medical student duly enrolled in any medical school course, the coursemaster will include an accompanying statement which contains the following information:

1. Student's name
2. Course title
3. Inclusive dates of course
4. Grade
5. Description of extent of academic encumbrance
6. Remedial action recommended to remove the academic encumbrance.

This type of statement will be submitted to the Office of the Registrar at the time student grades are reported and prior to the scheduled meetings of the various committees on academic review and promotions.

## PROMOTIONS

A faculty Committee on Academic Review and Promotions reviews the records of all students by curriculum level.

## RULES GOVERNING PROMOTIONS

Students must pass all required courses unless excused from their courses by the responsible departments. Students must have satisfactorily completed all the required courses for the first two years in order to be admitted to candidacy for the degree of doctor of medicine and to proceed to the third year of the curriculum.

Each student's performance will be evaluated periodically by a faculty Committee on Academic Review and Promotions. One such committee (CARP I) is concerned with the first year, another (CARP II) with the second year, and a third (CARP III) with the clinical years of the curriculum. In the case of unsatisfactory progress, as evidenced by failing grades or an inability to develop adequate clinical expertise, the appropriate committee may require that the student be reexamined or repeat the relevant courses. If a student does not achieve or maintain a satisfactory level of scholarship, the Committee may

drop the student from the School. Any action to drop a student from the School will be the result of a determination by a CARP Committee (on the basis of the student's performance and on the judgment of the members of the faculty who are familiar with him), that he has demonstrated an inability to successfully complete the requirements of the School for the degree of doctor of medicine.

A decision by a CARP committee to drop a student from the School may be appealed. The appeal must be submitted, in writing, to the Dean of the School of Medicine within 72 hours of the student's receipt of notification of the Committee's decision. Appeals will be considered within 30 days by a standing Appeals Committee appointed by the Dean. The Appeals Committee has limited authority either to uphold the earlier decision of the relevant CARP committee or to recommend to the Dean that the student be reinstated and allowed to continue his studies in the School. The reversal of a decision by a Committee on Academic Review and Promotions will be based only on a presentation of: (1) information which is new and/or different from that previously received by the CARP Committee; or (2) evidence of extreme hardship of which the CARP Committee was not fully apprised.

#### First-Year Curriculum

The Committee on Academic Review and Promotions *may recommend* to any first-semester student whose performance reflects difficulties with the required course work that he enter an individualized program. The Committee's recommendation will be based on a review of the student's performance in the first or second examinations in one or more of the major\* first semester courses. The intent of such an individualized program is to permit the student an optimum chance of successfully completing the requirements for the first year by permitting him to take up to two years to complete the first year's work. Students who accept the Committee's recommendation will be permitted to withdraw from one, or at the most two, of the major courses taught in the first

semester, and will be eligible for individual tutorial help in the remaining courses. At the end of the first semester the Committee *may require* a student who has failed one or more of the major courses to enter an individualized program.

A student who has been *required* to enter an individualized program is expected to pass all of his assigned courses in order to continue in subsequent semesters in the School of Medicine. If a student should fail any major course, one reexamination will be offered in each course at some time before the end of the summer preceding the next academic year. Should the student fail any reexamination, in the absence of such extenuating circumstances as personal ill health (physical or mental), he will be dropped from the School. In the second year of the individualized program the student shall complete all remaining first-year courses. If scheduling permits, and with the permission of CARP I, selected courses in the second-year curriculum may be taken.

#### Second-Year Curriculum

If a second-year student fails a course, one reexamination is permitted. Should the reexamination be failed, the course must be repeated. Failure in the repeated course will result in the student's being dropped from the School of Medicine by CARP II. If a second-year student who had been on an individualized program for the first-year curriculum fails a second-year course, that failure can be removed by passing a reexamination. Failure in the reexamination, in this case, constitutes grounds for CARP II to drop the student from the School of Medicine.

\*The term "major courses" refers only to the first-year courses. Biological Chemistry, Microbiology, and Gross Anatomy, which are currently taught in the first semester, and Physiology, Microscopic Anatomy and Neural Science, which are currently taught in the second semester.

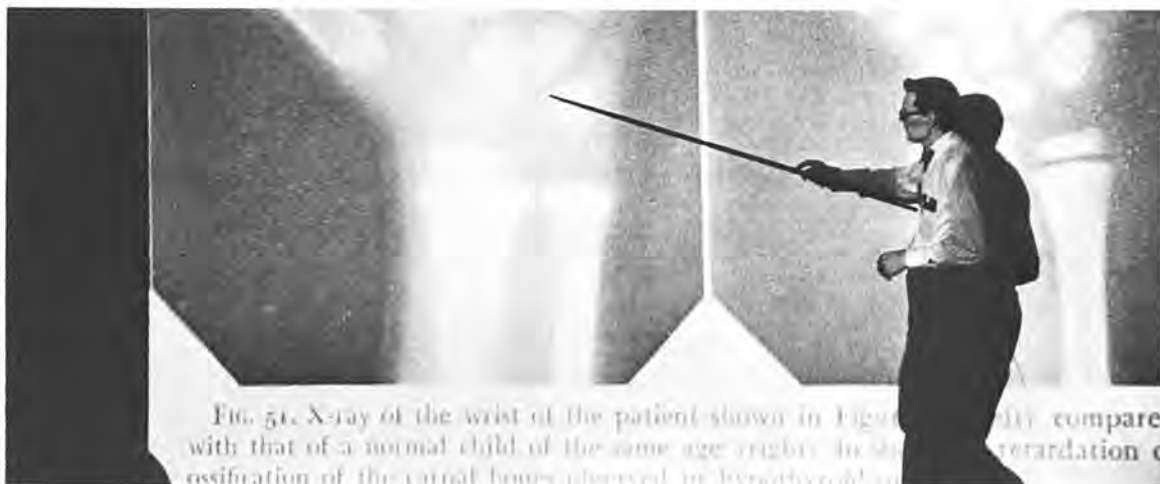


FIG. 51. X-ray of the wrist of the patient shown in Figure 50. The X-ray is compared with that of a normal child of the same age (right). In this case, the retardation of ossification of the carpal bones observed in hypothyroidism is evident.



No student may take more than three years to complete the course work required for the first two years of the curriculum. The Committee on Academic Review and Promotions II will neither promote a student to the status of candidate for the Doctor of Medicine degree nor permit a student to begin a clinical clerkship until all first- and second-year course work has been satisfactorily completed.

#### **Beyond the Second-Year Curriculum**

The Committee on Academic Review and Promotions III meets at least twice each year to review the academic progress of all students who have been promoted or admitted to the status of candidate for the degree of doctor of medicine. This includes students in the regular four-year degree program, students taking a five-year degree program, students in the clinical portion of the Medical Scientist Training Program, those selected students with a prior Ph.D. degree who have been approved by the Medical Science Training Placement Curriculum Committee for individualized curricula and are now in the clinical training period of their program (having previously been promoted to the status of candidate for the degree of (Doctor of Medicine), and all others who have successfully completed all aspects of the School's preclinical curriculum. Just prior to the end of each academic year, the Committee meets and recommends to the Executive Faculty those students who, in the opinion of the Committee, are qualified to receive the degree of Doctor of Medicine. Specific rules are as follows:

1. All academic encumbrances must be removed in order for a student to be recommended for graduation.
2. A candidate having failures in two subjects may, at the discretion of the Committee, be dropped from the School or may continue with an individualized program.

#### **STUDENT RESEARCH FELLOWSHIPS**

No matter what medical career an individual chooses, it will be essential for him to evaluate and use fresh knowledge as he moves through his professional life. Student Research Fellowships in basic science or clinical areas, awarded each year to selected students who undertake research projects under the direction of faculty members, are an important part of the educational program. 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. Selected faculty members serve as advisers to students interested in special research opportunities.

Fellowships are available to students after acceptance into the School. They are granted for a minimum of two months. The research must be undertaken during the student's free time or a vacation period. A number of studies conducted by students are reported in scientific journals.

#### **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 some will gain additional experience as postdoctoral fellows.

In order to aid students in obtaining desirable residency appointments, an active counseling program is maintained by the Assistant Dean for Postgraduate Training. Thus, in their junior year, students are provided with general background information about the kinds of residencies available. Since more residencies exist than there are candidates in any given year, students are able to exercise a considerable degree of selectivity.

The Assistant Dean for Postgraduate Training maintains an open file of brochures and other descriptive data regarding residencies throughout the country. Included are evaluations of their own residencies obtained from our recent graduates. The School participates in the National Resident Matching Program, which offers distinct advantages to applicants.

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.



# Admission

## ENTRANCE REQUIREMENTS

Entrance requirements to the School of Medicine are:

1. evidence of superior intellectual ability and achievement;
2. completion of at least 90 semester hours of college courses in an approved college or university;
3. completion of the New Medical College Admission Test of the Association of American Medical Colleges;
4. evidence of intellectual ability, character, attitude, interests, motivation and superior scholastic achievement 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. A course in physical chemistry (with calculus as a prerequisite) is strongly recommended. 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 presented as prerequisite because a great variety of courses may prepare the student for the many roles he may play in his medical career.

## APPLICATION PROCEDURE

The Washington University School of Medicine participates in the American Medical College Application Service (AMCAS) of the Association of American Medical Colleges. AMCAS is a centralized procedure 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 preprofessional advisers. For this reason, individuals requesting an application and a *Bulletin* from Washington University will receive an AMCAS Application Request Card and a brochure describing the School of Medicine. The *Bulletin* is mailed to candidates upon





receipt of their application credentials from AMCAS. Applicants are urged to file their applications as early as possible.

#### **Early Decision Admission**

This is an optional program for the applicant whose first-choice school of medicine is Washington University and who desires an admission decision on his application no later than October 1, 1982. To receive this special consideration, the applicant must agree to: (1) apply only to Washington University prior to receiving its admission decision; (2) present an academic record of 90 semester hours that indicates completion, or plans for completion, of all courses required for admission; (3) have a superior academic record and correspondingly strong scores on the New Medical College Admission Test; (4) submit all required credentials to AMCAS by August 1, 1982; (5) visit the Medical Center for interviews on a mutually convenient date prior to September 1, 1982; and (6) accept a position in the class, if offered one. There is no quota on the maximum number of positions in the class of 120 to be filled by Early Decision applicants. The AMCAS Application for Admission contains complete instructions regarding Early Decision programs.

#### **Regular Admission**

All applicants to the Washington University School of Medicine must submit their application to AMCAS by November 1, 1982. On receipt of the application from AMCAS, the Committee on 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 \$35 is charged by the University. Once complete, the applicant's admission credentials are reviewed and independently evaluated by members of the Committee on Admissions. Selected applicants are invited for a personal interview. Final decisions are made by the 20-member faculty committee. 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 May 15, 1983 every applicant should have a final decision—accepted, waiting list, or not accepted.

#### **Personal Interview**

The Committee on Admissions would like to interview every applicant who passes the initial evaluation screening process, but since this involves several thousand applicants, it is physically impossible to accomplish. Therefore, selected applicants are invited to visit the Washington University Medical Center for an interview, as well as a tour of the School of Medicine and its hospitals. This visit will provide 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 for him to write the Interview-Appointments Secretary, Committee on Admissions, Box 8107, Washington University School of Medicine, 660 South Euclid Avenue, St. Louis, Missouri 63110, and inquire if an interview will be requested of him. The inquiry should be made at least three weeks in advance of the anticipated travel. The Office of Admissions is open on weekdays from 8:30 a.m. to 5 p.m. central time.

#### **Accepted Applicants**

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 reservation deposit; 2) accept the offer of admission, submit the \$100 deposit, and request financial aid materials; and 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 June 16, 1983, the deposit is refunded.

#### **THIRD-YEAR CLASS TRANSFER PROGRAM**

Each year the Washington University School of Medicine accepts approximately twenty transfer students into its third-year class. This class enlargement is permitted because of the abundant clinical training facilities available in the Medical Center and because of the existence of a national need for such transfer positions. Transfer applications are accepted from well-qualified students in the U.S. medical schools where limited facilities require some students to transfer elsewhere for clinical training. Applications are also accepted from students in U.S. schools of medicine 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 our 1983 third-year class are available on August 1, 1982. Application deadline is November 1, 1982. Those applicants selected for interview will be invited to visit the Medical Center during November 1982. All applicants will be notified of the decision of the Committee on Admissions by December 31, 1982. Inquiries should be directed to:

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

# Financial Information

## COST OF EDUCATION, 1982-83 FIRST YEAR CLASS

For a first-year matriculant, tuition and housing rates for the 1982-83 academic year are listed below. Although the University reserves the right to change the fees at any time without notice, any change will not become effective until the 1983-84 academic year. Other items listed provide an estimate of the expenses for a single student in the 36-week first-year class. The total of these figures suggests a basic minimum budget of approximately \$13,191. Allowances for entertainment, travel, clothing, and other miscellaneous items must be added to this estimate.

Tuition (includes Student Health Service and Microscope Lending Plan) . . . . .	\$8,500
Books . . . . .	600
Supplies and instruments . . . . .	500
Housing (single room, Olin Residence Hall) . . . . .	1,449
Board (Medical Center cafeterias) . . . . .	2,142

### 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.

### Microscope Lending Plan

Microscopes which meet the technical requirements set by the faculty are provided to each student in the first- and second-year classes. The Plan saves the student the high cost of microscope purchase and makes available to them a superior quality instrument.

## 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.

At the time accepted students indicate they will matriculate in the School of Medicine, they may request an application for financial aid. The Graduate and Professional School Financial Aid Service (GAPSFAS) Financial Statement and other financial aid material, information, and instructions will be sent to the students by return mail. The GAPSFAS Financial Statement for



the academic year 1982-83 solicits information about the applicant and parents, including a detailed description of resources and liabilities. In addition, it requests information about the income, expenses, education and employment history of the student's spouse (or spouse-to-be). The School asks that the statement be forwarded promptly, within two weeks from date of receipt, to GAPSFAS for processing.

Financial aid award decisions are made by the five-member Committee on Student Financial Aid, and applicants are notified of the award decision within two weeks of the date the processed Financial Statement is received from GAPSFAS. An official copy of the parents' and the applicant's U.S. individual income tax return completes the data required for financial aid consideration. 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 Guaranteed Student Loan (GSL) 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 of medical school 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 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.

Students must agree to not travel outside the continental United States during the academic year in which they receive financial aid from the School.

### Washington University School of Medicine Merit Scholarships

The School has established five full-tuition scholarships to be awarded annually to members of the entering first-year class. The scholarships will be awarded, without regard to financial need, to students of proven academic excellence. In early fall 1982 selected applicants to the School's 1983 first-year class will be invited to file applications for scholarship consideration. Selection 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 1983 scholarship recipients will be made on March 1, 1983.

The scholarships are subject to annual renewal. Recipients of these scholarships will be expected to maintain academic excellence. If a scholarship is not renewed, the student may file for financial aid from the School.

A scholarship recipient may not concurrently hold an Olin Fellowship from Washington University, or participate in the School's Medical Scientist Training Program, the National Health Service Corps Scholarship Program or the Armed Forces Health Professions Scholarship Program. Scholars may apply to the School for financial aid in addition to the full-tuition scholarship. Additional aid would be determined on the basis of documented financial need.



### Scholarship Funds

*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.

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

*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.

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

*Robert Elman Scholarship in Surgery.* Created in 1980 through the bequest of Minna Elman in memory of her husband.

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

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

*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.

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

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

*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.

*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.

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

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



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

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

*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.

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

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

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

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

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

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

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

*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.

*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.

#### Scholarship and Loan Funds

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

*Danforth Foundation Loan and Scholarship Fund.* Provides financial assistance for medical students.

*Danforth Medical Foundation Fund.* Created through gifts from the Danforth Foundation and the late William H. Danforth to furnish loans, scholarships, or outright grants to talented and promising young men and women engaged in study or research in basic medical or clinical sciences.

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

*Robert Wood Johnson Foundation Fund.* Created in 1972 to provide financial assistance for students who are from rural backgrounds, members of specified minority groups, and women.

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

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

*Wilkinson Scholarship Fund.* Created in 1968 by the bequest of Anna J. Wilkinson in honor of her husband, Dr. George E. Wilkinson. Medical and postdoctoral students are eligible for Wilkinson scholarships or loans.





### Loan Funds

*American Medical Association Loan Program.* Makes available bank loans without collateral to eligible medical students, interns, or residents who are citizens of the United States. Applications for such loans are made through the Education and Research Foundation of the American Medical Association.

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

*Federally Insured Student Loan.* Washington University acts as the lender for students awarded loans by the School of Medicine.

*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.

*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.

*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.

*Ophelia H. Kooden and Violet G. Sachs Loan Fund.* Created in 1970 to provide loans for medical students in memory of the donors' brother, Jess Klement Goldberg.

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

*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.

*Robert Wood Johnson Foundation Student Loan Guarantee Program.* Provides "a last-resort source of funds for educational expenses."

*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.

### 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 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.

*J. Albert Key Fellowship Fund.* Provides a stipend for a fellow in orthopedic 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.

*George W. Merck Memorial Loan Fund.* Established in 1959 through the Merck Company Foundation to encourage deserving interns and residents to seek the best possible postdoctoral training.

*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.

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

*Student Research Fellowships.* Awarded each year to students who undertake special research projects under the direction of a faculty member. They carry a stipend. Application should be made to the Committee on Fellowships and Awards, which supervises the program.

#### Awards and Prizes

*Alpha Omega Alpha Book Prize.* Awarded at the end of the fourth year to a member of that class who has performed outstandingly for the entire medical course.

*Alexander Berg Prize.* Awarded to the student presenting the best results in research in bacteriology.

*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.

*Dr. Richard Brookings and Dr. Robert Carter Medical School Prizes.* Provided for medical students through a bequest of Robert S. Brookings.

*Kehar S. Chouke Prize.* Awarded at the end of the first year to a medical student who has demonstrated superior scholarship in anatomy.



*CIBA Award for Outstanding Community Service.* Recognizes a sophomore student who has performed laudable extracurricular activity within the community.

*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.

*Edmund V. Cowdry Prize in Histology.* Established in 1969 to honor Dr. Cowdry; awarded to a freshman medical student who has performed meritoriously in microscopic anatomy.

*Antoinette Frances Dames Prize in Physiology and Biophysics.* Awarded annually to a member of the first-year class who has demonstrated superior scholarship in these fields.

*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.

*Alfred Goldman Book Prize.* Created in 1972 as an annual award to be given to a student in the School of Medicine who, in the opinion of the faculty, has done outstanding clinical or research work in diseases of the chest or pulmonary physiology.

*Dr. J. E. Kirk Scholastic Award.* Established in 1975 and awarded to a graduating student of high scholastic standing.

*Louis and Dorothy Kovitz Senior Prize in Surgery.* Senior award prize in surgery recognizing a member of the senior class who has shown the most outstanding ability, zeal, and interest in surgical problems.

*Lange Medical Publications Book Awards.* Given to members of all four classes for high scholastic standing and achievement in research.

*Irwin Levy Memorial Fund.* 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 clerkship.

*Oliver H. Lowry Prize.* Awarded to second-year medical student for academic excellence in pharmacology.

*Howard A. McCordock Book Prize.* Awarded at the end of the second year to a member of that class for general excellence in pathology.

*Edward Massie Prize for Excellence in Cardiology.* Awarded to the member of the graduating class who, in the judgment of the Director of the Division of Cardiovascular Disease of the Department of Medicine, has done the most outstanding clinical or basic research work in the field of cardiovascular disease.

*Medical Center Alumni Scholarship Prize.* Given annually to a student who has shown excellence in his work during the preceding year.

*Medical Fund Society Prizes.* One prize awarded annually to a student of the senior class who has excelled in the study of internal medicine; one prize awarded

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annually to a student of the senior class who has excelled in the study of surgery. No individual is eligible for both prizes.

*Missouri State Medical Association Award.* A scroll and a U.S. Savings Bond presented annually to an honor graduate of the senior class.

*C. V. Mosby Company Book Awards.* Made to five members of the graduating class for high general scholastic standing and research achievement.

*James L. O'Leary Neuroscience Prize.* Awarded annually to students who demonstrate the best accomplishments in the neuroscience course.

*James L. O'Leary Prize for Research in Neuroscience.* Given annually to a predoctoral or postdoctoral student for the most original and important accomplishment in neuroscience research.

*St. Louis Internists Club Book Prize.* Awarded to the graduating senior who has done the most significant research in any area of internal medicine.

*St. Louis Pediatric Society Senior Prize.* Presented to the senior student showing the greatest promise in clinical pediatrics.

*Sandoz Award.* Given annually to a graduating student who has made a meritorious contribution to psychiatric research.

*Sidney I. Schwab Prize in Psychiatry.* Awarded at the end of the fourth year for general excellence in psychiatry.

*John R. Smith Memorial Fund Prize.* Created in 1982 to be awarded annually to a medical student who has

done meritorious clinical and/or research work in the Division of Cardiovascular Diseases of the Department of Medicine.

*Margaret G. Smith Award.* Given to a woman medical student for outstanding achievement in the first two years of medical school.

*Samuel D. Soule Award in Obstetrics and Gynecology.* Presented to a member of the junior or senior class for meritorious achievement in either basic or clinical investigation in obstetrics and gynecology.

*Upjohn Achievement Award.* Given to the senior student who has done the most meritorious work during his medical school career in the field of metabolism.

*Washington University School of Medicine Academic Achievement Award.* Given annually to a student who has exhibited to an unusual degree the qualities of industry, perseverance, determination, and enthusiasm in the first-year academic program.

*Samson F. Wennerman Prize.* Donated by his wife, Zelda E. Wennerman, and awarded annually to that senior student who has demonstrated promise in surgery.

*Hugh M. Wilson Award for Meritorious Work in Radiology.* Given annually to a graduating medical student in recognition of outstanding work in radiology-related subjects, either clinical or basic science.

*James Henry Yalem Prize in Dermatology.* Established by Charles Yalem in memory of his son and awarded annually to a member of the senior class for outstanding work in dermatology.



# Student Life

## HOUSING

The Apartment and Housing Referral Services, located in the Millbrook Building on the West Campus, Box 1059, Washington University, St. Louis, Missouri 63130, telephone (314) 889-5092, maintains listings of housing appropriate for married and single students.

The Spencer T. Olin Residence Hall has accommodations for approximately 250 single men and women. This building, made possible by generous gifts from Spencer T. Olin and alumni and friends of the School of Medicine, is located at 4550 Scott Avenue in the Medical Center. 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 1982-83 are:

### *School Year: September-June (Nine Months)*

Two-room suite .....	\$1,665
Single room .....	1,449
Double room .....	1,152
Large single .....	1,782

### *Summer 1982: for Three Months*

Two-room suite .....	555
Single room .....	483
Double room .....	384
Large single .....	595

### *Summer 1982: Weekly Rates for Student Visitor*

Two-room suite .....	70
Single room .....	60
Double room .....	50

### *Daily Rates for Visitors*

Two-room suite .....	30
Single room .....	25
Single room (prospective student) .....	20

Each occupant is required to pay a \$25 security fee in addition to the room rental charge. This fee will be held by the University until termination of residence to cover losses resulting from possible damage to the room or the furniture. Any portion not so used will be refunded.

## STUDENT HEALTH SERVICE

Entering students are given a complete medical examination and are provided with medical care as long as they are enrolled in the School of Medicine. Physicians are available at the Student Health Service, and a physician is on call for emergency care at Barnes Hospital. Essential costs of hospitalization are covered. The student or his family is responsible for meeting the costs of hospital care in excess of those paid by the Health Service. The responsibility of the Student Health Service for hospitalization costs will end 30 days after a hospitalized individual ceases to be an officially enrolled student.







Except in certain emergencies, costs will not be covered for outpatient care that is not arranged through the Student Health Service.

### **PARKING**

Parking is available on lots owned and operated by the School of Medicine. These lots are located near Olin Hall and various other sites within the Medical Center. The Busch lot, owned jointly by Barnes Hospital and the University, is located between Taylor and Newstead Avenues. An annual permit must be purchased for use of either of these two facilities. These permits are available to students—on a limited basis. Students also qualify to purchase monthly permits in the Washington University—Wayco Garage at the corner of Audubon and Euclid Avenues.



### **RECREATIONAL AND CULTURAL OPPORTUNITIES**

St. Louis is a city in the center of things, stylistically as well as geographically. Here, the industriousness of the North is tempered by the graciousness of the South, while Eastern respect for tradition is balanced by the pioneering spirit of the West.

A metropolitan area of more than 2.5 million people, St. Louis has one of the most diversified economies of any major U.S. city. Among other endeavors, its workers are engaged in the aerospace industry, automobile assembly, brewing, shoe manufacturing, and chemical production.

The city's cultural and recreational opportunities reflect a similar eclecticism. There are 26 institutions of higher learning in the area, as well as libraries, museums, professional drama companies, a dance society, opera theatre, and the second-oldest symphony orchestra in the nation. Frequent appearances by various popular recording artists round out the city's cultural opportunities.

St. Louis is served by 18 radio stations, and one educational and five commercial television channels. Two daily newspapers of opposing political views are published in the city—the morning *Globe-Democrat* and the evening *Post-Dispatch*.

For spectators, there are four major-league sports teams—the baseball and football Cardinals, soccer Steamers, and the hockey Blues. For participants, the four vibrant seasons make outdoor recreation a favorite pastime. Good country for hiking, camping, canoeing, and spelunking is just a short drive from the city.

The construction of the Gateway Arch, the proud symbol of the key role St. Louis played in the nation's westward expansion, sparked an urban renaissance in the 1960s, and the city is now enjoying the results. Within the past few years, the downtown business district has undergone a dramatic transformation, with the opening of a convention center, new hotels, and a riverfront entertainment district. Some of the city's historic residential neighborhoods, such as Lafayette Square and Souldard, have recently been rediscovered by modern homesteaders, who are restoring once-elegant townhouses to their former glory.

Washington University's School of Medicine is located in a district known as the Central West End—a diverse neighborhood which includes quiet private streets, high-rise apartment buildings, and many small shops, restaurants, and galleries. Under the auspices of the Washington University Medical Center Redevelopment Corporation, this area, too, is experiencing a resurgence of interest from both commercial and residential investors.

One of the city's major attractions, Forest Park, is bounded on the west by the campus of Washington University and on the east by the Washington University Medical Center, which includes the School of Medicine. Originally the site of the St. Louis World's Fair, this 1400-acre expanse of greenery and recreation facilities has paths for running and cycling, courts for tennis and handball, a skating rink, fishing ponds, fields for football, baseball and soccer, and three golf courses. Also located within the Park are the St. Louis Zoo, McDonnell Planetarium, Museum of the Missouri Historical Society, Jewel Box Floral Conservatory, City Art Museum, and Municipal Opera.

## **WASHINGTON UNIVERSITY MEDICAL CENTER ALUMNI ASSOCIATION**

The Washington University Medical Center Alumni Association was organized to foster a spirit of class fellowship among its members. It assists the School of Medicine by stimulating an interest in the advancement of medical and collateral sciences by supporting postgraduate studies.

In order to further the aims and purposes of the School, the Association sponsors a variety of programs designed to complement the philosophy of the institution. Student-Alumni activities include an Emergency Student Loan Fund, a High School Honors Day, a Freshman Visitation-Orientation Day, and a Pre-Med Exposure Program.

Alumni who are distinguished members of the Washington University School of Medicine are recog-

nized as recipients of the Annual Alumni-Faculty Achievement Awards. Additional recognition is given to alumni based on exemplary professional achievement and service to the School.

Each year the Alumni Association sponsors the Annual Clinical Conference held in February, receptions at major medical conferences, and a welcoming party for new house officers.

A new program established to foster alumnus-graduate relations matches alumni in various cities with new graduates just beginning their training.

Another new program, the Alumni Network presents special alumni programs in selected cities across the United States. Each event will be tailored to the interests of the medical alumni in the metropolitan area. A special seminar/lecture series is being prepared for alumni and their spouses in greater St. Louis.

Alumni Reunion Days are in May and feature a scientific program presented by the Office of Continuing Medical Education, a traditional welcoming cocktail party, individual class dinners, the Dean's Luncheon, and the Annual Alumni Dinner Dance at which the 50-year reunion class and the graduating seniors are honored guests. This program is designed to acquaint returning alumni with the continued vitality of their alma mater.

Membership is available to graduates of the School of Medicine, members of the faculty, and all former house officers of the Medical Center.

## **CONTINUING MEDICAL EDUCATION PROGRAM**

With encouragement and financial support from the Washington University Medical Alumni, the School of Medicine in 1973 set up the Office of Continuing Medical Education. The objectives of this program are:

- 1) To provide high quality educational activities for alumni of Washington University School of Medicine and other physicians regionally and, on occasion, nationally.
- 2) To encourage life-long learning by a variety of educational methods appropriate to the learners' needs.
- 3) To 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) To provide a forum where academic and practicing physicians can jointly explore solutions to health problems.
- 5) To translate the results of research and the habits of critical assessment of new data to the needs of practicing physicians.

In the first year the office sponsored five programs, and it has subsequently grown to 25 to 30 symposia annually. About 3,000 registrants attend these courses annually and receive more than 300 hours of instruction. In addition to formal courses, the CME Office has sponsored computer assisted instruction, medical and pediatric newsletters, audiotapes, mini-residencies, a speaker's

bureau, and supported continuing medical education in community hospitals.

## LECTURERSHIPS 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.

*Harry Alexander Visiting Professorship.* Established in 1964 by former house officers 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.

*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.

*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.

*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.

*Evarts A. Graham Memorial Lectureship.* Established in 1959 with a reserve fund left by Dr. Graham for his successors.

*Evarts A. Graham Visiting Professorship of Surgery.* Established in 1968 by the Harry Freund Memorial Foundation to support an annual lecture in honor of Dr. Graham's contribution to surgery.

*Samuel B. Grant Visiting Professorship.* Created in 1963 to provide annually a visiting professor in the Department of Medicine.

*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.

*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.

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

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

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

*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, graduate medical education, and commitment to patient care.

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

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

*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.

*St. Louis Football Cardinals Visiting Professorship in Orthopedic Surgery.* Made possible since 1971 by donations from the St. Louis Football Cardinals.

*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.* Established in 1939 by alumni "for the purpose of fostering greater appreciation of the study of human anatomy."

*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.



# Historical Perspective

The Washington University School of Medicine was established in 1899 as a union of the two oldest medical schools west of the Mississippi River: the Missouri Medical College, a proprietary school organized and owned by the faculty, and the St. Louis Medical College, founded by the local medical society. The Missouri Medical College was strong in clinical teaching, while the St. Louis Medical College stressed research, particularly clinical research. When the two were united as the Medical Department of Washington University, they combined these strengths, with the result that today the Washington University School of Medicine emphasizes both the scientific and research bases of medicine and the application of that knowledge to patient care and clinical practice.

Reorganized after the famous Flexner Report of 1912, with the help of the Carnegie Foundation for the Advancement of Teaching and funds provided by St. Louis philanthropist and civic leader Robert Brookings, the School restructured its program, built a new campus and appointed an entirely new faculty who had been trained in the new "scientific" medicine. Among the features adopted by the reorganized school were: full-time teaching appointments, enlarged hospital and outpatient facilities, laboratory space for both preclinical and clinical departments, faculty time for research, and a teaching

program which allowed undergraduate, graduate and postgraduate students to have meaningful contact with distinguished faculty members in informal small group settings. These tenets have resulted in bringing together a faculty, staff and alumni who have been awarded 14 Nobel Prizes in physiology and medicine, as well as many other honors, appointments and elections to important professional offices. Four faculty members have been elected to the National Academy of Sciences, six are members of the Academy's Institute of Medicine and many more are members of advisory boards of foundations and governmental granting agencies.

Over the years, the Washington University School of Medicine and its affiliated hospitals have worked and grown together, and in 1962 these several institutions formalized their relationships and established what is now termed the Washington University Medical Center. The Center consists of the Washington University School of Medicine, Barnes Hospital, The Jewish Hospital of St. Louis, St. Louis Children's Hospital, Barnard Hospital and the Central Institute for the Deaf. Integral units of the Medical Center include the world-famous Mallinckrodt Institute of Radiology, the Biomedical Computer Center, and the Irene Walter Johnson Institute of Rehabilitation. Extensive basic and clinical programs are carried on in the various institutions in the Medical Center. In 1981, Principal Investigatorships on one or more federal research grants were held by 223 faculty members. Twenty-five Program Project and Center Grants are held in the fields of cancer, general clinical research, thrombosis,





diabetes, arthritis, renal diseases, asthma, stroke, glaucoma, drug abuse, lipid research, emphysema, heart disease, genetics, reproduction, alcoholism, neurobiology and affective disorders.

New methods of offering health care have been developed through such means as the prepaid health maintenance organization, the Medical Care Group of St. Louis, which provides comprehensive health care for more than twenty thousand patients. The Queeny Tower is a multi-purpose building and includes several floors of doctors' offices in addition to acute-care and limited-care patient facilities and hotel accommodations for patients undergoing outpatient medical evaluation. The institutions in the Medical Center have more than a quarter of a million clinic and emergency room visits annually. Patients come to the Center from the metropolitan St. Louis area and the surrounding regions in Missouri and Illinois. Patients with especially difficult diagnostic and therapeutic problems are referred from throughout the Midwest and beyond.

The Washington University School of Medicine has a unique full-time faculty system. In 1982 the School employed 694 full-time, salaried faculty members in its eighteen preclinical and clinical departments. The clinical departments are further greatly strengthened by 773 part-time faculty members. The latter group of physicians includes men and women who practice their medical specialties in St. Louis and are members of one or more of the staffs of the six hospitals in the Center. Medical students and resident physicians also receive extensive and valuable clinical training in programs at the St. Louis City Hospital, St. Louis County Hospital and Cochran Veterans Administration Hospital, which are served by full-time and part-time faculty members of the School of Medicine.

The student body of the School of Medicine numbers approximately 530 medical students. Programs are also conducted for students in health administration, occupational therapy, physical therapy, radiologic technology and pediatric nurse practice. The Division of Biology and Biomedical Sciences has extensive graduate training programs for students seeking the Doctor of Philosophy degree in areas of developmental, cellular and systemic biology, evolutionary biology and ecology, molecular biology, neural sciences and plant biology. The outstanding Washington University School of Dental Medicine is adjacent to the School of Medicine. Unaffiliated with Washington University but located close to the Medical Center is the St. Louis College of Pharmacy.

Each year the School of Medicine and the Washington University Medical Center Alumni Association, through the Division of Continuing Medical Education, offer many short postgraduate training courses for physicians and other health professionals. These programs provide medical alumni and practicing physicians in St. Louis and the Midwest with the opportunity to keep abreast of rapidly changing medical concepts, information, techniques and treatment.

In summary, the Washington University School of Medicine and the several institutions in the Washington University Medical Center are committed to providing patients with high-quality medical care in a concerned, compassionate way, to educating superbly qualified young men and women in the health professions, and to increasing medical knowledge through research.

# Teaching Facilities

## THE SCHOOL OF MEDICINE

The Washington University School of Medicine and the Medical Center are located along the eastern edge of Forest Park in St. Louis. Along the western edge of the park is the West Campus of the University. A regularly scheduled shuttle bus, operated for the benefit of students and faculty, brings the two campuses within 10 minutes of each other. Spread over two city blocks, the School of Medicine is separated by Euclid Avenue, with preclinical departments predominating on the eastern side.

The focal point of teaching facilities is the McDonnell Medical Sciences Building. The McDonnell Building, with 300,000 square feet of the most technologically advanced research laboratories and classroom space in the country, was made possible by James Smith McDonnell, a generous benefactor of Washington University. Dedicated in the fall of 1970, it is the center of activity for entering medical students. 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, and offices and research laboratories for the seven existing basic science departments and the Division of Biology and Biomedical Sciences are located on the upper floors. Modern centralized animal quarters are housed in the basement.

The older structures, the North and South Buildings, in which centered the work of several Nobel Laureates, have been extensively renovated. Along with

the Cancer Research Building, they continue to provide space for laboratories, offices, the library, and some departmental facilities.

West of Euclid Avenue but connected by a pedestrian bridge are the major clinical departments of the School of Medicine, housed in eight buildings. Here the medical school facilities are closely intertwined physically (and programmatically) with Barnes and Children's Hospitals. Located here are the following facilities owned and operated by Washington University.

*Edward Mallinckrodt Institute of Radiology*, one of the largest and best-equipped in the world, houses two functioning cyclotrons and diagnostic, therapeutic, and research activities of the Department of Radiology. It is connected on most of its floors with the adjoining Barnes and Barnard Hospitals, and through them with other hospitals of the group, thus providing easy access for all inpatients.

*Renard Hospital*, an eight-story structure, is undergoing extensive renovation. With consolidation of patient-care services in the West Pavilion, it will provide additional office and laboratory space for the Department of Psychiatry.

*David P. Wohl, Jr., Memorial Hospital* (ten floors) opened in 1953, and until 1980 housed 80 medical patients. A project is under way to renovate Wohl Hospital into badly needed research and office space, principally for the Departments of Medicine and Surgery.

*St. Louis Maternity Hospital* houses offices and research laboratories for the Department of Obstetrics and Gynecology. A new Perinatal Center and laboratories for research in the physiology of reproduction are located in this building.

*Irene Walter Johnson Institute of Rehabilitation* is a center for training personnel in rehabilitation procedures, for treatment of disabled persons in the St. Louis metropolitan area, and for research related to chronic diseases.

*Oscar Johnson Institute for Medical Research* occupies the top five floors of the McMillan Hospital.

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

*West Building* contains offices and research laboratories for the Department of Preventive Medicine and Public Health, as well as for the Department of Pathology.

*William Greenleaf Eliot Division of Child Psychiatry*, located about a mile from the Medical Center at 367 North Taylor Avenue, conducts an advanced teaching program in child psychiatry and is the focus for research and treatment in child psychiatry.

### Biomedical Computer Laboratory

An outstanding group of computer scientists, engineers and their students are engaged in the development and application of computer technology to biomedical problems.







The Biomedical Computer Laboratory and the Computer Systems Laboratory are located in adjoining buildings at 700 and 724 South Euclid, which also house the Division of Biostatistics of the Department of Preventive Medicine and Public Health.

### Library

The School of Medicine Library is one of the largest medical libraries in the Midwest. It contains a collection of more than 180,000 volumes and subscribes to over 2,000 serials. Special holdings include a rare book collection, the School's historical archives and memorabilia, and manuscript copies of the scientific papers of such outstanding men of medicine as Doctors William Beaumont, Joseph Erlanger, E.V. Cowdry, Evarts Graham and others. A collection of over 400 audiovisual titles is maintained and may be viewed in the Library's Learning Resources Center.

The primary purpose of the Library is to provide information, services and materials to the faculty, researchers, students and staff of the Medical Center. In addition, the Library responds to requests for information from health professionals throughout the city, state, and nation, and from local hospitals. It is an active participant in the seven-state Midcontinental Regional Medical Library Program under the auspices of the National Library of Medicine.

The Library is deeply involved in computer research and use. It runs, at cost, a serials control system (PHILSOM) for a number of medical libraries throughout the United States. The Library's cataloging is done in conjunction with the national computer network at the Ohio College Library Center (OCLC), Inc., in Columbus. The serials, cataloging, and circulation control programs have been combined into an integrated on-line system



giving patrons and staff immediate access to information about the Library's collection.

Computer terminals are available to the public for searching the Library's catalogs of books and journals. Two terminals are available for computer-assisted instruction, and remote computer data bases (including MEDLINE, Toxline, and Chemical Abstracts) are searched by the reference staff on request.

Library hours are 8 a.m. to 12 midnight on weekdays; 8:30 a.m. to 6 p.m. on Saturdays; and 1 p.m. to 10 p.m. on Sundays. A student reading room is open 24 hours a day. In the summer and on holidays, special hours are maintained.

Further information can be found in the "Library Guide," "Library Notes," and special pamphlets on computer services.



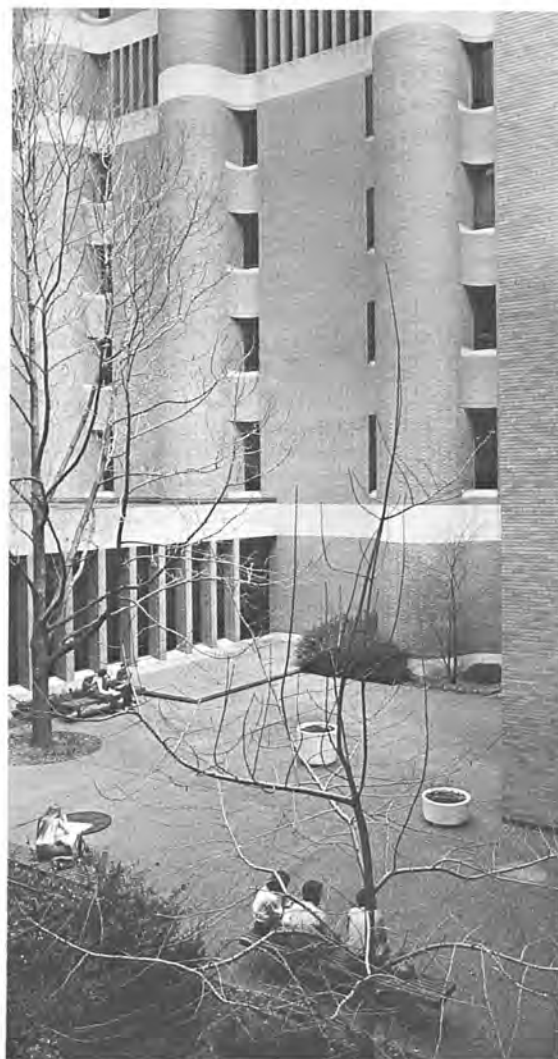


#### **Facilities Owned by Washington University and Shared with Barnes Hospital**

*David P. Wohl, Jr., Memorial-Washington University Clinics* are administered by Barnes Hospital and handle about 150,000 outpatient visits a year. Five floors of the building are devoted to the Clinics and five floors to research, including the Division of Health Care Research. This building is owned by the School of Medicine, with all patient-care services being operated by Barnes Hospital.

#### **THE MEDICAL CENTER, ITS HOSPITALS AND INSTITUTIONS**

The School of Medicine is part of a medical center of nearly 2,000 beds and 11,463 employees, providing nearly 652,990 days of care and more than 415,000 ambulatory care visits each year. Organized formally in 1962, the umbrella organization now known as the Washington



University Medical Center consists of a confederation of six strong, private institutions committed to the pursuit of excellence in health care, teaching and research. Students receive clinical instruction and gain experience in all divisions of the Medical Center.

Over the past 15 years, with the growing confidence of working together, the Washington University Medical Center has undertaken increasingly complex projects. Evidence of this is the massive redevelopment project under way in the 36-block area surrounding the Medical Center. Working closely with the neighborhood, the Washington University Medical Center Redevelopment Corporation will, over a nine-year period, provide impetus for new office buildings, laboratories, apartment buildings, commercial areas, renovated single dwellings, and many public improvements. To date, over fifty million dollars worth of construction has been completed or commissioned.

*Barnes Hospital* is the largest hospital in the Medical Center. It is independently owned and, through special agreement, operates outpatient clinics in buildings owned by the University. The contiguous facilities provide a major source of clinical experience for medical students. Barnes Hospital has a capacity of approximately 1,124 beds, and includes teaching facilities for all clinical departments except Pediatrics. All activities of the School of Medicine and Barnes Hospital are closely integrated, and the hospital staff is composed exclusively of members of the Faculty of Medicine.

The eighteen-story Queeny Tower has five nursing floors and two self-care floors, plus five floors of doctors' offices. The addition of four floors to the East Pavilion and a companion structure, the entirely new eighteen-story West Pavilion, has resulted in a facility that houses over 730 patient-care beds, over 50 operating rooms, a chronic renal dialysis unit, a 110-seat amphitheatre, doctors' offices, and additional facilities for the Mallinckrodt Institute of Radiology.

The combined East-West Pavilion, jointly owned by Barnes Hospital and the University, is one of the largest, most sophisticated tertiary medical facilities in the world. A large central diagnostic laboratory provides modern diagnostic patient services.

*Barnard Free Skin and Cancer Hospital* is independently owned but is operated by Barnes Hospital. It is a 44-bed hospital for the care and treatment of patients who suffer from skin diseases and cancer or who are undergoing special tests in the Clinical Research Center.

*St. Louis Children's Hospital*, governed by its own directors from its earliest days, has been an integral part of the Medical Center and a leader in the development of academic pediatrics. Its professional staff are members of the Faculty of Medicine, and the medical director is also professor and head of the Department of Pediatrics at Washington University. Considerable clinical service and research are conducted at Children's. Of particular interest is the recently created Ranken-Jordan Center of Metabolic Diseases.



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Currently, a new Children's Hospital (235 beds) is under construction approximately one block north of the present facility. This new building will largely supplant the older facilities and will consolidate a major amount of pediatric clinical and research activities.

*Jewish Hospital of St. Louis* contains 595 beds. Its departments represent each of the major specialties except pediatrics. The Aaron Waldheim Outpatient Clinics provide all facets of health care to the community, while the Yalem Research Building contains important research facilities for the Hospital and School of Medicine. The new nine-story Sydney M. Shoenberg pavilion provides inpatient rooms, surgical suites, and facilities for radiology. And soon to be completed is a 400-car addition to their parking garage that will span Parkview Place.

*Central Institute for the Deaf*, a nationally known institution, provides facilities for research into hearing problems, maintains a school for deaf and speech-handicapped children, provides outpatient clinics for children and adults, and engages in a program of professional education for scholars in the fields of audiology and otolaryngology.

## OTHER INSTITUTIONS

In addition to the above facilities which make up the Washington University Medical Center, the following hospitals are affiliated with the School of Medicine, and various members of the staffs hold University appointments.

The three City Hospitals:

*St. Louis City Hospital*, with 464 beds.

*Robert Koch Hospital*, with 465 beds.

*Harry S Truman Restorative Center*, with 300 beds.

*Malcolm Bliss Mental Health Center*, with 180 beds.

*Ellis Fischel State Cancer Hospital*, Columbia, Missouri, with 113 beds.

*St. John's Mercy Hospital*, with 659 beds.

*St. Louis Veterans Administration Hospitals*, with 947 beds.

*St. Louis County Hospital*, with 112 beds.

*St. Louis Shriners Hospital for Crippled Children*, with 80 beds.

*St. Louis State Hospital*, with 625 beds.

*St. Luke's Hospitals*, with 559 beds.

# Department of Anatomy and Neurobiology

The anatomical sciences are presented in three required courses: gross anatomy, offered in the first semester; and microscopic anatomy and neural science, taught in the second semester. The course in neural science is taught conjointly with the Department of Physiology and Biophysics. In addition, the department offers a series of graduate courses which may be taken as electives by senior students. Gross anatomy is taught essentially as a laboratory course, but with some lectures dealing with anatomical principles and with human growth and development. The course in microscopic anatomy consists largely of cell and tissue biology, with laboratory sessions paralleling the lectures in these areas. Neural science is taught mainly from an experimental point of view, with particular emphasis upon the development and organization of selected neural systems. Throughout all three courses, attention is paid to the results of recent investigations and to major developments in each field. The department is well equipped for special work in several areas, including gross anatomy, electron microscopy, tissue culture, neurobiology, cell biology, and developmental and reproductive biology.



## FIRST YEAR

### Bio 501. Human Anatomy

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 x-ray films, cineradiography films, fresh organs, 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. Occasional attendance at autopsies is recommended. Credit 6 units.

### Bio 506. Microscopic Anatomy

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, of preparations of fresh tissues, and of electron micrographs. A microscope will be provided for each student.

### Bio 554. Neural Sciences

This course, taught conjointly by the Departments of Anatomy and Neurobiology and of Physiology and Biophysics, provides a broad introduction to modern neurobiology. Cellular aspects of neurobiology and a comprehensive overview of the structure and function of major systems in the central and peripheral nervous systems. Class time of two half days a week throughout the second semester. A microscope will be provided for each student. Credit 5 units.







## RESEARCH

### Bio 590. Research Opportunities

These are offered in the following areas:

- The cell cycle and cellular differentiation. (Dr. Bischoff)
- The cytology of neural tissue. (Dr. M. Bunge)
- The development of the nervous system and its response to injury. (Dr. R. Bunge)
- Anatomy and physiology of the somatosensory system. (Dr. Burton)
- Insulin and growth factor gene organization and expression. (Dr. Chirgwin)
- Organization and physiology of the retina. (Dr. Cohen)
- Neurogenesis and synapse formation. (Dr. Fischbach)
- Growth and differentiation of neuroblastoma and other cultured cell lines. (Dr. Goldstein)
- Cell surface glycoproteins. (Dr. C. Gottlieb)
- Cell-cell recognition. (Dr. D. Gottlieb)
- The structure and function of the cerebral cortex. (Dr. Jones)
- Growth and differentiation of sympathetic neurons in culture. (Dr. Johnson)
- Central control of blood pressure. (Dr. Loewy)
- The structure and function of the skin. (Dr. Menton)
- Cross-sectional anatomy. (Dr. Peterson)
- The organization of the olfactory system and related parts of the basal forebrain. (Dr. Price)
- Physiology of posture and movement control. (Dr. Thach)

- Cell growth and radiation effects. (Dr. Tolmach)
- Axonal transport. (Dr. Willard)
- The structure and function of the cerebral cortex. (Dr. Woolsey)

## ELECTIVES

The department offers a number of graduate-level courses which 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. These course descriptions are presented in the section on Biology and Biomedical Sciences.

### Bio 428. Developmental Neurobiology

### Bio 457. Somatosensory System

### Bio 551, 552. Topics in Neurobiology

### Bio 561. Topics in Molecular Neurobiology

### Bio 562. Neural Control of Posture and Movement

### Bio 563, 564. Techniques in Neural Sciences

*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.



## Faculty of the Department of Anatomy and Neurobiology

### *Edison Professor of Neurobiology and Head of Department*

**Gerald D. Fischbach**, A.B., Colgate University, 1960; M.D., Cornell University Medical School, 1965.

### *Professor Emeritus and Lecturer*

**Mildred Trotter**, A.B., Mount Holyoke College, 1920; Sc.M., Washington University, 1921; Ph.D., 1924; Sc.D. (hon.), Western College, 1956; Sc.D. (hon.), Mount Holyoke College, 1960; Sc.D. (hon.) Washington University, 1980. (See Department of Radiology.)

### *Beaumont-May Institute of Neurology Scholar in Anatomy and Professor*

**Richard P. Bunge**, B.A., University of Wisconsin, 1954; M.S., 1956; M.D., 1960.

### *Professors*

**Mary B. Bunge**, B.S., Simmons College, 1953; M.S., University of Wisconsin, 1955; Ph.D., 1960.

**Adolph I. Cohen**, B.S., City College of New York, 1948; M.A., Columbia University, 1950; Ph.D., 1954. (See Department of Ophthalmology.)

**Edward G. Jones**, M.B., Ch.B., University of Otago, 1962; Ph.D., Oxford University, 1968; M.D., University of Otago, 1970. (See Department of Neurology and Neurological Surgery.)

**Roy R. Peterson**, A.B., University of Kansas, 1948; Ph.D., 1952.

**W. Thomas Thach, Jr.**, A.B., Princeton University, 1959; M.D., Harvard University, 1964. (See Department of Neurology and Neurological Surgery.)

**Leonard J. Tolmach**, B.S., University of Michigan, 1943; Ph.D., University of Chicago, 1951. (See Department of Radiology.)

### *Associate Professors*

**E. Richard Bischoff**, A.B., Knox College, 1960; Ph.D., Washington University, 1966.

**Harold Burton**, B.A., University of Michigan, 1964; Ph.D., University of Wisconsin, 1968. (See Department of Physiology and Biophysics.)

**Theodore J. Cicero**, B.S., Villanova University, 1964; M.S., Purdue University, 1966; Ph.D., 1968. (See Department of Psychiatry.)

**Milton N. Goldstein**, B.S., Western Reserve University, 1946; M.S., 1947; Ph.D., 1952. (See Department of Pathology.)

**Ursula W. Goodenough**, A.B., Barnard College, 1963; M.A., Columbia University, 1965; Ph.D., Harvard University, 1969. (Also Faculty of Arts and Sciences.)

**David I. Gottlieb**, B.A., State University of New York, Binghamton, 1964; M.A., University of Wisconsin, 1969; Ph.D., Washington University, 1971. (See Department of Biological Chemistry.)

**Boyd K. Hartman**, A.B., University of Kansas, 1962; M.D., 1966. (See Department of Psychiatry.)

**Arthur D. Loewy**, B.A., Lawrence University, 1964; Ph.D., University of Wisconsin, 1969.

**David N. Menton**, B.S., Mankato State College, 1959; Ph.D., Brown University, 1966. (See Department of Pathology.)

**Joseph L. Price**, B.A., University of the South, 1963; Ph.D., Oxford University, 1969.

**Mark B. Willard**, B.A., Oberlin College, 1965; Ph.D., University of Wisconsin, 1971. (See Department of Biological Chemistry.)

**Thomas A. Woolsey**, B.S., University of Wisconsin, 1965; M.D., Johns Hopkins University, 1969. (See Department of Physiology and Biophysics.)

### *Assistant Professors*

**John M. Chirgwin**, A.B., Harvard College, 1968; Ph.D., University of California, Riverside, 1974.

**William A. Frazier**, A.B., Johns Hopkins University, 1969; Ph.D., Washington University, 1973. (See Department of Biological Chemistry.)

**Charlene C. Gottlieb**, B.A., Radcliffe College, 1966; M.D., Washington University, 1972.

**Mary I. Johnson**, B.S., Washington State University, 1964; M.D., Johns Hopkins University, 1968. (See Departments of Neurology and Neurological Surgery and Pediatrics.)

**Elsie S. Rousch**, B.S., Madison College, 1943; M.S., University of Wisconsin, 1947; Ph.D., Washington University, 1950. (See Occupational Therapy.)

**Clifford B. Saper**, B.S., M.S., University of Illinois, 1972; M.D., Washington University, 1977; Ph.D., 1977. (See Department of Neurology.)

**Robert H. Waterston**, B.S.E., Princeton University, 1965; M.D., University of Chicago, 1972; Ph.D., 1972. (See Department of Genetics.)

### *Research Assistant Professor*

**Steven M. Rothman**, M.D., State University of New York, Upstate, 1973. (See Departments of Pediatrics and Neurology and Neurological Surgery.)

### *Research Instructor*

**Patrick M. Wood**, A.B., Centre College of Kentucky, 1961; M.S., Purdue University, 1965; Ph.D., 1968.

# Department of Anesthesiology

According to the American Board of Anesthesiology, this specialty may be described as a practice of medicine which encompasses (1) the management of procedures for rendering a patient insensible to pain during surgical procedures, (2) the support of life functions under the stress of anesthetic and surgical manipulations, (3) the clinical management of the patient, unconscious from whatever cause, (4) the management of problems in pain relief, (5) the management of problems in cardiac and respiratory resuscitation, (6) the application of specific methods of inhalational therapy, and (7) the clinical management of various fluid, electrolyte, and metabolic disturbances.

With these objectives in mind, this department is dedicated to presenting to the student, as opportunities develop, (1) clinical applications of certain anatomic relationships, e.g., regional nerve blocks, (2) applications of principles of respiratory physiology, e.g., mechanics of ventilation under various circumstances, cardiorespiratory resuscitation, (3) application of pharmacologic knowledge related to sedative, narcotic, and anesthetic drugs, and to compounds affecting the autonomic nervous system, (4) clinical problems related to acid-base, fluid, and electrolyte balance in surgical patients, and (5) principles underlying the approaches to the emerging concept of "acute medicine."

After the second year of medical school, preceptorships in anesthesiology are available for eight-week periods by individual application. Each preceptee is assigned to a staff anesthesiologist and gains experience in the performance of clinical anesthesia, participates in conferences and seminars, and joins in ward rounds in the recovery room and intensive care unit.

An elective in clinical anesthesiology is offered every six weeks for up to six students. The pharmacology of inhalation, intravenous, and local anesthetic drugs is demonstrated by practical application by the student in the operating room. The importance of blood gas determinations in evaluating the efficacy of ventilation is shown.

Opportunities to develop proficiency in techniques such as endotracheal intubation are available. Special sessions on cardiopulmonary resuscitation are conducted and students are expected to attend the regular anesthesia conferences and seminars.



## Faculty of the Department of Anesthesiology

### *Professor and Acting Head of Department*

**William D. Owens, B.A.,** Westminster College, 1961; M.D., University of Michigan, 1965.

### *Professors*

**Leonard W. Fabian, B.S.,** University of Arkansas, 1950; M.D., 1951.

**Albert Roos, M.D.,** University of Groningen, 1940. (See Department of Physiology and Biophysics.)

### *Professor (Clinical)*

**C. R. Stephen, B.S.,** McGill University, 1938; M.D.C.M., 1940.

### *Associate Professors*

**Milton L. Cobb, B.A.,** Baylor University, 1964; M.D., University of Texas (Southwestern), 1968. (See Department of Pediatrics.)

**James A. Felts, B.S.,** DePaul University, 1943; M.D., Northwestern University, 1946.

**James D. Jones II, B.S.,** Louisiana State University, 1940; D.D.S., Loyola University of the South, 1945; M.D., University of Alabama, 1957. (See Department of Obstetrics and Gynecology.)

**A. Ercument Kopman, M.D.,** Istanbul University, 1947.

**Lewis J. Thomas, Jr., B.S.,** Haverford College, 1953; M.D., Washington University, 1957. (See Department of Physiology and Biophysics and Biomedical Computer Laboratory.)

**Glenn R. Weygandt, B.S.,** University of Missouri, 1945; M.D., Washington University, 1947.

### *Associate Professor (Clinical)*

**Elsie F. Meyers, B.A.,** Indiana University, 1947; M.D., 1950.

### *Assistant Professors*

**Nabil Abboud, B.A.,** Christian Brothers College, 1963; M.D., St. Joseph's University, 1970. (Jewish Hospital.)

**Donald J. Dickler**, B.A., New York University, 1942; M.D., 1945. (Jewish Hospital.)

**Gary E. Hirshberg**, A.B., Princeton University, 1968; M.D., Hahnemann Medical College, 1972. (See Department of Pediatrics.)

**James J. Jenkins**, B.A., Duke University, 1966; M.D., University of North Carolina, 1970. (Jewish Hospital.)

**Sara T. Jones**, B.A., University of North Carolina, 1958; M.D., Bowman Gray School of Medicine, 1962.

**Susan W. Krechel**, A.B., Washington University, 1967; M.D., University of Louisville, 1972.

**Palle K. Reddy**, M.B.B.S., Kurnool Medical College, 1971.

**Necita L. Roa**, B.S., University of the Philippines, 1964; M.D., 1969.

**Cyril M. Sliom**, M.B., B.Ch., University of Witwatersrand, 1947; F.F.A., South African College of Medicine, 1962. (Jewish Hospital.)

#### **Instructors**

**Spomenko Bauer**, M.D., University of Zagreb Faculty of Medicine, 1968. (Jewish Hospital.)

**Dushyant N. Bhatt**, M.B.B.S., Lokmanya Medical College, 1973.

**Krishna Chunduri**, M.B.B.S., M.R. Medical College, Gulbarga, 1974.

**William J. Gallagher**, B.A., Holy Cross College, 1943; M.D., Cornell University, 1947.

**N. R. Gondipalli**, M.B.B.S., Kurnool Medical College, 1970.

**Barry A. Graff**, B.A., MacMurray College, 1972; M.D., St. Louis University, 1976. (Jewish Hospital.)

**Robert B. Holloway**, B.S., Le Moyne College, 1952; M.D., Meharry Medical College, 1956. (St. Louis V.A. Hospitals.)

**M. Emin Kiyancilar**, M.D., Ain-Shams University, 1970.

**Ravi S. Kumar**, M.B.B.S., Andhra University, 1973.

**Silvestre A. Tomeldan**, B.S., Far Eastern University, 1964; M.D., 1970. (Jewish Hospital.)

**Vijayalakshmi Vallurupalli**, M.B.B.S., Guntur Medical College, 1970.



**Madhav Vinjamuri**, M.B.B.S., Medical College of Gulbarga, 1971.

**Lawrence S. Waldbaum**, A.B., Cornell University, 1969; M.D., Washington University, 1973. (Jewish Hospital.)

#### **Instructors (Clinical)**

**Sedat M. Ayata**, B.S., Istanbul Lyceum, 1949; M.D., University of Istanbul, 1955.

**Robert C. Engelhardt**, B.S., University of South Carolina, 1946; M.D., University of Missouri, 1950.

**Paul L. Friedman**, A.B., Washington University, 1953; M.D., 1957.

**Robert Hellman**, B.A., Yeshiva University, 1969; M.D., New Jersey College of Medicine and Dentistry, 1973.

**George E. Lucas**, B.S., John Carroll University, 1953; M.D., St. Louis University, 1958.

**William A. Sims, Jr.**, A.B., University of Missouri, 1954; B.S. Med., 1955; M.D., Washington University, 1957.

# Department of Biological Chemistry

The department offers a general introductory course, an advanced course relating the subject to biology and medicine, and several specialized courses in the major aspects of biochemistry. Students of medicine and in the Graduate School of Arts and Sciences may enroll in the courses or pursue research work under the direction of the staff. Facilities in research are provided in carbohydrate, lipid, nucleic acid, protein, and steroid biochemistry, and varying emphasis on enzymology, metabolism, physical chemistry, structural studies, or biochemical genetics. Some summer research scholarships are offered to students of medicine.

## FIRST YEAR

### Bio 451. General Biochemistry

Involves the basic concepts of biochemistry. Designed for qualified undergraduate, medical, and graduate students. This course or an equivalent course is a prerequisite for advanced courses. Lectures only. Credit 4 units.

### Bio 531. Advanced Biochemistry

A discussion of the biochemistry of organized systems, with special emphasis on problems relevant to medicine. Extensive reading of original literature will be required. The course will consist of four parts: (1) metabolic regulation, including a study of hormonal control; (2) structure and function of membranes and organelle biogenesis; (3) gene expression in higher organisms, including malignant transformation; (4) biochemistry of specialized organs or tissues, for example, connective tissue, bone, blood clotting, etc. Credit 4 units.

## RESEARCH

### Bio 590. Research Opportunities

These are offered in the following areas of biochemistry:

X-ray analysis of protein structure; structure and mechanism of enzymes, lipoproteins. (Dr. Banaszak)

DNA sequence analysis and genetic engineering of bacterial DNA; transcriptional control of bacterial operons. (Dr. Barnes)

Structure-function relationships in proteins and enzymes. (Dr. Bradshaw)

Biochemical investigation of metabolic disorders of carbohydrate metabolism. (Dr. B. Brown)

Studies of pathways of carbohydrate metabolism in mammalian tissues. (Dr. D. Brown)

Mechanism of enzyme reactions. (Dr. Drysdale)

Studies of mobility on animal cell surfaces and of interactions between surface and cytoskeleton. (Dr. Elson)

Structure, function and topography of cell-surface macromolecules responsible for chemotaxis and cell cohesion. (Dr. Frazier)

Relationship of enzyme structure and function. Kinetic theory and applications to enzyme reactions. Protein-protein interactions. Polymerization of actin.

(Dr. Frieden)

Cell-cell recognition in normal and malignant cells. Mechanism of cell-wall biosynthesis. (Dr. Glaser)

Computer methods in biochemistry and mass spectrometry. (Dr. Holmes)

Biochemical studies of protein-lipid interactions; regulation of blood clotting, and properties of clotting proteases. (Dr. Jackson)

Structure of the oligosaccharides of soluble and membrane glycoproteins and their interactions with lectins.

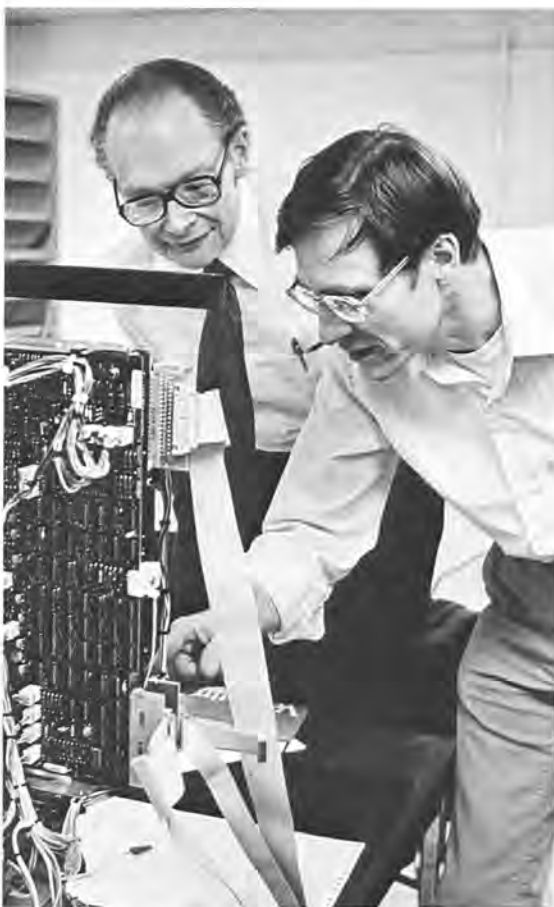
(Dr. R. Kornfeld)

Nucleic acid biochemistry of eukaryotes. Regulation of transcription during cell differentiation and during viral oncogenesis. (Dr. Roeder)

Membrane biochemistry of prokaryotes and eukaryotes. (Dr. Silbert)

Gene structure and protein biosynthesis in eukaryotes. Cloning, translation and compartmentalization of secretory, mitochondrial and membrane protein.

(Dr. Strauss)





## 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.

### Bio 452. Biochemistry Laboratory

### Bio 453. Basic Principles of Nucleic Acids and Protein Synthesis

### Bio 537. Protein Chemistry and Enzyme Mechanisms

### Bio 538. Structure and Function of Cell Membranes and Surfaces

### Bio 545I. Introductory Biophysical Chemistry

### Bio 548. Nucleic Acids and Protein Biosynthesis



## Faculty of the Department of Biological Chemistry

### Professor and Head of Department

**Luis Glaser**, B.A., University of Toronto, 1953; Ph.D., Washington University, 1956.

### Distinguished Service Professor Emeritus

**Carl F. Cori**, M.D., University of Prague, 1920; Sc.D. (hon.), Yale University, 1946; Sc.D. (hon.), Western Reserve University, 1946; Sc.D. (hon.), Boston University, 1948; Sc.D. (hon.), Cambridge University, 1949; Sc.D. (hon.), Washington University, 1966.

### Professors

**Leonard J. Banaszak**, B.S., University of Wisconsin, 1955; M.S., Loyola University, 1960; Ph.D., 1961. (See Department of Physiology and Biophysics.)

**Ralph A. Bradshaw**, B.A., Colby College, 1962; Ph.D., Duke University, 1966.

**Barbara I. Brown**, B.A., Smith College, 1946; Ph.D., Yale University, 1950.

**David H. Brown**, B.S., California Institute of Technology, 1942; Ph.D., 1948. (See Administration.)

**Thomas F. Deuel**, A.B., Princeton University, 1957; M.D., Columbia University, 1961. (See Department of Medicine.)

**George R. Drysdale**, B.S., Birmingham-Southern College, 1948; M.S., University of Wisconsin, 1950; Ph.D., 1952.

**Elliot L. Elson**, B.A., Harvard College, 1959; Ph.D. Stanford University, 1966.

**Carl Frieden**, B.A., Carleton College, 1951; Ph.D., University of Wisconsin, 1955.

**Craig M. Jackson**, B.S., Washington State University, 1963; Ph.D., University of Washington, 1967. (See Department of Medicine.)

**Rosalind H. Kornfeld**, B.S., George Washington University, 1975; Ph.D., Washington University, 1961. (See Department of Medicine.)

**Stuart A. Kornfeld**, A.B., Dartmouth College, 1958; M.D., Washington University, 1962. (See Department of Medicine.)

**Philip W. Majerus**, M.D., Washington University, 1961. (See Department of Medicine.)

**Garland R. Marshall**, B.S., California Institute of Technology, 1962; Ph.D., Rockefeller University, 1966. (See Department of Physiology and Biophysics.)

**F. Scott Mathews**, B.S., University of California, 1955; Ph.D., University of Minnesota, 1959. (See Department of Physiology and Biophysics.)

**Blake W. Moore**, B.S., University of Akron, 1948; Ph.D., Northwestern University, 1952. (See Department of Psychiatry.)

**William D. Phillips**, B.A., University of Kansas, 1948; Ph.D., Massachusetts Institute of Technology, 1951. (Also Faculty of Arts and Sciences.)

**Robert G. Roeder**, M.S., University of Illinois, 1965; Ph.D., University of Washington, 1969. (See Department of Genetics.)

**William R. Sherman**, A.B., Columbia University, 1951; Ph.D., University of Illinois, 1955. (See Department of Psychiatry.)

**David F. Silbert**, A.B., Harvard University, 1958; M.D., 1962.

**Robert E. Thach**, A.B., Princeton University, 1961; Ph.D., Harvard University, 1964. (Also Faculty of Arts and Sciences.)

**Joseph J. Volpe**, B.A., Bowdoin College, 1960; M.D., Harvard University, 1964. (See Departments of Neurology and Neurological Surgery and Pediatrics.)

**James C. Warren**, A.B., University of Wichita, 1950; M.D., University of Kansas, 1954; Ph.D., University of Nebraska, 1961. (See Department of Obstetrics and Gynecology.)

### Professor (Adjunct)

**Howard A. Schneiderman**, B.A., Swarthmore College, 1948; Ph.D., Harvard University, 1952.

### Associate Professors

**Oscar P. Chilson**, B.S., Arkansas State Teachers College, 1955; M.S., University of Arkansas, 1958; Ph.D., Florida State University, 1963. (Also Faculty of Arts and Sciences.)



**William A. Frazier, A.B.**, Johns Hopkins University, 1969; Ph.D., Washington University, 1973. (See Department of Anatomy and Neurobiology.)

**David I. Gottlieb, B.A.**, State University of New York, Binghamton, 1964; M.A., University of Wisconsin, 1969; Ph.D., Washington University, 1971. (See Department of Anatomy and Neurobiology.)

**William F. Holmes, A.B.**, Princeton University, 1953; Ph.D., University of Pennsylvania, 1960. (See Biomedical Computer Laboratory.)

**John J. Jeffrey, Jr., B.S.**, College of the Holy Cross, 1958; Ph.D., Georgetown University, 1965. (See Department of Medicine.)

**Arnold W. Strauss, B.A.**, Stanford University, 1966; M.D., Washington University, 1970. (See Department of Pediatrics.)

#### *Assistant Professors*

**Wayne M. Barnes, A.B.**, University of California, 1969; Ph.D., University of Wisconsin, 1974.

**Mark B. Willard, B.A.**, Oberlin College, 1965; Ph.D., University of Wisconsin, 1971. (See Department of Anatomy and Neurobiology.)

#### *Research Assistant Professor*

**Richard Wrenn, B.S.**, Virginia Polytech and State University, 1972; M.S.E.E., Washington University, 1975; D.S.C., 1979. (See Electrical Engineering.)

#### *Instructors*

**Joseph J. Baldassare, B.S.**, Boston College, 1963; Ph.D., University of Pittsburgh, 1970.

**Jens J. Birktoft, Cand. Scient.**, University of Copenhagen, Denmark, 1967.

**Gregory Grant, B.S.**, Iowa State University, 1971; Ph.D., University of Wisconsin, 1975. (See Department of Medicine.)

**William H. Holland, A.B.**, Washington University, 1950. (See Department of Psychiatry.)

**Linda C. Kurz, A.B.**, Washington University, 1967; Ph.D., 1973.

**Walter L. Nulty, Jr., B.A.**, Southern Illinois University, 1956.

#### *Lecturer*

**Walter G. Wiest, A.B.**, Brigham Young University, 1948; Ph.D., University of Wisconsin, 1952. (See Department of Obstetrics and Gynecology.)



# James S. McDonnell Department of Genetics

The James S. McDonnell Department of Genetics was formed in the fall of 1975 to develop a program of preclinical and graduate instruction in genetics. A medical genetics course in the second semester of the first year is designed to introduce advanced aspects of human and medical genetics. (Clinical training in genetics is offered in the fourth year by the Division of Medical Genetics of the Departments of Medicine and Pediatrics.)

The faculty of this new department is currently being recruited. As the department expands, most major areas of active genetic investigation and interest will be represented and a broad, comprehensive program of research and graduate training opportunities will be developed. Advanced courses in human genetics and immunogenetics are offered in the second semester. Additional graduate courses are being developed. Opportunities for research training and experience are available at all levels.



## FIRST YEAR

### Bio 550. Medical Genetics

Lectures and clinical conferences on human and medical genetics that include population and quantitative genetics, clinical cytogenetics, biochemical genetics and metabolic defects, counseling, and immunogenetics. Lectures and clinical conferences only. Credit 2 units. Prerequisite, an introductory genetics course or permission of the instructor. (Dr. Levine)

## RESEARCH

### Bio 590. Research Opportunities

These are offered in the following areas of genetics:

Mechanisms of gene transposition and plasmid-host cell interactions. (Dr. Berg)

Genetics of psychiatric disease. (Dr. Cloninger)

Molecular-genetic relationships of products of the major histocompatibility gene complexes. (Dr. Cullen)

Genetics of psychiatric disease, behavioral genetics. (Dr. Gottesman)

The genetic and immunologic basis for transplantation reactions. (Dr. Graff)

Experimental population genetics. (Dr. Hartl)

Genetic disorders of amino acid metabolism. (Dr. Hillman)

Population and biochemical genetics of enzyme polymorphisms. (Dr. Johnson)

Genetic specification of membrane structure. (Dr. Levine)

Molecular organization of eukaryotic chromosomes. (Dr. Olson)

Human population genetics and genetic epidemiology. (Dr. Rao)

Genetics of psychiatric disease. (Dr. Reich)

Transcriptional regulation of gene expression. (Dr. Roeder)

Immunogenetics and biochemical genetics of the major histocompatibility gene complexes. (Dr. Shreffler)

Genetics of lysosomal storage disease. (Dr. Sly)

Human population genetics. (Dr. Suarez)

Population and developmental genetics of parthenogenetic *Drosophila*. (Dr. Templeton)

Genetics of muscle development in the nematode. (Dr. Waterston)

Theoretical population genetics. (Dr. Yokoyama)

## ELECTIVE

### Bio 522. Immunogenetics

Genetic and immunologic aspects of variant systems detected by immunologic methods: blood groups, allotypes, histocompatibility antigens. Genetic dissection of immunologic mechanisms. (Dr. Shreffler)

*Note*—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

## Faculty of the James S. McDonnell Department of Genetics

### *James S. McDonnell Professor of Genetics and Head of Department*

**Donald C. Shreffler**, B.S., University of Illinois, 1954; M.S., 1958; Ph.D., California Institute of Technology, 1962.

### *James S. McDonnell Professor of Biochemical Genetics*

**Robert G. Roeder**, M.S., University of Illinois, 1965; Ph.D., University of Washington, 1969. (See Department of Biological Chemistry.)

### *Professors*

**C. Robert Cloninger**, B.A., University of Texas, 1966; M.D., Washington University, 1970. (See Department of Psychiatry.)

**Irving I. Gottesman**, B.S., Illinois Institute of Technology, 1953; Ph.D., University of Minnesota, 1960. (See Department of Psychiatry.)

**Daniel L. Hartl**, B.S., University of Wisconsin, 1965; Ph.D., 1968. (Also Faculty of Arts and Sciences.)

**Richard E. Hillman**, A.B., Brown University, 1962; M.D., Yale University, 1965. (See Department of Pediatrics.)

**George B. Johnson**, B.A., Dartmouth College, 1964; M.A., 1966; Ph.D., Stanford University, 1972. (Also Faculty of Arts and Sciences.)

**R. Paul Levine**, A.B., University of California, Los Angeles, 1949; Ph.D., 1951.

**Theodore Reich**, B.S., McGill University, 1959; M.D., 1963. (See Department of Psychiatry.)

**William S. Sly**, M.D., St. Louis University, 1957. (See Departments of Medicine and Pediatrics.)

**Alan R. Templeton**, A.B., Washington University, 1969; M.A., University of Michigan, 1972; Ph.D., 1972. (Also Faculty of Arts and Sciences.)

### *Associate Professors*

**Douglas E. Berg**, B.S., Cornell University, 1964; Ph.D., University of Washington, 1969. (See Department of Microbiology and Immunology.)

**Susan E. Cullen**, B.S., College of Mount St. Vincent, 1965; Ph.D., Yeshiva University, 1971.

(See Department of Microbiology and Immunology.)

**Ralph J. Graff**, A.B., Washington University, 1957; M.D., 1957.

(See Department of Surgery.) (Jewish Hospital.)

**Dabeeru C. Rao**, B.S., Indian Statistical Institute, 1967; M.S., 1968; Ph.D., 1971.

(See Departments of Preventive Medicine and Public Health and Psychiatry.)

**Robert H. Waterston**, B.S.E., Princeton University, 1965; M.D., University of Chicago, 1972; Ph.D., 1972.

(See Department of Anatomy and Neurobiology.)

### *Research Associate Professor*

**Daniel E. Dykhuizen**, B.S., Stanford University, 1965; Ph.D., University of Chicago, 1971.

### *Assistant Professors*

**Maynard V. Olson**, B.S., California Institute of Technology, 1965; Ph.D., Stanford University, 1970.

**Brian K. Suarez**, B.A., San Fernando Valley State College, 1967; M.A., University of California, Los Angeles, 1972; Ph.D., 1974. (See Department of Psychiatry.)

**Shozo Yokoyama**, B.S., Miyazaki University, 1968; M.S., Kyushu University, 1971; Ph.D., University of Washington, 1977. (See Department of Psychiatry.)

### *Research Assistant Professors*

**Miroslav Hauptfeld**, M.D., University of Zagreb, 1963.

**Vera Hauptfeld**, Ph.D., Charles University, 1968.



# John Milliken Department of Medicine

The general medicine teaching services of the department are located at Barnes Hospital, Jewish Hospital, and Veterans Hospital (John Cochran Division) under the following directors:

Barnes Hospital, *Dr. Kipnis*

House Staff Training Program, *Dr. Hammerman*  
Jewish Hospital, *Dr. Peck*

House Staff Training Program, *Dr. Lefrak*  
Veterans Hospital, *Dr. Chase*

In addition, for the purposes of both teaching and research, the Department of Medicine is divided into specialty divisions at Barnes Hospital and Jewish Hospital under the following directors:

Bone and Mineral Diseases, *Dr. Avioli*

Cardiovascular Diseases, *Drs. Sobel, Kleiger*

Dermatology, *Dr. Eisen*

Endocrinology and Metabolism, *Dr. Daughaday*

Gastroenterology, *Drs. Alpers, Stenson*

Hematology-Oncology, *Drs. Majerus, S. Kornfeld, T. Deuel*

Immunology and Allergy Diseases, *Dr. C. Parker*

Infectious Diseases, *Drs. Medoff, Little*

Laboratory Medicine, *Dr. McDonald*

Medical Genetics, *Dr. Sly*

Pulmonary Diseases, *Drs. Pierce, Senior*

Renal Diseases, *Drs. Klahr, Hruska*

Rheumatology, *Dr. Atkinson*

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 the 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 prepared for supervised clinical study of individual patients. A junior clerkship of 12 weeks, divided into two six-week periods, is served on one of the medical services supervised by the department. In the final year, students may elect a subinternship in general medicine or select any of a series of elective courses offered in the various medical subspecialties.

## FIRST YEAR

### Topics in Clinical Medicine

This interdepartmental course is designed to stimulate student interest in clinical medicine through carefully selected and presented discussions of both the clinical and basic science features of a number of illnesses. The course director involves faculty from the several clinical departments in structuring the direction, content, and presentation of the subject

(Dr. Kipnis and Staff)





## SECOND YEAR

Teaching by the Department of Medicine is designed to (1) prepare the student for the transition from the pre-clinical sciences to the study of the sick patient at the bedside, (2) help him analyze the manifestations of disease in terms of the altered mechanisms responsible for these manifestations, and (3) introduce him to the techniques of examination which are used regularly on all clinical services with the beginning of junior clerkships. This instruction is at times undertaken jointly with members of other clinical departments, and is coordinated when practicable with subject matter presented by the Department of Pathology.

### (a) Pathophysiology

Selected topics in clinical medicine are discussed in detail to illustrate the application of biochemical, physiological, and anatomical information in the understanding of pathological states. Infectious, cardiovascular and renal, neurological, gastrointestinal, hematological, metabolic, nutritional, and developmental diseases are reviewed by an interdepartmental faculty. Emphasis is placed on the use of fundamental information in approaching clinical problems as a way of thinking in preparation for a lifetime of medicine, during which much new information will constantly be acquired.

(Department of Medicine Staff)

### (b) Introduction to Clinical Medicine

The primary goal of Introduction to Clinical Medicine is to provide a clinical learning experience early in the second year where a student begins to become proficient in the collection, communication, and interpretation of patient-related data so that he can participate profitably in third-year clinical activities as a member of the health-care team. This is accomplished by using a variety of instructional formats including: lectures, demonstrations, film and videotape, supervised peer examination sessions, clinical subjects, patient simulation, and supervised interaction with patients in both the ambulatory and hospital setting. The understanding of the patient, his interaction with illness, and the importance of a good physician-patient relationship is emphasized. During the 124 instructional hours the mean student/faculty ratio is 5.6:1; in the clinical setting, the student/faculty ratio is 4:1.

(Dr. Tuteur and Staff)

## THIRD YEAR

### General Medicine

Supervised study of patients on the medical nursing divisions of Barnes Hospital (both Blue and Red), Jewish Hospital, and St. Louis Veterans Administration Hospital. Students are assigned in rotation as clinical clerks to the patients admitted to these services. Teaching is provided by attending physicians, house officers, consultants, and at regularly scheduled conferences. Formal instruction will be given in medical therapeutics during the junior clerkship. Students serve for six weeks on two of the five services.

(Drs. Chase, Hammerman,

Kipnis, Peck, Lefrak, and Staff)

### (a) Clinical Pathological Conference

Abstracts of the clinical records of patients upon whom postmortem examinations have been performed are

presented in advance to members of the third- and fourth-year classes and to members of the medical staff. At each conference the diagnosis is discussed in detail by the clinical staff before the anatomical findings are presented by the pathologists.

(Dr. Kipnis and Medical Staff,  
Dr. Kissane and Pathology Staff)

## FOURTH YEAR ELECTIVES

### Medical Subinternship

Medical subinternships, in multiples of six weeks, are offered to a limited number of students on the following medical services: Barnes Hospital Blue Service, Jewish Hospital, St. Louis Veterans Administration Hospital, and St. Luke's Hospital. Duties and responsibilities, including nights on call, will be those of an intern, with the proviso that requirements of Missouri state law must be met (e.g., orders must be countersigned by a licensed physician, etc.). The workload will be lighter than that for interns to insure ample time for reading about patients. Instruction and supervision will be provided by the appropriate chief of service, attending physicians, consultants, and house officers. Attendance at scheduled teaching conferences is required. The subinternship should be especially valuable to students who plan to take straight medical internships and to those who plan to go directly into a specialty residency program without first serving an internship of any kind (e.g., neurology, psychiatry, etc.).

(Drs. Chase, Hammerman,  
Kipnis, Paine, Peck, and Staff)

### Clinical Pathological Conference

Thursday, 12-1 p.m., September to June.

(Dr. Kipnis and Medical Staff,  
Dr. Kissane and Pathology Staff)

### Arthritic and Rheumatic Diseases

(a) Clinical Rheumatology. Barnes, Jewish, and VA, 6 weeks, all day. Students will participate in consultative service and clinic and inpatient practices. Laboratory experience also available.

(Dr. Atkinson and Staff)

### (b) Research.

1. Immunogenetics of complement proteins and the biochemistry and function of cell surface receptors for immunoglobulins and complement.

(Dr. Atkinson)

2. Students to participate in research procedures which include quantitation of the cell functions of chemotaxis, phagocytosis, and lysosomal enzyme release, isolation of cell receptors for chemotactic factors and purification of enzymes involved in neutrophil activation.

(Dr. Spilberg)

3. Structure of the human major histocompatibility complex (HLA) antigens. Mechanisms of HLA and disease associations.

(Dr. Schwartz)

4. Antigenic specificity and pathogenicity of monoclonal antibodies of DNA are being studied in the mouse models of SLE, as well as alterations of those antibodies with anti-idiotypes. Characteristics of autologous MLR in SLE patients also under investigation.

(Dr. Hahn)

### Cardiovascular Disease

(a) Clinical Cardiology. Barnes Hospital, six weeks, all day. Students will participate as members of Cardiovascular Division clinical team, both in the Cardiac Diagnostic





Laboratory and Cardiac Care Unit. Particular emphasis will be placed on clinical diagnosis, electrocardiography and the noninvasive techniques.

(Dr. Geltman and Staff)

(b) Clinical Cardiology. St. Luke's Hospital, six weeks, all day. Students are assigned to Cardiology Division including intensive care unit, heart station, echo laboratory, nuclear cardiology laboratory and catheter laboratory.

(Drs. R. Paine, G. Clark, S. Brodarick and D. Bauwens)

(c) Clinical Cardiology. Jewish Hospital, six weeks, all day. Students have experience in seeing patients in consultation, reading electrocardiograms, and participating in activities of the Coronary Care Unit and the Graphics Laboratory. In addition, students may observe procedures in the cardiac catheterization laboratory.

(Drs. Kleiger, Krone, Oliver, and Staff)

(d) Cardiac Catheterization and Hemodynamics. Highly specialized elective. Six weeks. Students will attend cardiac catheterization procedures and conferences; will perform complete "workups" of patients in preparation for catheterization, etc. Will observe all hemodynamic and angiographic procedures.

(Dr. Ludbrook and Staff)

(e) Electrocardiography. Jewish Hospital. Course designed to give the student familiarity with concepts involved in the interpretation of electrocardiography.

(Dr. Ruffy)

(f) Research. Minimum of 12 weeks, all day.

1. Lipids in cultured myocardial cells.

(Dr. Ahumada)

2. External assessment of myocardial metabolism and ischemic injury with positron-emitting isotopes.

(Dr. S. Bergmann)

3. Experimental analysis of mechanisms of arrhythmia.

(Dr. Corr)

4. Exercise physiology.

(Dr. Ehsani)

5. Myocardial contractile proteins and assessment of metabolism and function in anoxic and ischemic isolated perfused hearts.

(Dr. Henry)

6. Hemodynamics, myocardial mechanics, and ventricular function (cardiac catheterization).

(Dr. Ludbrook)

7. Ultrasonic assessment of cardiac metabolism.

(Dr. Perez)

8. Protection of ischemic myocardium in the experimental and clinical setting.

(Dr. Roberts)

9. Detection, quantification, and assessment of the mediation of myocardial ischemic injury.

(Dr. Sobel)

### Dermatology

(a) Clinical Clerkship. Students participate in both inpatient and outpatient care. Stress is placed on the dermatologic variations normally encountered, identification of common skin diseases, dermatologic clues to systemic disease, etc. Instruction is given in cutaneous histopathology and clinical mycology.

(Dr. Eisen and Staff)

(b) Research. Minimum of 12 weeks, all day.

1. Connective tissue, macromolecular organization, degradation, and related problems.

(Drs. Bauer, Eisen, Grant, Jeffrey, Seltzer, and Welgus)

2. Physiology and immunology of pathogenic fungi; molecular basis of morphogenesis and cellular differentiation in *Histoplasma capsulatum*: host-parasite interaction and experimental therapeutics in the systemic mycotic infections.

(Dr. Kobayashi)

### Gastroenterology

(a) Clinical Gastroenterology. Six weeks, all day. Students participate in the study of patients with a spectrum of digestive diseases, have responsibility for patients on whom consultations have been requested, receive instruction in specialized diagnostic techniques, and participate in the conferences and clinics run by the Division.

(Dr. Zuckerman)

(b) Research. Minimum of 12 weeks, all day.

1. Clinically applied research on viral hepatitis.

(Dr. Perrillo)

2. Research on intestinal protein metabolism.

(Dr. Alpers)

3. Research on lymphocyte function in human disease.

(Dr. R. MacDermott)

### Genetics

(a) Clinical Genetics. Six weeks, all day. Students participate in evaluation of patients on whom consultations are requested, receive instructions in interpreting cytogenetics and other specialized laboratory information, and in techniques used in genetic counseling.

(Drs. Sly and Taysi)

(b) Research. Minimum of 12 weeks, all day.

1. Investigation of inherited amino acid transport defects and enzyme replacement therapy and lysosomal storage diseases.

(Dr. Sly)

2. Chromosome disorders.

(Dr. Taysi)

## Hematology and Oncology

(a) Clinical Hematology and Oncology. Six weeks, all day. Students receive intensive instruction in morphology, specialized diagnostic techniques, management of patients with hematologic and oncologic disorders. Two separate clerkships are offered.

(Drs. S. Kornfeld, Majerus, Denes)

(b) Research. Minimum of 12 weeks, all day.

1. Biochemistry of platelet-vessel wall interactions. Studies focus on mechanism of agonist-activated prostacyclin synthesis in cells of vessel wall. (Dr. N. Baenziger)

2. Biochemical studies of poly (adenosine diphosphate) synthesis and its role in DNA replication and repair. (Dr. Berger)

3. Biochemistry of platelet release proteins and their relationship to cell growth and inflammation.

(Dr. T. Deuel)

4. Studies of neutrophil physiology, cryopreservation of bone marrow stem cells and effector mechanism in tumor immunity.

(Dr. Herzig)

5. Biochemistry of mammalian cell membranes.

(Drs. R. Kornfeld, S. Kornfeld)

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

(Dr. Majerus)

7. DNA sequence amplification in human lymphocytes; molecular biology of synthesis, processing and release of amplified DNA.

(Dr. Rogers)

8. Biochemical studies of interactions of plasma protease inhibitors with coagulation protease.

(Dr. Tollefsen)

## Hypertension

Research. Individualized research project and/or participation in a community hypertension program.

(Dr. Perry)

## Immunology

Research. Minimum of 12 weeks, all day.

1. Research in areas of experimental immunotherapy of murine leukemias or murine models of experimental fungal or bacterial infection.

(Dr. Little)

2. The structure and biosynthesis of lymphocyte cell surface antigens and lymphocyte triggering mechanisms. The effects of adjuvants in modulating the immune response.

(Dr. Little)

## Infectious Disease

(a) Clinical Infectious Diseases. Study of ward and private patients. Barnes Hospital, six weeks, all day.

(Drs. Gelb, Medoff)

(b) Research.

1. Integration-function of oncogenic virus DNA. Properties/localization of hepatitis B specific nucleic acids. Properties of varicella-zoster virus DNA and detection in latent infections.

(Dr. Gelb)

2. Effective therapy for fungal infections, control of membrane permeability of fungi, normal and transformed animal cells, alteration and control of immunologic response to infection and tumors, drug studies on bacterial pathogens.

(Dr. Medoff)



## Laboratory Medicine

(a) Clinical Laboratory Medicine. Proper use of the laboratory, basic operation of each area, daily activities and reading assignments, participation in rounds and conferences.

(Dr. McDonald)

(b) Research.

1. Antigens and immunity in human lung carcinomas. Projects include: detection and analysis of relevant human lung carcinoma plasma membrane antigens using monoclonal antibodies, purification and characterization of these antigens, establishment and application of *in vitro* immunologic assays involving these antigens, analysis of the immunologic suppression in lung cancer patients.

(Dr. Bell)

2. The possible role of insulin in the regulation of intracellular calcium homeostasis.

(Dr. Chan)

3. Functional and biochemical characterization of human T lymphocyte subpopulations and identification of human immune response genes.

(Dr. Gebel)

4. Rapid diagnostic methods for the detection of opportunistic systemic fungal infections.

(Dr. Kobayashi)

5. Mechanisms and genetic basis of antimicrobial resistance in enterococci, drug action and resistance in *Plasmodium falciparum*, epidemiology of nosocomial infection.

(Dr. Krogstad)

6. Elaboration of physiological rationale for differences between activity and concentration of electrolytes, particularly calcium.

(Dr. Ladenson)

7. Development of rapid techniques for recognition and identification of anaerobic bacteria in body fluids, analysis of nutritional requirements of anaerobic bacteria, development of standardized susceptibility testing methods for anaerobic bacteria, and *in vitro* assays of new antimicrobial agents.

(Dr. Murray)

8. Mechanism of insulin action at the cellular level and application of cellular research in diagnosis and treatment of diabetics.

(Dr. McDonald)

9. Research elective designed to familiarize student with fundamental concepts and transplantation immunology. (Dr. Rodey)

10. The mechanism of adhesion to and activation of platelets by collagen and the role of von Willebrand factor in this process. (Dr. Santoro)

#### **Metabolism and Endocrinology**

(a) Clinical Clerkship. Students see inpatients and outpatients with endocrine and metabolic disease and participate in the rounds and conferences of the Metabolism Division. (Drs. Avioli, Daughaday, and Staff)

(b) Bone and Mineral Metabolism. Jewish Hospital. Designed to acquaint student with clinical, radiological, and pathological manifestations of generalized disorders of the skeleton and to expose him to current concepts of therapy. (Drs. Avioli, S. Birge, Chase, T. Hahn, Teitelbaum, and Whyte)

(c) Research. Minimum of 12 weeks, all day.

1. Mineral homeostasis: calcitonin, parathyroid and vitamin D. (Drs. Avioli, Birge, Chase, Hahn)

2. Pituitary physiology; growth hormone, prolactin. (Dr. Daughaday)

3. Polypeptide hormone receptors in endocrine research; theoretical background developed. Radio-receptor assay experience provided and clinical applications of assays will be emphasized. (Dr. Gavin)

4. The pathophysiology of hypercholesterolemias. Cultured human skin fibroblasts and arterial endothelial and smooth muscle cells are used to study the interaction of lipoproteins with tissues in well-defined familial hypercholesterolemias. Relationship of contractile proteins to hormone secretion. (Dr. Ostlund)

5. Studies of the insulin gene and regulation of insulin gene expression in human diabetes and experimental animals. (Dr. Permutt)

#### **Pharmacology/Medicine**

Biologic effects of oxygenated fatty acids metabolites on renal function. (Dr. Morrison)

#### **Pulmonary Disease and Function**

(a) Medical Aspects of Pulmonary Disease. A full-time elective, periods one through eight. Elective offered at both Barnes and Cochran V.A. Hospital. (Drs. Pierce, Tuteur and Staff)

(b) Pulmonary Medicine. Six weeks. Students will work up patients and participate in teaching conferences and work rounds, Jewish Hospital. (Dr. Senior and Staff)

(c) A full-time elective in Intensive Care Medicine offered in the MICU at Jewish Hospital, periods one through eight. (Dr. Senior and Staff)

(d) A full-time elective in intensive care medicine offered in the MICU and RICU at Barnes Hospital. (Dr. Schuster and Staff)

(e) Research

1. Clinical research in various aspects of chronic obstructive pulmonary disease. (Dr. Pierce)

2. Mechanisms of destruction and synthesis of pulmonary connective tissue. (Dr. Senior)

#### **Renal Disease**

(a) Clinical Nephrology. Barnes Hospital, six weeks, all day. Study of patients with renal disease and electrolyte disorders. (Drs. Klahr and Slatopolsky)

(b) Clinical Nephrology. Jewish Hospital. Students will be provided opportunity to evaluate patients on the renal consultant service, participate in daily clinical nephrology rounds, and participate in combined rounds. (Dr. Hruska)

(c) Mixed clinical and research electives.

1. Micropuncture of superficial and deep nephrons and the physiology of urinary acidification. (Dr. Buerkert)

2. Studies on the physiological and metabolic effects of chronic ambulatory peritoneal dialysis in patients with end-stage renal disease. (Dr. Delmez)

3. Effects of phosphate depletion on glucose utilization, effects of PTH on carbohydrate intolerance of uremia, effects of PTH and phosphate depletion on peripheral glucose utilization, effect of uremia and dialysis on plasma catecholamine levels and gastrointestinal abnormalities associated with chronic renal disease, hemodialysis and renal transplantation. (Dr. Harter)

4. Cellular mechanisms of parathyroid hormone action. Renal phospholipid metabolism and effects of parathyroid hormone. (Dr. Hruska)

5. Methodology of ion transport and principles of energy transfer and ion transfer. Studies on the mechanisms of renal injury in urinary tract obstruction. (Dr. Klahr)

6. Studies on the metabolism of parathyroid hormone by isolated adult perfused bone. Studies on the cellular mode of action of parathyroid hormone. (Dr. K. Martin)

7. Role of chemotaxis in osteoclast recruitment and the pathophysiology of renal osteodystrophy, cellular control of osteoclast function, effects of vitamin D analogues, calcitonin and PTH on osteoclast. (Dr. Malone)

8. Studies on the biochemical control of parathyroid hormone synthesis and release. (Dr. Morrissey)

9. Structural-functional correlations in renal disease. Methodology used in transmission and scanning electron microscopy. (Dr. Purkerson)

10. Radioimmunoassay for parathyroid hormone. Role of the liver in the metabolism of parathyroid hormone. Studies investigate interrelationships between vitamin D metabolites and parathyroid metabolism. (Dr. Slatopolsky)

11. Studies of solute transport in isolated membrane vesicles from renal tubular cells. (Drs. Hammerman and Cohn)



## Faculty of the John Milliken Department of Medicine

### *Adolphus Busch Professor and Chairman of Department*

**David M. Kipnis**, A.B., Johns Hopkins University, 1945; M.A., 1949; M.D., University of Maryland, 1951.

### *John E. and Adaline Simon Professor and Associate Chairman of Department*

**William A. Peck**, A.B., Harvard University, 1955; M.D., University of Rochester, 1960.

### *Sydney M. and Stella H. Shoenberg Professor*

**Louis V. Avioli**, B.A., Princeton University, 1953; M.D., Yale University, 1957.

### *Professors Emeriti*

**Carl G. Harford**, A.B., Amherst College, 1928; M.D., Washington University, 1933. (See Medical Care Group.)

**Virginia Minnich**, B.S., Ohio State University, 1937; M.S., Iowa State College, 1938.

**Edward H. Reinhard**, A.B., Washington University, 1935; M.D., 1939. (See Department of Radiology.)

### *Professors*

**David H. Alpers**, A.B., Harvard University, 1956; M.D., 1960.

**Elmer B. Brown, Jr.**, A.B., Oberlin College, 1946; M.D., Washington University, 1950. (See Administration.)

**Hugh Chaplin, Jr.**, A.B., Princeton University, 1943; M.D., Columbia University, 1947. (See Department of Preventive Medicine and Public Health.)

**Philip E. Cryer**, B.A., Northwestern University, 1962; M.D., 1965. (Also Clinical Research Center.)

**William H. Danforth**, A.B., Princeton University, 1947; M.D., Harvard University, 1951. (See Administration.)

**William H. Daughaday**, A.B., Harvard University, 1940; M.D., 1943.

**Thomas F. Deuel**, A.B., Princeton University, 1957; M.D., Columbia University, 1961. (See Department of Biological Chemistry.)

**Arthur Z. Eisen** (Dermatology), A.B., University of Buffalo, 1951; Sc.M., Brown University, 1953; M.D., University of Pennsylvania, 1957.

**John J. Jeffrey, Jr.** (Dermatology), B.S., College of the Holy Cross, 1958; Ph.D., Georgetown University, 1965. (See Department of Biological Chemistry.)

**M. Kenton King**, B.A., University of Oklahoma, 1947; M.D., Vanderbilt University, 1951. (See Administration and Department of Preventive Medicine and Public Health.)

**Saulo Klahr**, B.S., College of Santa Librada, 1954; M.D., Universidad Nacional de Colombia, 1959.

**Robert E. Kleiger**, B.A., Yale University, 1956; M.D., Harvard University, 1960.

**George S. Kobayashi** (Microbiology), B.S., University of California, 1952; Ph.D., Tulane University, 1963. (See Department of Microbiology and Immunology.)

**Rosalind H. Kornfeld**, B.S., George Washington University, 1957; Ph.D., Washington University, 1961. (See Department of Biological Chemistry.)

**Stuart A. Kornfeld**, A.B., Dartmouth College, 1958; M.D., Washington University, 1962. (See Department of Biological Chemistry.)

**J. Russell Little, Jr.**, A.B., Cornell University, 1952; M.D., University of Rochester, 1956. (See Department of Microbiology and Immunology.)

**Philip W. Majerus**, M.D., Washington University, 1961. (See Department of Biological Chemistry.)

**Gerald Medoff**, A.B., Columbia College, 1958; M.D., Washington University, 1962. (See Department of Microbiology and Immunology.)

**Charles W. Parker** (Howard Hughes Medical Institute Investigator in Medicine), M.D., Washington University, 1953. (See Department of Microbiology and Immunology.)

**H. Mitchell Perry**, M.D., Washington University, 1946.

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

**Glenn E. Rodey**, B.S., Ohio University, 1957; M.D., Ohio State University, 1961. (See Department of Pathology.)

**David Schlessinger** (Microbiology), B.A., University of Chicago, 1955; B.S., 1957; Ph.D., Harvard University, 1960. (See Department of Microbiology and Immunology.)

**Gustav Schonfeld**, A.B., Washington University, 1956; M.D., 1960. (See Department of Preventive Medicine and Public Health.)

**Robert M. Senior**, A.B., Oberlin College, 1957; M.D., George Washington University, 1961.

**Robert E. Shank**, A.B., Westminster College, 1935; M.D., Washington University, 1939. (See Department of Preventive Medicine and Public Health.)

**Laurence A. Sherman**, B.A., B.S., University of Chicago, 1956; M.D., Albany Medical College, 1964. (See Department of Pathology.)

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

**William S. Sly**, M.D., St. Louis University, 1957. (See Departments of Genetics and Pediatrics.)

**Burton E. Sobel**, A.B., Cornell University, 1958; M.D., Harvard University, 1962.

**John D. Vavra**, B.A., University of Colorado, 1950; M.D., Washington University, 1954. (See Administration and Department of Preventive Medicine and Public Health.)

**R. Dean Wochner**, A.B., Arizona State University, 1956; M.D., Washington University, 1960. (See Department of Preventive Medicine and Public Health.)

### *Professor (Adjunct)*

**Robert M. Donati**, B.A., St. Louis University, 1955; M.D., 1959. (Chief of Staff, Veterans Administration Hospital.)

### *Research Professor*

**Irene E. Karl**, B.S., University of Wisconsin, 1937; M.A., 1938; Ph.D., 1940.

### *Professors Emeriti (Clinical)*

**Clinton W. Lane** (Dermatology), A.B., St. Mary's College, 1916; M.D., St. Louis University, 1921.





Edward Massie, A.B., Washington University, 1931; M.D., 1935.

#### *Professors (Clinical)*

**I. J. Flance**, A.B., Washington University, 1931; M.D., 1935.

**Bernard T. Garfinkel**, M.D., Washington University, 1948.

**Ralph V. Gieselman**, M.D., Washington University, 1947.

**Michael M. Karl**, B.S., University of Wisconsin, 1936; M.D., University of Louisville, 1938.

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

**G. Charles Oliver**, A.B., Harvard University, 1953; M.D., 1957.

**Robert Paine**, M.D., Harvard University, 1944.

**Franz U. Steinberg**, M.D., University of Berne, 1938. (See Departments of Preventive Medicine and Public Health and Surgery.)

#### *Associate Professors*

**John P. Atkinson** (Howard Hughes Medical Institute Investigator in Medicine), A.B., University of Kansas, 1965; M.D., 1969. (See Department of Microbiology and Immunology.)

**Eugene A. Bauer** (Dermatology), B.S., Northwestern University, 1963; M.D., 1967.

**C. Elliott Bell, Jr.**, B.S., Tulane University, 1960; M.D., 1964. (See Department of Pathology.)

**Nathan A. Berger** (Leukemia Society of America Scholar in Medicine), A.B., Temple University, 1962; M.D., Hahnemann Medical College, 1966.

**Stanley J. Birge, Jr.**, B.A., Amherst College, 1959; M.D., Washington University, 1963.

**Lewis R. Chase**, A.B., Princeton University, 1960; M.D., Harvard University, 1964. (Chief, Washington University Medical Service, Cochran V.A. Hospital.)

**David N. Dietzler** (Clinical Chemistry), A.B., Washington University, 1957; Ph.D., 1963. (See Department of Pathology.)

**Ali A. Ehsani**, M.D., Tehran University, 1965. (See Department of Preventive Medicine and Public Health and Irene Walter Johnson Institute of Rehabilitation.)

**Anthony P. Fletcher**, B.M., University of London, 1943; B.S., 1943; M.D., 1949.

**Lawrence D. Gelb**, B.S., University of Michigan, 1963; M.D., Harvard University, 1967. (See Department of Microbiology and Immunology.)

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

**Bevra H. Hahn**, B.Sc., Ohio State University, 1960; M.D., Johns Hopkins University, 1964.

**Theodore J. Hahn, Jr.**, A.B., Princeton University, 1960; M.D., Johns Hopkins University, 1964.

**Herschel R. Harter**, B.S., Marquette University, 1962; M.D., Georgetown University, 1966.

**Philip D. Henry**, M.D., University of Berne, 1960.

**Geoffrey P. Herzig** (Leukemia Society of America Scholar in Medicine), B.S., University of Cincinnati, 1963; M.D., Western Reserve University, 1967.

**Craig M. Jackson**, B.S., Washington State University, 1963; Ph.D., University of Washington, 1967. (See Department of Biological Chemistry.)

**Ronald Krone** (John E. Simon Scholar in Medicine), M.D., University of Chicago, 1966.

**Stephen S. Lefrak**, A.B., Colgate University, 1960; M.D., State University of New York, Downstate, 1965.

**David M. Lieberman**, M.D., Vanderbilt University, 1949.

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

**Jay M. McDonald**, B.S., Tufts University, 1965; M.D., Wayne State University, 1969. (See Department of Pathology.) (Director of Diagnostic Laboratories, Barnes Hospital.)

**William V. Miller** (Visiting Staff), A.B., University of Missouri, 1962; M.D., 1966. (See Department of Pathology.)

**Richard E. Ostlund, Jr.**, B.S., University of Utah, 1966; M.D., 1970.

**Marshall A. Permutt**, A.B., Johns Hopkins University, 1961; M.D., Washington University, 1965.

**Mabel L. Purkerson**, A.B., Erskine College, 1951; M.D., Medical College of South Carolina, 1956. (See Administration and Department of Pediatrics.)

**Robert Roberts**, B.Sc., Memorial University, 1961; M.D., Dalhousie University, 1965.

**John C. Rogers**, B.S., University of Nebraska, 1966; M.S., 1968; M.D., 1968.

**Benjamin D. Schwartz** (Howard Hughes Medical Institute Investigator in Medicine), B.A., Columbia College, 1965; Ph.D., Albert Einstein College of Medicine, 1971; M.D., 1972. (See Department of Microbiology and Immunology.)

**Barry A. Siegel**, A.B., Washington University, 1965; M.D., 1969. (See Department of Radiology.)

**Isaiah Spilberg**, B.S., University of San Marcos, 1956; M.D., 1963.

**Peter G. Tuteur** (Robert Wood Johnson Health Policy Fellow in Medicine), A.B., Johns Hopkins University, 1962; M.D., University of Illinois, 1966.

**H. James Wedner**, A.B., Cornell University, 1963; M.D., 1967.

#### *Research Associate Professors*

**Norma A. Fletcher**, M.S., Technical University, 1949; Ph.D., University of Copenhagen, 1965.

**James G. Miller**, A.B., St. Louis University, 1964; M.A., Washington University, 1966; Ph.D., 1969. (See Biomedical Computer Laboratory.) (Also Faculty of Arts and Sciences.)

#### *Associate Professors Emeriti (Clinical)*

**James W. Bagby** (Dermatology), A.B., University of Missouri, 1930; B.S. Med., 1931; M.D., Washington University, 1933.

**Paul O. Hagemann**, A.B., Washington University, 1930; M.D., 1934.

**Stanley F. Hampton**, A.B., Washington and Lee University, 1930; M.D., Washington University, 1934.

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

**Harold Scheff**, M.D., University of Toronto, 1931.

#### *Associate Professors (Clinical)*

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

**Morton A. Binder**, B.S., Yale University, 1948; M.D., Columbia University, 1951.

**Arnold Dankner**, M.D., Washington University, 1947.

**John J. Garrett**, M.D., Harvard University, 1951. (See Medical Care Group.)

**Neville Grant**, A.B., Yale University, 1950; M.D., Columbia University, 1954.

**James N. Heins**, A.B., University of Louisville, 1957; M.D., 1961.

**Harold J. Joseph**, B.A., University of Texas, 1947; M.D., 1950.

**Owen S. Kantor**, M.D., University of Missouri, 1968.

**Robert S. Kursh**, A.B., Washington University, 1951; M.D., 1952.

**Charles Kilo**, M.D., Washington University, 1959.

**Philip E. Korenblat**, M.D., University of Arkansas, 1960.

**Marvin E. Levin**, A.B., Washington University, 1947; M.D., 1951.

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

**David M. Lieberman**, M.D., Vanderbilt University, 1949.

**Harvey Liebhaber**, A.B., New York University, 1953; M.D., 1957.

**Herbert Lubowitz**, A.B., Clark University, 1954; M.D., Washington University, 1958.

**Edward J. Miller**, B.A., St. John's University, 1958; M.D., St. Louis University, 1962.

**James F. Nickel**, A.B., University of Oklahoma, 1944; M.D., Washington University, 1948.

**Robert C. Packman**, A.B., Washington University, 1953; B.S. Med., University of Missouri, 1954; M.D., Washington University, 1956.

**Mary L. Parker**, B.S., Florida State University, 1946; M.S., 1949; M.D., Washington University, 1953. (See Department of Preventive Medicine and Public Health.) (University Health Service.)

**William D. Perry**, A.B., Northwest Missouri State College, 1943; B.S. Med., University of Missouri, 1945; M.D., Washington University, 1947.

**Ernest T. Rouse**, B.S., Alabama Polytechnic Institute, 1939; M.D., Washington University, 1943.

**Shabbir H. Safdar**, F.Sc., Government College Jhang, 1954; M.D., Nishtar Medical College, 1961.

**Llewellyn Sale, Jr.**, A.B., Yale University, 1936; M.D., Washington University, 1940.

**Burton A. Shatz**, A.B., Washington University, 1940; M.D., 1943.

**James C. Sisk** (Dermatology), A.B., Washington University, 1943; M.D., 1946.

**Ross B. Sommer**, A.B., Miami University, 1949; M.D., Cornell University, 1949.

**J. Allen Thiel**, B.S., Rockhurst College, 1956; M.D., St. Louis University, 1960.

**Stanley M. Wald**, M.D., Washington University, 1946.

**Alvin S. Wencker**, A.B., Washington University, 1949; M.D., 1953.

#### *Assistant Professors*

**Gail A. Ahumada**, B.A., Stanford University, 1961; M.A., 1962; M.D., University of California, San Diego, 1972.

**Elsa Bello-Reuss**, B.A., University of Chile, 1957; M.D., 1964. (See Department of Physiology and Biophysics.)

**Steven R. Bergmann** (Medical Physiology), B.A., George Washington University, 1972; Ph.D., Hahnemann Medical College, 1977.

**Dennis M. Bier**, B.S., LeMoyné College, 1962; M.D., New Jersey College of Medicine, 1966. (See Department of Pediatrics.)

**George J. Broze, Jr.**, B.S., University of Washington, 1968; M.D., Washington University, 1972.

**John E. Buerkert**, B.S., University of San Francisco, 1963; M.D., Marquette University, 1968.

**Michael E. Cain**, B.A., Gettysburg College, 1971; M.D., George Washington University, 1975.

**Edward J. Campbell**, B.S., Purdue University, 1969; M.D., Washington University, 1972.

**Kwok-Ming Chan**, Ph.D., University of South Dakota, 1977. (See Department of Pathology.)

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- John B. Shapleigh II**, M.D., Washington University, 1946.

**Gerald S. Shatz**, B.A., Northwestern University, 1970; M.D., Washington University, 1974.

**John S. Skinner**, M.D., Washington University, 1940.

**David Smuckler**, B.S., Georgetown University, 1974; M.D., 1978.

**Keith D. Stottlemeyer**, B.S., West Liberty State College, 1966; M.D., West Virginia University, 1976.

**Arnold S. Tepper**, B.S., St. Louis College of Pharmacy, 1966; M.D., University of Missouri, 1970.

**William M. Thomson**, B.S., Davidson College, 1969; M.D., Johns Hopkins University, 1973.

**Sharon F. Tiefenbrunn**, A.B., Washington University, 1971; M.D., 1975.

**Alice W. Trotter**, B.A., Mount Holyoke College, 1962; M.D., Washington University, 1969.

**Dolores R. Tucker** (Dermatology), B.S., St. Mary's of Notre Dame, 1958; M.D., Washington University, 1974.

**John H. Uhlemann** (Dermatology), B.A., Grinnell College, 1967; M.D., Washington University, 1971.

**Albert L. Van Amburg III**, A.B., Washington University, 1968; M.D., 1972.

**Richard C. Walters** (Dermatology), B.S., University of Illinois, 1969; M.D., Washington University, 1973.

**Hugh R. Waters**, B.S., Northwestern University, 1942; M.D., Washington University, 1945.

**James R. Wiant**, A.B., Princeton University, 1955; M.D., Jefferson Medical College, 1959.

**Herbert C. Wiegand**, A.B., Washington University, 1940; M.D., 1943.

**R. Jerome Williams, Jr.**, A.B., Harvard University, 1973; M.D., Duke University, 1977.

**Elsie Winstead**, B.S., East Carolina University, 1973; M.D., University of North Carolina, 1977. (See Medical Care Group.)

**Edward M. Wolfe** (Dermatology), B.A., Hobart College, 1956; M.D., Washington University, 1960.

**James A. Wood**, A.B., Westminster College, 1947; M.D., Washington University, 1949.

**Michael J. Zachek**, B.S., Georgetown University, 1973; M.D., 1977.

**Jacob M. Zeffren**, B.A., Yeshiva University, 1971; M.D., St. Louis University, 1975.

#### *Research Associates*

**Linda N. K. F. Abruzzini**, B.S., University of Florida, 1975; Ph.D., 1980.

**Marilyn J. B. Ackerman**, B.S., University of Wisconsin, 1969; M.S.T., 1970; Ph.D., Colorado State University, 1978.

**Dunell E. Cohn**, B.A., Swarthmore College, 1965; M.A., University of California, 1967; Ph.D., City University of New York, 1975.

**John B. Costello**, B.A., St. Louis University, 1974; M.D., 1977.

**Fanny M. Ebling**, B.S., College of Guayaquil, 1954; Ph.D., University of Guayaquil, 1959.

**Jeffrey L. Evelhoch**, B.S., West Chester State College, 1977; M.S., University of California, Riverside, 1979; Ph.D., 1981.

**Walter T. Gregory**, B.S., St. Louis University, 1960.

**Keiji Kakita**, M.D., Kawasaki Medical School, 1976.

**Annemarie Kronberger**, B.S., University of Vienna, 1965; Ph.D., University of Salzburg, 1978.

**Katherine D. Little**, B.S., Illinois Wesleyan University, 1952; M.S., University of Rochester, 1954; Ph.D., 1957.

**Patricia M. McKeivitt**, B.A., Clarke College, 1967; M.S.W., Washington University, 1969.

**Jagdish M. Mehta**, B.S., Gujarat University, 1960; M.S., 1962; M.S., University of Missouri, 1966; Ph.D., 1968.

**Lalji Mishra**, B.S., University of Allahabad, 1964; M.S., 1967; Ph.D., University of California, 1973.

**Jozef Mruk**, M.D., Medical Academy of Krakow, 1975.

**Sara L. Newell** (Howard Hughes Medical Institute Research Associate), B.A., Vassar College, 1969; M.S., University of Wisconsin, 1971; M.D., University of Iowa, 1975.

**Audrey A. Painter**, B.S., Southern Florida College, 1955; M.D., Northwestern University, 1957.

**Helen Quill** (Howard Hughes Medical Institute Research Associate), B.A., Trinity College, 1968; Ph.D., Massachusetts Institute of Technology, 1979.

**Suresh D. Shah**, B.S., Gujarat University, 1956; M.S., 1959; M.S., St. Louis University, 1972.

**Esther M. Sternberg**, B.Sc., McGill University, 1972; M.D., 1974.

**Bakula L. Trivedi**, M.S., Sarvajani Science College, 1961.

**Carol A. Weerts**, R.N., St. John's Hospital School of Nursing, 1960; B.S., Washington University, 1965; B.S., 1975; M.A., Webster College, 1980.

#### *Research Assistants*

**Sharon E. Carmody**, B.A., Webster College, 1960.

**Howard L. Christopherson**, B.S., University of Minnesota, 1949; M.S., 1953.

**Frieda R. Chyn**, A.B., University of Missouri, 1971.

**Leonard Cohen**, B.A., State University of New York, 1971; M.S., New York University, 1975; M.D., 1977; Ph.D., 1977.

**Margaret W. Erlanger**, B.A., University of Iowa, 1932; M.S., 1938.

**Kiyoshi Fukui**, M.D., Kyoto University, 1979.

**Ann M. Grace**, A.B., Bryn Mawr College, 1954; A.M., Washington University, 1956; Ph.D., St. Louis University, 1970.

**Foster Harris**, B.A., University of Missouri, 1969.

**Thomas Howard, Sr.**

**Milan D. Kapadia**, B.S., Gujarat University, 1972; M.D., Indore University, 1974.

**Catherine R. Keim**, B.S., Mercer University, 1977.

**Charles L. McConkey, Jr.**, B.A., Illinois Wesleyan University, 1969; M.S., Southern Illinois University, 1975.

**Dale F. Osborne**, B.S., Louisiana State University, 1971.

**Claire K. Pedersen**, B.S., Quincy College, 1948.

**Betty F. Perry**, A.B., Washington University, 1945.

**M. Benjamin Perryman**, B.S., Emory University, 1970; M.S., University of Montana, 1972; Ph.D., Texas A & M University, 1980.

**William T. Roswit** (Dermatology), B.A., Washington University, 1973.

**Jesse T. Yates**, B.S., Fisk University, 1956.

#### *Assistant (Clinical)*

**John E. Mullins**, A.B., Washington University, 1954; M.D., 1958.

# Department of Microbiology and Immunology

The department teaches a one-semester introductory course in microbiology for first-year medical students and for graduate students. The course is concerned particularly with principles of microbial physiology and genetics, and of immunology and, through a limited survey of pathogenic bacteria, viruses, and fungi, attempts to prepare medical students for more advanced study of infectious diseases later in the curriculum. The department also offers a number of advanced elective research activities. A limited number of summer research fellowships are available.

## FIRST YEAR

### Medical Microbiology

**Lectures and laboratory.** This course presents the basic principles relating to the growth and reproduction of bacteria and viruses and to the immune responses of the host to diverse substances, including pathogenic microbes and their metabolic products. The sequence followed is: immunology and microbial physiology/genetics followed by virology, and a survey of pathogenic bacteria and fungi. Medical students with sufficient background in one of these subjects may substitute that section with a graduate course (see Electives). The immunology section emphasizes structure, function and biosynthesis of antibodies, and provides an introduction to cell-mediated immune responses and immunopathology. The microbial physiology and genetics section emphasizes aspects of bacterial structure, growth, and reproduction which set the organisms apart from the human host. Later in the course, when specific groups of pathogenic organisms and viruses are considered, the interaction between host and parasite is studied by analyzing wherever possible the molecular basis for the pathogenicity of the microbe and for the immune reactions of man. The factors that make microorganisms vulnerable or resistant to chemotherapeutic agents are emphasized. Credit 6 units. (Staff)

Individuals other than medical students may register for individual sections of the course (see listing for the Division of Biology and Biomedical Sciences: under Bio 517, General Immunology, 2 units; Bio 523, Microbial Physiology and Genetics, 1 unit; Bio 529, Animal Virology, 1 unit; Bio 533, Pathogenic Microbiology, 2 units).

## RESEARCH

### Bio 590.

These electives acquaint the student with the analyses that are used in present-day biomedical research, especially at the molecular level. (Staff)

Processing and decay of RNA in *E. coli* and mammalian cells, normal and malignant. Differentiation-activation of unexpressed genes in mammalian cells. (Dr. Apirion)



Immunogenetics of complement proteins and the biochemistry and function of cell surface receptors for immunoglobulins and complement. (Dr. Atkinson)

Mechanisms and evolution of gene transposition and of antibiotic resistance in bacteria. (Dr. Berg)

Biochemical polymorphism of Ir gene products is studied with the aim of relating structure to immunoregulatory function. (Dr. Cullen)

B cell subsets, mechanisms of antibody diversity. (Dr. Davie)

Structure and biosynthesis of antibodies; immunoglobulin gene expression in hybridoma cells. (Dr. Fleischman)

Biochemistry of tumor viruses, varicella-zoster, and hepatitis B virus. (Dr. Gelb)

Mechanisms of action of immune response genes. (Dr. Kapp-Pierce)

Biochemistry and genetics of macromolecule regulation: mRNA metabolism in bacteria; regulation of metabolism in cultured mammalian cells. (Dr. Kennell)

Interactions of IgE and IgE receptors, structure of IgE and Fc receptors, mechanisms of immediate hypersensitivity. (Dr. Kulczycki)

Differentiation and function of mononuclear phagocytes. (Dr. Lin)

The structure and biosynthesis of lymphocyte cell surface antigens and lymphocyte triggering mechanisms. The effects as adjuvants in modulating the immune response. (Dr. Little)

Development of therapy for intracellular bacterial and fungal infections. (Drs. Kobayashi, Medoff)

Tumor immunotherapy. Establishment of animal models of human malignancy. (Dr. Medoff)



Cellular immunology; immediate hypersensitivity.

(Dr. Parker)

Gene expression in animal RNA viruses (vesicular stomatitis virus, poliovirus) with special emphasis on the regulation of viral RNA polymerase activities and the role of defective interfering virus particles in the establishment and maintenance of persistent viral infections.

(Dr. Perrault)

Mechanisms regulating immune responses in tissue culture systems.

(Dr. Pierce)

Biochemistry and replication of oncogenic adenoviruses.

(Dr. Raskas)

Interactions between RNA animal viruses and their host cells. Emphasis on maturation and assembly of viral proteins. The immune response to viruses; formation and properties of infectious viral-antibody complexes.

(Dr. M. Schlesinger)

Structure and replication of enveloped RNA animal viruses.

(Dr. S. Schlesinger)

Ribosome formation; processing and turnover of RNA in bacteria and mammalian cells.

(Dr. D. Schlessinger)

Structure of histocompatibility and immune response region associated antigens. Molecular mechanisms underlying HLA-disease association. Mechanisms of HLA disease associations.

(Dr. Schwartz)

Bacterial plasmid gene function, especially resistances to heavy metals such as mercury, arsenic, cadmium and silver. A combined approach to these resistances including genetic analysis with transposon mutagenesis and gene cloning, physiological studies of the basis of resistances, and biochemical analysis of the enzymes or other cellular proteins responsible.

(Dr. Silver)

Clinical microbiology, anaerobes, endogenous infections; enterics and enteric infections.

(Dr. Sonnenwirth)

## ELECTIVES

At present the primary enrollees in these 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. In the latter, each student has an opportunity to integrate various disciplines of modern molecular biology into the area of biology or medicine that is of particular interest to him. Those courses most relevant to the field of microbiology are listed under the Division of Biology and Biomedical Sciences.

### Bio 521. Cellular Aspects of the Immune Response

The mechanisms of regulation of immune responses by antigen, macrophages, T cells, B cells and their products will be discussed. The material covered will vary in emphasis from year to year and will stress critical analysis of the literature. Credit 2 units. Prerequisite: BIO 5051 and consent of instructor. (Also Pathology.)

(Dr. Pierce and Staff)

### Bio 528. Cell Development in Animals and in Culture

Lectures and student seminars on the fate of individual cell types in animals and in cell culture. Principles of cell renewal exemplified in muscle, chondrocytes, and hemopoiesis. Cell culture, including growth factors, hormonal factors, cyclic nucleotide effects, and genetics of cultured cells. Programmed cell death discussed along with the relation of differentiation to cell division, the role of cell-cell interactions, and studies of teratomas. Credit 3 units.

(Drs. D. Schlessinger, Lieberman)

### Bio 534. Gene Expression and Differentiation in Eukaryotic Cells

Emphasis will be on nuclear events which are relevant to gene expression. Material covered will include examples mainly from *Drosophila*, mouse, chicken, and cells in tissue culture. We shall cover the cell cycle, mitosis, meiosis, organization of chromatin and chromosomes, the content of the nucleus, chromosomal proteins, nuclear RNA, polytomic chromosomes, the transcription machinery, expression of rRNA genes in pro- and eukaryotes, nucleolus, turnover and processing of RNA in the nucleus and cytoplasm, expression of the globin genes and genes induced by steroid hormones, teratomas, somatic cell genetics, nuclear cytoplasmic relationships, plasmids and cloning of eukaryotic genes in bacteria. Credit 3 units.

(Dr. Apirion)

### Bio 539. Topics in Animal Virology

The course will consist of readings and seminars in specific areas of animal virology. The topics will vary from year to year. Credit 2 units.

(Drs. M. Schlesinger, S. Schlesinger)

### Bio 541. Molecular Biology of Prokaryotes

Growth, metabolism and genetics of the bacterial cell, including transport mechanisms, the regulation of gene expression and protein synthesis and the molecular biology of virus infection by virulent and temperate bacteriophages. The conceptual and experimental bases for present knowledge, as well as major problems to be solved, will be emphasized. About 15 hours of lecture followed by seminar presentations on selected topics by each student. Credit 2 units.

(Dr. Kennell)

### Bio 546. Antibodies: Structure, Function, and Formation

The principal features of the structure and function of antibody molecules will be examined in lectures, assigned reading of current research papers, and in student seminar presentations. Emphasis will be placed on the genetic and molecular events which govern the appearance of antibodies during the immune response.

(Drs. Fleischman, Little, Prof. Simms)

### Bio 5051. Foundations in Immunology I

This course is designed for graduate students as an in-depth introduction to immunology. Topics will include: antibody structure and genetics, cellular immunology, complement, transplantation immunology, and clinical immunology. Credit 3 units. (Dr. Kapp-Pierce)

*Note*—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

## Faculty of the Department of Microbiology and Immunology

### *Professor and Head of Department*

**Joseph M. Davie**, A.B., Indiana University, 1962; M.A., 1964; Ph.D., 1966; M.D., Washington University, 1968. (See Department of Pathology.)

### *Professors*

**David Apirion**, M.S., Hebrew University of Jerusalem, 1960; Ph.D., University of Glasgow, 1963.

**David E. Kennell**, A.B., University of California, 1955; Ph.D., 1959.

**George S. Kobayashi**, B.S., University of California, 1952; Ph.D., Tulane University, 1963. (See Department of Medicine.)

**J. Russell Little, Jr.**, A.B., Cornell University, 1952; M.D., University of Rochester, 1956. (See Department of Medicine.) (Jewish Hospital)

**Gerald Medoff**, A.B., Columbia College, 1958; M.D., Washington University, 1962. (See Department of Medicine.)

**Charles W. Parker**, M.D., Washington University, 1953. (See Department of Medicine.)

**Carl W. Pierce**, A.B., Colgate University, 1962; Ph.D., University of Chicago, 1966; M.D., 1966. (See Department of Pathology.) (Jewish Hospital)

**Heschel J. Raskas**, B.S., Massachusetts Institute of Technology, 1962; Ph.D., Harvard University, 1967. (See Department of Pathology.)

**Milton J. Schlesinger**, B.S., Yale University, 1951; M.S., University of Rochester, 1953; Ph.D., University of Michigan, 1959.

**Sondra Schlesinger**, B.S., University of Michigan, 1956; Ph.D., 1960.

**David Schlessinger**, B.A., University of Chicago, 1955; B.S., 1957; Ph.D., Harvard University, 1961. (See Department of Medicine.)

**Simon D. Silver**, B.A., University of Michigan, 1957; Ph.D., Massachusetts Institute of Technology, 1962. (Also Faculty of Arts and Sciences.)

**Alexander C. Sonnenwirth**, A.B., University of Nebraska, 1950; M.S., Purdue University, 1953; Ph.D., Washington University, 1960. (See Department of Pathology.) (Jewish Hospital)

### *Associate Professors*

**John P. Atkinson**, A.B., Kansas University, 1965; M.D., 1969. (See Department of Medicine.)

**Douglas E. Berg**, B.S., Cornell University, 1964; Ph.D., University of Washington, 1969. (See Department of Genetics.)

**Susan E. Cullen**, B.S., College of Mt. St. Vincent, 1965; Ph.D., Albert Einstein College, 1971. (See Department of Genetics.)

**Julian B. Fleischman**, B.S., Yale University, 1955; Ph.D., Harvard University, 1960.

**Judith A. Kapp-Pierce**, B.A., Miami University, 1965; M.S., Indiana University, 1969; Ph.D., Harvard University, 1976. (See Department of Pathology.) (Jewish Hospital.)

**Benjamin D. Schwartz**, B.A., Columbia College, 1965; Ph.D., Albert Einstein College, 1971; M.D., 1972. (See Department of Medicine.)

**Ernest S. Simms**

### *Assistant Professors*

**Lawrence D. Gelb**, B.S., University of Michigan, 1963; M.D., Harvard University, 1967. (See Department of Medicine.)

**Henry V. Huang**, A.B., Occidental College, 1972; Ph.D., California Institute of Technology, 1977.

**Anthony Kulczycki, Jr.**, A.B., Princeton University, 1966; M.D., Harvard University, 1970. (See Department of Medicine.)

**Hsiu-san Lin**, M.D., Taiwan University, 1960; Ph.D., University of Chicago, 1968. (See Department of Radiology.)

**Richard B. Markham**, A.B., Harvard University, 1969; M.D., Albert Einstein College of Medicine, 1972. (See Department of Medicine.)

**Jacques Perrault**, B.S., McGill University, 1964; Ph.D., University of California, 1972.

### *Research Assistants*

**John Courtney**, A.B., University of Illinois, 1953.

**Richard J. McDonald**



# Department 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 provided by the Departments of Anatomy and Neurobiology and of Physiology and Biophysics. In the second year, the department presents the course in Pathophysiology of Nervous System Disorders. Here are demonstrated the interrelationships between knowledge derived from basic investigative and clinical sources. In addition, there are lectures and exercises with patients in neurological physical diagnosis. A full-time four-week clerkship in the third year, with collaborative teaching by both Neurology and Neurological Surgery services, introduces the phenomenology of the diseased nervous system. In the fourth year, there are opportunities for clinical externships and many varieties of research experience.



Several informal organizational groups of faculty members are established for specialized research and teaching purposes. They include:

*James L. O'Leary* Laboratory of Experimental Neurology and Neurological Surgery, *Dr. Jones* (Director).

Division of Pediatric Neurology, *Dr. Pinsky* (Director), *Drs. Carroll, Deuel, Dodge, Dodson, Johnson, Rothman, Volpe*.

Division of Clinical Neuropharmacology, *Dr. Ferrendelli* (Director), *Drs. Clifford, Dodson, Lothman, Wooten*.

Division of Neuromuscular Diseases, *Dr. Brooke* (Director), *Drs. Carroll, Eliasson, Nemeth*.

Groups concerned with particular neurological illness research areas include:

Cerebral Circulation and Metabolism, *Drs. Collins, Grubb, Herscovitch, Powers, Raichle*.

Convulsive Disorders, *Drs. Clifford, Dodson, Ferrendelli, Goldring, Lothman, Pinsky, Vastola*.

Demyelinating Diseases, *Drs. Agrawal, Trotter*.

Disorders of Movement, *Miss Clare, Drs. Landau, Montgomery, Sahrman, Thach, Wooten*.

Memory Aging, and Dementia, *Drs. Berg, Cohen, Danziger, Hughes, Raichle*.

Metabolic Diseases of Children, *Drs. Dodson, Pinsky*.

## SECOND YEAR

**Pathophysiology of Nervous System Disorders** (part of course in pathophysiology)

A collaborative sequence concerned with mechanisms of disease of the nervous system. Lectures and seminars. (*Dr. Eliasson, Thach, and combined Neurology-Neurosurgery Staff*)

**Neurological Examination in Clinical Diagnosis** (part of interdepartmental course in clinical diagnosis)

Lectures, demonstrations, and practice examinations of neurological patients. (*Dr. Eliasson and Staff*)

## THIRD YEAR

**Combined Neurology-Neurosurgical Clerkship**

A full-time, four-week clerkship is provided on the neurology services at Barnes and City Hospital-Starkloff Memorial and the Barnes Hospital neurosurgical service. Patients are assigned to students who follow them with the resident staff and discuss them regularly in conferences with the senior neurological and neurosurgical staff. Students also work in the neurology and neurosurgical clinics under staff supervision.

(*Drs. Eliasson, Landau, Goldring, and Staff*)

## FOURTH YEAR ELECTIVES

### Research

A 6- to 12-week elective is available in many areas such as neuroanatomy, neurophysiology, cerebral metabolism and circulation, neurochemistry, neuropharmacology,

etc. Facilities are available for qualified students in any year to undertake original research in the laboratories of the department or in the clinics and wards.

(Drs. Goldring, Landau, and combined Neurology-Neurosurgery Staff)

### Clinical Neurology

A six-week subintern elective on the Starkloff Hospital neurology service provides direct patient responsibility as a member of the housestaff team. Organized conferences and readings with housestaff members and staff are provided.

(Dr. Collins and Staff)

A six-week consult elective is offered at Barnes Hospital. The student works directly with the consult resident and senior staff covering consultations at Barnes and Jewish Hospitals. Selected reading assignments on current topics in neurology

(Dr. Eliasson and Staff)

A six-week consult elective organized in the same manner is offered at Starkloff Hospital.

(Dr. Collins and Staff)

### Clinical Neurosurgery

The goal of the six-week clerkship at Barnes Hospital is to provide an overview of neurological surgery. Responsibilities include patient workup, pre- and post-operative care, and attendance at selected neurosurgical operations. Daily teaching rounds are held with a member of the

attending staff. Students also work in the Neurosurgical Clinic and attend the weekly staff conferences.

(Dr. Goldring and Staff)

### Staff Conferences

Students are invited to attend the Conjoint Neurological Conference (neuropathology, neuroradiology, medical neurology, pediatric neurology, and neurological surgery) held on Wednesday afternoon. The conference is held in West Pavilion Auditorium at 1:30 p.m. except on the second Wednesday of each month, when it is held at City Hospital-Starkloff Memorial at 1:45 p.m. in the third-floor conference room. The format of the conferences includes clinical presentations, symposia, and CPCs. Neurosurgery Grand Rounds are held weekly at 4:00 p.m. on Friday in the Neurosurgery conference room, 511 McMillan Hospital. Neuropathology brain-cutting conferences are held weekly in the Pathology Department on Monday at 1:00 p.m. and in the Starkloff Hospital morgue biweekly on Monday at 11:15 a.m. In alternate weeks a seminar in pathophysiology is held on Division 20. Dr. Brooke conducts a rehabilitation conference in the rehabilitation satellite unit on 11400 Barnes at noon on Monday. Professor's rounds, dealing systematically with major problem areas of clinical neurology, are held at noon on Tuesday in the Barnes 11400 classroom.

## Faculty of the Department of Neurology

### Co-Heads of Department

Sidney Goldring, William Landau

### NEUROLOGY

#### Andrew B. and Gretchen P. Jones Professor of Neurology and Head

William M. Landau, M.D., Washington University, 1947.

#### Professor and Vice Chairman of Neurology

Sven G. Eliasson, Ph.D., University of Lund, 1952; M.D., 1954. (See Irene Walter Johnson Institute of Rehabilitation.)

#### Seay Professor of Clinical Neuropharmacology

James A. Ferrendelli, A.B., University of Colorado, 1958; M.D., 1962. (See Departments of Pharmacology and Ophthalmology.)

#### Allen P. and Josephine B. Green Professor of Pediatric Neurology

Arthur L. Pinsky, A.B., Cornell University, 1951; M.D., New York University, 1955. (See Department of Pediatrics.)

#### A. Ernest and Jane G. Stein Professor of Developmental Neurology

Joseph J. Volpe, B.A., Bowdoin College, 1960; M.D., Harvard University, 1964. (See Departments of Biological Chemistry and Pediatrics.)

### Professors

Harish C. Agrawal (Neurochemistry), B.Sc., Allahabad University, 1957; M.Sc., 1959; Ph.D., 1964. (See Departments of Pathology and Pediatrics.)

Michael H. Brooke, M.B., B.Ch., Cambridge University, 1958. (See Department of Preventive Medicine and Public Health and Irene Walter Johnson Institute of Rehabilitation.)

Ronald M. Burde, B.S., Massachusetts Institute of Technology, 1960; M.D., Jefferson Medical College, 1964. (See Departments of Ophthalmology and Neurological Surgery.)

Margaret H. Clare (Neurophysiology), B.S.Ed., Southeast Missouri State Teachers College, 1940; M.A., Washington University, 1951.

Philip R. Dodge, M.D., University of Rochester, 1948. (See Department of Pediatrics.)

Edward G. Jones (Neuroscience), M.B., Ch.B., University of Otago, 1962; Ph.D., Oxford University, 1968; M.D., University of Otago, 1970; George H. and Ethel R. Bishop Scholar in Neuroscience in Neurology and Neurological Surgery. (See Neurological Surgery and Department of Anatomy and Neurobiology.)

Alan L. Pearlman, A.B., State University of Iowa, 1958; M.D., Washington University, 1961. (See Department of Physiology and Biophysics.)

Marcus E. Raichle, B.S., University of Washington, 1960; M.D., 1964. (See Department of Radiology.) (Also School of Engineering and Applied Science.)

W. Thomas Thach, Jr., A.B., Princeton University, 1959; M.D., Harvard University, 1964. (See Department of Anatomy and Neurobiology.)

Edward E. Vastola, B.S., Yale University, 1945; M.D., Columbia College of Physicians and Surgeons, 1947. (Starkloff Hospital)

### Professors (Clinical)

Leonard Berg, A.B., Washington University, 1945; M.D., 1949.



**Herbert E. Rosenbaum, B.S.,** University of Oregon, 1947; M.D., 1949.

**Stuart Weiss, A.B.,** Washington University, 1950; M.D., 1954.

#### *Associate Professors*

**Lawrence A. Cohen, B.S.,** Western Reserve University, 1948; M.D., Western Reserve University, 1954. M.A., Northwestern University, 1951 (Also Computer Systems Laboratory.)

**Robert C. Collins, B.A.,** University of California, Berkeley, 1964; M.D., Cornell University, 1969. (Starkloff Hospital)

**Ruthmary K. Deuel, B.A.,** Mount Holyoke College, 1956; M.D., Columbia College of Physicians and Surgeons, 1961. (See Department of Pediatrics.)

**W. Edwin Dodson, A.B.,** Duke University, 1963; M.D., 1967. (See Department of Pediatrics.)

**Charles P. Hughes, B.A.,** Yale University, 1960; M.D., Case Western Reserve University, 1964. (Starkloff Hospital)

**John L. Trotter, A.B.,** DePauw University, 1965; M.D., Washington University, 1969. (Gordon R. and Thelma B. Coates Scholar in Neurology.)

**George F. Wooten, Jr., B.A.,** Rice University, 1965; M.D., Cornell University Medical College, 1970. (See Department of Pharmacology.) (Starkloff Hospital)

#### *Associate Professors (Clinical)*

**Earl R. Schultz, A.B.,** Southeast Missouri State College, 1952; B.S. Med., University of Missouri, 1953; M.D., Washington University, 1955. (See Department of Psychiatry.)

**Richard S. Sohn, B.S.,** Brooklyn College, 1964; M.D., University of Chicago, 1968.

#### *Assistant Professors*

**James E. Carroll, B.S.,** University of Louisville, 1966; M.D., 1969. (See Department of Pediatrics and Irene Walter Johnson Institute of Rehabilitation.)

**Mary I. Johnson, B.S.,** Washington State University, 1964; M.D., Johns Hopkins University, 1968. (See Departments of Anatomy and Neurobiology and Pediatrics.)

**Eric William Lothman, B.A.,** Duke University, 1969; Ph.D., 1974; M.D., 1975. (Starkloff Hospital.)

**Erwin B. Montgomery, Jr., B.S.,** State University of New York, Buffalo, 1972; M.D., 1976.

**Patti M. Nemeth (Myochemistry), B.S.,** University of Arizona, 1969; Ph.D., University of California, 1977. (See Department of Anatomy and Neurobiology.)

**William J. Powers, A.B.,** Dartmouth College, 1971; M.D., Cornell University, 1975.

**Steven M. Rothman, M.D.,** State University of New York, Upstate, 1969. (See Departments of Anatomy and Neurobiology and Pediatrics.)

**Shirley A. Sahrman (Neurophysiology), B.S.P.T.,** Washington University, 1958; M.A., 1971; Ph.D., 1973. (See Department of Physiology and Biophysics and Program in Physical Therapy.)

**Clifford B. Saper, Ph.D.,** Washington University, 1977; M.D., 1977.

#### *Research Assistant Professors*

**Chuan Huan Cheng, B.S.,** China National Central University, 1944; M.S., Cornell University, 1950; Ph.D., Michigan State University, 1955.

**Joseph Inukai (See Neurological Surgery.)**

**Kenneth K. Kaiser, B.S.,** Colorado State University, 1968.

**Lloyd N. Simpson (See Neurological Surgery.)**

**Arthur W. Toga, B.S.,** University of Massachusetts, 1974; M.S., St. Louis University, 1975; Ph.D., 1978.



#### *Assistant Professors (Clinical)*

**Joseph T. Black, B.A.,** University of Rochester, 1961; M.D., State University of New York, Upstate, 1965.

**Octavio de Marchena, A.B.,** Johns Hopkins University, 1972; M.D., 1976.

**Joseph M. Dooley, Jr., B.S.,** St. Louis University, 1954; M.D., 1958.

**Joseph Hanaway, B.A.,** McGill University, 1956; M.D., 1960; C.M., 1960.

**William B. Hardin, B.S.,** Rice University, 1953; M.D., University of Texas Medical School at Galveston, 1957.

**David M. Reister, A.B.,** Harvard University, 1957; M.D., Washington University, 1961; M.P.H., Johns Hopkins University, 1971.

**Eli R. Shuter, A.B.,** Cornell University, 1956; M.D., Washington University, 1960.

#### *Instructors*

**David B. Clifford, B.A.,** Southwestern University, 1971; M.D., Washington University, 1975.

**John Michael Hatlelid, B.A.,** St. John's University, 1970; M.D., Washington University, 1977.

**Peter Herscovitch, B. Eng.,** McGill University, 1971; M.D., C.M., 1975.

**William Robert Wayne Martin, B. Med. Sci.,** University of Alberta, 1973; M.D., 1975.

#### *Instructor*

**Michael Noetzel, A.B.,** Yale, 1973; M.D., University of Virginia, 1977.

#### *Instructor (Clinical)*

**Robert J. Mueller, M.D.,** Washington University, 1936; M.S., University of Michigan, 1942.

#### *Research Assistants*

**David Yuen-Kai Chi, B.A.,** Greenville College, 1970; M.S., St. Louis University, 1976.

**Warren L. Danziger, A.B.,** Washington University, 1973; Ph.D., 1979.

**Julaine Florence, B.S.,** Washington University, 1975.

**Ann C. McKeon, B.S.,** Boston College, 1975.

**JoAnne D. Scarpellini, B.S.,** Indiana State University, 1955.

**Jeanne M. Smith**

### **NEUROLOGICAL SURGERY**

#### *Professor and Head*

**Sidney Goldring, B.S.,** Washington University, 1943; M.D., 1947.

**August A. Busch, Jr., Professor**

**Henry G. Schwartz, A.B.**, Princeton University, 1928; M.D., Johns Hopkins University, 1932.

**Professors**

**Ronald M. Burde, B.S.**, Massachusetts Institute of Technology, 1960; M.D., Jefferson Medical College, 1964. (See Departments of Ophthalmology and Neurology.)

**William S. Coxe, B.S.**, Hampden-Sydney College, 1945; M.D., Johns Hopkins University, 1948.

**Mokhtar Gado, M.B., B.Ch.**, Cairo University, 1953; DMRE, 1960. (See Department of Radiology.)

**Robert L. Grubb, Jr., A.B.**, University of North Carolina, 1961; M.D., 1965. (See Department of Radiology.)

**Edward G. Jones (Neuroscience)**, M.D., Ch.B., University of Otago, 1962; Ph.D., Oxford University, 1968; M.D., University of Otago, 1970; George H. and Ethel R. Bishop Scholar in Neuroscience in Neurology and Neurological Surgery. (See Neurology and Department of Anatomy and Neurobiology.)

**Robert A. Ratcheson, B.S.**, Northwestern University, 1962; M.D., 1965.

**Assistant Professor**

**Arthur B. Jenny II, A.B.**, Johns Hopkins University, 1965; M.D., 1969; Ph.D., Washington University, 1980.



**Research Assistant Professors**

**Joseph Inukai** (See Neurology.)

**Lloyd N. Simpson** (See Neurology.)

**Research Assistants**

**Isaac A. Edwards**

**Stuart A. Golden, B.S.**, Washington University, 1974.

**J. Stevadson Massey, B.A.**, University of the South, 1977; B.S., Washington University, 1980.

**Cheryl Ann Myrick, B.S.N.**, St. Louis University, 1979.

**Jeanne Me. Smith** (See Neurology.)

# Department of Obstetrics and Gynecology

The student's involvement in obstetrics and gynecology consists of a thorough exposure to the basic concepts in reproductive biology and an active participation in the delivery of medical care to women with gestations normal or at risk, congenital anomalies of pelvic viscera, structural disorders secondary to difficult childbirth, reproductive endocrinopathies and infertility, and gynecologic malignancies. The junior clerkship is conducted at Barnes Hospital, Jewish Hospital and St. Louis County Hospital, with the majority of the students stationed at Barnes. Senior electives may be taken at Barnes Hospital or in the many affiliated hospitals in St. Louis. Regularly held conferences in reproductive biology, perinatal medicine, ob-gyn pathology, and oncology supplement the student's education.

## SECOND YEAR

The sophomore is introduced to obstetrics and gynecology with lectures in reproductive biology which apply the pelvic anatomy and physiology taught in the first year, physiology of tubal transport and ovarian control, myometrial function, placental perfusion, steroidogenesis, genetics, and prenatal diagnosis.

## THIRD YEAR

Students are assigned to a resident-staff team, and the residents and staff physicians serve as preceptors during the students' six-week stay in the department. Every woman seen in the office or cared for in the hospital by the team of physicians is considered in her entirety. Attention is paid to the manner in which her social and economic situation has modified her response to disease. Environmental manipulation, in addition to traditional medical care, is prescribed to improve her health. The team method ensures that personalized care is given by arranging for the same group of physicians to meet a woman's health needs during each visit. The residents in a team function like a group in obstetrics and gynecology practice, and the student works like an intern in the specialty. He sees patients in the office with his resident group, attends deliveries, assists in surgery, goes to conferences and takes night call with them as a part of the team.

## FOURTH YEAR

Seniors wishing to take an externship or research elective can choose from a variety of courses:

### Ob-Gyn Externships

#### Endocrinology-Infertility Externship

In the office and hospital, the extern participates in the study and treatment of women with reproductive endocrine disorders and infertility. He presents patients in conferences, has assigned reading, and obtains experience

in the techniques of steroid and gonadotropin quantitation as well as various manipulative procedures.

(Dr. Warren)

#### Pathology Externship

The elective elucidates the principles of anatomic pathology as applied to operative material in obstetrics and gynecology. The extern examines gross and microscopic specimens in the Ob-Gyn Pathology Laboratory and reviews pertinent literature with a senior pathologist.

(Dr. Gersell)

#### Gyn Oncology Externship

This elective concerns itself with the diagnosis and treatment of malignant tumors of the female reproductive tract. The extern is involved in all aspects of the care of women with gyn malignant tumors. This experience will include the surgical treatment, radiation therapy and chemotherapy.

(Dr. Camel)

#### Perinatal Medicine Externship

Electronic and biochemical surveillance of the human fetus and mother before and during parturition. The extern is involved in the care of women with gestations at risk (i.e., diabetes, hypertension, toxemia, renal disease, fetopelvic disproportion, etc.).

(Dr. Arias)

#### Ob-Gyn Preceptorship

The student spends six weeks with a clinical faculty member who is in private practice. He makes hospital rounds and operates with his preceptor at Barnes and other community hospitals. He becomes familiar with the experiences of the private practitioner.

(Dr. Warren)



### Endocrinologic Function and Disease During Pregnancy Subinternship

While on elective, the senior student will participate in clinical and/or research activities leading to a basic understanding of the endocrinology of pregnancy and endocrine dysfunction during pregnancy. He will present patients in conferences, have assigned reading and obtain experience in clinical research techniques. (Dr. Rigg)

### Genetics Subinternship

This elective involves clinical exposure to preconceptual and preamniocentesis counseling, methods of prenatal diagnosis (genetic amniocentesis, diagnostic ultrasound, amniography, etc.) and physical diagnosis of genetic disease. Laboratory experience in cytogenetic techniques such as amniotic fluid, lymphocyte, bone marrow and tissue culture is also included. (Dr. Crane)

### Obstetric Anesthesiology

In this clinical elective, students receive instruction in the fundamentals of obstetric pain relief and newborn infant management and resuscitation. The pharmacology of sedatives, tranquilizers, narcotics, local anesthetics, inhalation and intravenous drugs is demonstrated by practical application, emphasizing fetal-maternal implications in the management of labor. Special local anesthetic blocks such as caudal, lumbar epidural, and saddle spinal. Experience is also gained in the management of general anesthesia for minor gynecologic procedures such as postpartum tubal ligations.

(Dr. Jones)



### General Ob-Gyn Externships

St. Louis County Hospital

(Dr. Siemers)

The externship in each of these affiliated hospitals allows the student a greater degree of participation and responsibility in the care of patients. There is a wealth of clinical material in each of these facilities.

## RESEARCH ELECTIVES

### Molecular Aspects of Endocrinology and Population Control

The research involves the study of the topography of macromolecular steroid binding sites, evaluation of the role of steroid "receptor" proteins in molecular mechanisms of steroid action, and the synthesis of affinity-labeling steroids and anti-steroids and their application to disease states and population control. (Dr. Warren)

### Radioimmunoassay

Radioimmunoassay is now the most widely applied *in vitro* assay procedure. This elective is designed to acquaint the student with basic theoretical considerations as well as with technical and practical applications of assays of value in obstetrics and gynecology. The student will be given opportunity to develop, evaluate and apply clinically an assay of choice. (Dr. Wiest)

### Regulation of Placental Hormone Synthesis

Our laboratory is concerned with studying the factors regulating the biosynthesis of protein hormones in the placenta, human placental lactogen (hPL), and human chorionic gonadotropin (hCG). The appearance of these hormones in maternal serum differs markedly. For these studies the template mRNAs have been isolated and we are generating complementary DNAs to the corresponding mRNAs. These DNA probes will be used to assay gene activities in normal and pathological tissues. Students will be concerned with the concepts and techniques of molecular biology as applied to the above research.

(Dr. Boime)

### Sperm Biochemistry and Andrology

Research is performed which is aimed at the understanding and control of the molecular events which allow for sperm penetration of the ovum. Investigations into male infertility centering on sperm motility, bacteriological considerations, and freezing of semen are also conducted.

(Dr. Polakoski)

### Bio-Organic Chemical Endocrinology

The mechanism of steroid hormone action at the molecular level is approached by producing new progesterone and estrogen analogs by organic synthesis. The student can work at the organic synthetic or biochemical level. Isolation of uterine estrogen and progesterone receptor proteins by a newly synthesized affinity chromatography system is in progress. Also, new steroids, containing alkylating functional groups are synthesized and have a dual research role: to serve as tools with which to probe the steroid-macromolecular binding phenomenon and to produce biologically active steroids with persistent hormone activity or hormone blocking action. Physicochemical methods are used to study steroid-protein interaction.

(Dr. Sweet)



## Faculty of the Department of Obstetrics and Gynecology

### *Professor and Head of Department*

**James C. Warren, A.B.**, University of Wichita, 1950; M.D., University of Kansas, 1954; Ph.D., University of Nebraska, 1961. (See Department of Biological Chemistry.)

### *Professor Emeritus*

**Willard M. Allen, B.S.**, Hobart College, 1926; M.S., University of Rochester, 1929; M.D., 1932; Sc.D. (hon.), Hobart College, 1940; Sc.D. (hon.), University of Rochester, 1957.

### *Professors*

**Fernando Arias, M.D.**, National University of Bogota, 1958; Ph.D., Tulane University, 1965.

**Irving Boime, B.S.**, St. Louis College of Pharmacy, 1964; M.S., Purdue University, 1966; Ph.D., Washington University, 1970. (See Department of Pharmacology.)

**H. Marvin Camel, M.D.**, Creighton University, 1950.

**Walter G. Wiest, A.B.**, Brigham Young University, 1948; Ph.D., University of Wisconsin, 1952. (See Department of Biological Chemistry.)

### *Professors Emeriti (Clinical)*

**A. Norman Arneson, B.S.**, Texas Christian University, 1924; M.D., Washington University, 1928. (See Department of Radiology.)

**John E. Hobbs, A.B.**, Southwest Missouri State Teachers College, 1923; M.D., Washington University, 1927.

**Melvin A. Roblee, B.S.**, Washington University, 1923; M.D., 1925.

**Samuel D. Soule, M.D.**, Washington University, 1928.

### *Professors (Clinical)*

**Robert Burstein, M.D.**, Washington University, 1948.

**Charles R. Gulick, A.B.**, Central College, 1940; M.D., St. Louis University, 1943.

**William H. Masters, B.S.**, Hamilton College, 1938; M.D., University of Rochester, 1943.

### *Associate Professor Emeritus*

**George J. L. Wulff, Jr., A.B.**, Washington University, 1929; M.D., 1933.

### *Associate Professors*

**James P. Crane, A.B.**, Indiana University, 1966; M.D., 1970.

**Ernst R. Friedrich, M.B.**, University of Berlin, 1951; M.D., University of Heidelberg, 1954.

**James D. Jones II, B.S.**, Louisiana State University, 1940; D.D.S., Loyola University of the South, 1945; M.D., University of Alabama, 1957. (See Department of Anesthesiology.)

**Ming-Shian Kao, M.D.**, National Taiwan University Medical College, 1961.

**David W. Keller, B.S.**, Canisius College, 1960; M.D., University of Buffalo, 1964.

**Kenneth V. Polakoski, B.S.**, Wisconsin State University, 1966; M.S., University of Georgia, 1971; Ph.D., 1972.

**Jacques Sauvage, B.S.**, University of Liege, 1953; M.D., 1957.

**Ronald C. Strickler, B.S.**, University of Toronto, 1963; M.D., 1967.

**Frederick Sweet, B.S.**, City University of New York, 1960; Ph.D., University of Alberta, 1968.

### *Associate Professor Emeritus (Clinical)*

**David B. Rothman, B.S.**, Washington University, 1935; M.D., 1935.

### *Associate Professors (Clinical)*

**S. Michael Freiman, A.B.**, Montana State University, 1951; M.D., Washington University, 1955.

**Frank B. Long, Jr., M.D.**, Washington University, 1947.

**J. Barlow Martin, B.A.**, Amherst College, 1951; M.D., Washington University, 1955.

**Norman K. Muschany, A.B.**, Westminster College, 1947; M.D., Temple University, 1951.

### *Assistant Professors*

**Michael J. Gast, B.S.**, University of Illinois, 1970; M.D., Ohio State University, 1973; Ph.D., Washington University, 1981.

**Alfred B. Knight, B.S.**, Massachusetts Institute of Technology, 1968; M.D., Case Western Reserve University, 1972.

**Tom E. Morgan, A.B.**, Vanderbilt University, 1969; M.D., University of Tennessee, 1972.

**Lee A. Rigg, B.A.**, Arizona State University, 1961; Ph.D., University of Colorado, 1965; M.D., Washington University, 1971.

### *Research Assistant Professors*

**Chang-chen Chin, B.S.**, National University, 1944; Ph.D., Oklahoma State University, 1967.

**Sau Wai Cheung, B.S.**, New Asia College, 1966; M.S., University of Louisville, 1969; Ph.D., Indiana University, 1975.

### *Assistant Professors Emeriti (Clinical)*

**William Berman, A.B.**, Washington University, 1931; M.D., 1935.

**Arthur R. Bortnick, M.D.**, Washington University, 1935.

**Arthur T. Esslinger, M.D.**, Washington University, 1940.

**Kevin C. Morrin, M.B., B.Ch.**, National University of Ireland, 1921.

**Willard C. Scrivner, B.S.**, Washington University, 1926; M.D., 1930.

**Helman C. Wasserman, A.B.**, Johns Hopkins University, 1928; M.D., Washington University, 1932.

### *Assistant Professors (Clinical)*

**Robert S. Cohen, B.S.**, Union College, 1958; M.D., State University of New York, 1962.

**Andrew Galakatos, B.S.**, St. Louis College of Pharmacy, 1960; M.D., University of Missouri, 1965.

**Robert S. Goell, A.B.**, Middlebury College, 1949; A.M., University of Pennsylvania, 1950; M.D., Washington University, 1960.

**C. Richard Gulick, B.A.**, Westminster College, 1966; M.D., University of Rochester, 1971.

**Jacob Klein, B.S.**, Muhlenberg College, 1964; M.D., Jefferson Medical College, 1968.

**Laurence E. Maze, M.D.**, Washington University, 1948.

**Seymour M. Monat, A.B.**, University of Pennsylvania, 1935; M.D., Long Island College, 1939.

**James Pennoyer, B.S.**, Hobart College, 1933; M.D., University of Rochester, 1939.

**Edward G. Peskin, B.A.**, University of Wisconsin, 1970; M.D., Washington University, 1974. (See Medical Care Group.)

**Jonathan R. Reed, B.A.**, Fisk University, 1956; M.D., Meharry Medical College, 1965.

**Marvin Rennard, A.B.**, Washington University, 1947; B.S., University of Missouri, 1950; M.S., 1950; M.D., Washington University, 1952.

**Melvin M. Schwartz, A.B.**, University of Nebraska, 1945; M.D., 1947.

**William L. Smiley**, A.B., Ohio State University, 1933; M.D., 1937.

**Chotchai Srisuro**, M.D., Faculty of Medical Sciences, 1967.

**Eugene D. Taylor**, B.S., Virginia State College, 1948; M.D., Howard University, 1954.

**M. Bryant Thompson**, A.B., Eastern New Mexico University, 1957; M.D., University of California, 1961.

**J. Leslie Walker**, B.A., Vanderbilt University, 1957; M.D., University of Tennessee, 1960.

**Ronald P. Wilbois**, B.S., University of Illinois, 1959; M.D., 1964.

**Carol F. Williams**, B.A., University of Tennessee, 1952; M.D., 1955.

#### *Instructor*

**Carolyn M. Siemers**, B.A., Lindenwood College, 1970; M.D., Washington University, 1976.

#### *Instructors Emeriti (Clinical)*

**Hubert L. Allen**, A.B., University of Kansas, 1932; M.D., Tulane University, 1936.

**Frances H. Stewart**, M.D., Washington University, 1927.

#### *Instructors (Clinical)*

**Scott Barrett, Sr.**, M.D., Meharry Medical College, 1938.

**Scott R. Barrett, Jr.**, M.D., Howard University, 1975.

**Robert L. Becker**, B.A., Cornell University, 1965; M.D., Washington University, 1969.

**Joe E. Belew**, A.B., Central College, 1953; M.D., St. Louis University, 1957.

**Robert H. Duemler**, A.B., Washington University, 1952; M.D., 1956.

**Ira C. Gall**, B.S., University of Cincinnati, 1948; M.D., 1951.

**John A. Hamilton**, B.S., University of Michigan, 1972; M.D., St. Louis University, 1976.

**Joseph Hazan**, M.D., Ege University Medical School, 1971.

**Randall L. Heller, Jr.**, B.S., University of Missouri, 1964; Ph.D., 1968; M.D., University of Texas, 1976.

**Godofredo M. Herzog**, B.S., Louisiana State University, 1953; M.D., Washington University, 1957.

**William L. Holcomb**, B.S., Purdue University, 1970; M.D., Indiana University, 1975.

**Darwin C. Jackson**, B.S., Ohio State University, 1972; M.D., Washington University, 1976.

**Michael K. Johnson**, B.S., Ohio State University, 1970; M.D., St. Louis University, 1975.

**James W. Kessel**, M.D., University of Chicago, 1975; Ph.D., California Institute of Technology, 1963.

**S. Robert Kovac**, A.B., Washington University, 1960; M.D., University of Missouri, 1964.

**Justin F. Kraner**, M.D., University of Michigan, 1949.

**Theodore Merrims**, A.B., Washington University, 1949; M.D., 1954.

**Jerry N. Middleton**, B.A., Westminster College, 1959; M.D., Washington University, 1963.

**F. Delbert Moeller**, B.S., Muskingum College, 1965; M.D., Ohio State University, 1969.

**Sam Momtazee**, M.D., Shiraz Medical School, 1961.

**Nathaniel H. Murdock**, B.S., Harvard University, 1958; M.D., Meharry Medical College, 1963.

**Gerald Newport**, A.B., Washington University, 1948; M.D., 1953.

**Joseph D. O'Keefe**, A.B., University of Colorado, 1946; M.D., Washington University, 1950.

**William E. Pearson**, B.S., Texas Christian University, 1964; M.D., Washington University, 1968.

**Chinda Vanasin Rojanasathit**, M.D., Siriraj Medical School, 1967.

**James Sawyer**, A.B., Ohio State University, 1949; M.D., 1951.

**Albro C. Tobey, Jr.**, B.S., Butler University, 1965; M.D., Trinity College, University of Dublin, 1972.

**Parker H. Word**, B.S., Virginia State College, 1941; M.D., Howard Medical School, 1944.

**Mitchell Yanow**, M.D., Washington University, 1941.



# Department of Ophthalmology

Instruction begins in the second year with methods of examination of the eye. Emphasis is on the use of the ophthalmoscope. There are also several lectures on various aspects of ocular disease. During the third year, students are assigned to an ophthalmology clerkship for one week. In the fourth year, six-week and twelve-week clinical or research electives are offered.

## SECOND YEAR

### Ophthalmology

Lectures and demonstrations in the basic principles of ophthalmology. (Staff)

## THIRD YEAR

### Ophthalmology

Students rotate through the Eye Clinic for a one-week clinical clerkship. (Staff)

## FOURTH YEAR ELECTIVES

### Clinical Clerkship in Ophthalmology

One student rotates through the Department of Ophthalmology for either a six-week period or a twelve-week period. He is given instruction in the basic principles of

ophthalmologic examination and assists in the workup of eye patients at St. Louis Veterans Administration Hospital and at Washington University Medical Center (Barnes Hospital). He is expected to present cases at rounds and conferences. This elective is geared to the student who plans to enter the specialty of ophthalmology.

## RESEARCH ELECTIVES

Experimental and clinical research in glaucoma.

(Drs. Kass, Krupin)

Experimental and diagnostic ophthalmic pathology.

(Dr. M. Smith)

Experimental research in ocular physiology.

(Dr. Moses)

Research in cornea and diabetes.

(Dr. Waltman)

Experimental research in anatomy and physiology.

(Dr. Cohen)

Experimental research in visual physiology.

(Dr. R. Miller)

Experimental neuropathology.

(Dr. R. Burde)

Computer application in visual fields.

(Dr. W. Hart)

Research in intraocular lenses.

(Dr. D. Meltzer)

Clinical research in pediatric ophthalmology.

(Dr. J. Miller)

## Faculty of the Department of Ophthalmology

### Professor and Head of Department

**Bernard Becker, A.B.**, Princeton University, 1941; M.D., Harvard University, 1944.

### Professors

**Ronald M. Burde, B.S.**, Massachusetts Institute of Technology, 1960; M.D., Jefferson Medical College, 1964. (See Department of Neurology and Neurological Surgery.)

**Adolph I. Cohen, B.S.**, City College of New York, 1948; M.A., Columbia University, 1950; Ph.D., 1954. (See Department of Anatomy and Neurobiology.)

**Nigel W. Daw, B.A.**, Trinity College, 1956; M.A., 1961; Ph.D., Johns Hopkins University, 1967. (See Department of Physiology and Biophysics.)

**Allan E. Kolker, A.B.**, Washington University, 1954; M.D., 1957.

**James E. Miller, B.S.**, Tulane University, 1946; M.D., the Medical College of Alabama, 1949. (See Department of Pediatrics.)

**Robert A. Moses, A.B.**, Johns Hopkins University, 1938; M.D., University of Maryland, 1942.

**Morton E. Smith, B.S.**, University of Maryland, 1956; M.D., 1960. (See Department of Pathology.)

**Stephen R. Waltman, B.S.**, Massachusetts Institute of Technology, 1961; M.D., Yale University, 1964.

### Professors (Clinical)

**Robert C. Drews, A.B.**, Washington University, 1952; M.D., 1955.

**Edward Okun, B.S.**, Dartmouth College, 1952; M.D., University of Vermont, 1956.

### Associate Professors

**William M. Hart, Jr., Ph.D.**, University of Maryland, 1970; M.D., 1970.

**Michael A. Kass, B.S.**, Northwestern University, 1966; M.D., 1966.

**Theodore Krupin, A.B.**, Washington University, 1964; M.D., St. Louis University, 1968.

**Elsie F. Meyers, B.A.**, Indiana University, 1947; M.D., 1950. (See Department of Anesthesiology.)



**Robert F. Miller, M.D.**, University of Utah, 1967. (See Department of Physiology and Biophysics.)

*Associate Professors Emeriti (Clinical)*

**Howard R. Hildreth, M.D.**, Washington University, 1928.

**Theodore E. Sanders, B.S.**, University of Nebraska, 1931; M.D., 1933.

*Associate Professors (Clinical)*

**George M. Bohigian, A.B.**, Washington University, 1961; M.D., St. Louis University, 1965.

**Jack Hartstein, B.S.**, University of Missouri, 1953; M.D., University of Cincinnati, 1955.

**Glen P. Johnston, A.B.**, Washington University, 1953; M.D., 1956.

**Jack Kayes, B.A.**, Yale University, 1953; M.D., Washington University, 1957.

**Terence G. Klingele, M.D.**, University of California, 1970.

**Benjamin Milder, M.D.**, Washington University, 1939.

**Harry D. Rosenbaum, M.D.**, Washington University, 1934.

**Bernd Silver, B.S.**, University of Louisville, 1952; M.D., 1956.

*Assistant Professors*

**David W. Meltzer, A.B.**, Princeton University, 1965; Ph.D., University of Rochester, 1970; M.D./Ph.D., University of Miami, 1975.

**Peter Reinach, B.S.**, New York University, 1964; Ph.D., 1972.

**Malcolm M. Slaughter, B.S.**, City College of New York, 1967; M.S., Fordham University, 1972; Ph.D., 1977.

**Mitchel L. Wolf, B.A.**, Yeshiva College, 1964; M.D., Albert Einstein College of Medicine, 1968.

*Assistant Professors Emeriti (Clinical)*

**Edmund B. Alvis, M.D.**, Washington University, 1934.

**Daniel Bisno, B.A.**, University of Wisconsin, 1927; M.D., Johns Hopkins University, 1931.

**William H. Meinberg, B.S.**, Washington University, 1932; M.D., 1932.

*Assistant Professors (Clinical)*

**Neva P. Arribas, M.D.**, Manila Central University, 1954.

**Stanley C. Becker, A.B.**, Washington University, 1948; M.A., 1950; Ph.D., 1951; M.D., Chicago Medical School, 1955.

**Edward F. Berg, A.B.**, Washington University, 1960; M.D., 1964.

**Ronald C. Bilchik, B.S.**, University of Toledo, 1963; M.D., Washington University, 1967.

**James C. Bobrow, B.A.**, Yale University, 1966; M.D., Johns Hopkins University, 1970.

**Isaac Boniuk, B.S.**, Dalhousie University, 1958; M.D., 1962.

**James H. Bryan, A.B.**, Washington University, 1932; M.D., 1936.

**Dean B. Burgess, A.B.**, Occidental College, 1963; M.D., University of California, 1967.

**Samuel A. Canaan, Jr., A.B.**, State University of Iowa, 1942; M.A., Columbia University, 1948; M.D., Meharry Medical College, 1954.

**Richard F. Escoffery, M.B.**, B.S., University of West Indies Medical School, 1969.

**Robert M. Feibel, A.B.**, Johns Hopkins University, 1965; M.D., Harvard University, 1969.

**James M. Gordon, B.A.**, University of Minnesota, 1962; M.D., 1966.

**M. Gilbert Grand, B.S.**, Tufts University, 1964; M.D., Yale University, 1968.

**Harry L. Knopf, A.B.**, Harvard University, 1963; M.D., Harvard Medical School, 1967.

**Barry D. Milder, B.S.**, Massachusetts Institute of Technology, 1969; M.D., Washington University, 1973.

**Matthew Newman, A.B.**, Vanderbilt University, 1956; M.D., Columbia University, 1959.

**F. Thomas Ott, B.A.**, Southern Methodist University, 1963; M.D., Washington University, 1965.

**Lawrence T. Post, Jr., M.D.**, Washington University, 1948.

**Philip T. Shahan, A.B.**, Harvard College, 1938; M.D., Washington University, 1942.

**Arthur W. Stickler, Jr., M.D.**, University of Oklahoma, 1943.

**Philip Venable, B.S.**, Wayne State University, 1935; M.D., 1940.

**Charles E. Windsor, A.B.**, Carleton College, 1956; M.D., University of Rochester, 1960.

*Instructors*

**Rodolfo Dumlaio, B.A.**, Far Eastern University, 1959; M.D., 1964.

**Lawrence A. Gans, B.A.**, Columbia University, 1972; M.D., Case Western Reserve University, 1977.

*Research Instructors*

**Mae E. Gordon, B.A.**, Portland State University, 1967; M.S., University of Wisconsin, 1970; Ph.D., 1978.

**Walter J. Grodzki, D.D.S.**, St. Louis University, 1944.

**Elaine Miller, A.B.**, Judson College, 1944; M.D., Medical College of Alabama, 1949. (See Department of Pediatrics.)

**Gillian Roper-Hall, D.B.O.**, Moorfield Eye Hospital, 1966; D.B.O.(D), 1969; Certified Orthoptist, U.S. Board, 1973.

*Instructors (Clinical)*

**Nevinkumar J. Amin, I.S.C.**, Bombay University, 1960; M.B.B.S., 1966.

**Ruth S. Freedman, A.B.**, Washington University, 1938; M.D., 1942.

**David M. Freeman, A.B.**, University of Missouri, 1940; B.S., Med., 1941; M.D., Washington University, 1943.

**Sidney J. Hanish, B.A.**, University of North Dakota, 1969; M.L.A., 1971; M.D., Rush Medical College, 1975.

**Michael J. Isserman, A.B.**, Harvard University, 1971; M.D., Washington University, 1975.

**William S. Joffe, A.B.**, Washington University, 1959; M.D., 1963.

**Robert L. Lamberg, B.S.**, University of Missouri, St. Louis, 1972; M.D., Washington University, 1976.

**John V. Linberg, B.A.**, University of Rochester, 1967; M.D., New York University, 1971.

**Robert Joseph Olk, A.B.**, Johns Hopkins University, 1969; M.L.A., 1971; M.D., Rush Medical College, 1975.

**John C. Perlmutter, B.A.**, Queens College, 1967; M.D., Cornell University Medical College, 1971.

**Maxwell Rachlin, M.D.**, University of Toronto, 1942.

**Michael B. Rumelt, B.S.**, Lamar State College of Technology, 1962; M.D., Washington University, 1966.

**Mickey L. Salmon, M.D.**, Louisiana State University, 1959.

*Assistant*

**Clemens H. Jacques, B.S.**, University of California, 1949; O.D., 1949. (See Medical Care Group.)

*Research Assistants*

**Dorothy G. Cooper, R.N.**, Washington University, 1953; B.S.N., 1964; M.S.N., 1966.

**Nels J. Holmberg, B.S.**, Oklahoma State University, 1963; M.S., 1966.

**Floyce A. Scherrer, R.N.**, Washington University, 1960.



# Department of Otolaryngology

Otolaryngology is presented to students during their sophomore, junior, and senior years. A clinical pathologic correlation lecture series is presented to sophomores. In the junior year, each student spends one week on one of the services in East Pavilion or St. Louis Veterans Administration. 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 Thursdays, and an introduction to audiology as well as to basic ENT research.

Senior students who show a special interest may take a rotating elective in ENT suited to their interests. Some possibilities include research or clinical work. Ample research facilities and ongoing projects are available. Clinical exposure could include oncologic diseases related to the head and neck, otologic diseases, otoneurology, audiology, or middle-ear surgery.

## SECOND YEAR

### Otolaryngology and Physical Diagnosis

Clinical pathologic correlative lectures in otolaryngology are given to the entire class. (Dr. Thawley)

## THIRD YEAR

### Otolaryngology Clerkship

Practical instruction in diagnosis and treatment. One week. (Dr. Thawley)

## FOURTH YEAR ELECTIVES

### Structure and Innervation of Labyrinth (Dr. Bohne)

### Clinical Clerkship

A six-week rotation which stresses outpatient diagnosis and management of ENT problems. Lectures, field trips, office practice, and operating room exposure round out the rotation. Two students are accepted for each rotation. (Dr. Thawley)

## RESEARCH ELECTIVES

Cytology, neurology, and histochemistry of membranous labyrinth. (Dr. Bohne)

Physiology of larynx. (Drs. Ogura, Harvey)

Nasopulmonary physiology. (Dr. Ogura)

Metabolism of the inner ear. Physiological and biochemical aspects. (Dr. Thalmann)

Otoneurology labs. (Dr. Stroud)

Development of otic capsule and ossicles. (Dr. Bohne)

Audiology. (Bob Loomis)

## Faculty of the Department of Otolaryngology

### Lindburg Professor and Head of Department

Joseph H. Ogura, A.B., University of California, 1937; M.D., 1941.

### Professors

Donald G. Sessions, A.B., Princeton University, 1958; M.D., Washington University, 1962.

S. Richard Silverman (Audiology), A.B., Cornell University, 1933; M.S., Washington University, 1938; Ph.D., 1942. (Also Central Institute for the Deaf and Faculty of Arts and Sciences.)

Gershon J. Spector, A.B., Johns Hopkins University, 1960; M.D., University of Maryland, 1964.

Malcolm H. Stroud, M.B., 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.

### Research Professor Emeritus and Lecturer

Hallowell Davis, A.B., Harvard University, 1918; M.D., 1922; Sc.D. (hon.), Colby College, 1954; Sc.D.

(hon.), Northwestern University, 1962; Sc.D. (hon.), Washington University, 1973. (See Department of Physiology and Biophysics.) (Also Central Institute for the Deaf.)

### Research Professors

Donald H. Eldridge, S.B., Harvard University, 1943; M.D., 1946. (Also Central Institute for the Deaf and Faculty of Arts and Sciences.)

Ira J. Hirsh, (Audiology), New York State College for Teachers (Albany), 1942; M.A., Northwestern University, 1943; M.A., Harvard University, 1947; Ph.D., 1948. (Also Central Institute for the Deaf and Faculty of Arts and Sciences.)

### Professors Emeriti (Clinical)

Harold M. Cutler, A.B., University of Maine, 1930; M.D., Tufts College, 1937.

Ben H. Senturia, A.B., Washington University, 1931; M.D., 1935.

### Professor (Clinical)

Morris Davidson, B.S., Indiana University, 1936; M.D., 1938.



#### *Associate Professors*

**Barbara A. Bohne, A.B.**, Washington University, 1967; Ph.D., 1971.

**Joseph E. Harvey** (Experimental-Otolaryngology), B.A., University of California, Berkeley, 1954; M.A., 1964; Ph.D., 1968.

**Stanley E. Thawley, B.A.**, University of Texas, 1963; M.D., University of Texas Medical Branch, 1967.

#### *Associate Professors Emeriti (Clinical)*

**William T. K. Bryan, A.B.**, Washington University, 1929; M.D., 1933.

**Guerdan Hardy, M.D.**, Washington University, 1929.

**Robert E. Votaw, B.S.**, State University of Iowa, 1927; M.D., 1929.

#### *Associate Professors (Clinical)*

**Benard C. Adler, B.S.**, Washington University, 1937; M.D., 1937.

**Carl F. Ehrlich, B.S.**, St. Louis University, 1961; M.D., University of Missouri, Columbia, 1965.

**Charles C. Jacobs, A.B.**, Washington University, 1942; M.D., 1945.

**Edward H. Lyman, B.S.**, Washington University, 1937; M.D., 1937.

**Wayne A. Viers, B.S.**, Phillips University, 1952; M.D., University of Oklahoma, 1956.

**Joseph W. West, M.D.**, Duke University, 1944.

#### *Assistant Professor*

**Kenneth D. Faw, B.S.**, Seattle Pacific College, 1972; M.D., University of Washington School of Medicine, 1976.

**Laurence A. Levine, B.A.**, Hofstra University, 1962; M.A., 1963; D.D.S., New York University, 1967; M.D., Albany Medical College, 1971. (Jewish Hospital.)

**Peter G. Smith, B.S.**, Clemson University, 1967; Ph.D., Purdue University, 1972; M.D., Medical University of South Carolina, 1976.

#### *Research Assistant Professor*

**Daniel C. Marcus, B.S.**, Antioch College, 1968; M.S., Washington University, 1971; D.Sc., 1976.

**Isolde Thalmann, B.S.**, Washington University, 1969; A.M., 1972.

#### *Assistant Professors Emeriti (Clinical)*

**Alfred J. Cone, B.S.**, State University of Iowa, 1921; M.D., 1923; M.S., 1927.

**Herbert M. Smit, M.D.**, St. Louis University, 1933.

#### *Assistant Professors (Clinical)*

**Wallace P. Berkowitz, B.S.**, University of Notre Dame, 1963; M.D., Boston University, 1967.

**Sheldon Davis, B.S.**, Wayne State University, 1969; M.D., University of Michigan, 1973.

**Norman S. Druck, A.B.**, Washington University, 1967; M.D., University of Illinois, 1970.

**Jeffrey Fierstein, B.A.**, Dartmouth College, 1967; M.D., Albert Einstein College of Medicine, 1971.

**Donald R. Ingram, M.D.**, University of Illinois, 1956.

**Arnoldo Kuczer, M.D.**, University of Buenos Aires, 1955. (Jewish Hospital.)

**Philip L. Martin, B.A.**, St. Louis University, 1968; M.D., 1968.

**Lloyd Thompson, B.A.**, Union College, 1960; M.D., Howard University, 1964.

**Supote Phipatanakul, M.D.**, Chulalongkorn Hospital Medical School, 1965.

#### *Instructors*

**Harlan R. Muntz, B.S.**, Miami University Ohio, 1973; M.D., Washington University, 1977 (Jewish Hospital).

#### *Research Instructors*

**Marion P. Bryan, A.B.**, Washington University, 1931.

**Thomas H. Comegys, B.A.**, Central Methodist College, 1966.

**John DeMott, B.A.**, University of Missouri, 1975; M.A., 1978.

#### *Instructors (Clinical)*

**Larry Dobbs, B.S.**, Hendrix College, 1968; M.D., University of Arkansas, Medical Sciences, 1972.

**Steven B. Overton, B.S.**, University of Michigan, 1963; M.D., 1967; M.S., 1972.

**Albert F. Ruehl, B.S.**, Washington University, 1961; M.S., 1964; M.D., St. Louis University School of Medicine, 1973.

**Richard E. Schrick, B.S.**, University of Missouri, Rolla, 1968; M.S., University of Missouri, Columbia, 1972; M.D., 1977.

#### *Research Associates*

**William Clark, B.A.**, University of Michigan, 1969; M.S., 1973; Ph.D., 1975. (Also Central Institute for the Deaf.)

**Nancy Marcus, B.S.**, Antioch College, 1968; M.A., Washington University, 1970.

#### *Research Assistants*

**Charles D. Carr**

**Gertraude Thallinger**

#### *Consultants*

**Daniel P. O'Brien, D.D.S.**, Washington University, 1964.

**L. Woodrow O'Brien, D.D.S.**, Washington University, 1935.

**Richard L. O'Brien, B.S.**, St. Louis University, 1964; D.D.S., Washington University, 1968; M.S., 1973.



# 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 sciences. Pathologists are involved in diagnostic, teaching, and research activities.

In addition to the sophomore 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. Michael Lieberman.

For the purpose of teaching, research, and service, the department is divided into specialty divisions under the following directors:

Autopsy Pathology, Dr. McKeel

Graduate Programs in Experimental Pathology, Dr. Baenziger

Laboratory Medicine, Dr. McDonald

Neuropathology, Dr. Nelson

Pediatric Pathology, Dr. Kissane

Surgical Pathology, Dr. W. Bauer

## SECOND YEAR

### Bio 515, 516. General Pathology

This course is a comprehensive study of the cellular and molecular basis of disease. Lectures, gross and microscopic demonstrations, laboratory work, tutorials, case studies, and experimental pathology seminars are all utilized. The course is divided into six sections, each consisting of a six-week period of study that is correlated with the subject matter concurrently presented in the sophomore pathophysiology course.

The sections consist of (1) general pathology and infectious diseases, (2) cardiovascular, pulmonary and renal diseases, (3) metabolic, endocrine, and gastrointestinal diseases, (4) hematology and oncology, (5) neuropathology, and (6) development, pediatric, obstetric, and gynecologic diseases. (Staff)

## THIRD AND FOURTH YEARS

### 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 the students an opportunity to interpret the clinical observations in light of the postmortem findings. One hour a week during the year. (Staff)

### Laboratory Medicine Conference

One hour each week for six weeks during Internal Medicine rotations at Barnes Hospital. Problem cases and general principles of Laboratory Medicine are discussed. (Staff)

### Tumor Conference

One hour each week for twelve weeks during the surgery and obstetrics and gynecology clerkships. Problem cases are presented for illustration and discussion of all aspects of neoplastic disease. (Staff)

## RESEARCH

### Bio 590.

The department encompasses all of the major areas of investigation in experimental pathology. Examples include:

Production of monoclonal antibodies against B lymphocyte. (Dr. Ahmed)

Lymphokines: Structure and mechanisms of action. (Dr. Aune)

Examination of glycoprotein oligosaccharides and their role in endocytosis and cellular recognition. (Dr. Baenziger)

Kinetics and hormonal aspects of neoplastic cell growth. (Drs. Bauer, Meyer)

Plasma membrane tumor associated antigens and immunity to them in human lung cancer. (Dr. Bell)

Mechanism of antigen recognition by cytolytic T lymphocytes. (Dr. Braciale)

The possible role of insulin in the regulation of intracellular calcium homeostasis. (Dr. Chan)

Experimental analysis of gastrin secretion by rat pyloric antral cells *in vitro*. (Dr. DeSchryver)

The coordination and interregulation of the pathways of carbon and energy metabolism *in vitro* using *Escherichia coli* as a model system. (Dr. Dietzler)

Functional and biochemical characterization of human T lymphocyte subpopulations and identification of human immune response genes. (Dr. Gebel)

Structure and function of endocrine cells of the gastrointestinal tract and pancreas. (Dr. Greider)

Immunologic aspects of lymphoreticular disease. (Dr. Griffith)

Cellular immunology with particular emphasis on genetic control of antibody responses. (Drs. Kapp and Araneo)

Morphologic and immunocytologic correlates of pulmonary disease. (Dr. Katzenstein)

Renal pathology, pediatric pathology. (Dr. Kissane)

Rapid diagnostic methods for the detection of opportunistic systemic fungal infections. (Dr. Kobayashi)

Mechanism of antimicrobial action and resistance. (Dr. Krogstad)

Experimental pulmonary diseases, environmental pathology. (Dr. Kuhn)

Experimental diabetes mellitus, tissue culture of islets, transplantation of islets. (Dr. Lacy)



Distribution of electrolytes and trace metals in blood.  
(Dr. Ladenson)

Chemical carcinogenesis and enzymology of DNA repair, chromatin structure, DNA methylation and cloning.  
(Dr. Lieberman)

Experimental diabetes: biochemical studies of insulin release mechanisms *in vitro*.  
(Dr. M. McDaniel)

Biology of breast cancer.  
(Dr. McDivitt)

Cellular mechanism of insulin and related hormone action with emphasis on the role of intracellular divalent cations.  
(Dr. McDonald)

Human and experimental pituitary neoplasms: pathogenetic mechanisms, cell biology, cytology, diagnosis and treatment.  
(Dr. McKeel)

Analysis of predictability of clinical laboratory diagnostic tests.  
(Dr. Murray)

Analysis of human lymphocyte subsets.  
(Dr. Nahm)

Pathogenesis of cerebral microcirculatory injury: response of the autonomic nervous system to injury; pathology and pathogenesis of lesions associated with vitamin E deficiency; pathogenesis of skeletal muscle injury.  
(Dr. Nelson)

The application of biostatistics and computer technology to the solution of data analysis problems in Laboratory Medicine.  
(Dr. Parvin)

Mechanisms regulating immune responses in tissue culture systems.  
(Dr. Pierce)

Transplantation immunology.  
(Dr. Rodey)

The mechanism of adhesion to and activation of platelets by collagen and the role of von Willebrand factor in this process.  
(Dr. Santoro)

Metabolism of coagulation moieties (fibrinogen and platelets), thrombus localization, and blood banking immunoassays.  
(Dr. Sherman)

Relationships of high-energy phosphates and insulin action.  
(Dr. Siegfried)

Placental transport and surface membrane structure and function.  
(Dr. C. Smith)

Clinical microbiology, anaerobes, endogenous infections.  
(Dr. Sonnenwirth)

Metabolic bone diseases.  
(Dr. Teitelbaum)

Characterization of receptor ligand binding systems.  
(Dr. Valdes)

Pathogenesis of diabetic vascular disease. Cellular mechanisms of endocytosis and macromolecular transport by endothelium.  
(Dr. Williamson)

Immunochemistry of fibrinopeptide.  
(Dr. Wilner)

## ELECTIVES

### Advanced Special Pathology

A series of seminars discussing timely selected topics in special pathology of human disease, augmented by illustrative cases and emphasizing clinicopathologic correlations. Reading lists will be circulated and active discussion is encouraged. If the size of the group makes it practical to do so, each student will prepare and conduct a session on a subject of his choice.  
(Dr. Kissane)

### Autopsy Pathology

A full-time elective, periods 4-8. Students assist in performing autopsies and participate fully in anatomic pathology research-related conferences, as well as in the mechanisms of diseases journal club.

(Dr. McKeel and Staff)

### Selected Topics in Immunology and Immunopathology

This will be a seminar course covering topics in immunology and immunopathology with emphasis both on areas of current research interest in immunology and on areas applicable to the understanding of human disease states. The subject matter can be selected so as to suit student interests but will also include organization of the immune system, immune deficiency and immunosuppression, cellular interaction in the immune response, patterns of immunological disease and diseases with immunological features, tolerance, and autoimmunity.

(Dr. T. Braciale)

### Neuropathology Seminar

Clinical pathological correlations of neurological diseases will be investigated by the case study method using current and documented material. Participants will partake in gross neuropathological examinations and will be assigned selected cases for discussion of clinical data and gross and microscopic pathological findings, especially in relationship to evolution and mechanism of disease processes. Topics covered will include vascular, infectious, demyelinating, and neuronal diseases, as well as neoplasms of the nervous system.

(Dr. Nelson)

### Clinical Laboratory Medicine

A full-time elective, periods three and five. Designed to acquaint the student with the proper use of the laboratory in clinical medicine and to expose the student to the basic operation of each area of the laboratory.

(Dr. McDonald and Staff)

### Anatomic Pathology—Jewish Hospital

This elective is designed to reacquaint students who have had some clinical experience with the morphological basis of disease, and to permit them to relearn normal morphological relationships. During the elective students will learn to perform gross autopsy dissections, and will be taught how to select appropriate tissue samples for further microscopic, histochemical, immunofluorescent and electron microscopy study. Subsequently, they will learn how to perform these procedures under supervision of members of the Anatomic Pathology Staff and how to interpret their results. Following completion of appropriate studies, an in-depth report of clinical pathological correlations will be prepared for each autopsy performed. This elective is considered appropriate for students who intend careers in Internal Medicine, Surgery and Radiology.

(Dr. McDivitt and Staff)

### Laboratory Medicine—Jewish Hospital

Intensive elective training in Laboratory Hematology: Includes training in immunochemistry, coagulation and special as well as routine laboratory hematology procedures. Emphasis will be placed on laboratory procedures and their relationship with patient diagnosis and management.

(Dr. Wilner)



### **Surgical Pathology—Jewish Hospital**

This elective is designed to acquaint the student with the discipline of Surgical Pathology and to permit him to develop basic skills in histopathological interpretation. This elective will be offered to only one student/period in order to permit maximum interaction with the Surgical Pathology Staff and House Officers. During the course of the elective, the student will be taught to function as a junior House Officer. He will participate in the examination and dissection of gross specimens, take operating room call, learn frozen section diagnosis, and formulate histopathological diagnoses, all in conjunction with members of the Senior Staff. Since the Laboratory of Surgical Pathology at Jewish Hospital processes a broad range of medical biopsy material as well as specimens derived from busy surgical subspecialty practice, the elective is considered desirable for students who plan careers in internal medicine and surgery as well as for those who intend to enter the field of pathology. (Dr. McDivitt)

### **Surgical Pathology**

Surgical pathology offers an elective for a 6-week period under Surgical Pathology I. Students participate fully in activities of the Division of Surgical Pathology and they are responsible for dissection and description of gross specimens and microscopic diagnosis under supervision of the senior staff of the Division. Students attend morning conferences with the Director, surgical and medical grand rounds, tumor and subspecialty conferences.

In addition, Surgical Pathology II includes rotations through subspecialties: Neuropathology, Hematopathology, Dermatopathology, ENT Pathology and Gynecologic Pathology. (Dr. Bauer and Staff)

The Division of Surgical Pathology also offers an Oncology course for a 6-week period under the guidance of Walter C. Bauer, M.D. This elective is designed to expose the student to all aspects of neoplastic disease. Students will follow the clinical course of a variety of cancer patients, correlating clinical response with mode of treatment, state of disease, and pathologic evaluation. Students will make rounds with the medical oncologists and will follow treatment with surgery, irradiation and chemotherapy. Correlation of the results of radiologic examinations, exfoliative cytology and tumor kinetic studies with extent of disease and response to treatment will be studied. Students will represent in detail the treatment, rationale for therapy, and observed response on at least one patient per week. (Dr. Bauer)

In addition to the above, the department offers a number of 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.

### **Bio 504. Environmental Pathology**

### **Bio 518, 519. Pathology Research Seminar**

### **Bio 520. Methods in Experimental Pathology**

### **Bio 521. Cellular Aspects of the Immune Response**

### **Bio 544. Mechanisms of Neoplasia**

*Note*—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

## **Faculty of the Department of Pathology**

### **Edward Mallinckrodt Professor and Head of Department**

**Paul E. Lacy, B.A.,** Ohio State University, 1945; M.D., 1948; M.S., 1948; Ph.D., University of Minnesota, 1955.

### **Professors Emeriti**

**Lauren V. Ackerman** (Pathology and Surgical Pathology), A.B., Hamilton College, 1927; M.D., University of Rochester, 1932. (Also Consultant)

**Ruth Silberberg, M.D.,** University of Breslau, 1931. (Also Lecturer)

### **Professors**

**Walter C. Bauer, B.S.,** Ohio State University, 1946; M.D., Washington University, 1954.

**Joseph M. Davie, A.B.,** Indiana University, 1962; M.A., 1964; Ph.D., 1966; M.D., Washington University, 1968. (See Department of Microbiology and Immunology.)

**John M. Kissane, A.B.,** University of Rochester, 1948; M.D., Washington University, 1952. (See Department of Pediatrics.)

**Charles Kuhn, A.B.,** Harvard University, 1955; M.D., Washington University, 1959.

**Michael Kyriakos, B.S.,** City College of New York, 1958; M.D., Albert Einstein College of Medicine, 1962.

**Michael W. Lieberman, B.A.,** Yale University, 1963; M.D., University of Pittsburgh, 1967; Ph.D., 1972.

**Robert W. McDivitt, M.D.,** Yale Medical School, 1956. (Jewish Hospital)

**John S. Meyer, A.B.,** Yale University, 1952; M.D., Washington University, 1956. (Jewish Hospital)

**James S. Nelson, M.D.,** St. Louis University, 1957. (See Department of Pediatrics.)

**John W. Olney, B.A.,** University of Iowa, 1956; M.D., 1963. (See Department of Psychiatry.)

**Carl W. Pierce, A.B.,** Colgate University, 1962; M.D., University of Chicago, 1966; Ph.D., 1966. (See Department of Microbiology and Immunology.) (Jewish Hospital)

**Heschel J. Raskas, B.S.,** Massachusetts Institute of Technology, 1962; Ph.D., Harvard University, 1967. (See Department of Microbiology and Immunology.)

**Glenn E. Rodey, B.S.,** Ohio University, 1957; M.D., Ohio State University, 1961. (See Department of Medicine.)

**Laurence A. Sherman, B.A., B.S.,** University of Chicago, 1956; M.D., Albany Medical College, 1964. (See Department of Medicine.)

**Morton E. Smith, B.S.,** University of Maryland, 1956; M.D., 1960. (See Department of Ophthalmology.)

**Alexander C. Sonnenwirth**, A.B., University of Nebraska, 1950; M.S., Purdue University, 1953; Ph.D., Washington University, 1960. (See Department of Microbiology and Immunology.) (Jewish Hospital)

**Richard Torack**, B.S., Seton Hall University, 1948; M.D., Georgetown University, 1952.

**Joseph R. Williamson**, A.B., Phillips University, 1954; M.D., Washington University, 1958.

#### *Professor (Visiting Staff)*

**Frederick G. Germuth, Jr.**, A.B., Johns Hopkins University, 1942; M.D., 1945.

#### *Associate Professors*

**Harish C. Agrawal**, B.Sc., Allahabad University, 1957; M.Sc., 1959; Ph.D., 1964. (See Departments of Pediatrics and Neurology and Neurological Surgery.)

**Jacques U. Baenziger**, B.A., New College, 1969; M.D., Washington University, 1975; Ph.D., 1975.

**C. Elliott Bell, Jr.**, B.S., Tulane University, 1960; M.D., 1964. (See Department of Medicine.)

**David N. Dietzler**, A.B., Washington University, 1957; Ph.D., 1963. (See Department of Medicine.)

**Milton N. Goldstein**, B.S., Western Reserve University, 1946; M.S., 1947; Ph.D., 1952. (See Department of Anatomy and Neurobiology.)

**Marie H. Greider**, B.S., Ohio State University, 1949; M.S., 1955; Ph.D., 1960.

**Phyllis M. Hartroft**, B.S., University of Michigan, 1949; M.A., University of Toronto, 1951; Ph.D., 1954.

**Judith A. Kapp-Pierce**, B.A., Miami University, 1965; M.S., Indiana University, 1969; Ph.D., Harvard University, 1976. (See Department of Microbiology and Immunology.) (Jewish Hospital)

**Anna-Luise Katzenstein**, A.B., Johns Hopkins University, 1968; M.D., 1971.

**Gerald Kessler**, B.S., City College of New York, 1950; M.S., University of Maryland, 1952; Ph.D., 1954. (Jewish Hospital)

**Jack H. Ladenson**, B.S., Pennsylvania State University, 1964; Ph.D., University of Maryland, 1971. (See Department of Medicine.)

**Michael L. McDaniel**, B.A., Southern Illinois University, 1963; M.S., University of North Dakota, 1966; Ph.D., St. Louis University, 1970.

**Jay McDonald**, B.S., Tufts University, 1965; M.S., Wayne State University, 1969. (See Department of Medicine.)

**Carl H. Smith**, B.A., Swarthmore College, 1955; M.D., Yale University, 1959. (See Department of Pediatrics.)

**Steven L. Teitelbaum**, B.A., Columbia University, 1960; M.D., Washington University, 1964. (Jewish Hospital)

**George D. Wilner**, B.S., Northwestern University, 1962; M.D., 1965. (See Department of Medicine.) (Jewish Hospital)

#### *Associate Professors (Visiting Staff)*

**Frederick T. Kraus**, B.A., College of William and Mary, 1951; M.D., Washington University, 1955.

**William V. Miller**, A.B., University of Missouri, 1962; M.D., 1966. (See Department of Medicine.)

**Blanca M. Perez**, B.A., Universidad del Valle, 1953; M.D., 1961.

#### *Assistant Professors*

**Jacques U. Baenziger**, B.A., New College, 1969; M.D., Washington University, 1975; Ph.D., 1975.

**Thomas J. Braciale**, B.S., St. Joseph's College, 1968; M.D., University of Pennsylvania, 1975; Ph.D., 1975.

**Kwok-Ming Chan**, B.S., Hong Kong Baptist College, 1971; Ph.D., University of South Dakota, 1977. (See Department of Medicine.)

**Katherine DeSchryver**, M.D., University of Louvain, 1971.

**Samir K. El-Mofty**, B.D.S., Cairo University, 1959; M.Sc., University of Pennsylvania, 1966; Ph.D., Temple University, 1975. (Also School of Dental Medicine.)

**Keith Fulling**, A.B., Johns Hopkins University, 1971; M.D., Washington University, 1975.

**Howard M. Gebel** (Clinical Immunology), B.S., University of Illinois, 1973; Ph.D., University of Missouri, 1976. (See Department of Medicine.)

**Deborah Gersell**, B.S., University of Michigan, 1971; M.D., Washington University, 1975.

**Carlos J. Goldenberg**, M.D., Universidad Nacional de Buenos Aires, 1967.

**Rogers C. Griffith**, B.S., University of Arkansas, 1968; M.D., 1972.

**Suleyman Gulmen**, D.D.S., Hacettepe University, 1968; M.D.S., University of Minnesota, 1972. (Also School of Dental Medicine.)

**Donald J. Krogstad**, A.B., Bowdoin College, 1965; M.D., Harvard Medical School, 1969. (See Department of Medicine.)

**Michael L. Landt**, B.S., Whitworth College, 1970; Ph.D., University of Oregon, 1976. (See Department of Pediatrics.)

**Robert L. Low**, A.B., University of California, 1970; Ph.D., University of Chicago, 1975; M.D., 1977.

**Michael T. Mazur**, B.S., Northwestern University, 1970; M.D., 1973. (Jewish Hospital)

**Daniel W. McKeel**, B.S., Hampden-Sydney College, 1961; M.D., University of Virginia, 1966.

**David N. Menton**, B.S., Mankato State College, 1959; Ph.D., Brown University, 1966. (See Department of Anatomy and Neurobiology.)



**Patrick Murray, B.S.**, Saint Mary's College, 1969; Ph.D., University of California, 1974. (See Department of Medicine.)

**Moon Nahm, A.B.**, Washington University, 1970; M.D., 1974. (See Department of Medicine.)

**Daniel Santa Cruz, M.D.**, University of Buenos Aires, 1971.

**Samuel Santoro, B.S.**, Emory University, 1972; M.D., Vanderbilt University, 1979; Ph.D., 1979. (See Department of Medicine.)

**Robert E. Schmidt, A.B.**, Washington University, 1969; M.D., 1976; Ph.D., 1976.

**Barry A. Siegfried, B.S.**, Washington University, 1972; M.D., 1976. (See Department of Medicine.) (Jewish Hospital)

**E. Kaye Smith, B.S.**, Webster College, 1957; M.S., St. Louis University, 1963; D.V.M., Kansas State University, 1965.

**Roland Valdes, Jr., B.S.**, University of Miami, 1969; M.S., California State University, 1972; Ph.D., University of Virginia, 1976. (Jewish Hospital)

#### *Research Assistant Professor*

**Kun-hwa Hsieh, B.S.**, National Taiwan University, 1965; Ph.D., University of California, 1973. (Jewish Hospital.)

#### *Assistant Professors (Visiting Staff)*

**Wagih M. Abdel-Bari, B.A.**, School of Science, 1948; M.D., Ein Shams University, 1953; Ph.D., Washington University, 1965.

**John D. Bauer, B.Sc.**, University of Innsbruck, 1938; L.R.C.P. and S., University of Glasgow, 1944; M.D., Marquette University, 1947.

**Luis Q. Del Rosario, M.D.**, University of Santo Tomas, 1954.

**Valgard Jonsson, B.S.**, North Dakota State University, 1958; M.S.P.H., University of North Carolina, 1961; Ph.D., 1965.

**Richard A. Kahn, A.B.**, University of Missouri, 1966; M.S., 1968; Ph.D., Georgetown University, 1972.

**Kathleen S. McLaughlin, B.S.**, St. Louis University, 1960; M.D., Washington University, 1964.

**Robert W. Ogilvie, B.A.**, University of Utah, 1943; M.D., 1946.

**Donald J. Parker, B.S.**, Duquesne University, 1959; M.S., 1964; Ph.D., Kansas State University, 1967.

**Richard Payne, B.S.**, Ohio University, 1960; M.D., Washington University, 1963.



**Luis Tumialan, M.D.**, University of San Marcos, 1965.

**Andres J. Valdes, B.S.**, Institute de Santa Clara, 1949; M.D., University of Havana, 1957.

#### *Instructors*

**Howard Brent Clark, B.A.**, Macalester College, 1970; M.D., Washington University, 1978; Ph.D., 1978.

**Jeffrey Saffitz, B.A.**, Case Western Reserve University, 1971; M.S., 1971; Ph.D., 1977; M.D., 1978.

#### *Research Instructors*

**Barbara A. Araneo, B.A.**, University of Wisconsin, 1973; Ph.D., University of Rochester, 1976. (Jewish Hospital.)

**Thomas M. Aune, B.S.**, Southwestern at Memphis, 1973; Ph.D., University of Tennessee, 1976. (Jewish Hospital)

**Vivian Braciale, A.B.**, Cornell University, 1969; Ph.D., University of Pennsylvania, 1973.

**Katherine C. Chang, B.S.**, University of Taiwan, 1969; Ph.D., University of Iowa, 1974.

**Edward H. Finke, B.S.**, Washington University, 1962.

**Jeffrey P. Lake, B.A.**, Washington and Jefferson College, 1971; M.S., Idaho State University, 1973; Ph.D., Montana State University, 1977. (Jewish Hospital)

**Craig M. Sorensen, B.S.**, University of Illinois, 1976; Ph.D., Washington University, 1980. (Jewish Hospital)

**Moon-Shong Tang, B.S.**, National Taiwan University, 1966; M.S., University of Texas, 1975; Ph.D., 1976.

**Ronald G. Tilton, B.S.**, University of South Florida, 1971; Ph.D., Washington University, 1977.

#### *Instructors (Clinical)*

**Parveen Ahmed, M.B.B.S.**, Karachi University, 1970.

**Curtis Parvin, B.S.**, Michigan State University, 1974; M.S., University of Minnesota, 1976; Ph.D., 1980.

#### *Instructors (Visiting Staff)*

**Tomas Aquino, S.B.**, Santa Clara Institute, 1949; M.D., University of Havana, 1957; Ph.D., University of Chicago, 1967.

**Robert R. Dahlgren, B.S.**, Oklahoma State University, 1962; D.V.M., 1963; M.S., 1966.

**Virgilio P. Dumadag, M.D.**, Far Eastern University Institute of Medicine, 1961.

**Rodolfo A. Latorre, M.D.**, University of the East, Ramon Magsaysay Memorial Medical Center, 1961.

**Manuel Marban, A.A.**, Xavier University, 1959; M.D., University of Santo Tomas, 1964.

**Michael A. McCarty, A.B.**, Washington University, 1969; M.D., 1973.

**Carlos Perez-Mesa, M.D.**, University of Havana, 1950.

**Antonio Salvador, M.D.**, University of Porto, 1963.

**Ursula Sclafford, B.S.**, Howard University, 1942; M.D., 1945.

**Gregorio Sierra, B.S.**, Institute of Manzanillo, 1945; M.D., University of Havana, 1954.

#### *Research Assistants*

**Maria Chraplyvy, B.S.**, St. Louis University, 1964; M.S., 1967.

**Dorothy J. Fiete, B.S.**, Marymount College, 1966.

**C. Joan Fink, B.A.**, Lindenwood College, 1958.

**Mary P. Leckie, B.S.**, University of Toledo, 1967.

**Joan Lee, B.S.**, Taiwan Christian College, 1960; M.S., Oklahoma State University, 1967.

**Christina L. Patke, B.A.**, St. Louis University, 1977.

**Santiago Plurad, B.S.**, University of Philippines, 1952; M.S., Iowa State University, 1962; Ph.D., University of Missouri, 1967.

**Elaine V. Rieders, B.A.**, Hunter College, 1948.

# Edward Mallinckrodt Department of Pediatrics

The primary aim of the Department of Pediatrics in the teaching program 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 will have an appreciation of pediatric problems regardless of his future choice of a career in medicine.

The major clinical and research facilities are in the St. Louis Children's Hospital and the St. Louis Maternity Hospital. The former has a bed capacity of 182, and accepts children through adolescence with all types of medical problems. Hospital admittances average 6,000 annually. The Pediatric Outpatient Division averages about 70,000 visits a year. In the Medical Center the yearly number of newborn infants averages more than 4,000.

## SECOND YEAR

The student is introduced to pediatrics and to the full-time staff through a series of lectures designed to acquaint him with the concepts of human growth and development, genetics, and the effects of age and maturity on reactions to injury and disease. A second series of talks highlights the important disorders commonly encountered in infants and children. The unique aspects of the physical examination of the infant and child are presented during the course in physical diagnosis. Members of the department also participate in the sophomore course in pathophysiology.



## THIRD YEAR

A clerkship of six weeks is scheduled, where the student participates in the following:

1. Care of inpatients, sharing responsibility with intern or resident.
2. Daily ward rounds and bedside conferences with house staff and attending physician.
3. Special conferences on various facets of pediatrics.
4. Tutorial with junior faculty.
5. Weekly grand rounds.
6. Weekly case conference.

## FOURTH YEAR

This year is devoted to elective time which may be spent according to the individual preferences of the student, who may serve as an intern substitute or in the research laboratory or combine clinical and laboratory work. The following electives are offered:

### Pediatric Cardiology

#### Clinical Elective—Inpatient

The student works as a subintern and is assigned selected patients on the Pediatric Cardiology ward.

(Drs. Goldring, Hartmann, Hernandez, Strauss)

#### Clinical Elective—Outpatient

The student will see patients attending all of the outpatient clinics including both new referrals and follow-up visits. The student will also be responsible for the interpretation of electrocardiograms, echocardiograms and 24-hour Holter monitor examinations performed in the cardiology non-invasive laboratory.

(Drs. Goldring, Hartmann, Hernandez, Strauss)

#### Research Elective (minimum 12 weeks)

Students will participate in on-going research concerning the pathophysiology and epidemiology of childhood hypertension (Dr. Goldring) or in the molecular basis of compartmentation of newly synthesized proteins (Dr. Strauss). The basic science elective is conducted in the







biochemistry department and involves recombinant DNA technology, cloning of various DNA fragments and cell biological techniques.

### **Pediatric Neurology**

#### **Clinical Elective**

The student participates as a full member of the neurology ward team and is directly responsible for a proportion of the patients on the service under the direction of the senior resident. He is expected to take night call every third or fourth night, during which time he is responsible for the medical care of the entire ward, as well as for emergency admissions. (Drs. Dodge, Prenskey)

#### **Research Elective**

The student has an opportunity to learn some of the chromatographic and spectrophotometric techniques frequently used in developmental neurochemistry, while working on a project of his choosing or one that is currently in progress in the laboratory. Prior discussion is necessary. (Dr. Agrawal)

### **Pediatric Infectious Diseases**

#### **Clinical Elective**

The student will be assigned patients on the Infectious Diseases or General Pediatric Division for initial evaluation and continuing care. The student works as an extern and is expected to take night call every third 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 diseases, failure to thrive, acute asthma, poisoning, immune deficiency diseases, and gastrointestinal disorders.

(Drs. Granoff, Keating, Shackelford)

### **Research Electives**

Research is aimed at identification of the proteins of Varicella Zoster Virus (VZV) and correlation of individual viral proteins with the antigenic determinants of humoral and some mediated host immune response to VZV infection. Prefer student for at least three periods who would like project leading to publication, but shorter projects could be arranged. Techniques involved are tissue culture, virus purification, immunofluorescence and ELISA assays, lymphocyte blastogenesis assays, gel electrophoresis radioimmune precipitation and affinity column chromatography. (Dr. Gardner)

A variety of clinical and laboratory opportunities are available. The work is focused on *H. influenzae* type b infections in children—epidemiology, immune response and prevention through immunization. We are attempting to delineate the composition and immunogenicity of the noncapsular surface antigens of this organism. We also are interested in genetic determinants of human antibody response to *H. influenzae*, type b.

(Dr. Granoff)

We are involved in studies of the humoral immune response of young children to polysaccharide antigens. Techniques utilized in these studies include isoelectric focusing, radioimmunoassays, affinity purification of antibodies and production of hybridoma antibodies.

(Dr. Shackelford)

### **Pediatric Hematology and Oncology**

Large numbers of children with diverse hematological and oncological problems are seen. During the six-week rotation the student will learn to interpret blood smears, bone marrows, and special laboratory studies. Concepts of management and differential diagnosis are reviewed.

(Drs. Brodeur, Distelhorst, Land, Vietti, Zarkowsky)

### **Pediatric Renal Disease**

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 a large number of both inpatients and outpatients. Students will have an opportunity to follow the courses of patients with acute renal disease as well as those with more chronic problems and will help to plan the evaluation and therapeutic management of these patients. Discussions and rounds with the attending staff and fellows emphasize the relationship between clinical problems and the pathophysiology of the underlying disease. These informal teaching sessions are supplemented by more formal sessions. These include renal attending rounds, renal research rounds and journal clubs which are conducted weekly in conjunction with the Renal Divisions, Barnes and Jewish Hospitals. Formal conferences are held regularly in association with Dr. John Kissane (renal pathology). 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 of areas of interest to him either in renal physiology or clinical topics.

(Drs. Cole, Robson)

## General Pediatrics

### Pediatric Ambulatory Service

A six-week course with participation in all aspects of ambulatory care of children under the direction of St. Louis Children's Hospital staff physicians. Includes diagnosis and treatment of acute and chronic illness in general pediatric service, in private physicians' offices, and in the emergency room. Experiences in subspecialty clinics are also offered. (Dr. Middelkamp)

### General Clinical Pediatrics

The student participates as an active member of the pediatric care team at the St. Louis County Hospital. Under supervision of faculty, senior and junior residents, he is involved with patients in the pediatric clinics, the emergency department, the newborn nursery, and the inpatient service. The elective provides a general pediatric experience, with emphasis on ambulatory care and neonatology. (Drs. Jones, Keller)

### Pediatric Endocrinology and Metabolism

This elective is designed to include broad clinical experience in pediatric endocrine and metabolic problems. The student has the opportunity to evaluate many of the pediatric endocrine patients and to see some adult patients during weekly rounds. Emphasis is placed on the practical management of common problems. The student attends rounds and clinics (endocrine, metabolic, and diabetic) and the joint metabolic seminar and rounds held with the medical service. A large number of patients with varied problems are studied in depth during any six-week period. (Drs. Bier, Blethen, Granoff, Hillman, Santiago, Weldon, White)

## Genetics

### Medical Genetics

Twelve weeks, all day. Combined clinical and research course. (Drs. Sly, Taysi)

## Clinical Genetics

Six weeks, all day. Experience in clinical/laboratory approach to study of genetic problems. Students see all consultations referred to the Division of Medical Genetics. They work in the Medical Genetics Clinic on Monday afternoons, attend daily genetics rounds, and participate in scheduled seminars. (Drs. Sly, Taysi)

### Research Elective

This course offers a period of research experience participating in studies of 1) lysosomal storage disorders, particularly mucopolysaccharidosis, and 2) fundamental mechanisms of intracellular transport of macromolecules (receptor-mediated endocytosis). (Dr. Sly)

## Neonatology

### Clinical Neonatology

The time is spent at St. Louis Children's Hospital in the intensive care nursery learning the care of severely ill newborns and prematures. During the entire six weeks, daily teaching rounds will be held on the Intensive Care Unit at Children's Hospital. Interested students may arrange to spend time at Maternity Hospital learning the examination and care of normal newborn and premature infants, as well as those with less severe illnesses that do not require intensive care. Students will be offered considerable responsibility in patient care and may participate in the transportation of ill patients from other hospitals to St. Louis Children's Hospital. Opportunities are available for clinical research in perinatal medicine. (Drs. Hillman, Marshall, Thach)

## Seminar Elective

### Developmental Neurobiology

This course covers selected topics in the development of the nervous system. While emphasis is given to the neurochemical aspects of brain growth and maturation, there are also discussions of the neurophysiological and functional development of the brain. The relationship between chemical, physiological, and functional development and underlying anatomical changes is stressed. The course is conducted as a seminar, with papers assigned prior to each meeting. Members of the Departments of Pediatrics and Neurology and Neurological Surgery are present at these discussions to clarify obscure points and to add additional information when possible. (Dr. Agrawal)

## Clinical Chemistry Laboratory

### Research Electives

Placental amino acid transfer—in *vitro* tissue incubation, regulation, and relation to needs of the fetus. Composition and function of trophoblast plasma membrane. (Dr. Smith)

The role of calmodulin (an ubiquitous calcium-binding protein) in the mechanisms of hormone action. Present investigations include the involvement of calmodulin in (1) pancreatic islet cell secretion, (2) control of membrane phosphorylation, and (3) activation of hormone-sensitive enzymes. (Dr. Landt)





## Faculty of the Department of Pediatrics

### *Professor and Head of Department*

**Philip R. Dodge, M.D.**, University of Rochester, 1948. (See Department of Neurology and Neurological Surgery.)

### *Allen P. and Josephine B. Green Professor of Pediatric Neurology*

**Arthur L. Pinsky, A.B.**, Cornell University, 1951; M.D., New York University, 1955. (See Department of Neurology and Neurological Surgery.)

### *Professor Emeritus*

**Donald L. Thurston, B.S.**, Vanderbilt University, 1934; M.D., 1937. (Also Lecturer.)

### *Professors*

**Harish C. Agrawal, B.Sc.**, Allahabad University, 1957; M.S., 1959; Ph.D., 1964. (See Departments of Neurology and Neurological Surgery and Pathology.)

**David Goldring, A.B.**, Washington University, 1936; M.D., 1940.

**Alexis F. Hartmann, Jr., B.S.**, Washington University, 1947; M.D., 1951.

**John C. Herweg, B.S.**, Drury College, 1943; M.D., Washington University, 1945. (See Administration.)

**Richard E. Hillman, A.B.**, Brown University, 1962; M.D., Yale University, 1965. (See Department of Genetics.)

**Lawrence I. Kahn** (Health Care Research), A.B., University of Alabama, 1941; M.D., Louisiana State University, 1945. (See Department of Preventive Medicine and Public Health and Medical Care Group.) (Also Pediatric Nurse Practitioner Program.)

**James P. Keating, A.B.**, Harvard University, 1959; M.D., 1963.

**John M. Kissane, A.B.**, University of Rochester, 1948; M.D., Washington University, 1952. (See Department of Pathology.)

**Richard E. Marshall, B.A.**, Wesleyan University, 1954; M.D., Yale University, 1962.

**William H. McAlister, B.S.**, Wayne State University, 1950; M.D., 1954. (See Department of Radiology.)

**J. Neal Middelkamp, B.S.**, University of Missouri, 1946; M.D., Washington University, 1948.

**James E. Miller, B.S.**, Tulane University, 1946; M.D., Medical College of Alabama, 1949. (See Department of Ophthalmology.)

**James S. Nelson, M.D.**, St. Louis University, 1957. (See Department of Pathology.)

**Alan M. Robson, M.B.B.S.**, University of Durham, 1959; M.D., 1964. (See Department of Medicine.)

**William S. Sly, M.D.**, St. Louis University, 1957. (See Departments of Medicine and Genetics.)

**Carl H. Smith, B.A.**, Swarthmore College, 1955; M.D., Yale University, 1959. (See Department of Pathology.)

**Jessie L. Ternberg, A.B.**, Grinnell College, 1946; Ph.D., University of Texas, 1950; M.D., Washington University, 1953; Sc.D. (hon.), Grinnell College, 1972. (See Department of Surgery.)

**Jean H. Thurston, B.A.**, University of Alberta, 1938; M.D., 1941.

**Teresa J. Vietti, A.B.**, Rice University, 1949; M.D., Baylor University, 1953. (See Department of Radiology.)

**Joseph J. Volpe, B.A.**, Bowdoin College, 1960; M.D., Harvard University, 1964. (See Departments of Neurology and Neurological Surgery and Biological Chemistry.)



**Clarence S. Weldon, A.B.**, University of Michigan, 1951; M.D., Johns Hopkins University, 1955. (See Department of Surgery.)

**Virginia V. Weldon, A.B.**, Smith College, 1957; M.D., University of Buffalo, 1962. (See Administration.)

#### *Professors Emeriti (Clinical)*

**Joseph C. Jaudon, A.B.**, Washington University, 1926; M.D., 1933.

**Park J. White, A.B.**, Harvard University, 1913; M.D., Columbia University, 1917.

#### *Professors (Clinical)*

**Maurice J. Keller, A.B.**, Yale University, 1936; M.D., Columbia University, 1940.

**George Sato, M.D.**, Washington University, 1947.

**Donald B. Strominger, B.A.**, Yale University, 1948; M.D., Washington University, 1953.

#### *Associate Professor Emeritus*

**Dorothy J. Jones, A.B.**, Oberlin College, 1930; M.D., Washington University, 1934. (See Pediatric Nurse Practitioner Program.) (Also Lecturer.)

#### *Associate Professors*

**Dennis M. Bier, B.S.**, LeMoine College, 1962; M.D., New Jersey College of Medicine, 1966. (See Department of Medicine.)

**Barbara R. Cole, B.A.**, Doane College, 1963; M.D., University of Kansas, 1967.

**Ruthmary K. Deuel, B.A.**, Mount Holyoke College, 1956; M.D., Columbia University College of Physicians and Surgeons, 1961. (See Department of Neurology and Neurological Surgery.)

**W. Edwin Dodson, A.B.**, Duke University, 1963; M.D., 1967. (See Department of Neurology and Neurological Surgery.)

**Dan M. Granoff, B.A.**, Johns Hopkins University, 1965; M.D., 1968.

**Barbara M. Herjanic, B.A.**, Northwestern University, 1943; B.S., Western Michigan College, 1946; M.D., University of Michigan, 1950. (See Department of Psychiatry.)

**Antonio Hernandez, Jr., A.A.**, University of the Philippines, 1949; M.D., Manila Central University, 1954.

**Laura S. Hillman, B.A.**, Carleton College, 1964; M.D., Yale University, 1968.

**Vita J. Land, B.S.**, McGill University, 1961; M.D., 1965.

**Charles B. Manley, Jr.** (Genitourinary Surgery), A.B., University of Missouri, 1955; M.D., 1958. (See Department of Surgery.)

**Helen Palkes** (Psychology), B.S., Washington University, 1966; M.A., 1968.

**Julio V. Santiago, B.S.**, Manhattan College, 1963; M.D., University of Puerto Rico, 1967. (See Department of Medicine.)

**Gary D. Shackelford, B.A.**, Northwestern University, 1964; M.D., Washington University, 1968. (See Department of Radiology.)

**Penelope G. Shackelford, B.S.**, University of Wisconsin, 1964; M.D., Washington University, 1968.

**Arnold W. Strauss, B.A.**, Stanford University, 1966; M.D., Washington University, 1970. (See Department of Biological Chemistry.)

**Kutay Taysi, M.D.**, Ankara University School of Medicine, 1961.

**Bradley T. Thach, A.B.**, Princeton University, 1964; M.D., Washington University, 1968.

**James K. Turner, A.B.**, Washington University, 1949; M.D., 1953. (See Medical Care Group.)

**Harold Zarkowsky, A.B.**, Washington University, 1957; M.D., 1961.

#### *Associate Professors Emeriti (Clinical)*

**Helen M. Aff, B.S.**, Washington University, 1934; M.D., 1934.

**Max Deutch, M.D.**, Washington University, 1926.

**Stanley L. Harrison, B.S.**, Washington University, 1928; M.D., 1930.

**Frederick A. Jacobs, B.S.**, Washington University, 1927; M.D., 1928.

**Sol Londe, B.S.**, Washington University, 1925; M.D., 1927.

**Bernard Schwartzman, A.B.**, Washington University, 1931; M.D., 1935.

#### *Associate Professors (Clinical)*

**C. Read Boles, A.B.**, Washington University, 1940; M.D., 1943.

**Robert H. Friedman, M.D.**, Washington University, 1948.

**Gene H. Grabau, B.S.**, St. Louis College of Pharmacy, 1937; M.D., Washington University, 1942.

**Marshall B. Greenman, B.S.**, University of Illinois, 1946; M.D., 1948.

**Kenneth A. Koerner, A.B.**, Washington University, 1935; M.D., 1941.

**Maurice J. Lonsway, Jr., A.B.**, Washington University, 1946; M.D., 1950.

**John C. Martz, A.B.**, University of Missouri, 1938; M.D., Washington University, 1942.

**Helen E. Nash, A.B.**, Spelman College, 1942; M.D., Meharry Medical College, 1945.

**Frederick D. Peterson, A.B.**, Knox College, 1953; M.D., Washington University, 1957.

**Warren G. Sherman, B.A.**, University of Missouri, 1965; M.D., Tulane University, 1969.

**Argyrios A. Tsifutis, M.D.**, Aristotelion University of Thessalonika, 1954.

**Frank S. Wissmath, A.B.**, Washington University, 1939; M.D., 1943.

#### *Assistant Professors*

**Stephen J. Barenkamp, B.A.**, Carleton University, 1973; M.D., University of Chicago, 1977.

**Mary G. Beale, B.A.**, Wellesley College, 1966; M.D., Johns Hopkins University, 1970.

**Martin J. Bell, B.A.**, New York University, 1959; M.D., State University of New York, Downstate, 1963. (See Department of Surgery.)

**Sandra L. Blethen, B.S.**, University of Chicago, 1961; Ph.D., University of California, Berkeley, 1965; M.D., Albert Einstein College of Medicine, 1975.

**Richard J. Bower, B.S.**, Northern Illinois University, 1965; M.D., University of Virginia, 1969. (See Department of Surgery.)

**Garrett M. Brodeur, B.A.**, St. Louis University, 1971; M.D., Washington University, 1975.

**Max H. Burgdorf, A.B.**, Washington University, 1970; M.D., 1974. (See Medical Care Group.)

**James E. Carroll, B.S.**, University of Louisville, 1966; M.D., 1969. (See Department of Neurology and Neurological Surgery and Irene Walter Johnson Institute of Rehabilitation.)

**Fred I. Chasalow, B.S.**, Stevens Institute of Technology, 1964; Ph.D., Brandeis University, 1971.

**Milton L. Cobb, B.A.**, Baylor University, 1964; M.D., University of Texas Southwestern Medical School, 1968. (See Department of Anesthesiology.)

**Clark W. Distelhorst, B.A.**, Ohio State University, 1968; M.D., 1971.



**Felton J. Earls, B.S.**, Howard University, 1963; M.D., 1967. (See Department of Psychiatry.)

**Kenneth D. Faw, B.S.**, Seattle Pacific University, 1972; M.D., Washington University, 1976. (See Department of Otolaryngology.)

**Tessa D. Gardner, B.S.**, Massachusetts Institute of Technology, 1968; M.D., Harvard University, 1972.

**Alice B. Granoff, B.A.**, University of Texas, Austin, 1959; M.D., University of Texas Southwestern Medical School, 1963.

**Gary E. Hirschberg, A.B.**, Princeton University, 1968; M.D., Hahnemann Medical College, 1972. (See Department of Anesthesiology.)

**Barbel Holtmann, B.S.Ed., A.B.**, University of Missouri, 1964; M.D., 1968. (See Department of Surgery.)

**Mary I. Johnson, B.S.**, Washington State University, 1964; M.D., Johns Hopkins University, 1968. (See Departments of Anatomy and Neurobiology and Neurology and Neurological Surgery.)

**Michael L. Landt** (Laboratory Medicine), B.S., Whitworth College, 1970; Ph.D., University of Oregon, 1976. (See Department of Pathology.)

**Jeffrey L. Marsh, B.A.**, Johns Hopkins University, 1967; M.D., 1970. (See Department of Surgery.)

**Mabel L. Purkerson, A.B.**, Erskine College, 1951; M.D., Medical College of South Carolina, 1956. (See Administration and Department of Medicine.)

**Jerry L. Rosenblum, B.A.**, Emory University, 1970; M.D., Washington University, 1974.

**Steven M. Rothman, M.D.**, State University of New York, Upstate, 1973. (See Departments of Anatomy and Neurobiology and Neurology and Neurological Surgery.)

**Marilyn J. Siegel, A.B.**, Washington University, 1965; M.D., State University of New York, Downstate, 1969. (See Department of Radiology.)

**Paul S. Simons, B.A.**, University of Texas, 1963; M.D., Washington University, 1967. (See Medical Care Group.)

**Gregory A. Storch, A.B.**, Harvard University, 1969; M.D., New York University School of Medicine, 1973.

**Neil H. White, B.S.**, State University of New York, Albany, 1971; Albert Einstein College of Medicine, 1975.

#### *Research Assistant Professors*

**Ronald L. Gingerich, B.A.**, Goshen College, 1970; Ph.D., Indiana University, 1975. (See Department of Medicine.)

**Robert S. Munson, B.A.**, University of Connecticut, 1968; Ph.D., 1976.

#### *Assistant Professors Emeriti (Clinical)*

**Martin Calodney, B.S.**, College of the City of New York, 1930; M.D., New York University, 1936.

**Marianne Kuttner, M.D.**, Johann Wolfgang Goethe University, 1931.

**Edith C. Robinson, A.B.**, Randolph-Macon College, 1927; M.S., University of South Carolina, 1928; M.D., Johns Hopkins University, 1932.

#### *Assistant Professors (Clinical)*

**Edward T. Barker, A.B.**, Princeton University, 1953; M.D., Washington University, 1957.

**Walter F. Benoist, A.B.**, University of Pennsylvania, 1968; M.D., Washington University, 1972.

**Gordon R. Bloomberg, A.B.**, University of Illinois, 1955; B.S., 1955; M.D., 1959.

**James M. Corry, B.S.**, Grinnell College, 1970; M.D., Washington University, 1974.

**Charles H. Dougherty, A.B.**, College of the Holy Cross, 1969; M.D., University of Rochester, 1973.

**Gerald J. Duling, B.S.**, Xavier University, 1955; M.D., St. Louis University, 1959.

**Ira J. Friedman, B.S.**, University of Arkansas, 1955; M.D., 1960.

**Elliot F. Gellman, B.A.**, State University of Iowa, 1957; M.D., University of Missouri, 1961.

**Samuel W. Gollub, B.S.**, Washington University, 1941; M.D., 1941.

**Santosh Gupta, M.B.B.S.**, Lucknow University, 1963; D.C.H., University of London, 1966.

**J. Larry Harwell, A.B.**, Washington University, 1958; M.D., University of Missouri, 1961.

**Henry L. Knock, A.B.**, Johns Hopkins University, 1949; M.D., 1953.

**Stanley B. Lyss, A.B.**, Harvard University, 1958; M.D., Washington University, 1962.

**Richard Margolis, B.S.**, College of William and Mary, 1947; M.D., Western Reserve University, 1951.

**Homer E. Nash, Jr., B.S.**, Morehouse College, 1948; M.D., Meharry Medical College, 1951.

**Paul H. Painter, M.D.**, St. Louis University, 1947. (See Division of Child Psychiatry.)

**Susan Pittman, A.B.**, University of Missouri, 1959; M.D., 1963.

**Steven I. Plax, A.B.**, University of Missouri, 1957; M.D., 1961.

**William J. Ross, B.A.**, Miami University, 1968; M.D., Washington University, 1972.

**Robert C. Schaan, A.B.**, Washington University, 1949; M.D., 1953.

**Alfred S. Schwartz, A.B.**, Amherst College, 1932; M.D., Johns Hopkins University, 1936.

**Mary A. T. Tillman, M.D.**, Howard University, 1960.

**George T. Wilkins, Jr., B.S.**, University of Illinois, 1956; M.D., 1957.

**Kathleen Winters, B.S.**, Winthrop College, 1946; M.D., Medical College of South Carolina, 1955.

**Gerald Wool, A.B.**, Princeton University, 1958; M.D., Washington University, 1962.

#### *Instructors*

**Suzanne G. Busch** (Psychology), A.B., University of Maryland, 1969; M.A., Washington University, 1976; Ph.D., 1981.

**John Gilster** (Dental Medicine), D.D.S., Washington University, 1944.

**Donald V. Huebener** (Dental Medicine), D.D.S., Washington University, 1969. (See Department of Radiology.)

**M. Emin Kiyancilar, M.D.**, Ain-Shams University, 1970. (See Department of Anesthesiology.)

**Michael J. Noetzel, A.B.**, Yale University, 1973; M.D., University of Virginia, 1977.

**Patricia A. Parsons** (Dental Medicine), B.S., San Diego State College, 1953; D.D.S., Washington University, 1957.

**Barbara K. Talent** (Psychology), B.A., DePauw University, 1972; Ph.D., Washington University, 1978.

**Zila Welner, M.D.**, Hebrew University, 1961. (See Department of Psychiatry.)

#### *Instructor Emeritus (Clinical)*

**Joseph A. Bauer, M.D.**, Washington University, 1926.

#### *Instructors (Clinical)*

**Christos A. Antoniou, M.D.**, University of Athens, 1958.

**Jean M. Auguste, B.A.**, Lycée T. L'Ouverture, 1950; M.D., Medical School of Haiti, 1956.

**Jill M. Baer**, B.S., University of Kentucky, 1972; M.D., 1975.

**Susan L. Baumer**, B.A., University of Oregon, 1969; M.D., University of Pennsylvania, 1975.

**Pardeep Bhanot**, M.B.B.S., Medical College of Amritsar, 1974.

**Huldah C. Blamoville**, B.S., Queens College, 1959; M.D., Meharry Medical College, 1965.

**Carmelita V. Britton**, B.S., Rensselaer Polytechnic Institute, 1973; M.D., Albany Medical College, 1973.

**Sandra J. Dodson**, B.S., Cornell University, 1970; M.D., Northwestern University, 1976.

**Florentina U. Garcia**, M.D., University of the Philippines, 1965.

**Roman E. Hammes**, B.A., University of Iowa, 1950; M.D., 1954.

**Jay L. Hoecker**, B.A., Westminster College, 1968; M.D., University of Texas, 1973.

**Nancy E. Holmes**, B.A., University of Kansas, 1972; M.D., University of Missouri, 1976.

**Carl S. Ingber**, A.B., University of Rochester, 1968; M.D., Boston University, 1972.

**Larry A. Jones**, A.B., Johns Hopkins University, 1972; M.D., 1976.

**Sheldon Kessler**, M.D., St. Louis University, 1951.

**Norton S. Kronemer**, A.B., Washington University, 1958; M.D., University of Missouri, 1962.

**Leland M. Laycob**, A.B., Washington University, 1964; M.D., University of Missouri, 1968.

**Richard L. Lazaroff**, B.A., Brown University, 1974; M.D., St. Louis University, 1978.

**Despine Liebhaber**, B.A., Smith College, 1958; M.D., Columbia University, 1962.

**Robert D. Lins**, A.B., University of Missouri, 1965; M.D., 1969.

**Elaine Miller**, A.B., Judson College, 1944; M.D., Medical College of Alabama, 1949. (See Department of Ophthalmology.)

**Alan M. Muney**, Sc.B., Brown University, 1975; M.D., 1978.

**Michael J. Nichols**, B.A., Brown University, 1973; M.D., 1976.

**David S. Olander**, A.B., Washington University, 1964; M.A., 1965; Ph.D., 1967; M.D., 1974.

**Eugenia M. Pierce**, M.D., St. Louis University, 1958.

**Robert L. Quaas**, B.A., Syracuse University, 1965; B.S., University of South Dakota, 1973; M.D., University of Chicago, 1975.

**Mohammad H. Rahman**, M.B.B.S., University of Karachi, 1960.

**Richard W. Sato**, B.A., Johns Hopkins University, 1973; M.D., Washington University, 1977.

**Howard J. Schlansky**, B.A., University of Missouri, Kansas City, 1976; M.D., 1978.

**Seymour M. Schlansky**, M.D., Chicago Medical School, 1950.

**Jeffrey I. Schulman**, B.A., Yale University, 1970; M.D., University of Kentucky, 1974.

**Karen L. Scruggs**, B.A., Macalester College, 1968; M.D., Washington University, 1973.

**Orestes S. Valdes**, B.S., Instituto de Santa Clara, 1947; M.D., University of Havana, 1954.

**Barbara N. Voegel**, B.S., University of Illinois, 1950; M.D., Washington University, 1957.

**Roger J. Waxelman**, A.B., Washington University, 1965; M.D., University of Missouri, 1969.

**Patricia B. Wolff**, B.A., University of Minnesota, 1968; M.D., 1972. (See Medical Care Group.)

**H. Benjamin Zwirn**, M.D., University of Basel, 1954.

#### *Assistants*

**Marion H. Baker**, (Health Services), R.N., St. John's Hospital, 1946; P.N.P., Cardinal Glennon Memorial Hospital for Children, 1973. (See Medical Care Group.)

**Jeanette M. Broering**, (Health Services), B.S.N., St. Louis University, 1974; P.N.P., Cardinal Glennon Memorial Hospital, 1976. (See Medical Care Group.)

**Susann M. Farberman**, (Health Services), R.N., B.S., St. Louis University, 1970; P.N.P., Washington University, 1975. (Also Pediatric Nurse Practitioner Program.)

**Susan K. Keating**, (Health Services), B.S., University of North Carolina School of Nursing, 1965; P.N.P., Washington University, 1970.

**Kevyn F. Schroeder**, (Health Services), B.S., St. Louis University, 1975; P.N.P., Washington University, 1976.

**Mary J. Stralka**, (Health Services), R.N., Holy Cross School of Nursing, 1966; B.S.N., St. Louis University, 1970; P.N.P., Cardinal Glennon Memorial



Hospital, 1971; M.S.N., St. Louis University, 1978. (Also Pediatric Nurse Practitioner Program.)

#### *Research Assistants*

**Charles E. Crawford, Jr.**, B.S., Washington University, 1956.

**Charles A. Reed**, A.B., Washington University, 1961.

**Lorraine L. Thomas**, A.B., St. Louis University, 1971; M.S., Southern Illinois University, 1973.

#### *Assistants (Clinical)*

**Marietta O. Belen**, M.D., Far Eastern University, 1963.

**Richard J. Iken**, B.A., University of Wisconsin, 1973; M.D., University of Missouri, Columbia, 1978.

**Sudhir R. Raikar**, M.B., University of Bombay, 1969.

**Hsin-Chin Shih**, M.D., Kaoshiung Medical College, 1964.

**Nareshkumar Solanki**, B.M., B.S., University of Nairobi, 1975.

#### *Lecturers*

**Dorothy J. Jones**, A.B., Oberlin College, 1930; M.D., Washington University, 1934. (Also Pediatric Nurse Practitioner Program.)

# Edward Mallinckrodt Department of Pharmacology

It is the purpose of the pharmacology course, through discussions of existing drugs, to develop general principles which will be applicable as well to drugs of the future. Pharmacology draws heavily on biochemistry, physiology, and microbiology for an understanding of drug action. It looks toward pathology, medicine, and surgery for its uses.

The laboratory portion of the course is closely coordinated with the lecture material and is designed to demonstrate and emphasize pertinent pharmacological principles and to employ agents, equipment, and skills relevant to current medical practice.

A selection of mini-courses (Special Topics), dealing in depth with more advanced concepts of pharmacology and related topics is integrated into the medical pharmacology course. Small groups of students regularly meet with the faculty to review and discuss the details and interpretation of original literature articles.

## SECOND YEAR

### Bio 507, 508. Pharmacology

(a) Lectures, conferences, panel discussions. (b) Laboratory course. Credit 7 units for the year.  
(Dr. Covey and Staff)

## RESEARCH

### Bio 590.

The facilities of the research laboratories are available to those who wish to carry on an original investigation on problems of their own or on those the department is prepared to suggest.

Neurochemistry; regulation of metabolism; quantitative histochemistry; micro-analytical methods. (Dr. Berger)

Biosynthesis and processing of placental and pituitary peptide hormones. (Dr. Boime)

Problems in the biochemical development of rat kidney; transport mechanisms in rat kidney; renal histochemistry. (Dr. Burch)

Experimental analysis of mechanisms of dysrhythmia; electrophysiology; membrane chemistry and autonomic neural effects. (Dr. Corr)

Synthesis and biological characterization of "suicide substrates" as potential inhibitors of androgen and estrogen biosynthesis in normal and carcinogenic tissue. Computer-assisted drug design. (Dr. Covey)

Neurochemistry of seizures; neuropharmacology of anti-convulsant and psychotropic drugs; role of cyclic nucleotides in nervous tissue function and metabolism. (Dr. Ferrendelli)

Secretion of macromolecules. Serum albumin biosynthesis and secretion. (Dr. Geller)

Purification and properties of the drug metabolizing enzymes. Glutathione dependent enzymes of metabolism and detoxication. (Dr. Hunter)

The biosynthesis and chemical and biological characterization of leukotrienes and other arachidonate metabolites. (Dr. Jakschik)

Normal and abnormal development of the sympathetic nervous system; physiology and pathophysiology of the sympathetic nervous system. (Dr. Johnson)

Mechanism of insulin action in regulating the phosphorylation of glycogen synthase in cultured mammalian skeletal muscle cells. (Dr. Lawrence)

Neurochemistry; regulation of metabolism; quantitative histochemistry; the chemistry of individual human and muscle fibers. (Dr. Lowry)

Pineal-hypothalamic pituitary interactions in the regulation of pituitary function. (Dr. Martin)

Energy metabolism in nerve, axonal flow, and the biochemistry of sensory neurons. (Dr. McDougal)

Regulation of endogenous renal hormones and their effects on renal blood flow and excretory function. (Dr. Morrison)

Pharmacology and biochemistry of prostaglandins, thromboxanes and prostacyclins. (Dr. Needleman)

Biology of cytotoxic lymphocytes and mechanisms of immune damage. (Dr. Russell)

Pharmacology and biochemistry of neurotransmission in the basal ganglia. (Dr. Wooten)

## ELECTIVES

### Bio 364. Principles of Drug Action

A brief study of pharmacology and pharmacodynamics. This course discusses the biological, chemical, and molecular basis of action of drugs in general and of selected specific drugs in detail. Topics covered will include general pharmacologic principles; receptor theory; drug kinetics; distribution and metabolism; drugs which inhibit cellular growth, e.g., antibiotics, anti-cancer; endocrine drugs; both the autonomic and central action of drugs; drugs which act on the cardiovascular and renal systems; and elements of psychoactive drugs and of drug abuse. (Dr. Johnson and Staff)

Descriptions of the following courses are shown in the Division of Biology and Biomedical Sciences:

### Bio 5031. Endocrine Physiology and Pharmacology.

### Bio 509, 510. Current Topics in Pharmacology

### Bio 540. Cell Surface Receptors

### Bio 555. Neuropharmacology

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

## Faculty of the Edward Mallinckrodt Department of Pharmacology

### *Professor and Head of Department*

**Philip Needleman**, B.S., Philadelphia College of Pharmacy and Science, 1960; M.S., 1962; Ph.D., University of Maryland, 1964.

### *Distinguished Professor Emeritus and Lecturer*

**Oliver H. Lowry**, B.S., Northwestern University, 1932; Ph.D., University of Chicago, 1937; M.D., 1937.

### *Professor Emeritas and Lecturer*

**Helen B. Burch**, B.S., Texas University for Women, 1926; M.S., Iowa State University, 1928; Ph.D., 1935.

### *Professors*

**Irving Boime**, B.S., St. Louis College of Pharmacy, 1964; M.S., Purdue University, 1966; Ph.D., Washington University, 1970. (See Department of Obstetrics and Gynecology.)

**James A. Ferrendelli**, A.B., University of Colorado, 1958; M.D., 1962. (See Departments of Neurology and Neurological Surgery and Ophthalmology.)

**F. Edmund Hunter, Jr.**, B.S., Mount Union College, 1938; Ph.D., University of Rochester, 1941.

**David B. McDougal, Jr.**, A.B., Princeton University, 1945; M.D., University of Chicago, 1947.

### *Associate Professors*

**David M. Geller**, B.A., Amherst College, 1952; Ph.D., Harvard University, 1957.

**Eugene M. Johnson, Jr.**, B.S., University of Maryland, 1966; Ph.D., 1970.

### *Assistant Professors*

**Peter B. Corr**, B.S., Union University, 1971; Ph.D., Georgetown University, 1975. (See Department of Medicine.)

**Douglas F. Covey**, B.S., Loyola College, 1967; M.A., Johns Hopkins University, 1969; Ph.D., 1973.

**Jeanne E. Martin**, B.A., Winthrop College, 1969; Ph.D., Duke University, 1974.

**Aubrey R. Morrison**, M.B., B.S., University of London, 1970. (See Department of Medicine.)

**John H. Russell**, B.S., Juniata College, 1968; Ph.D., Washington University, 1974.

**George F. Wooten, Jr.**, B.A., Rice University, 1965; M.D., Cornell University Medical College, 1970. (See Department of Neurology and Neurological Surgery.)

### *Research Assistant Professors*

**Sosamma J. Berger**, B.S., University of Bombay, 1958; M.S., University of Puget Sound, 1962; Ph.D., Hahnemann Medical College, 1968.

**Sr. Barbara A. Jakschik**, B.S., Duquesne University, 1963; M.S., 1965; Ph.D., Washington University, 1974.





# Department of Physiology and Biophysics

The department offers instruction to medical and graduate students. A course in the second semester of the first year of the medical curriculum 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 physiology and biophysics.

The following research interests are represented in the department at the present time: macromolecular structure as studied by x-ray crystallography and other physical methods, the mechanism of action of polypeptide hormones, transport across cell membranes, epithelial transport, intracellular transport, secretion and uptake of macromolecules, and renal physiology, neurophysiology, contractile activation of muscle, peripheral circulation, respiration, and the application of computer techniques to biological problems. The interests in neurophysiology concern principally membrane phenomena in nerve fibers, the physiology of synapse, and the function of receptors and sensory systems. Electron microscopy of nerve and muscle is used to relate structure and function in these tissues.

## FIRST YEAR

### Bio 502. General Physiology

Lectures, demonstrations, and laboratory experiments are utilized to provide a basis for understanding general physiological mechanisms and the functional organization of physiological systems that are of immediate or potential importance in medicine. Credit 8 units. (Staff)

### Bio 554. Neural Sciences

An integrated course dealing with the anatomy and physiology of the nervous system at the cellular level, leading on to a consideration of sensory and motor systems. Credit 5 units.

## RESEARCH

### Bio 590. Research

The department offers a variety of research opportunities, particularly in the following areas: macromolecular structure as studied by x-ray crystallography; synthesis and biological activities of polypeptides; membrane transport; lysosomes and intracellular transport; neurophysiology, including nerve membrane, muscle, synaptic transmission, sensory systems (especially auditory and visual), electron microscopy of neural tissues, and biochemical regulation in neurons; circulation; respiration; renal physiology; and the application of computer sciences to physiological problems. (Staff)

## ELECTIVES

Descriptions of the following courses may be found under the Division of Biology and Biomedical Sciences.

### Bio 401. Vertebrate Physiology

### Bio 457. Somatosensory System

### Bio 458. Biophysics of the Ear

### Bio 459. Vision

### Bio 525. Fundamental Concepts in Cell Membrane Physiology and Biophysics

### Bio 526. Selected Topics in the Physiology and Biophysics of Cell Membranes

### Bio 545I. Introductory Biophysical Chemistry

### Bio 558. Formation and Maintenance of Synaptic Connections

### Bio 559. Nerve, Muscle and Synapse

### Bio 562. Neural Control of Posture and Movement

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.



## Faculty of the Department of Physiology and Biophysics

### *Edward Mallinckrodt, Jr., Professor and Head of Department*

**Carlton C. Hunt**, B.A., Columbia University, 1939; M.D., Cornell University, 1942.

### *Professors Emeriti*

**Hollowell Davis**, A.B., Harvard University, 1918; M.D., 1922; Sc.D. (hon.), Colby College, 1954; Sc.D. (hon.), Northwestern University, 1962; Sc.D. (hon.), Washington University, 1973. (See Department of Otolaryngology.) (Also Lecturer.) (Also Central Institute for the Deaf.)

**Arthur S. Gilson, Jr.**, B.S., Dartmouth College, 1919; A.M., Harvard University, 1922; Ph.D., 1924.

**Stanley Lang**, Ph.B., University of Chicago, 1948; B.S., 1949; M.S., 1951; Ph.D., 1953.

### *Professors*

**Jerome R. Cox, Jr.** (Biomedical Engineering), S.B., Massachusetts Institute of Technology, 1947; S.M., 1949; Sc.D., 1954. (See Biomedical Computer Laboratory.) (Also School of Engineering and Applied Sciences.)

**Nigel W. Daw**, B.A., Trinity College, Cambridge, 1956; M.A., 1961; Ph.D., Johns Hopkins University, 1967. (See Department of Ophthalmology.)

**Paul J. De Weer**, B.S., University of Louvain, 1959; M.D., 1963; M.S., 1964; Ph.D., University of Maryland, 1969.

**John E. Heuser**, B.A., Harvard College, 1964; M.D., Harvard University, 1969.

**Garland R. Marshall**, B.S., California Institute of Technology, 1962; Ph.D., Rockefeller University, 1966. (See Department of Biological Chemistry.)

**F. Scott Mathews**, B.S., University of California, 1955; Ph.D., University of Minnesota, 1959. (See Department of Biological Chemistry.)

**Charles E. Molnar**, B.S.E.E., Rutgers University, 1956; M.S.E.E., 1957; Sc.D., Massachusetts Institute of Technology, 1966. (Also Computer Systems Laboratory.)

**Alan L. Pearlman**, A.B., State University of Iowa, 1958; M.D., Washington University, 1961. (See Department of Neurology and Neurological Surgery.)

**Dale Purves**, A.B., Yale University, 1960; M.D., Harvard University, 1964.

**Luis Reuss**, B.A., University of Chile, 1957; M.D., 1964.



**Albert Roos**, M.D., University of Groningen, 1940. (See Department of Anesthesiology.)

**Carl M. Rovainen**, B.S., California Institute of Technology, 1962; Ph.D., Harvard University, 1967.

**Philip D. Stahl**, B.S., West Liberty State College, 1964; Ph.D., West Virginia University, 1967.

### *Associate Professors*

**Leonard J. Banaszak**, B.S., University of Wisconsin, 1955; M.S., Loyola University, 1960; Ph.D., 1961. (See Department of Biological Chemistry.)

**C. David Barry**, B.Sc., Manchester University, 1962; Ph.D., 1965. (Also Computer Systems Laboratory.)

**Harold Burton**, B.A., University of Michigan, 1964; Ph.D., University of Wisconsin, 1968. (See Department of Anatomy and Neurobiology.)

**Yasushi Fukami**, M.D., Kyoto University, 1957; Ph.D., 1961.

**Duck O. Kim**, B.S., Seoul National University, 1968; M.S., Rose Polytechnic Institute, 1969; D.Sc., Washington University, 1972. (Also Computer Systems Laboratory.)

**Robert F. Miller**, M.D., University of Utah, 1967. (See Department of Ophthalmology.)

**Lewis J. Thomas, Jr.**, B.S., Haverford College, 1953; M.D., Washington University, 1957. (See Department of Anesthesiology and Biomedical Computer Laboratory.)

**Thomas A. Woolsey**, B.S., University of Wisconsin, 1965; M.D., Johns Hopkins University, 1969. (See Department of Anatomy and Neurobiology.)

### *Assistant Professors*

**Elsa Bello-Reuss**, B.A., University of Chile, 1957; M.D., 1964. (See Department of Medicine.)

**Robert F. Rakowski**, B.Ch.E., Cornell University, 1964; M.Eng., 1966; Ph.D., University of Rochester, 1972.

**Joshua R. Sanes**, B.A., Yale College, 1970; Ph.D., Harvard University, 1976.

### *Research Assistant Professors*

**T. M. Balasubramanian**, B.S., University of Madras, 1962; B.S., University of Bombay, 1965; M.S., 1968; Ph.D., St. Louis University, 1974.

**Nobutaka Hirokawa**, M.D., University of Tokyo, 1971; Ph.D., University of Tokyo, 1978.

**Paul H. Schlesinger**, B.S., University of Illinois, 1966; M.D., University of Chicago, 1970; Ph.D., 1973.

**Robert S. Wilkinson**, B.S., Rice University, 1968; M.A., University of Texas, Austin, 1970; Ph.D., 1974.

### *Instructor*

**Shirley A. Sahrman**, B.S.P.T., Washington University, 1958; A.M., 1971; Ph.D., 1973. (See Departments of Neurology and Neurological Surgery and Program in Physical Therapy.)

# Department of Preventive Medicine and Public Health

The department offers instruction during the first and second years of the curriculum and provides other learning experiences in elective courses in the fourth year. In the clinical clerkships of other departments, students have experience in rehabilitation in the Irene Walter Johnson Institute of Rehabilitation. In the first semester of the first year, the course *Medicine in Modern Society* provides background information, and students are encouraged to participate in discussion of important and evolving issues of medical care. A course in statistical methods in medicine given in the second semester affords a basis for understanding quantitative assessment in biology and medicine and prepares the student for critical evaluation of reports in the medical literature. During the second year in the course in pathophysiology, the department contributes material concerning the epidemiology of disease and the variety of factors in the person and environment which contribute to the occurrence of disease, and provides approaches and methods for prevention and control. Interested students may choose to participate in more intensive study of certain of these subject areas in the departmental elective offerings.

Opportunities for clinical and/or research experience are provided by the following organizational units within the department or cooperating with it:

Division of Applied Physiology, *Dr. John Holloszy*

Division of Biostatistics, *Dr. D. C. Rao*

Division of Health Care Research, *Dr. Lee Benham*



Nutrition Research Laboratories, *Dr. Robert Shank*,

*Dr. Ruth Brennan*

Irene Walter Johnson Institute of Rehabilitation,

*Dr. Michael Brooke*

Lipid Research Center, *Dr. Gustav Schonfeld*

## FIRST YEAR

### *Medicine in Modern Society*

This is planned as a series of 12 weekly lectures and discussions on topics selected to afford characterization of medicine as a profession of singular importance to modern society. There will be an attempt to identify some of the challenges or problems which confront the profession, as well as possible avenues leading to resolution and new accomplishments.

Topics to be covered include description of the physician's role, career choices within the profession, the organization of medical care, regulation of physician and hospital services, the economics of medical care, assessment of risk-benefit in choice of diagnostic or treatment procedures, the interface between medicine and the law, and ethical considerations in the practice of medicine.

(Drs. Chaplin, Kahn, Benham, Vavra and Shank)

### *Introduction to Biostatistics*

This introduction to the principles and methods of biostatistics emphasizes the concepts of statistical methodology as being essential to proper application and interpretation of statistical methods. Elementary statistical techniques illustrating the use of statistical principles in experimentation and clinical research are discussed. Second semester.

(Drs. McGue and Spitznagel)

## SECOND YEAR

### *Pathophysiology*

In lectures and demonstrations, there is description of the patterns of occurrence and the distribution of selected diseases in populations. Consideration is given to the variety of characteristics of host, agent, and environment which determine the occurrence of specific disorders. Procedures which may be utilized to prevent or interrupt the course of disease and disability are described and evaluated. Patterns of provision of medical care and the social factors influencing health care needs are discussed.

(Dr. Shank and Staff)

### *Summer Traineeships in Physical Disability and Rehabilitation*

See Institute of Rehabilitation.

(Dr. Brooke)

## FOURTH YEAR ELECTIVES

### *Clerkship in Primary Care I*

This clerkship is designed to provide the student with firsthand experience with medical practice, in much the same manner that clerkships in other medical disciplines provide patient-care experience in supervised settings. The clerkship uses as its clinical setting the Medical Care Group of St. Louis (MCG), a teaching and research prepaid group practice.

Students will join individual physicians in the Medical Care Group of St. Louis or in their private practices, and will work in their offices caring for patients under supervi-



sion. Preventive, social, and continuing aspects of medical practice will be emphasized. It is hoped that this elective will give an overview of medical practice in internal medicine and in pediatrics, and will provide an opportunity for the student to see comprehensive medical care as it is practiced in St. Louis and as it exists in a group practice model: the Medical Care Group.

(Drs. Brett and Turner)

#### **Family Practice Preceptorship**

The Division of Health Care Research will monitor this elective. The student wishing such an experience should find the practitioner with whom he wishes to work and request that this physician send Dr. John J. Garrett of the School of Medicine (1) a copy of his (the physician's) curriculum vitae, (2) an outline of the program he will offer the student, and (3) a commitment to evaluate the student's performance. The student must provide (1) a summary of his experience in the practice and a critical analysis of its usefulness in his medical education, and (2) at least six case summaries describing patients whose care he participated in and/or a report of a primary care research project in which he took part, i.e., a brief paper.

(Dr. Garrett)

#### **Clinical Electives**

- a) Exercise in Preventive Medicine and Medicine. Exercise testing will include exercise electrocardiography, exercise echocardiography, measurement of O<sub>2</sub> uptake capacity, noninvasive cardiac output measurement and radionuclide studies during exercise. In addition, there will be opportunity to participate in exercise training as a component of treatment of patients with ischemic heart disease, hypertension, diabetes and chronic uremia.

(Drs. Holloszy, Ehsani and Hagberg)

- b) Physical disability and rehabilitation. (See Institute of Rehabilitation.)

(Dr. Brooke)

#### **Physical Disability and Rehabilitation**

The student will become familiar at first hand with the techniques for defining the extent of physical disability and with various approaches to its treatment. Emphasis will be placed on methods used in physical, occupational, and speech therapy, and on the specialized contribution to be made by rehabilitation social work, nursing, and vocational testing and counseling. Supervised visits may be arranged to specially related outside facilities and agencies (Visiting Nurses Association, Special School District, Shriners Hospital, Central Institute for the Deaf, manufacturers of prosthetics and orthotic devices). All the above will be accomplished in relation to selected patients assigned to the student for his supervision of their rehabilitation programs. In general, these will include inpatients on the Pediatrics, Medical Neurology, Neurosurgical, Orthopedic, and Plastic Surgery Services. Special emphasis on any one or any combination of the above services can be arranged to suit the interests of individual students.

In addition to the programs available at the Rehabilitation Institute, the student may choose to spend part of the elective at Jewish Hospital on the Rehabilitation Service.

(Dr. Brooke)

#### **Inpatient Rehabilitation Care**

The Department of Rehabilitation Medicine of Jewish Hospital offers a 4- or 6-week elective course to senior medical students. The Department operates a 55-bed service for patients with physical disabilities, under the supervision of four full-time physicians. The case material is varied and includes patients with spinal cord injuries, strokes, Parkinson's disease, and arthritis. The department holds an Amputee Clinic twice a month and does all the electromyographic examinations for Jewish Hospital. The medical students serve as externs.

They gain experience in the prescription of a rehabilitation program and follow their patients in physical therapy, occupational therapy, speech therapy, or whatever other activity is applicable. They work with the orthopedic, neurological, urological, and plastic surgery consultants who serve this unit. The details of the program can be adapted to fit the particular interests of the individual student.

(Dr. Steinberg and Staff)

#### **HEALTH ADMINISTRATION AND PLANNING (HAP)**

As a specialty, health administration looks at medical care from an institutional and organizational perspective. Rational health administration requires expert knowledge in many areas including: law, finance, planning, and organizational behavior.

The goals of this six-week elective are:

1. To give the medical student an overview of the specialty of health administration including some contact with the supporting disciplines of hospital and health law, hospital accounting and finance, organizational behavior, health planning and health regulation.
2. To provide first hand contact with selected local institutions and their administrators.
3. To allow students to investigate particular subjects of interest to them.

At the beginning of the elective the student will discuss his/her particular background and interest with the HAP Faculty. A plan of study will then be formulated in the context of the resources actually available through HAP. Throughout the period there will be weekly review sessions and at the end of the elective, the student will be expected to submit a report.

The purpose of the elective is not to make administrators out of physicians but rather it is anticipated at the end of the six weeks that the student will be able to communicate with those persons who see medicine from an organizational viewpoint and will recall what to ask and what to expect from consultation with hospital and health administrators.

(Dr. Hepner and Staff)

#### **SEMINAR ELECTIVES**

##### **Applied Biostatistical Techniques**

The seminar is intended for students who have completed a basic biostatistics course and who want to increase their understanding of contemporary statistical techniques, particularly those commonly applied in clinical research. Students will be expected to participate in analysis and critique of studies appearing in the medical literature. The emphasis will be on the appropriateness of



the statistical techniques and underlying rationale rather than on mathematical details of the techniques. Both basic (e.g., t tests, chi-squared tests, correlation, regression and more advanced multivariate techniques (e.g., multiple regression, discriminant analysis, analysis of variance) will be covered during the seminar.

(Mr. Miller and Staff)

#### **World Population Problems**

Five or six seminars will be conducted by invited guest faculty who are nationally recognized experts in the demographic, sociologic, economic, political, food-supply, and ethical aspects of world population growth. The first 45 minutes of each seminar is given to a presentation of key background material by the seminar leader; the final 45 minutes, to free discussion initiated by students. Suggested reading lists will be provided where appropriate.

(Dr. Chaplin)

#### **Clinical Epidemiology and Health Care Policy**

Actual applications of clinical epidemiology in developing clinical protocols are reviewed and critiqued. Application areas to be reviewed are early detection of breast and cervical cancer, and carcinogenic testing of food additives like saccharin. Background material on decision analysis, benefit-cost analysis, mathematical models and randomized clinical trials is developed as needed.

(Dr. Gohagan)

### **RESEARCH ELECTIVES**

#### **Biochemistry of Exercise**

Research deals with the acute and chronic responses to exercise. Areas of interest include biochemical adaptations in muscle in response to endurance exercise and to heavy resistance exercise; cardiac adaptations to increased work load; the serum triglyceride lowering effect of exercise; the biochemical basis of muscle fatigue.

(Drs. Ehsani, Hagberg, Holloszy)

#### **Genetic Epidemiology**

After being introduced to current approaches in Genetic Epidemiology, interested students will be supervised on research projects dealing with methodological

developments and applications of these techniques. Topics to be covered include: path analysis, variance components, segregation analysis, linkage and genetic counseling.

(Dr. Rao and Staff)

#### **Health Care Research**

Students will, with advice and consent of preceptor, engage in studies pertinent to: 1) Medical Care in Group Practice (e.g., medical care utilization, reaction to illness, screening, etc.); 2) Studies in Adult Ambulatory Care (included are utilization, social and economic aspects of medical care, problems in medical care organization, or in community projects); 3) Studies in Pediatric Ambulatory Care; 4) Studies in Obstetrics/Gynecology, and 5) any other topic in this area which is of mutual interest to the student and his supervisor.

(Dr. Kahn and Staff)

#### **Lipoprotein Metabolism**

Opportunities are available for interested students to participate in research projects dealing with normal and disordered lipoprotein transport. Included are studies of the effects of diabetes, uremia, diets and drugs on human lipoprotein levels, composition and structure; regulation of apoprotein synthesis in cultured rat hepatocytes; and immunologic properties of apoproteins using monoclonal antibodies.

(Dr. Schonfeld)

#### **Topics in Medical Economics**

This course is designed to expose students to economic issues in the medical sector. Students will pursue a selected research topic under an economist's supervision. Emphasis will be placed on policy issues concerning the effective allocation of medical expenditures. Examples of topics which can be considered are: the economics of excess capacity in surgery; the economics of prepaid group practice; the cost effectiveness of therapy for hypertension, cost differences of therapies for a given medical problem as a function of physicians' specialties; responsiveness of physician to alternative incentive schemes; criteria to be used in determining the allocation of resources among the medical subsectors.

(Dr. Benham)

## **Faculty of the Department of Preventive Medicine and Public Health**

#### **Kountz Professor and Acting Head of Department**

**Hugh Chaplin, Jr., A.B., Princeton University, 1943; M.D., Columbia University, 1947.** (See Department of Medicine.)

#### **Danforth Professor**

**Robert E. Shank, A.B., Westminster College, 1935; M.D., Washington University, 1939.** (See Department of Medicine.)

#### **Professor and Director of Applied Physiology Division**

**John O. Holloszy, M.D., Washington University, 1957.** (See Department of Medicine.)

#### **Professor Emeritus**

**C. Howe Eller (Public Health), A.B., Stanford University, 1927; M.D., University of Colorado, 1930; Ph.D., Johns Hopkins University, 1934.**

#### **Professors**

**Michael H. Brooke (Rehabilitation), M.B., B.Ch., Cambridge University, 1958.** (See Department of Neurology and Neurological Surgery and Irene Walter Johnson Institute of Rehabilitation.)

**Lawrence I. Kahn (Health Care Research), A.B., University of Alabama, 1941; M.D., Louisiana State University, 1945.** (See Department of Pediatrics and

Medical Care Group.) (Also Pediatric Nurse Practitioner Program.)

**M. Kenton King, B.A., University of Oklahoma, 1947; M.D., Vanderbilt University, 1951.** (See Administration and Department of Medicine.)

**Gustav Schonfeld, A.B., Washington University, 1956; M.D., 1960.** (See Department of Medicine.)

**John D. Vavra, B.A., University of Colorado, 1950; M.D., Washington University, 1954.** (See Administration and Department of Medicine.)

**Reimut Wette (Biostatistics), B.S., University of Heidelberg, 1949; M.S., 1952; D.Sc., 1955.**

**R. Dean Wochner**, A.B., Arizona State University, 1956; M.D., Washington University, 1960. (See Department of Medicine.)

*Associate Professor and Director of Division of Biostatistics*

**Dabeeru C. Rao**, B.S., Indian Statistical Institute, 1967; M.S., 1968; Ph.D., 1971. (See Departments of Psychiatry and Genetics.)

*Associate Professor Emeritus*

**M. Frances Watson** (Social and Environmental Studies), B.S., Northeast Missouri State Teachers College, 1932; M.S.W., Washington University, 1949.

*Associate Professors*

**Lee Benham** (Health Care Research), B.A., Knox College, 1962; Ph.D., Stanford University, 1970. (Also Faculty of Arts and Sciences.)

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

**John K. Gohagan** (Health Care Research), B.A., LaSalle College, 1964; M.A., Temple University, 1968; Ph.D., Massachusetts Institute of Technology, 1973. (Also Department of Engineering and Applied Sciences.)

**Mary L. Parker**, B.S., Florida State University, 1946; M.S., 1949; M.D., Washington University, 1953. (See Department of Medicine.) (University Health Service.)

**Edward L. Spitznagel, Jr.** (Biostatistics), B.S., Xavier University, 1962; M.S., University of Chicago, 1963; Ph.D., 1965. (Also Faculty of Arts and Sciences.)

*Associate Professor (Clinical)*

**Franz U. Steinberg**, M.D., University of Berne, 1938. (See Departments of Medicine and Surgery.) (Jewish Hospital.)

*Assistant Professors Emeriti*

**Edward J. Berger**, M.D., Washington University, 1937. (Medical Director, Labor Health Institute.)

**Barbara B. Hixon** (Biostatistics), B.S., University of Illinois, 1941.

*Assistant Professors*

**Ruth E. Brennan** (Nutrition), B.S., University of Tennessee, 1943; M.S., Simmons College, 1945; Sc.D., University of Pittsburgh, 1966.

**Andrew P. Goldberg**, M.D., State University of New York, 1969. (See Department of Medicine.)

**Boas Gonen**, B.Sc., Hebrew University, 1966; M.D., 1973. (See Department of Medicine.)

**James M. Hagberg**, B.S., Carthage College, 1972; M.S., University of Wisconsin, 1974; Ph.D., 1976.

**J. Philip Miller** (Biostatistics), A.B., Washington University, 1965. (See Biomedical Computer Laboratory.)

**Wolfgang P. Patsch**, M.D., University of Innsbruck, 1971.

**John P. Rice** (Biostatistics), B.A., Cornell University, 1969; M.A., Washington University, 1972; Ph.D., 1975. (See Psychiatry.)

**Robert S. Woodward** (Health Care Research), B.A., Haverford College, 1965; Ph.D., Washington University, 1972. (See Health Administration and Planning Program.)

*Instructors*

**Susy Alias** (Rehabilitation), B.Sc., University of Kerala, 1964; M.D., Calicut Medical College, 1969. (Jewish Hospital.)

**Bernard Feigenbaum** (Health Care Research), B.A., University of California, Los Angeles, 1974; M.A., 1976. (See Health Administration and Planning Program.)

**A. Donna King** (Social Work), B.A., Western Maryland College, 1960; M.S.W., Washington University, 1966. (See Medical Care Group.)

**Matthew K. McGue** (Biostatistics), B.A., University of California, Berkeley, 1975; Ph.D., University of Minnesota, 1981.

**Kathleen S. Madsen** (Biostatistics), B.Sc., University of Edinburgh, 1970; Ph.D., University of Dundee, 1975.

**Diana L. Reed** (Social Work), A.B., Washington University, 1968; M.S.W., 1970.

**Elizabeth A. Stoddard** (Rehabilitation), B.S., Montana State University, 1954; M.D., Washington University, 1957. (See Department of Medicine.) (Jewish Hospital)

**In Sook Sunwoo** (Rehabilitation), M.D., Woo Sok University, 1959. (Jewish Hospital)

*Research Instructor*

**Kyung-soo Hahn**, B.S., Yonsei University, 1969; M.S., North Carolina Central University, 1975; Ph.D., Duquesne University, 1979.

**Barbara A. Pfleger**, B.S., St. Louis University, 1957.

*Research Assistant*

**May W-S. Chen**, B.S., Baker University, 1963.

**Ratna V. Dargar**, B.Sc., University of Bombay, 1960; M.Sc. (in Biochemistry), 1962; M.Sc. (in Organic Chemistry), 1964.

**Martha C. Monroe**, B.S., Iowa State University, 1975.

*Lecturer*

**Richard A. Sutter** (Industrial Medicine and Rehabilitation), A.B., Washington University, 1931; M.D., 1935.



# 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

### Introduction to Clinical Psychiatry

Emphasis is upon (a) effective interviewing in preparation for medical history taking, (b) evaluation of behavioral and emotional factors in patients with various kinds of illnesses, (c) the diagnosis and natural history of the major psychiatric disorders, (d) critical evaluation of conceptual and methodologic problems in psychiatry and psychology. Lectures, demonstration interviews, discussions. (Dr. Cloninger and Staff)

## THIRD YEAR

### Psychiatry Clerkship

Students in groups of about 15 spend six weeks on the inpatient services of Barnes, Jewish and Bliss Hospitals. (Dr. Croughan and Staff)

## FOURTH YEAR ELECTIVES

### Outpatient Psychiatry

This is a flexible clerkship tailored to the student's interests. Adult psychiatric patients in the Washington University Psychiatric Clinic present a variety of psychological and interpersonal problems similar to those encountered in the office practice of a psychiatrist, an internist, or a family physician. Students have an opportunity to learn a variety of treatment techniques under supervision.

Students also manage patients in a community mental health center located in an inner-city area. There, students see how psychiatry works with social agencies, schools, and other institutions utilizing paramedical personnel in the detection and treatment of mental illness.

(Drs. Smith, Taylor)

### Clinical Psychiatry in Barnes Hospital

This is a senior course providing the student with an opportunity to learn clinical psychiatry by functioning as an extern on a six-week rotation. The student participates in a role similar to that of a first-year resident and attends all rounds and conferences for first-year psychiatry residents. The student takes night call approximately every fifth or sixth night. Supervision is by the chief resident and

the director of the inpatient service. This rotation is particularly desirable for students going into family practice, general internal medicine, general pediatrics, or other nonpsychiatry specialties. The rotation provides an excellent opportunity to learn firsthand about psychiatric diagnosis, psychopharmacology, community resources, familial interventions, and further insights into the current literature. (Dr. Helzer)

### Clinical Psychiatry in a Community Mental Health Center

This elective course provides students with opportunities to become key medical members of psychiatric treatment teams dealing with evaluation of patients in an emergency room, selective admissions of certain cases, diagnosis and management of particular patients. Supervision is provided by the full-time supervising psychiatrist in charge of wards to which the student may be assigned. The student participates in teaching sessions arranged for first-year psychiatric residents in training at the Malcolm Bliss Mental Health Center. (Dr. M. Herjanic)

### Child Psychiatry, Children's Hospital and the Washington University Child Guidance Clinic

This clerkship in child psychiatry gives students an appreciation of the intricacies of diagnosis and treatment of emotionally disturbed children. The clerkship involves working up a small number of preadolescent, as well as adolescent children under the supervision of senior staff members. Didactic teaching is available, as well as individual supervision of patients. Students gain an appreciation of both drug treatment and the limitations of drug treatment. They are exposed to the roles of community agencies such as settlement houses, juvenile courts, and various private agencies with which a child psychiatrist must work. Students also gain appreciation of the roles of nurse, social worker, teacher, and occupational therapist in collaboration with individuals of these disciplines. (Dr. T. Earls)

### Neurochemistry

This course is given jointly by the Departments of Psychiatry and Pharmacology. Topics covered include carbohydrates; energy metabolism, including changes found in different functional states; amino-acid metabolism and its relation to protein and transmitter synthesis; special proteins and protein metabolism; cerebral lipids, membranes, and normal and disordered lipid metabolism; transmitters and modulators; learning; growth, development, and trophic functions; cerebral blood flow, blood brain barrier. (Drs. McDougal, B. Moore)

### Selected Topics in Research

Students may elect to work full time in psychiatric research at any time during their elective year. Twelve weeks is the minimum time allowed; no maximum time is specified. The arrangements are made on an individual basis with the appropriate investigators.

(Drs. Cicero, Guze, Hartman, Helzer, B. Herjanic, Murphy, Olney, Reich, and Staff)

## Faculty of the Department of Psychiatry

### *Spencer T. Olin Professor and Head of Department*

**Samuel B. Guze**, M.D., Washington University, 1945. (See Administration and Department of Medicine.)

### *Wallace Renard Professor*

**Eli Robins**, A.B., Rice University, 1940; M.D., Harvard University, 1943.

### *Professor Emeritus*

**Saul Rosenzweig** (Medical Psychology), A.B., Harvard University, 1929; M.A., 1930; Ph.D., 1932. (Also Psychology.)

### *Professors*

**Theodore J. Cicero** (Neuropharmacology), B.S., Villanova University, 1964; M.S., Purdue University, 1966; Ph.D., 1968. (See Department of Anatomy and Neurobiology.)

**C. Robert Cloninger**, B.A., University of Texas, 1966; M.D., Washington University, 1970. (See Department of Genetics.)

**Irving I. Gottesman** (Psychiatric Genetics), B.S., Illinois Institute of Technology, 1953; Ph.D., University of Minnesota, 1960. (See Department of Genetics.)

**Boyd K. Hartman**, A.B., University of Kansas, 1962; M.D., 1966. (See Department of Anatomy and Neurobiology.)

**Marijan Herjanic**, M.D., Zagreb University, 1956. (Malcolm Bliss Hospital)

**Blake W. Moore** (Biochemistry), B.S., University of Akron, 1948; Ph.D., Northwestern University, 1952. (See Department of Biological Chemistry.)

**George E. Murphy**, B.S., Oregon State College, 1949; M.D., Washington University, 1952.

**John W. Olney**, B.A., Iowa University, 1956; M.D., 1963. (See Department of Pathology.)

**Dabeeru C. Rao** (Biostatistics), B.S., Indian Statistical Institute, 1967; M.S., 1968; Ph.D., 1971. (See Departments of Genetics and Preventive Medicine and Public Health.)

**Theodore Reich**, B.S., McGill University, 1959; M.D., 1963. (See Department of Genetics.)

**Lee N. Robins** (Sociology), B.A., Radcliffe College, 1942; M.A., 1943; Ph.D., 1951. (Also Faculty of Arts and Sciences.)

**William R. Sherman** (Biochemistry), A.B., Columbia University, 1951; Ph.D., University of Illinois, 1955. (See Department of Biological Chemistry.)

**Kathleen Smith**, B.S., University of Arkansas, 1944; M.D., Washington University, 1949. (Malcolm Bliss Hospital)

### *Research Professor*

**Mitchell Taibleson** (Mathematics), S.M., University of Chicago, 1960; Ph.D., 1962. (Also Faculty of Arts and Sciences.)

### *Professors Emeriti (Clinical)*

**Margaret C. L. Gildea**, B.S., University of Chicago, 1923; M.D., Yale University, 1936.

**Sydney B. Maughs**, A.B., Westminster College, 1931; M.D., Washington University, 1935.

### *Professors (Clinical)*

**Richard W. Hudgens**, B.A., Princeton University, 1952; M.D., Washington University, 1956.

**Alex H. Kaplan**, B.S., College of City of New York, 1932; M.D., St. Louis University, 1936.

**Frank O. Shobe**, A.B., Washington University, 1938; M.D., 1942.

### *Associate Professors*

**Jack L. Croughan**, B.A., University of Kansas, 1964; M.D., Kansas University, 1968.

**John E. Helzer**, M.D., University of Utah, 1967.

**Brian K. Suarez** (Genetics), B.A., San Fernando Valley State College, 1967; M.A., University of California, Los Angeles, 1972; Ph.D., 1974. (See Department of Genetics.)

**Richard D. Wetzel** (Medical Psychology), B.A., Concordia College, 1959; B.D., Concordia Seminary, 1963; Ph.D., St. Louis University, 1974.

### *Associate Professors (Clinical)*

**John M. Anderson**, B.S., Colorado State University, 1938; M.D., Meharry Medical College, 1958. (Malcolm Bliss Hospital)

**John T. Biggs, Jr.**, A.B., Drury College, 1963; M.S., University of Tennessee, 1965; M.D., 1968.

**Robert B. Deitchman**, B.A., University of Virginia, 1949; M.D., 1953.

**Edward H. Kowert**, A.B., Washington University, 1940; M.D., 1943. (Malcolm Bliss Hospital)

**Wanda M. Lamb**, B.S., University of Missouri, 1946; M.D., Washington University, 1948.

**Patricia L. O'Neal**, A.B., Washington University, 1944; M.D., 1948.

**Paul M. Packman**, A.B., Washington University, 1959; M.D., 1963.

**Marcel T. Saghir**, B.Sc., American University of Beirut, 1959; M.D., 1963.





**Earl R. Schultz, A.B.**, Southeast Missouri State College, 1952; B.S. Med., University of Missouri, 1953; M.D., Washington University, 1955. (See Department of Neurology and Neurological Surgery.)

**Harold D. Wolff, A.B.**, Washington University, 1952; B.S., University of Missouri, 1953; M.D., State University of Iowa, 1955.

#### *Assistant Professors*

**Bernardo G. Aleksander, M.D.**, University of Buenos Aires, 1959. (Malcolm Bliss Hospital)

**Michael D. Bieri, B.A.**, University of Kansas, 1968; M.D., Washington University, 1972. (Malcolm Bliss Hospital)

**Gregory Carey (Medical Psychology)**, B.A., Duquesne University, 1971; M.A., New School for Social Research, 1973; Ph.D., University of Minnesota, 1978.

**Mary L. Carlson (Neuropsychology)**, B.S., University of Wisconsin, 1961; M.A., Northwestern University, 1964; Ph.D., Tulane University, 1967.

**Robert M. Carney (Medical Psychology)**, B.A., University of Missouri, St. Louis, 1969; M.S., Eastern Kentucky University, 1972; Ph.D., Washington University, 1978.

**Raymond S. Dean (Medical Psychology)**, B.A., State University of New York, 1973; M.S., 1974; Ph.D., Arizona State University, 1978.

**Plaridel C. Deza, M.D.**, University of Santo Tomas, 1956. (Malcolm Bliss Hospital)

**Terry A. Fuller, B.S.**, University of Notre Dame du Lac, 1970; M.D., Washington University, 1974.

**Julian C. Hall (Social Work)**, B.S., University of Louisville, 1949; M.S., 1951; D.S.W., Washington University, 1968. (Malcolm Bliss Hospital)

**Barry A. Hong (Medical Psychology)**, B.A., Concordia Senior College, 1969; M.Div., Concordia Seminary, 1972; Ph.D., St. Louis University, 1978.

**John W. Knesevich, A.B.**, Indiana University, 1971; M.D., McGill University, 1974.

**Collins E. Lewis, B.A.**, Rutgers University, 1967; M.D., Harvard University, 1971; M.P.H., 1975.

**Lynn J. McLaughlin (Medical Psychology)**, B.A., Gonzaga University, 1965; M.S., St. Louis University, 1968; Ph.D., 1972. (Malcolm Bliss Hospital)

**John P. Rice (Mathematics)**, B.A., Cornell University, 1969; M.A., Washington University, 1972; Ph.D., 1975. (See Preventive Medicine and Public Health.)

**Sandra P. Schoenberg (Sociology)**, A.B., Sarah Lawrence College, 1954; M.P.A., University of Pennsylvania, 1969; Ph.D., Bryn Mawr College, 1974.

**Burton Singerman, B.A.**, Case Western Reserve University, 1969; M.D., Harvard University, 1973; M.P.H., Johns Hopkins, 1975.

**Roger K. Stoltzman, B.A.**, Westmar College, 1972; M.D., University of Nebraska, 1976.

**John R. Taylor, B.S.**, Loyola University, 1970; M.D., 1974.

**Michele Van Eerdewegh, M.D.**, Free University of Brussels, 1970.

**Robert H. Vanderpearl, A.B.**, Washington University, 1950; M.D., 1954. (Malcolm Bliss Hospital)

**Shozo Yokoyama (Genetics)**, B.S., Miyazaki University, 1968; M.S., Kyushu University, 1971; Ph.D., University of Washington, 1977. (See Department of Genetics.)

#### *Research Assistant Professors*

**Paul P. Hipps (Biochemistry)**, B.S., Lakeland College, 1966; Ph.D., North Dakota State University, 1971.

**William H. Holland (Electronics)**, A.B., Washington University, 1950. (See Department of Biological Chemistry.)

**Madelon T. Price (Neurobiology)**, A.B., Washington University, 1953; Ph.D., 1973.

**Elizabeth M. Smith (Social Work)**, B.A., University of Nebraska, 1960; M.S.W., 1962; Ph.D., Washington University, 1978.

#### *Assistant Professors Emeriti (Clinical)*

**Robert M. Bell, M.D.**, St. Louis University, 1928.

**Hyman H. Fingert, B.A.**, State University of Iowa, 1931; M.D., 1934.

**Reese H. Potter, A.B.**, University of Kansas, 1931; B.S., University of Missouri, 1933; M.D., Washington University, 1935.

#### *Assistant Professors (Clinical)*

**John F. Bergmann, A.B.**, Washington University, 1950; M.D., 1954.

**Robert D. Brookes, A.B.**, DePaul University, 1934; M.D., Washington University, 1938.

**Jane E. Brownstone (Medical Psychology)**, A.B., Washington University, 1961; A.M., 1964; Ph.D., 1968. (Malcolm Bliss Hospital)



**Lincoln B. Calvin, B.Ed.**, Illinois State University, 1942; M.D., Meharry Medical College, 1951. (Malcolm Bliss Hospital)

**Sei Y. Choi, B.S.**, Woo Sok University, 1951; M.D., 1963. (Malcolm Bliss Hospital)

**William W. Clendenin, M.D.**, University of Tennessee, 1963.

**Bun Tee Co, Jr., B.S.**, University of Santo Tomas, 1963; M.D., 1967. (Malcolm Bliss Hospital)

**Juan C. Corvalan, M.D.**, Argentina National University, 1965.

**Mary E. Cox, A.B.**, Washington University, 1941; M.D., 1944.

**Mary Davis, B.A.**, Ohio State University, 1947; M.D., Washington University, 1952.

**George H. Dowell, Jr., B.A.**, Amherst College, 1960; M.D., Washington University, 1969.

**Fred W. Gaskin, B.S.**, University of Minnesota, 1966; M.D., 1968.

**Wilbur H. Gearhart, B.S.**, Butler University, 1949; M.D., Hahnemann Medical College, 1950.

**James N. Haddock, A.B.**, University of Missouri, 1940; M.A., 1942; M.D., Washington University, 1943.

**Robert S. Hicks, A.B.**, Hendrix College, 1951; M.D., University of Arkansas, 1958.

**R. Eugene Holemon, A.B.**, Washington University, 1954; M.D., 1958.

**Natarajan Lakshminarayanan**, M.B., University of Madras, 1960; M.S., 1960; M.D., 1967. (Malcolm Bliss Hospital)

**Jay L. Liss**, A.B., Washington University, 1962; M.D., 1966.

**Joe K. McKinney**, B.A., Westminster College, 1954; M.D., Washington University, 1958.

**Jay Meyer**, A.B., Washington University, 1956; M.D., St. Louis University, 1960.

**Mary A. Montgomery**, A.B., Vassar College, 1967; M.D., Northwestern University, 1973.

**Bharat R. S. Nakra**, F.Sc., Punjab University, 1961; M.B.B.S., 1966. (Malcolm Bliss Hospital)

**Earni Pal**, M.B.B.S., Andhra University, 1965. (Malcolm Bliss Hospital)

**Thomas F. Richardson**, B.A., Millikin University, 1959; M.D., Washington University, 1963.

**William M. Riedesel II**, A.B., University of Rochester, 1968; M.D., Cornell University, 1973.

**Samuel H. Rosen**, B.A., Emory University, 1971; M.D., University of Alabama, 1974. (Malcolm Bliss Hospital)

**Reed E. Simpson**, B.A., Wabash College, 1972; M.D., Washington University, 1976. (Malcolm Bliss Hospital)

**James B. Smith**, A.B., University of Missouri, 1963; M.D., 1967.

**Alberto Soto**, B.S., Instituto de Santiago, 1951; M.D., Havana University, 1960.

**Cengiz M. Sumer**, M.D., Istanbul University, 1951. (Malcolm Bliss Hospital)

**John Sweet**, B.A., University of Michigan, 1964; M.D., University of Missouri, 1968. (Malcolm Bliss Hospital)

**Leonard J. Wiedersheim**, A.B., Washington University, 1943; M.D., 1946.

**Edwin D. Wolfgram**, B.A., State University of Iowa, 1954; M.D., 1959.

#### *Instructors*

**Ahmad Ardekani**, M.D., Pahlavi University, 1974. (Malcolm Bliss Hospital)

**Kathryn G. Bennett** (Social Work), B.A., University of Kansas, 1938; M.S.W., Smith College, 1940. (Jewish Hospital)

**Anna K. Bradley** (Social Work), B.J., University of Missouri, 1956; M.S.W., Washington University, 1958. (Malcolm Bliss Hospital)

**Morris D. Fishbein** (Medical Psychology), B.A., Tulane University, 1976; M.A., University of Missouri, 1979; Ph.D., 1981. (Malcolm Bliss Hospital)

**Tamara Frishberg**, M.D., Vinnitza Medical School, 1961. (Malcolm Bliss Hospital)

**Shrikrishna Kulkarni**, M.D., J.N. Medical College, 1973. (Malcolm Bliss Hospital)

**Judith A. McGee** (Medical Psychology), B.A., Long Island University, 1969; M.S., St. Louis University, 1975; Ph.D., 1979. (Malcolm Bliss Hospital)

**John F. Mueller** (Social Work), B.S., Washington University, 1947; M.S.W., 1952. (Malcolm Bliss Hospital)

**Muniyapla T. Rajappa**, M.B.B.S., Mysore Medical College, 1973. (Malcolm Bliss Hospital)

**Michael N. Stake** (Medical Psychology), B.A., Long Beach State University, 1970; M.A., Arizona State University, 1974; Ph.D., 1976. (Malcolm Bliss Hospital)

**Deborah E. Wald** (Social Work), B.A., University of Hawaii, 1975; M.S.W., Washington University, 1975. (Jewish Hospital)

#### *Research Instructor*

**Juanita L. Carl** (Biochemistry), B.S., Drury College, 1959; A.M., Washington University, 1962.

#### *Instructors (Clinical)*

**Lachman K. Abichandani**, B.S., Vikram University, 1970; M.D., Far Eastern University, 1974. (Malcolm Bliss Hospital)

**Felipe Crimi**, M.D., National University of Cordoba, 1946. (Malcolm Bliss Hospital)

**Alejandro M. Datuin**, A.A., University of Santo Tomas, 1951; M.D., 1965. (Malcolm Bliss Hospital)



**Pacita C. Dy, A.A.**, University of the East, 1959; M.D., Far Eastern University, 1967. (Malcolm Bliss Hospital)

**Randy L. Hammer** (Medical Psychology), B.A., Washington University, 1970; Ph.D., 1975. (Jewish Hospital)

**Abid Hussain, M.D.**, Osmania University, 1974. (Malcolm Bliss Hospital)

**Rashmi R. Nakra, M.B.B.S.**, Lady Hardinge, 1970.

**Richard W. Nysewander, B.S.**, Georgia Institute of Technology, 1971; M.D., Medical College of Georgia, 1975.

**Ronald A. Oliver** (Medical Psychology), B.A., University of Rhode Island, 1968; M.A., Xavier University, 1970; Ph.D., Iowa State University, 1973. (Malcolm Bliss Hospital)

**Dean L. Rosen** (Medical Psychology), B.S., University of Iowa, 1968; Psy. D., University of Illinois, 1977. (Malcolm Bliss Hospital)

**Kenneth L. Russ** (Medical Psychology), A.B., University of Rochester, 1965; M.S., University of Pittsburgh, 1969; Ph.D., 1970. (Jewish Hospital)

**Jo-Ellyn M. Ryall, B.A.**, Rutgers University, 1971; M.D., Washington University, 1975.

**Allahyar Samadaei, M.D.**, Pahlavi University, 1973. (Malcolm Bliss Hospital)

**Paul W. Sheffner, B.A.**, Wabash College, 1970; M.D., Washington University, 1974.

**Wayne A. Stillings, B.A.**, Oberlin College, 1971; M.D., Washington University, 1975.

**Theodis M. Wheatt, B.S.**, Tuskegee Institute, 1971; M.D., Washington University, 1975. (Malcolm Bliss Hospital)

#### Lecturers

**Michael Merbaum** (Medical Psychology), B.A., Drake University, 1956; M.A., University of Missouri, 1957; Ph.D., University of North Carolina, 1961. (Also Psychology)

**Robert C. Kolodny** (Human Sexuality), B.A., Columbia University, 1965; M.D., Washington University, 1969. (See Department of Medicine.)

**Virginia Johnson-Masters** (Human Sexuality), D.Sc. (Hon.), University of Louisville, 1978.

**William H. Masters** (Human Sexuality), B.S., Hamilton College, 1938; M.D., Rochester University, 1943; Sc.D. (Hon.), Hamilton College, 1973. (See Department of Obstetrics and Gynecology.)



## **WILLIAM GREENLEAF ELIOT DIVISION OF CHILD PSYCHIATRY**

The Division of Child Psychiatry offers a varied teaching program for residents in psychiatry and fellows in child psychiatry through the St. Louis Children's Hos-

pital, its Child Psychiatry Clinic at 369 North Taylor Avenue, and the Hawthorn Children's Psychiatric Hospital. Trainees are assigned to these various units, where they participate in diagnostic evaluations and see patients in treatment under supervision.

### *Director and Associate Professor*

**Felton J. Earls** (Child Psychiatry), B.S., Howard University, 1963; M.D., 1967. (See Department of Pediatrics.)

### *Blanche F. Ittleson Professor*

**E. James Anthony** (Child Psychiatry), B.S., University of London, 1938; M.R.C.S., L.R.C.P., 1941; M.B., B.S., 1942; D.P.M., 1947; M.D., 1949.

### *Associate Professor*

**Barbara M. Herjanic** (Child Psychiatry), B.A., Northwestern University, 1943; B.S., Western Michigan College, 1946; M.D., University of Michigan, 1950. (See Department of Pediatrics.)

### *Assistant Professor Emeritus*

**Loretta K. Cass Seleski** (Medical Psychology), B.A., Colorado College, 1934; M.A., 1942; Ph.D., Ohio State University, 1950.

### *Assistant Professors*

**Cynthia L. Janes** (Medical Psychology), B.A., University of Oklahoma, 1965; Ph.D., 1970.

**David G. Weeks** (Medical Psychology), B.A., California State University at Fullerton, 1975; M.A., University of California at Los Angeles, 1976; Ph.D., 1978.

**Zila Welner** (Child Psychiatry), M.D., Hebrew University Hadassah Medical School, 1961. (See Department of Pediatrics.)

**Julien Worland** (Medical Psychology), B.A., McGill University, 1966; Ph.D., Washington University, 1973.

### *Assistant Professors (Clinical)*

**Haruo Kusama** (Child Psychiatry), A.B., Washington University, 1960; M.D., 1965.

**Paul H. Painter** (Child Psychiatry), M.D., St. Louis University, 1947. (See Department of Pediatrics.)

**Adolfo E. Rizzo** (Child Psychiatry), M.D., Buenos Aires University, 1955.

**Emel A. Sumer** (Child Psychiatry), M.D., University of Istanbul, 1957.

### *Instructor Emerita*

**Louetta Berger** (Psychiatric Social Work), B.S., University of Wichita, 1941; M.S.W., Washington University, 1946.

### *Instructors*

**Erna C. Jenkins** (Psychiatric Social Work), A.B., Fontbonne College, 1959; M.S.W., University of Missouri, 1961.

**Gail A. Overbey** (Medical Psychology), B.S., Southeast Missouri State University, 1973; Ph.D., University of Texas at Austin, 1979.

**Robert P. Wade** (Psychiatric Social Work), B.A., Maryknoll College, 1960; M.S.W., St. Louis University, 1969.

**Lillian B. Weger** (Psychiatric Social Work), B.A., Barnard College, 1954; M.S.W., Columbia University, 1956.

**Helen L. Zibit** (Psychiatric Social Work), B.A., Drake University, 1950; M.A., Indiana University, 1955.

### *Instructors (Clinical)*

**Alicia D. Gonzalez** (Child Psychiatry), M.D., University of Buenos Aires, 1961.

**Anna E. Hartnett** (Child Psychiatry), B.S., Loyola University, 1956; M.D., University of Ottawa, 1960.

**Julio Morales** (Child Psychiatry), M.D., University of Trujillo, 1966.

**Diane Rankin** (Child Psychiatry), B.A., University of Colorado, 1962; M.D., 1968.

**Jagdish C. Suri** (Child Psychiatry), B.Sc., Lucknow University, 1954; M.B.B.S., King George's Medical College, 1959; M.D., Lucknow University, 1964. (Hawthorn Children's Psychiatric Hospital)

**Eliza E. Wochnik** (Child Psychiatry), M.D., Medical Academy of Warsaw, 1962. (Hawthorn Children's Psychiatric Hospital)



# Department of Radiology

The Department of Radiology is located primarily in the 13-story Mallinckrodt Institute of Radiology, but also occupies space in the West Pavilion of Barnes Hospital, Barnard Hospital, St. Louis Children's Hospital, and the Washington University Clinic Building. The department provides diagnostic radiology, nuclear medicine, and radiation oncology services to Barnes Hospital and St. Louis Children's Hospital.

Clinical facilities for the Division of Radiation Oncology are located on the ground floor of the Institute and in Barnard Hospital. Therapy equipment consists of an advanced 35 MV linear accelerator, 20 MV linear accelerator, 6 MV linear accelerator, 4 MV linear accelerator, and Cobalt 60 therapy. There are also facilities and an ample stock of Cesium 137 sources for both interstitial and intracavitary therapy.

The first floor of the Institute houses administrative and business offices, film library, consulting viewing rooms, and the 135-seat Scarpellino Auditorium.

Fifty-five examination rooms for diagnostic radiology are available in the Institute and the newly constructed West Pavilion. Institute facilities are located on the second floor (chest, musculoskeletal radiology, and

mammography), third floor (neuroradiology, vascular radiology, ultrasound, and genitourinary radiology), fourth floor (gastrointestinal and genitourinary radiology), and the fifth floor (pediatric radiology). Cardiac radiology and the Division of Nuclear Medicine are located on the ninth floor of the West Pavilion. The tenth floor of the West Pavilion is dedicated entirely to outpatient services. The modern features of the Institute include five CT scanners and two digital subtraction systems.

The sixth floor of the Institute contains the Division of Radiation Sciences, which also utilizes two medical cyclotrons in Barnard Hospital. Additional research facilities are located on the seventh floor (nuclear medicine), ninth floor (diagnostic radiology), tenth floor (cancer biology), sixth floor of Barnard Hospital (radiation oncology), and the 4511 Forest Park building (cancer biology).

Administrative, teaching, and support functions occupy the eighth and eleventh floors. The twelfth floor is occupied by sophisticated computer facilities that are utilized for clinical, research, and teaching applications.

The undergraduate teaching program is designed to present both diagnostic and therapeutic radiology to students as part of the clinical clerkship experience. Every effort is made to provide an opportunity to correlate radiologic and clinical findings through interdepartmental conferences, consultations, and group discussions.

## SECOND YEAR

Twenty-six hours of lecture are devoted to an introduction to radiology. The majority of the course is devoted to diagnostic radiology including computed tomography, ultrasound, and nuclear medicine. Radiation biology and radiation oncology are also introduced.

## ELECTIVES

### RESEARCH ELECTIVES

Opportunity is available to carry out research in the laboratories under the guidance of the staff in the fields of diagnostic radiology, therapeutic radiology, radiation physics, nuclear medicine, and radiation and cancer biology.

### ONCOLOGY CLERKSHIP FOR FRESHMAN STUDENTS

A ten-week summer clerkship program is available for freshman medical and dental students. The students participate in the clinical activities of the Division of Radiation Oncology 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 some laboratory research or clinical investigation under the direction of the staff members of the sections of Clinical Radiation Oncology and Cancer Biology. (Dr. Simpson)

### CANCER BIOLOGY COURSE

January-April; consult coursemaster for exact time and dates. Topics to be covered include: interaction of radiation with matter; radiation chemistry and effect on



macromolecules; target theory and dose-survival curves; cellular radiobiology with emphasis on nuclear effects, age-response and repair, the oxygen effect and dose fractionation; radiation effects on cell renewal systems and on organs, radiation genetics and long-term effects; radiation sensitization and interaction with other anticancer agents. (Dr. Sapareto)

#### FOURTH YEAR ELECTIVES

##### Clerkship in Radiation Oncology

Six-week elective in which the student has the opportunity to see patients being evaluated and treated in Radiation Oncology. Emphasis is on techniques of cancer diagnosis and localization, selection of therapy, indications for irradiation and techniques on treatment planning, simulation and irradiation of a variety of tumors. There are several conferences in which the students participate, including new case planning conferences, clinical physics conference, protocol conference, and interdepartmental conferences with the Department of Pediatrics, Obstetrics and Gynecology, Surgery and Pathology.

(Drs. Marks or Perez)

##### Clerkship in Diagnostic Radiology

A six-week elective which emphasizes the role of radiology in the solution of clinical diagnostic problems. Each

student on the rotation will spend two to three weeks on subspecialty sections within the department (abdomen, bone and joint, cardiac, chest, neuroradiology, nuclear medicine, pediatric radiology, radiation oncology, and Queeny Tower radiology) under the supervision of a senior faculty member. The student will have a chance to observe special procedures as well as routine radiological examinations. Conferences intended to complement the subspecialty approach to radiology round out this six-week experience. (Dr. Aronberg)

Additional six-week clerkships in diagnostic radiology are offered at Jewish Hospital (Dr. Hyman Senturia) and St. Luke's Hospital (Dr. Mayes)

##### Clerkship in Clinical Nuclear Medicine

A six-week elective in which the student will be exposed to the full range of techniques, including organ imaging with radionuclides, nuclear hematology, *in vitro* tests, and radionuclide therapy. The student will be responsible for planning appropriate isotope studies in patients referred to the department in conjunction with the staff. Opportunity exists to learn instrumental techniques, including new ones such as computer applications. Participation in clinical and laboratory research projects may also be arranged if desirable. There are daily conferences and scan interpretation sessions. (Dr. B. Siegel)

## Faculty of the Department of Radiology

**Elizabeth E. Mallinckrodt Professor and Head of Department and Director of the Mallinckrodt Institute of Radiology**

Ronald G. Evens, A.B., Washington University, 1961; M.D., 1964.

#### Professors

**Mokhtar Gado**, M.B., B.Ch., Cairo University, 1953; DMRE, 1960.

**Louis A. Gilula**, M.D., University of Illinois, 1967.

**Robert L. Grubb, Jr.** (Radiation Sciences), A.B., University of North Carolina, 1961; M.D., 1965. (See Department of Neurology and Neurological Surgery.)

**Fred J. Hodges III**, B.A., University of Wisconsin, 1944; M.D., 1946.

**James E. Marks**, A.B., Knox College, 1961; M.D., Washington University, 1965.

**William H. McAlister**, B.S., Wayne State University, 1950; M.D., 1954. (See Department of Pediatrics.)

**Bruce L. McClennan**, B.S., Union College, 1963; M.D., State University of New York, Upstate, 1967.

**Carlos A. Perez**, B.S., University of Antioquia, 1952; M.D., 1960.

**Marcus E. Raichle** (Radiation Sciences), B.S., University of Washington, 1960; M.D., 1964. (See Department of Neurology and Neurological Surgery.)

**Stuart S. Sagel**, B.A., Temple University, 1961; M.D., 1965.

**Gary D. Shackelford**, B.A., Northwestern University, 1964; M.D., Washington University, 1968. (See Department of Pediatrics.)

**Barry A. Siegel**, A.B., Washington University, 1965; M.D., 1969. (See Department of Medicine.)

**Michel M. Ter-Pogossian** (Radiation Sciences), B.A., University of Paris, 1943; M.S., Washington University, 1948; Ph.D., 1950. (Also School of Engineering and Applied Science.)

**Leonard J. Tolmach** (Radiation Biology), B.S., University of Michigan, 1943; Ph.D., University of Chicago, 1951. (See Department of Anatomy and Neurobiology.)

**Teresa J. Vietti** (Radiation Oncology), A.B., Rice University, 1949; M.D., Baylor University, 1953. (See Department of Pediatrics.)

**Michael J. Welch** (Radiation Chemistry), B.A., Cambridge University, 1961; M.A., 1964; Ph.D., University of London, 1965. (Also Faculty of Arts and Sciences.)

#### Professor Emeriti (Clinical)

**Hyman R. Senturia**, A.B., Washington University, 1929; M.D., 1933.

#### Associate Professors

**Daniel R. Biello**, B.A., Ohio Wesleyan University, 1969; M.D., Case Western Reserve, 1973.

**John O. Eichling** (Radiation Sciences), B.S., Northeastern Oklahoma State College, 1958; M.S., Oklahoma State University, 1959; Ph.D., Washington University, 1970.

**Rexford L. Hill** (Computer Sciences), B.S., University of Cincinnati, 1964; M.S., 1966. (See Biomedical Computer Laboratory.)

**R. Gilbert Jost**, A.B., Harvard University, 1964; M.D., Yale University, 1969.

**Joseph K. T. Lee**, B.Sc., Chinese University of Hong Kong, 1968; M.D., Washington University, 1973.

**Robert G. Levitt**, B.A., University of California, 1968; M.D., 1972.

**Hsiu-san Lin** (Cancer Biology), M.D., Taiwan University, 1960; Ph.D., University of Chicago, 1968. (See Department of Microbiology and Immunology.)

**Philip R. Ludbrook, M.B., B.S.,** University of Adelaide, 1963. (See Department of Medicine.)

**Robert C. McKnight, B.S.,** Florida State University, 1957; M.D., Washington University, 1961. (See Department of Medicine.)

**G. Leland Melson, B.A.,** Ottawa University, 1961; M.D., Washington University, 1965.

**William A. Murphy, Jr., B.S.,** University of Pittsburgh, 1966; M.D., Pennsylvania State University, 1971.

**Miljenko V. Pilepich, M.D.,** University of Zagreb, 1965.

**James A. Purdy (Radiation Physics),** B.S., Lamar University, 1967; M.A., University of Texas, 1969; Ph.D., 1971.

**Bruce J. Walz, A.B.,** Washington University, 1962; M.D., 1966.

**Todd H. Wasserman, A.B.,** University of Rochester, 1968; M.D., University of Rochester School of Medicine and Dentistry, 1972.

#### *Associate Professor Emeriti (Clinical)*

**A. Norman Arneson, B.S.,** Texas Christian University, 1924; M.D., Washington University, 1928. (See Department of Obstetrics and Gynecology.)

#### *Associate Professors (Clinical)*

**Charles L. Abramson, A.B.,** New York University, 1957; M.D., University of Basel, 1963.

**Mark D. Eagleton, Jr., A.B.,** Amherst College, 1947; M.D., Washington University, 1950.

**Sumner Holtz, M.B.,** St. Louis University, 1948.

**Noah Susman, A.B.,** Washington University, 1948; M.D., 1952. (Jewish Hospital)

#### *Assistant Professors*

**Dixie J. Aronberg, B.A.,** Hendrix College, 1967; M.D., Washington University, 1971.

**Dennis M. Balfe, B.S.,** University of Santa Clara, 1968; M.D., Medical College of Wisconsin, 1975.

**John M. Bedwinek, B.A.,** Oberlin College, 1967; M.D., Columbia University College of Physicians and Surgeons, 1971.

**Dien-ming Ben Chen, B.S.,** Fu Jen University, 1969; M.S., State University of New York, 1972; Ph.D., Vanderbilt University, 1977.

**Judy M. Destouet, B.S.,** University of Southwestern Louisiana, 1969; M.D., Baylor College of Medicine, 1975.

**Bahman Emami, M.D.,** Tehran University, 1968.

**Edward M. Geltman, B.S.,** Massachusetts Institute of Technology, 1967; M.D., New York University, 1971. (See Department of Medicine.)

**Glenn P. Glasgow (Radiation Physics),** B.S., Western Kentucky State College, 1965; M.S., University of Kentucky, 1969; Ph.D., 1974.

**Fernando R. Gutierrez, M.D.,** University of Valladolid, 1974.

**Donald V. Huebener (Dental Medicine),** D.D.S., Washington University, 1969. (See Department of Pediatrics.) (Also School of Dental Medicine.)

**Bharath A. K. Kumar, M.B., B.S.,** Andhra University Medical College, 1969.

**Michael R. Kilbourn, B.S.,** University of Michigan, 1975; Ph.D., University of Illinois, 1979.

**Karen D. McElvany, B.A.,** College of Wooster, 1976; A.M., Washington University, 1977; Ph.D., 1979.

**Tom R. Miller, B.S.,** California Institute of Technology, 1966; M.S., Stanford University, 1969; Ph.D., 1971; M.D., University of Missouri, 1976.

**Alexander N. Nakeff (Cancer Biology),** B.S., University of Toronto, 1962; M.S., 1965; Ph.D., University of Rochester, 1969.

**Gilbert H. Nussbaum, B.S.,** City College of New York, 1960; M.A., Harvard University, 1962; Ph.D., 1967.

**Gordon L. Phillips, B.A.,** University of Oklahoma, 1966; M.D., 1971. (See Department of Medicine.)

**D. Venkato Rao, M.D.,** Osmania Medical College, 1973.

**Stephen A. Sapareto (Cancer Biology),** B.S., University of Massachusetts, 1971; M.S., Colorado State University, 1973; Ph.D., 1978.

**Marilyn J. Siegel, A.B.,** Washington University, 1965; M.D., State University of New York, 1969. (See Department of Pediatrics.)

**Joseph R. Simpson, A.B.,** Cornell University, 1963; Ph.D., University of Chicago, 1967; M.D., Harvard University, 1973.

**Emily L. Smith, A.B.,** Washington University, 1964; M.D., 1968.

**Alan J. Tiefenbrunn, A.B.,** Washington University, 1970; M.D., 1974. (See Department of Medicine.)

**Patrick R. M. Thomas, B.S.,** London University, 1965; M.B., 1968.

**William G. Totty, B.A.,** David Lipscomb College, 1969; M.D., University of Tennessee, 1975.

**Michael W. Vannier, B.S.,** Colorado State University, 1971; B.S.M.E., University of Kentucky, 1971; M.D., 1976.

**Gary E. VanZant (Cancer Biology),** B.S., University of Nebraska, 1966; M.S., 1968; Ph.D., New York University, 1973.

**Philip J. Weyman, B.A.,** Yale University, 1968; M.D., 1972.

#### *Assistant Professors (Clinical)*

**Robert J. Baglan, B.S.,** University of Kentucky, 1965; Ph.D., University of California, 1970; M.D., Washington University, 1976.

**John L. Bardsley, B.A.,** University of Illinois, 1961; M.D., 1964.

**Enrique Cubillo, M.D.,** University of Madrid, 1962.

**James W. Debnam, Jr., B.A.,** University of Louisville, 1958; M.D., 1962.

**Keith C. Fischer, A.B.,** Oberlin College, 1967; M.D., Johns Hopkins University, 1971.

**Guillermo C. Geisse, B.A.,** University of Chile, 1957; M.D., 1965.

**Albert E. Hesker, A.B.,** University of Missouri, 1961; M.D., 1964.

**Fransiska Lee, A.B.,** Washington University, 1962; M.D., 1966.

**MacDonald B. Logie, B.S.,** Northwestern University, 1965; M.D., 1967.

**Ben R. Mayes, Jr., B.A.,** Vanderbilt University, 1962; M.D., Washington University, 1966.

**Allan H. McCown, B.S.,** University of Idaho, 1962; M.D., Washington University, 1964.

**Christopher J. Moran, B.S.,** University of Notre Dame, 1970; M.D., St. Louis University, 1974.

**Arthur A. Porporis, A.B.,** Washington University, 1946; M.D., 1948.

**Wayne A. Simril, A.B.,** Culver-Stockton College, 1941; M.D., Washington University, 1944.

**Chandrakant C. Tailor, M.B., B.S.,** Maharaja Sayajirao University of Baroda, 1972.

#### *Instructors*

**Frederick G. Abrath (Radiation Physics),** B.S., University of Wisconsin, 1967; Ph.D., North Texas State University, 1974.

**Gerald Edelstein**, B.S., Pennsylvania State University, 1964; D.O., Philadelphia College of Osteopathic Medicine, 1968.

**Seymour Fox** (Computer Sciences), B. Comm., McGill University, 1971; M.S., University of Oregon, 1972; Ph.D., University of Oklahoma, 1977.

**Harvey S. Glazer**, B.A., Washington University, 1971; M.D., 1976.

**Jay P. Heiken**, B.A., Williams College, 1974; M.D., Columbia University, 1978.

**Pamela A. Kopen**, B.S., Lafayette College, 1974; M.D., Pennsylvania State University, 1978.

**Barbara Monsees**, B.A., Brandeis University, 1971; M.D., Washington University, 1975.

**Jashbhai I. Patel**, M.B., B.S., Seth G. S. Medical College, 1974.

**William J. Powers** (Radiation Sciences), A.B., Dartmouth College, 1971; M.D., Cornell University, 1975. (See Department of Neurology and Neurological Surgery.)

**Ralph L. Smathers, Jr.**, B.S., University of Florida, 1974; M.D., University of Chicago, 1978.

**Jonathan S. Stein**, M.B., B.Ch., Witwatersrand University, 1975.

**Donald E. Wadsworth**, B.S., Portland State University, 1961; M.D., University of Oregon, 1964.

**Franz J. Wippold II**, B.A., Westminster College, 1973; M.D., St. Louis University, 1977.

#### **Research Instructor**

**Kondapuram S. Sampathkumaran**, B.S., Bangalore University, 1970; M.S., 1972; M.S., McMaster University, 1976.

#### **Instructors (Clinical)**

**Stephen F. Albert**, A.B., Washington University, 1964; M.D., St. Louis University, 1968.

**Edward Cohen**, A.B., Washington University, 1961; M.D., University of Missouri, 1969.

**Gene L. Davis, Jr.**, B.A., University of Virginia, 1968; M.D., 1972.

**Beauvoir H. Edmond**, B.S., Lycee Petion, 1949; M.D., University of Haiti, 1955.

**Albert M. Hammerman**, A.B., Washington University, 1973; M.D., 1976.

**Lawrence M. Kotner, Jr.**, B.A., Washington University, 1965; M.D., 1968.



**Daniel J. Leary, Jr.**, B.S., St. Louis University, 1962; M.D., Washington University, 1966.

**Gary H. Omell**, M.D., University of Tennessee, 1967.

**Gary A. Ratkin**, B.A., Rice University, 1963; M.D., Washington University, 1967. (See Department of Medicine.)

**Naris Rujanavech**, M.D., Faculty of Medicine, Siriraj Hospital, 1972.

**Robert F. Scheible**, A.B., Johns Hopkins University, 1968; M.D., Washington University, 1972.

**Gerald L. Shaikun**, B.S., University of Kentucky, 1960; M.D., University of Chicago, 1964.

**Gene W. Spector**, B.A., Amherst College, 1954; M.D., Yale University, 1959.

**Frederick R. Zivnaska**, B.S., St. Procopius College, 1961; M.S., Marquette University, 1964; M.D., University of Wisconsin, 1970.

#### **Research Associates**

**Karen L. Beetham**, B.A., St. Olaf College, 1968; M.S., University of Iowa, 1971; Ph.D., 1974.

**Duan Liang**, National Wu-Han University.

**Peter A. Parrino**, B.S.E.E., Worcester Polytechnic Institute, 1962; M.S.E., Pennsylvania State College, 1970.

#### **Research Assistants**

**Dean M. Coulter**, B.S., Weber State College, 1967; M.S., Utah State University, 1975.

**David C. Ficke**, B.S.E.E., Southern Illinois University, 1974.

**Gary R. Hoffman**, B.A., University of Missouri, 1976.

#### **Lecturer**

**Armand Diaz** (Radiologic Technology), R.N., R.T., Havana University School of Medicine, 1948. (See Program in Radiologic Technology.)

#### **Consultant**

**Mildred Trotter** (Anatomy), A.B., Mount Holyoke College, 1920; Sc.M., Washington University, 1921; Ph.D., 1924; Sc.D., (hon.), Western College, 1956; Sc.D., (hon.), Mount Holyoke College, 1960; Sc.D., (hon.), Washington University, 1980. (See Department of Anatomy and Neurobiology.)



# Mary Culver

## Department of Surgery

The Department of Surgery includes general surgery, plastic and reconstructive surgery, orthopedic surgery, urological surgery, cardiothoracic surgery, and pediatric surgery. The formal instruction begins in the second year with an introduction to surgical principles, the basis of which is largely derived from concepts learned in the pre-clinical sciences.

In the third year, students are assigned to clinical clerkships where they have an opportunity to study the more common surgical diseases. These clerkships last for twelve weeks and may be spent at a hospital in the Barnes complex or at an allied hospital. Students attend daily patient rounds with the house staff and attending staff. Seminars and teaching conferences are scheduled on a regular basis.

Students are encouraged to assist at operative procedures involving patients assigned to them.

The fourth-year surgical program permits students to select any of the following electives most of which are for periods of six to eighteen weeks: (1) subinternships or preceptorship during which the student is assigned to a staff member for instruction in managing surgical problems; (2) surgical research (minimum time 12 weeks); (3) electives in pediatric surgery, thoracic and cardiovascular surgery, orthopedic surgery, neurosurgery, urological surgery, oncological surgery, transplantation surgery, and emergency room surgery.

### SECOND YEAR

#### Introduction to Surgery

Lectures present certain fundamental principles of physiology, biochemistry, and pathology as applied to surgery. Recitations and demonstrations are included. Patient problems are discussed and related to physiological and biochemical abnormalities. Two hours weekly for 18 weeks during the second and third trimesters of the second year.

### THIRD YEAR

#### Surgical Wards

Pathological material is reviewed and considered an integral part of the case study. At regular intervals the students meet with residents and attending staff in informal conferences. In addition, the material is presented to students in small discussion groups with their preceptors. After discharge students follow their patients in the post-operative and outpatient clinic. A particular effort is made to see that students are exposed to the more common surgical lesions, and that the assigned cases are sufficiently diversified to afford an accurate perspective of surgery. Students are encouraged to consult the library frequently in the solution of problems concerning patients.

### FOURTH YEAR

The electives offered to senior students are principally clinical subinternships or research.

#### Surgical Preceptorships and Subinternships

Each student is assigned to a senior general surgeon. The student sees patients in the surgeon's office, takes histories, performs physical examinations, and follows patients in the hospital. (Dr. Etheredge and Staff)





#### **Surgical Research Elective**

This elective introduces the student to the general approach to analyzing clinical problems of surgery in the laboratory and familiarizes him with some of the investigative methods in surgery. In general, the student gains more experience by working with an established investigator on a current project. The student is encouraged, however, to plan and execute a laboratory solution to a specific problem within the limitations of his elective time. The student participates in the weekly departmental research seminars, where investigators describe a wide range of current topics. (Dr. Scharp and Staff)

#### **Pediatric Surgery Elective**

Emphasis is placed on the different problems this age group presents in respect to type of surgical diseases and their care. The student gains exposure to many surgical conditions seen only in children. The exposure includes daily morning and evening rounds as well as participation in the operative procedures. Diagnostic x-rays are reviewed on a daily basis, and the student is encouraged to attend the many weekly conferences of the Surgery Department and Pediatrics Department. Students are expected to participate actively in clinical care and not merely to be observers.

The student may also elect to spend a portion of the time in an introduction to ongoing research within the Division. Currently, areas of activity include surgical bacteriology, short gut syndrome, and experimental animal fetal surgery. (Dr. Ternberg and Staff)

#### **Principles of Thoracic and Cardiac Surgery**

Two avenues are available which may be mixed. The first involves a clinical rotation on cardiothoracic surgical service where the students will be assigned duties comparable to that of an intern. They will share night call under supervision of the first- and second-year residents in rotation with the ward interns. They will have the prerogative of selection of operative cases on which to scrub and are

at liberty to spend time within the cardiac catheterization laboratory, with members of the cardiopulmonary bypass team, or on any particular problem of acute pulmonary or hemodynamic nature in the Intensive Care Unit. The second alternative is six weeks in the laboratory working on ongoing projects having to do with ischemic heart disease and a myocardial infarction model, prosthetic heart valves, perfusion techniques for infants and the studies of the pulmonary microcirculation.

(Dr. Weldon and Staff)

#### **Plastic and Reconstructive Surgery Elective**

This elective offers two tracks, a clinical clerkship or participation in a laboratory project. On occasion, these can be combined if desired by the student.

The clinical clerkship is available for six to twelve weeks. Plastic Surgery is divided into five services. The student will rotate on each service for one week. After four weeks, he can elect the services to which he will be assigned. Each service provides a unique opportunity for patient care. Service I—Drs. Marsh and Holtmann—congenital anomalies, craniofacial and maxillofacial surgery; Service II—Drs. Weeks and Young—hand surgery and reconstructive plastic surgery; Service III—Drs. Wray and Zografakis—reconstructive plastic surgery and microsurgery; and Service IV—resident service—general plastic surgery. The student will assist his attendings in the care of out-patients and in-patients. There are three conferences weekly, one reviews patients seen the previous week, another permits didactic presentations by the resident staff, and the third is an x-ray conference.

The research elective can be for six or twelve weeks, twelve weeks being preferable. Research can pursue projects at either a basic science or clinical study level. Basic research done in the Division of Plastic Surgery concerns the healing of skin, tendon, and nerve wounds. Many clinical research projects are being conducted by members of the Division of Plastic Surgery. Students are encouraged to participate in these projects.

(Dr. Weeks and Staff)

#### **Orthopedic Surgery Elective**

Clinical clerkship electives are available for six weeks, during which time the student attends conferences and outpatient clinics and serves in the various orthopedic clinical divisions. It is also possible to establish a research elective in the Orthopedic Research Laboratory under the guidance of Dr. David Simmons. Students on the clinical elective become an active part of the orthopedic team and may spend part of their time at the Shriners Hospital for Crippled Children, Veterans Hospital and Barnes Hospital, the exact program to be worked out on an individual basis with the chairman of the division.

(Dr. Schoenecker and Staff)

#### **Urology Elective**

A six-week clinical clerkship offers the interested student an adequate knowledge of the type of problems with which the clinical urologist deals. The student is taught the basic diagnostic procedures and the management of surgical and nonsurgical patients on both the private and ward services under the supervision of the attending staff

and house officers. The experience involves direct care of patients in the clinics, as well as the urologic admissions to the hospital. Daily morning and evening rounds of all patients on a particular service are conducted by the responsible resident. Two additional teaching rounds for the house staff and students are held weekly. In addition, the student attends daily x-ray conferences, the weekly staff conference, and the weekly research seminar. The student is given an opportunity to assist in open and endoscopic surgery, as well as in the various diagnostic procedures performed in the cystoscopy and urography section. (Dr. Fair and Staff)

#### **Oncology Elective**

Students electing to study the theoretical and practical aspects of the epidemiology, diagnosis, treatment and prognosis of neoplastic diseases in man may select a program (subject to the approval of the Tumor Committee) which includes interdepartmental experience in several of the following areas of knowledge:

- (a) Surgical pathology of neoplasms. (Dr. Bauer)
- (b) Neoplasms in children. (Dr. Vietti)
- (c) Head and neck cancer. (Dr. Ogura)
- (d) Radiation therapy of neoplasms. (Dr. Perez)
- (e) Hematologic neoplastic disease. (Dr. Reinhard)
- (f) Chemotherapy of solid tumors. (Dr. Philpott)

All students attending the oncology elective will be expected to attend the tumor, gynecologic cancer, ENT tumor, and neoplastic hematology conferences, as well as the cancer workshop.

Each student taking an elective in oncology must select (or be assigned) a problem for study in this field. Each

student is expected to report to his peers and instructors on the selected subject at the end of the elective period. Members of the Tumor Committee evaluate the report, as well as the student's performance during the elective.

(Drs. Bauer, Philpott, and Staff)

#### **Transplantation Elective**

This orientation course is designed to offer the student an overview of the entire field of organ transplantation. The student is an integral part of the renal transplantation team and assumes appropriate responsibilities under supervision. (Dr. Anderson and Staff)

#### **Urology Research Elective**

A unique opportunity is afforded the student interested in surgical research to participate in any of the research activities in the Division of Urology. This elective may be structured so as to be meaningful to the student with no previous research experience who desires an exposure to the techniques and methodology utilized in surgical research. The student may participate in any one of a number of ongoing projects dealing with the pathogenesis and etiology of urinary tract infections, mechanisms involved in normal and abnormal prostatic growth, urologic oncology with specific emphasis on tumor immunology, the use of prostheses in urology and studies on the etiology of urinary tract calculi.

Students with prior investigative experience will be encouraged to outline and execute a specific laboratory problem within the time limitations of the elective. Students will also be invited to participate in all research seminars within the Division.

(Drs. Fair, Heston and Staff)

## **Faculty of the Mary Culver Department of Surgery**

*Bixby Professor of Surgery,  
Chairman, Department of Surgery*  
Samuel A. Wells, Jr., M.D.

*Harry Edison Professor of Surgery*  
Gordon W. Philpott, M.D. (See  
Division of General Surgery.)

#### **DIVISION OF CARDIOTHORACIC SURGERY**

*Head of Division*  
Clarence S. Weldon, M.D.

##### **Professors**

Richard E. Clark, B.S.E., Princeton  
University, 1956; M.D., Cornell  
University, 1960; M.D., University of  
Virginia, 1962.

Clarence S. Weldon, A.B., University of  
Michigan, 1951; M.D., Johns Hopkins  
University, 1955. (See Department  
of Pediatrics.)

##### **Professor (Clinical)**

Thomas B. Ferguson, B.S., Duke  
University, 1947; M.D., 1947.

##### **Associate Professor**

John P. Connors, A.B., Holy Cross  
College, 1961; M.D., Georgetown  
University, 1965. (Jewish Hospital)

##### **Associate Professors (Clinical)**

Martin Bergman, A.B., Washington  
University, 1942; M.D., 1945.

Charles L. Roper, A.B., Colorado  
College, 1949; M.D., University of  
Colorado, 1953.

##### **Assistant Professors**

John P. Marbarger, B.S., University of  
Illinois, Urbana, 1968; M.D., University  
of Illinois, Chicago, 1974.

Joseph G. Sandza, B.S., University of  
Notre Dame, 1964; M.D., University of  
Puerto Rico, 1969.

Richard C. Shaw, B.A., State University  
of Iowa, 1963; M.D., Washington  
University, 1967.

##### **Research Associate Professor**

Ignacio Christlieb, B.A., Colegio  
Frances de Preparatoria, 1945; M.D.,  
National Autonomous University of  
Mexico, 1952.

#### **DIVISION OF GENERAL SURGERY**

##### **Harry Edison Professor of Surgery**

Gordon W. Philpott, B.S., Yale  
University, 1957; M.D., Washington  
University, 1961. (Jewish Hospital)  
(Cancer Coordinator and Director of  
the Division of Tumor Services, and  
Head, Section of Surgical Oncology,  
Washington University School  
of Medicine.)

##### **Professors**

Charles B. Anderson, A.B., Johns  
Hopkins University, 1958; M.D., Yale  
University, 1962.

Walter F. Ballinger, M.D., University of  
Pennsylvania, 1948.

**Harvey R. Butcher, Jr., A.B.,** Central College, 1941; M.D., Harvard University, 1944.

**William W. Monafó, A.B.,** Harvard University, 1953; M.D., Tufts University, 1957.

**Professors Emeriti (Clinical)**

**Eugene M. Bricker, M.D.,** Washington University, 1934.

**J. G. Probst, M.D.,** Loyola University, 1917.

**Associate Professors**

**Laurence Cheung, M.D.,** National Defense Medical Center, 1968. (St. Louis V.A. Hospitals)

**Thomas H. Covey, Jr., A.N.,** West Virginia University, 1957; M.D., Harvard University, 1961. (Jewish Hospital)

**Edward E. Etheredge, B.A.,** Yale University, 1961; M.D., 1965; Ph.D., University of Minnesota, 1974.

**John D. Halverson, B.A.,** Hamilton College, 1963; M.D., State University of New York, 1967.

**Associate Professors Emeriti (Clinical)**

**Heinz Haffner, B.S.,** University of Arizona, 1931; M.D., Washington University, 1935.

**Instructors (Clinical)**

**Robert R. Anschütz, M.D.,** Washington University, 1940

**John B. Buettner, A.B.,** Dartmouth College, 1963; M.D., Washington University, 1967.

**Arthur R. Dalton, B.S.,** University of Missouri, 1939; B.S. Med., Northwestern University, 1940; M.D., 1941.

**Samuel J. Freund, B.S.,** St. Louis University, 1923; M.D., 1927.

**Robert D. Fry, A.B.,** Oklahoma City University, 1968; M.D., Washington University, 1972.

**Ronald J. Gaskin, A.B.,** Washington University, 1966; M.D., 1970.

**Jay W. Haines, B.A.,** Trinity University, 1970; M.D., Chicago Medical School, 1974.

**Fleming B. Harper, M.D.,** Medical College of Virginia, 1947.

**John D. Hirsch, B.A.,** Case Western Reserve University, 1969; M.D., Washington University, 1973.

**Robert J. Kingsbury, A.B.,** Asbury College, 1956; M.D., University of Michigan, 1960.

**David Krajcovic, A.B.,** Washington University, 1965; M.D., 1969.

**G. Lynn Krause, Jr., A.B.,** Amherst College, 1950; M.D., University of Pennsylvania, 1954.

**Alan M. Londe, A.B.,** Washington University, 1957; M.D., 1961.

**Eugene N. Mitchell, B.S.,** St. Louis University, 1955; M.D., University of Missouri, 1960.

**Julian C. Mosley, Jr., B.S.,** St. Louis University, 1966; M.D., Washington University, 1972.

**George A. Oliver, A.B.,** Washington University, 1948; M.D., 1952.

**Charles L. Parks, B.A.,** University of North Dakota, 1967; M.D., Washington University, 1969.

**Joseph C. Peden, Jr., B.S.,** Harvard University, 1940; M.D., 1943.

**Mather Pfeifferberger, Jr., A.B.,** Yale University, 1941; M.D., Harvard University, 1944.

**George B. Rader, M.D.,** Washington University, 1951.

**Frank O. Richards, A.B.,** Talladega College, 1944; M.D., Howard University, 1947.

**Donald C. Sauer, A.B.,** Washington University, 1956; M.D., 1960.

**Belmont R. Thiele, M.D.,** St. Louis University, 1948.

**Marc K. Wallack, B.S.,** Albright College, 1966; M.D., University of Pittsburgh, 1970. (Head, Section of Surgical Oncology, Barnes Hospital.)

**Research Assistant Professors**

**Harry Margraf, Ph.D.,** Polytechnicum Milan, 1943; Sc.D., Washington University, 1971.

**Maria Michaelides, B.A.,** Smith College, 1953; M.A., Radcliffe College, 1954; Ph.D., 1958.

**Assistant Professors (Clinical)**

**Kenneth J. Arnold, B.A.,** Notre Dame University, 1964; M.D., Washington University, 1968.

**Kenneth J. Bennett, M.D.,** Tulane University, 1965.

**Richard V. Bradley, M.D.,** Washington University, 1952.

**Cyril J. Costello, B.S.,** University of Texas, 1935; M.D., 1939.

**Richard H. Fallon, B.S.,** Boston College, 1952; M.D., Harvard University, 1956; A.M., Washington University, 1971.

**Alvin Goldfarb, A.B.,** Washington University, 1940; M.D., 1943.

**Ira J. Kodner, A.B.,** Washington University, 1963; M.D., 1967.

**Jerome F. Levy, A.B.,** Washington University, 1954; M.D., 1958.

**Stanley L. London, M.D.,** Washington University, 1949.

**Sherwin H. Malt, A.B.,** Washington University, 1962; M.D., University of Missouri, 1966.

**Jerry R. Meyers, B.A.,** University of Texas, 1962; M.D., Washington University, 1966.

**Shale Rifkin, M.D.,** Washington University, 1948.

**Richard G. Sisson, A.B.,** Harvard University, 1943; M.D., Yale University, 1946.

**Andrew D. Spencer, A.B.,** Indiana University, 1951; M.D., 1954.

**Instructors Emeriti (Clinical)**

**Virgil O. Fish, M.D.,** Washington University, 1930

**George C. Wee, M.D.,** University of Louisville, 1931.

**Carl E. Lischer, A.B.,** University of California, 1933; M.D., Washington University, 1937.

**Associate Professors (Clinical)**

**Ralph J. Graff, A.B.,** Washington University, 1957; M.D., 1957. (See Department of Genetics.)

**Falls B. Hershey, B.S.,** University of Illinois, 1939; M.D., Harvard University, 1943.

**Robert H. Lund, B.S.,** Miami University, 1945; M.D., Washington University, 1949.

**C. Alan McAfee, B.S.,** Washington State College, 1938; M.D., Washington University, 1942.

**Lawrence W. O'Neal, M.D.,** Washington University, 1946.

**Leo A. Sachar, A.B.,** Washington University, 1936; M.D., 1940.

**William D. Schieber, M.D.,** Washington University, 1953.

**James M. Stokes, M.D.,** Washington University, 1948.

**George L. Tucker, A.B.,** Columbia University, 1952; M.D., Harvard University, 1956.

**Willard B. Walker, M.D.,** Washington University, 1946.

**Assistant Professors**

**Robert C. Donaldson, A.B.,** University of Missouri, 1941; M.D., Washington University, 1944. (St. Louis V.A. Hospitals)

**David W. Scharp, M.D.,** Washington University, 1970.



**Gregorio Sicard, B.S.**, St. Louis University, 1965; M.D., University of Puerto Rico, 1972.

**Robert J. Stine, B.A.**, Williams College, 1964; M.A.T., Harvard University, 1965; M.D., Vanderbilt University, 1972. (See Department of Medicine.)

#### *Assistants (Clinical)*

**Arthur I. Auer, B.S.**, Massachusetts Institute of Technology, 1952; M.D., Washington University, 1956.

**Leslie F. Bond, A.B.**, University of Illinois, 1948; M.D., Meharry Medical College, 1952.

**Katherine Crawford, B.S.**, Michigan State College, 1943; M.D., Woman's Medical College of Pennsylvania, 1946.

**James R. Criscione, B.S.**, Youngstown University, 1943; M.D., St. Louis University, 1951.

**Dan F. Kopen, B.S.**, Wilkes College, 1970; M.D., Pennsylvania State University, 1974.

**Samuel Lugo, B.S.**, St. Louis University, 1954; M.D., 1958.

**Lester J. Nathan, B.A.**, University of Omaha, 1949; M.D., University of Nebraska, 1952.

**Robert Rainey, B.S.**, Yale University, 1944; M.D., Washington University, 1947.

### **DIVISION OF ORTHOPEDIC SURGERY**

#### *Acting Head of Division*

**Perry L. Schoenecker**

#### *Professor Emeritus*

**Fred C. Reynolds, A.B.**, Washington University, 1931; M.D., 1934. (Also Professor in Clinical Surgery.)

#### *Associate Professors*

**Lee T. Ford, M.D.**, University of Tennessee, 1940.

**Perry L. Schoenecker, B.S.**, University of Wisconsin, 1964; M.D., 1968.

#### *Research Associate Professor*

**David J. Simmons, B.A.**, Boston University, 1954; M.D., Clark University, 1956; Ph.D., University of Chicago, 1959.

#### *Associate Professors (Clinical)*

**Marshall B. Conrad, A.B.**, Westminster College, 1942; M.D., Washington University, 1945.

**Harry C. Morgan, B.A.**, University of Missouri, 1949; B.S., 1951; M.D., Harvard University, 1953.

#### *Assistant Professors*

**Wayne J. Daum, B.S.**, John Carroll University, 1967; M.D., St. Louis University, 1971.

**Robert A. Shively, B.S.**, University of Illinois, 1965; M.D., 1969.

**William B. Strecker, B.A.**, University of Missouri, 1971; M.D., St. Louis University, 1975.

#### *Assistant Professor Emeritus (Clinical)*

**J. Otto Lottes, Ph.B.**, St. Louis College of Pharmacy, 1926; Ph.G., 1928; A.B., University of Missouri, 1934; B.S., 1935; M.D., University of Louisville, 1937.

#### *Assistant Professors (Clinical)*

**James C. Ellsasser, B.S.**, Duke University, 1960; M.D., Washington University, 1964.

**Jerome J. Gilden, A.B.**, Washington University, 1948; M.D., 1952.

**Jordon H. Ginsburg, B.A.**, University of Michigan, 1968; M.D., University of Illinois, 1972.

**Earl P. Holt, Jr., A.B.**, Duke University, 1942; M.D., 1945.

**Robert E. Kuhlman, A.B.**, Washington University, 1953; M.D., 1956.

**David R. Lange, A.B.**, Dartmouth College, 1970; M.D., Washington University, 1974.

**Marvin R. Mishkin, B.A.**, Roosevelt College, 1950; M.D., University of Illinois, 1955.

**George E. Scheer, B.A.**, Municipal University of Wichita, 1940; M.D., Washington University, 1943.

**Leo A. Whiteside, B.S.**, University of Oklahoma, 1965; M.D., University of Texas, 1969.

#### *Instructor*

**Robert A. Shively, B.S.**, University of Illinois, 1965; M.D., 1969.

#### *Instructors (Clinical)*

**Donald R. Bassman, A.B.**, Washington University, 1971; M.D., Washington University School of Medicine, 1975.

**Vilray P. Blair, Jr.**, University of Virginia, 1935; Washington University, 1939.

**Donald H. Brancato, B.A.**, Northwestern University, 1963; M.D., 1967.

**William S. Costen, A.B.**, Princeton University, 1950; M.D., Washington University, 1954.

**Ronald C. Hertel, A.B.**, Washington University, 1952; M.D., 1956.

**Barrett K. Holder, B.A.**, Southern Illinois University, 1965; M.D., Washington University, 1969.

**Robert C. Lander, B.A.**, University of Michigan, 1968; M.D., University of Illinois, 1972.

**W. Edward Lansche, A.B.**, Washington University, 1948; M.D., 1952.

**Charles Mannis, A.B.**, Washington University, 1965; M.D., University of Missouri, Columbia, 1969.

**Alan H. Morris, B.A.**, University of Illinois, 1959; M.D., 1963.

**Barry L. Samson, B.A.**, University of Wisconsin, 1970; M.D., Washington University, 1974.

**Michael H. Winer, A.B.**, Washington University, 1964; M.D., University of Illinois, 1968.

#### *Research Instructors*

**Jean E. Childers, B.A.**, Cornell College, 1965; Ph.D., Rice University, 1970.



S. Vic Glogovac, A.B., Washington University, 1969; M.D., 1973.

#### *Assistants (Clinical)*

**John P. Arnot, B.A.,** Rice University, 1954; M.D., Yale University, 1958.

**Kyu Sop Cho, M.D.,** Yon-Sei University, 1954.

**Herman E. Russell, B.A.,** New York University, 1950; M.D., University of Geneva, 1956.

**George R. Schoedinger III, M.D.,** University of Oregon, 1962.

### **DIVISION OF PEDIATRIC SURGERY**

#### *Head of Division*

**Jessie L. Ternberg, M.D.**

#### *Professor*

**Jessie L. Ternberg, A.B.,** Grinnell College, 1946; Ph.D., University of Texas, 1950; M.D., Washington University, 1953; Sc.D. (hon.), Grinnell College, 1972. (See Department of Pediatrics.)

#### *Associate Professor*

**Martin J. Bell, B.A.,** New York University, 1959; M.D., State University of New York, Downstate, 1963. (See Department of Pediatrics.)

#### *Assistant Professor*

**Richard J. Bower, B.S.,** Northern Illinois University, 1965; M.D., University of Virginia, 1969. (See Department of Pediatrics.)

#### *Research Assistant Professor*

**Paul R. Manske, B.A.,** Valparaiso University, 1960; M.D., Washington University, 1964.

#### *Research Associate*

**Peggy A. Lesker, B.A.,** Illinois College, 1965.

### **DIVISION OF PLASTIC AND RECONSTRUCTIVE SURGERY**

#### *Head of Division*

**Paul M. Weeks, M.D.**

#### *Professor*

**Paul M. Weeks, A.B.,** Duke University, 1954; M.D., University of North Carolina, 1958. (See Irene Walter Johnson Institute of Rehabilitation.)

#### *Professor Emeriti (Clinical)*

**Minot P. Fryer, A.B.,** Brown University, 1936; M.D., Johns Hopkins University, 1940; D.S.C., Brown University, 1972.

#### *Associate Professor*

**Robert C. Wray, Jr., B.S.,** University of Arkansas, 1961; M.D., Washington University, 1963.

#### *Assistant Professors*

**John J. Delfino, B.S.,** Holy Cross College, 1960; D.D.S., Temple University, 1967. (Also School of Dental Medicine.)

**Barbel Holtmann, B.S.Ed., A.B.,** University of Missouri, 1964; M.D., 1968. (See Department of Pediatrics.)

**Jeffrey L. Marsh, B.A.,** Johns Hopkins University, 1967; M.D., 1970. (See Department of Pediatrics.)

**Vernon Leroy Young, B.A.,** University of Kentucky, 1966; M.D., 1970.

#### *Assistant Professors (Clinical)*

**Joseph W. Eades, A.B.,** Amherst College, 1952; M.D., Washington University, 1960.

**George H. Zografakis, M.S.,** Rutgers University, 1955; M.D., State University of New York, Upstate, 1959.

#### *Instructor*

**Susan H. Barcus, A.B.,** Cornell University, 1970; M.D., University of Rochester, 1975.

#### *Instructors (Clinical)*

**David A. Caplin, A.B.,** Kenyon College, 1971; M.D., University Cincinnati, 1975.

**Henry Ollinger, A.B.,** University of Missouri, 1967; M.D., 1971.

**Richard Shatz, B.A.,** University of Missouri, 1968; M.D., St. Louis University, 1972.

**Bruce I. White, M.D.,** Washington University, 1964.

#### *Consultant in Oral Surgery*

**Leroy W. Peterson, D.D.S.,** University of Michigan, 1940. (Also School of Dental Medicine.)

#### *Consultant in*

#### *Speech Pathology in Surgery (Plastic and Reconstructive Surgery)*

**Richard Merson, Ph.D.,** University of Wisconsin, 1970. (Also School of Dental Medicine.)

### **DIVISION OF UROLOGY**

#### *Head of Division*

**William R. Fair, M.D.**

#### *Professors*

**Saul Boyarsky, B.S.,** University of Vermont, 1943; M.D., 1946.

**William R. Fair, B.S.,** Philadelphia College of Pharmacy, 1956; M.D., Jefferson Medical College, 1960.

#### *Professor (Clinical)*

**Robert K. Royce, B.S.,** University of Mississippi, 1939; M.D., Washington University, 1942.

#### *Associate Professors*

**William J. Catalona, B.S.,** Otterbein College, 1964; M.D., Yale Medical School, 1968.

**Charles B. Manley, Jr., A.B.,** University of Missouri, 1955; M.D., 1958. (See Department of Pediatrics.)

**Gerald Sufin, B.S.,** University of Pennsylvania, 1960; M.D., State University of New York, Upstate, 1966.

#### *Associate Professor Emeritus (Clinical)*

**Carl A. Wattenberg, A.B.,** University of Kansas, 1934; M.D., 1937.

#### *Associate Professors (Clinical)*

**Morris Abrams, B.S.,** University of Illinois, 1934; M.D., 1937.

**William T. Bowles, A.B.,** Stanford University, 1952; M.D., 1955.

**M. Richard Carlin, B.A.,** Dartmouth College, 1944; M.D., Yale University, 1947.

#### *Assistant Professors*

**Leonard D. Gaum, Pre-Medical,** Dalhousie University, 1968; M.D., 1972.

**Mani Menon, B.S.,** St. Thomas College, 1964; M.D., Madras University, 1969.

**William C. Sharer, B.A.,** Princeton University, 1968; M.D., Northwestern University, 1972.

#### *Research Assistant Professors*

**Warren D. Heston, Ph.D.,** University of Colorado, 1968.

**Richard F. Parrish, B.S.,** Southern Illinois University, Edwardsville, 1969; M.S., 1970; Ph.D., Iowa State University, 1976.

**Timothy L. Ratliff, B.S.,** University of Texas, 1971; M.S., East Texas University, 1974; Ph.D., University of Arkansas, 1977.

**Franz U. Steinberg, M.D.,** University of Bern, 1938. (See Departments of Medicine and Preventive Medicine and Public Health.)

**George E. Swaneck, B.S.,** Universidad Catolica, 1958; M.D., 1962. (Jewish Hospital)

#### *Assistant Professors (Clinical)*

**James G. Bucy, B.S.,** Haverford College, 1958; M.D., Northwestern University, 1962.

**Richard P. Parsons, B.D.,** Missouri Valley College, 1954; M.D., Washington University, 1958.

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***Instructor***

**Dov Kadmon**, Pre-Medical, Hebrew University Hadassah Medical School, 1966; M.D., 1970.

***Instructors (Clinical)***

**Lawrence M. Aronberg**, A.B., Washington University, 1932; M.D., 1936.

**J. Byron Beare**, B.S., St. Louis University, 1936; M.D., 1939; M.S., University of Minnesota, 1947.

**Saul Klein**, M.D., Syracuse University Medical Center, 1959.

**Neal Neuman**, M.D., St. Louis University, 1971.

**Herbert Sunshine**, A.B., Washington University, 1950; M.D., 1954.

***Research Associates***

**Rose Boyarsky**, B.S., University of Vermont, 1944; M.A., Columbia University, 1946; Ph.D., Duke University, 1969.

**Ramasamy Selven**, B.Sc., St. Xavier, 1968; M.Sc., Madras University, 1970; Ph.D., Madras University, 1975.

***Research Assistant***

**Carl Mahle**, B.S., University of Maryland, 1974.



# Teaching and Research Divisions

## BIOMEDICAL COMPUTER LABORATORY

The Biomedical Computer Laboratory collaborates with research investigators at the Medical Center in the application of modern information processing techniques to problems in biology and medicine. The laboratory currently has active programs in real-time and high-speed ECG analysis, clinical pathophysiologic research, tomography, central nervous system diseases and encephalogram analysis, speech synthesis and models of cochlear function and patient-based medical information systems.

Research and training are offered to medical and graduate students in mathematical techniques, digital system design, and advanced programming techniques applied to the biomedical problems described above. Opportunities to carry out research are available to students who have completed the first year of the medical school curriculum and to graduate students on a year-round basis. A number of assistantships are available. The laboratory participates in the interdepartmental programs in Biomedical Engineering and Health Care Technology.

The Biomedical Computer Laboratory is affiliated with the Computer Systems Laboratory located in nearby quarters at the School of Medicine. The mission of the Computer Systems Laboratory is the design and development of advanced computer systems with a current focus on the development of modular processors. These systems are being applied to molecular and neural modeling, electrocardiographic rhythm analysis and speech synthesis.

### BMed 582. Biophysical Measurements

(Same as EE 582)

Specific variables measured in life-science research and in clinical medicine such as force, displacement, pressure, biopotentials, ion and gas concentrations, flows, etc., are examined and techniques for converting them to electrical signals are discussed. Prerequisites: EE 482 or equivalent, elementary electromagnetic theory. Credit 3 units.

(Prof. Shipton)

### BMed 693. Physical and Mathematical Principles of Tracer Kinetics

Theoretical foundations of tracerkinetic methods. Topics covered are differential equations for conservation of tracer mass, applications of elementary linear systems theory, stochastic and compartmental models, methods of accounting for tracer recirculation and methods of data-processing.

(Dr. Larson)

### Programming for Medical Information Systems

An interpretive language designed for medical information systems is described, with programming examples from hospital and ambulatory care settings. The language

used is MUMPS (MGH Utility Multi-Programming System). Three hours of class work plus laboratory each week for six weeks.

(Dr. Blaine and Staff)

### Introduction to Programming a Laboratory Computer

Topics covered are: generalized description of digital computer architecture, organization and implementation; introduction to a minicomputer operating system; programming technique and structure; and input/output programming. The PDP-11 minicomputer with the RSX-11M operating system is used for laboratory workshops. Prior knowledge of FORTRAN is helpful but not required.

(Dr. Blaine and Staff)

### Computers in Medicine

This course will cover selected topics related to the spectrum of computer technologies (large-scale computers through microcomputers) used in both research and clinical medicine. Topics include medical information management, acquisition of laboratory data, large-scale computation and language options. Only a minimal background in mathematics and electrical theory is assumed. Three class hours each week. Demonstrations and laboratory exercises provide an opportunity for "hands-on" experience.

(Dr. Blaine and Staff)





*Associate Professor and Director*

**Lewis J. Thomas, Jr.**, B.S., Haverford College, 1953; M.D., Washington University, 1957. (See Departments of Anesthesiology and Physiology and Biophysics.)

*Professors and*

*Senior Research Associates*

**Jerome R. Cox, Jr.**, S.B., Massachusetts Institute of Technology, 1947; S.M., 1949; Sc.D., 1954. (See Department of Physiology and Biophysics.) (Also School of Engineering and Applied Science.)

**Harold W. Shipton**, C.Eng., Shrewsbury Technical College, 1949. (Also School of Engineering and Applied Science.)

**Donald L. Synder**, B.S., University of Southern California, 1961; M.S., Massachusetts Institute of Technology, 1963; Ph.D., 1966. (Also School of Engineering and Applied Science.)

*Associate Director*

**G. James Blaine III**, B.S., Washington University, 1959; M.S., 1961; D.Sc., 1974. (Also School of Engineering and Applied Science.)

*Professors*

**G. Charles Oliver**, A.B., Harvard University, 1953; M.D., 1957. (See Department of Medicine.)

**Donald L. Snyder**, B.S., University of Southern California, 1961; M.S., Massachusetts Institute of Technology, 1963; Ph.D., 1966. (Also School of Engineering and Applied Science.)

*Associate Professors*

**R. Martin Arthur**, B.A., Rice University, 1962; B.S., 1963; M.S., 1964; Ph.D., University of Pennsylvania, 1968. (Also School of Engineering and Applied Science.)

**William F. Holmes**, A.B., Princeton University, 1953; Ph.D., University of Pennsylvania, 1960. (See Department of Biological Chemistry.)

*Research Associates*

**Robert J. Arnzen**, B.S., Washington University, 1964; M.S., 1966; Ph.D., 1969. (Also Computer Systems Laboratory.)

**Kenneth W. Clark**, B.S., St. Louis University, 1965; M.S., 1967.



**James G. Dunham**, B.S., Stanford University, 1973; M.S., 1973; Ph.D., 1977. (Also School of Engineering and Applied Science.)

**A. Maynard Engebretson**, B.S., University of Minnesota, 1958; M.S., Washington University, 1963; D.Sc., 1970. (Also Central Institute for the Deaf.)

**Ronald W. Hagen**, B.S., University of Minnesota, 1964; M.S., St. Louis University, 1970. (See Department of Surgery.)

**Richard E. Hitchens**, B.S., Washington University, 1969. (Also School of Engineering and Applied Science.)

**Kenneth B. Larson**, Met.E., Colorado School of Mines, 1954; S.M., Massachusetts Institute of Technology, 1958; Ph.D., 1964.

**James G. Miller** (Physics), St. Louis University, 1964; M.A., Washington University, 1966; Ph.D., 1969. (See Department of Medicine.) (Also Faculty of Arts and Sciences.)

*Assistant Professors*

**Rexford L. Hill**, B.S., University of Cincinnati, 1964; M.S., 1966. (See Department of Radiology.)

**J. Philip Miller** (Biostatistics), A.B., Washington University, 1965. (See Department of Preventive Medicine and Public Health.)

## THE MEDICAL CARE GROUP OF ST. LOUIS (MCG)

MCG is a prepaid group practice providing comprehensive health services to more than 21,000 members. Since its beginning eleven years ago, MCG's relationship with the School of Medicine has been as a teaching and research unit serving as a model practice setting within a medical school environment. It is housed in a separate facility on the medical school campus. The practice is a site for optional programs for advanced residents in general internal medicine and general pediatrics. An elective is available for senior medical students.

### Director

**Lawrence I. Kahn** (Health Care Research), A.B., University of Alabama, 1941; M.D., Louisiana State University, 1945. (See Departments of Pediatrics and Preventive Medicine and Public Health.) (Also Pediatric Nurse Practitioner Program.)

### Staff

**Marion H. Baker**, R.N., St. John's Hospital, 1946; P.N.P., Cardinal Glennon Memorial Hospital for Children, 1973. (See Department of Pediatrics.)

**Allan S. Brett**, B.A., University of Pennsylvania, 1972; M.D., 1976. (See Department of Medicine.)

**Jeanette M. Broering**, B.S.N., St. Louis University, 1974; P.N.P., Cardinal Glennon Memorial Hospital, 1976. (See Department of Pediatrics.)

**Max H. Burgdorf, Jr.**, A.B., Washington University, 1970; M.D., 1974. (See Department of Pediatrics.)

**John J. Garrett**, B.S., Niagara University, 1942; M.D., Harvard Medical School, 1951. (See Department of Medicine.)

**Guner B. Gulmen**, M.D., Hacettepe University Medical School, 1969. (See Department of Medicine.)

**Michael B. Gutwein**, A.B., Harvard University, 1969; M.D., Washington University, 1974. (See Department of Medicine.)

**Carl G. Harford**, A.B., Amherst College, 1928; M.D., Washington University, 1933. (See Department of Medicine.)

**Will Holcomb**, B.A., Purdue University, 1970; M.D., Indiana University, 1974. (See Department of Obstetrics and Gynecology.)

**Janet D. Hoy**, B.S., Carroll College, 1975; P.A., St. Louis University, 1977. (See Department of Medicine.)

**Clemens H. Jacques**, B.S., University of California, 1949; O.D., 1949. (See Department of Ophthalmology.)

**Kwangsop S. Kim**, M.D., Seoul National University, 1963; Ph.D., 1970. (See Department of Medicine.)

**A. Donna King**, B.A., Western Maryland College, 1960; M.S.W., Washington University, 1966. (See Department of Preventive Medicine and Public Health.)

**Donald K. King**, A.B., Fairfield University, 1966; M.D., Johns Hopkins University, 1970. (See Department of Medicine.)

**Richard Lazaroff**, B.A., Brown University, 1974; M.D., St. Louis University, 1978. (See Department of Pediatrics.)

**Jerald Maslanko**, M.D., Emory University, 1975. (See Department of Medicine.)

**Edward G. Peskin**, B.A., University of Wisconsin, 1970; M.M.S., Rutgers University, 1972; M.D., Washington University, 1974. (See Department of Obstetrics and Gynecology.)

**Chinda Vanasin Rojanasathit**, M.D., Siriraj Medical School, 1968.

**Paul S. Simons**, B.A., University of Texas 1963; M.D., Washington University, 1967. (See Department of Pediatrics.)

**Kongsak Tanphaichitr**, M.D., Siriraj Hospital Medical School, 1970. (See Department of Medicine.)

**James K. Turner**, A.B., Washington University, 1949; M.D., 1953. (See Department of Pediatrics.)

**Elsie Winstead**, B.S., East Carolina University, 1973; M.D., University of North Carolina 1977. (See Department of Medicine.)

**Patricia B. Wolff**, B.A., University of Minnesota, 1968; M.D., 1972. (See Department of Pediatrics.)

MCG is a source of data for various clinical and health services research.

The practice is staffed by physicians who are members of the faculty of the School of Medicine in the Departments of Internal Medicine, Pediatrics, Preventive Medicine, and Obstetrics and Gynecology. They are supported by medical, pediatric, and obstetric nurse practitioners as well as physician's assistants, psychiatric social workers, a dietician, and an optometrist. Subspecialty care is delivered by other members of the faculty in the various clinical departments of the School of Medicine.

## BEAUMONT-MAY INSTITUTE OF NEUROLOGY

The Beaumont-May Institute of Neurology was established in 1955 by gifts from the Louis D. Beaumont Foundation, Mrs. Charles M. Rice, and Morton J. May. It is the purpose of the institute to foster basic and clinical research in neurology, with special reference to defects in the structure of the nerve cell which occasion important neurological disorders having a high incidence of prolonged disability.

## DIVISION OF TUMOR SERVICES

The Division of Tumor Services was organized by the coordinating committee for the cancer education program. Cancer, like many other subjects in the medical curriculum, is taught in an interdepartmental manner. In the sophomore year, a six-week interdepartmental course in hematology and oncology is taught as part of the pathophysiology course by members of all clinical departments which participate in the division. In the junior year,

students are assigned to the tumor clinics of the various services, where they gain firsthand experience with cancer.

Interdepartmental tumor conferences, held each week for members of the junior class, postgraduate students, visitors, and staff, serve as a forum to demonstrate some of the complex problems in diagnosis and therapy which arise in patients with malignant disease. Other tumor conferences are held at regular intervals by the various clinical departments.

In the senior year, students may elect periods of study which expose them to the theoretical and practical aspects of the epidemiology, diagnosis, treatment, and prognosis of various human neoplasms. This program is tailored to the particular interests of each student with the approval of the executive committee of the Division of Tumor Services. The oncological electives available to seniors include studies in any of the following fields: surgical pathology, neoplasms in children, surgical oncology, radiation therapy, hematologic neoplasms, and epidemiology of cancer.

*Cancer Coordinator, Director of Division, and Chairman of Executive Committee*  
Gordon W. Philpott

*Executive Committee*  
*Anesthesiology*  
William D. Owens

*Internal Medicine*  
Stuart A. Kornfeld

*Neurology and Neurological Surgery*  
William S. Cox

*Obstetrics and Gynecology*  
H. Marvin Camel  
Ming-Shian Kao

*Ophthalmology*  
Morton E. Smith

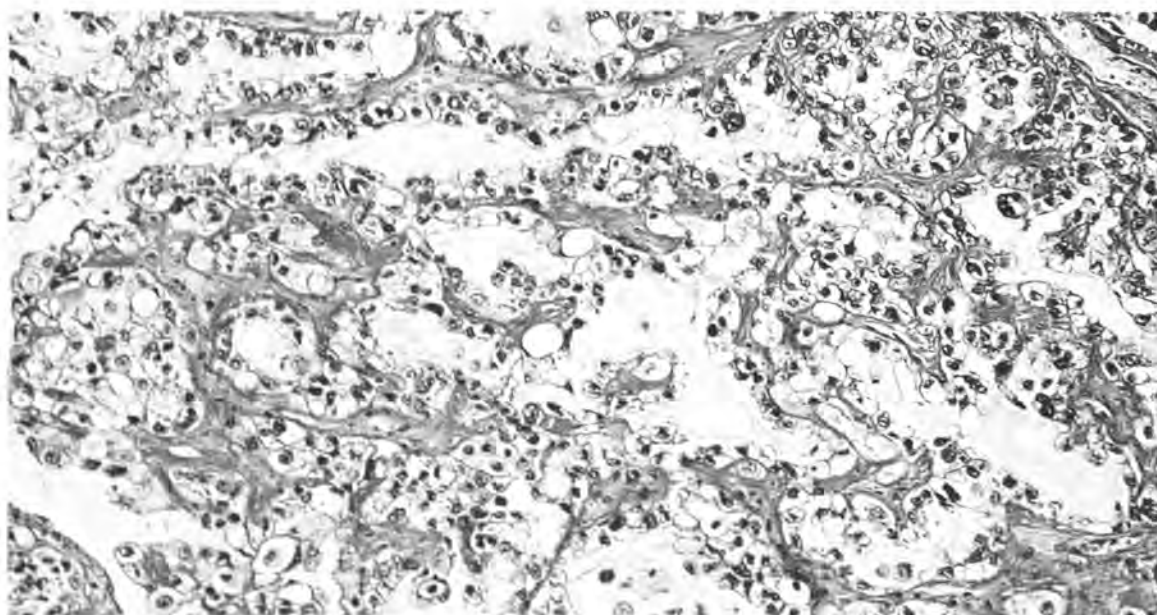
*Otolaryngology*  
Joseph H. Ogura  
Donald G. Sessions

*Pathology*  
Walter C. Bauer

*Pediatrics*  
Teresa J. Vietti

*Radiology*  
Fransiska Lee  
Carlos A. Perez

*Surgery*  
Harvey R. Butcher, Jr.  
Gordon W. Philpott



## THE IRENE WALTER JOHNSON INSTITUTE OF REHABILITATION

The teaching of rehabilitation is conducted by the Department of Preventive Medicine and Public Health in collaboration with various specialty services. The Irene Walter Johnson Institute of Rehabilitation is a modern, five-story facility that is air-conditioned and well equipped for the care of disabled patients. Students of medicine, house officers, and students of paramedical services have an opportunity to affiliate with the institute.

### Traineeship Elective

Traineeships in Physical Disability and Rehabilitation of eight weeks' duration may be elected during the interval between the end of spring semester and beginning of the fall semester by two students who have completed the first year of the medical school curriculum. Specific instruction is given by means of informal lectures, demonstrations, and seminars. The student becomes familiar with the techniques for defining the extent of physical disability and with various approaches to its treatment. Emphasis is placed on methods used in physical, occupational, and speech therapy, and on the specialized contributions to be made by rehabilitation, social work, nursing, and vocational testing and counseling. Opportunity is made available for special emphasis on the rehabilitation of hand injuries and for participating in research activities of the Rehabilitation Engineering Unit.

Interests of the students will be met by arranging experience in rehabilitation medicine at extramural facilities, including Jewish Hospital and Paraguard.

### Director

**Michael H. Brooke, M.B., B.Ch.,** Cambridge University, 1958. (See Departments of Neurology and Neurological Surgery and Preventive Medicine and Public Health.)

### Associate Director

**Sven G. Eliasson, Ph.D.,** University of Lund, 1952; M.D., 1954. (See Department of Neurology and Neurological Surgery.)

### Assistant Director

**James Carroll, B.S.,** University of Louisville, 1966; M.D., 1969. (See Departments of Neurology and Neurological Surgery and Pediatrics.)

### Director of Milliken Hand Rehabilitation Center

**Paul M. Weeks, A.B.,** Duke University, 1954; M.D., University of North Carolina, 1958. (See Department of Surgery.)

### Director of the Cardiac Rehabilitation Center

**Ali A. Ehsani, M.D.,** Tehran University, 1956. (See Departments of Medicine and Preventive Medicine and Public Health.)





# Graduate Training

## DIVISION OF BIOLOGY AND BIOMEDICAL SCIENCES

The Division of Biology and Biomedical Sciences, formed in the summer of 1973, was established because of the realization that training and research in modern biology transcend the limits of departmental structure. The faculty consists of members of preclinical departments of the School of Medicine: Anatomy and Neurobiology, Biological Chemistry, Genetics, Microbiology and Immunology, Pathology, Physiology and Biophysics, and of the Department of Biology of the Faculty of Arts and Sciences. For purposes of graduate training, the Division is divided into the following programs: Integrative and Cell Biology, Molecular Biology, Neural Sciences, Plant Biology, and Population Biology.

The faculty in each of these programs participates in the presentation of divisional courses and sets the requirements for the Ph.D. degree within the programs. These courses are also available to medical students as *senior electives*. The Ph.D. requirements in all programs are highly flexible. They include courses which are adjusted to the student's background and interest, qualifying examinations usually taken during the second year, execution of original research suitable for a dissertation, and defense of the thesis. Graduate students are admitted to the Division as students-at-large for the first year of their training. During the first year, advisers are appointed to assist students in selecting courses and to help them become acquainted with the various research programs in the Division. At the conclusion of the first year, it is expected that students will make a decision as to which program they wish to join and, by choosing a research adviser, will be located in one of the departments which make up the Division. Alternatively, graduate students may also select training programs within the disciplines represented by the departments; the Ph.D. degree requirements for these students will be determined by the individual departments. In order to obtain expertise in teaching as well as research, all students serve as teaching assistants for two semesters during their graduate training.

Students in the Ph.D. program will receive full tuition remission and stipends at the level of \$5,500. In many cases the award is made from an NIH training grant and is subject to the payback agreement and taxability provisions appropriate to such awards.

Applications for admission are due no later than January 31 for matriculation the following summer or fall. Admission is based on demonstrated ability, future promise, and the number of openings currently available. In general, a student should have completed undergraduate training in biology, chemistry, or physics at a high scholastic level and have completed most



of the following courses: biology, genetics, chemistry (general, analytical, organic, and physical), physics, and calculus. It is possible for the student, in exceptional cases, to fill some lack of basic entrance requirements for the specific program by electing these courses in the beginning year of study. It is strongly recommended that the applicant take the Graduate Record Examination, both the aptitude and advanced portions. Additional information and the application for admission may be obtained by writing directly to the Office of Graduate Student Affairs, Box 8072, Washington University School of Medicine, 660 S. Euclid Avenue, St. Louis, Missouri 63110.

For the 1982-83 academic year, the tuition and health fee in the Graduate School of Arts and Sciences will be \$3,702.50 a semester for full-time study. For students enrolled for fewer than twelve units, the rate is \$295 a unit. Graduate students who are enrolled for more than six units per semester in courses at the Medical Center are required to participate in the Medical Center Student Health Service. The health fee is payable each semester at the time of registration. As noted above, these charges are usually covered by tuition remission.

The following graduate courses are offered by the Division of Biology and Biomedical Sciences. Those courses which are particularly relevant to any given department are cross-listed under that department in this *Bulletin*. The faculty member in charge of the course and his departmental affiliation are shown at the end of each course.

**Bio 401. Vertebrate Physiology**

Two hours each week will be devoted to an examination of the functional anatomy and the function of the great organ system of the mammal (exclusive of the nervous system and the reproductive systems). One hour will involve discussion of the pertinent phylogeny and important variations in the particular system under study. Prerequisite, general chemistry, physics and college algebra or their equivalents. Credit 3 units.  
(Staff [Physiology and Biophysics])

**Bio 404. Laboratory of Neurophysiology**

Elements of the nervous system, neural analysis of sensory information and organization of neural activity will be electrophysiologically studied by students to find out how some of the interesting experiments in neurophysiology are actually performed. Resting and action potentials, excitation transmission, sound- and photo-reception, organized activity of motoneurons, analysis of human and animal sounds, and psychological phenomena will be examined. Credit 3 units.  
(Suga [Biology])

**Bio 405. Physiological Basis of Acoustic Communication**

Lectures and seminars in hearing of various species of animals, including humans. Structural and functional adaption to the environment in which their acoustic communication is performed is considered. Not only auditory physiology, but also sound production, acoustic communication, and echolocation in bats will be discussed. Demonstrations of neural responses to acoustic stimuli will be included. Credit 2 units.  
(Suga [Biology])

**Bio 408. Human Evolution**

The fossil evidence for human and nonhuman primate evolution. Classification and genetics in evolutionary perspectives, relations between biology and culture in ancient and modern populations. Prerequisite, Anthro 150 or one 100-level biology course.  
(Molnar [Anthropology])

**Bio 410. Molecular Virology**

A comprehensive study of the virus world—including animal, plant, and bacterial viruses—with emphasis on the molecular biology of virus structure and replication. This course is for advanced undergraduate and graduate students, who are expected to read original papers and participate in discussion groups. Credit 3 units.  
(M.J. Schlesinger,  
S. Schlesinger, Beachy  
[Microbiology and Immunology])

**Bio 411. Phycology**

A systematic treatment of the freshwater and marine algae. Emphasis primarily on morphology, physiology, taxonomy, and genetics of the major and minor algal groups. Certain aspects of recent research and present problems in phycology will be considered. Credit 4 units.  
(Nichols [Biology])

**Bio 412. Experimental Aquatic Biology**

Studies of current research problems and research techniques devoted to aquatic flora and fauna. The course

will include group or individual participation in a research problem or problems dealing with individual aquatic components of the aquatic environment or their interaction. Prerequisite, permission of instructor. Limited enrollment. Credit 4 units.  
(Nichols [Biology])

**Bio 4131. Laboratory Tutorial on Plant Development**

Modern tools and techniques for research on growth, development, and regulation of higher plants. Prerequisite, Bio 299, Chem 252 and 257. Consent of instructor required. Two afternoons a week or equivalent. Credit 2 units.  
(Beachy [Biology])

**Bio 4141. Laboratory Tutorial on Plant Physiology**

Modern tools and techniques for research on metabolism and physiology of higher plants. Prerequisite, Bio 299, Chem 252 and 257. Consent of instructor required. Two afternoons a week or equivalent. Credit 2 units.  
(Varner [Biology])

**Bio 415. Theoretical Population Genetics**

A rigorous introduction to the theoretical basis of population genetics and evolutionary mechanisms. Quantitative genetics and population structure 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. Credit 3 units.  
(Templeton [Biology])

**Bio 416. Evolutionary Biology**

Individual areas of evolutionary biology will be discussed in depth. Topics will include the Biological Species concept, the hypothesis of selective neutrality of enzyme polymorphism, modern concepts in systematics, molecular approaches to the study of adaptation, the coevolution of insects and plants, and other topics of current evolutionary interest. Credit 3 units.  
(Johnson [Biology])

**Bio 417. Mathematical Ecology**

The theory of the Leslie Matrix will be developed with respect to population growth, colonization, demography and evolution of life history attributes. Matrix approaches will next be used to study species interactions and communities. Finally, the use and limitations of optimization models in ecology will be discussed. Credit 3 units.  
(Templeton [Biology])

**Bio 4181. Population Genetics**

An introduction to the basic principles of population and ecological genetics. The mechanisms of microevolutionary processes are discussed, and an integrated ecological and genetic approach is used to study the adaptive nature of the evolutionary process. Credit 3 units.  
(Templeton [Biology])

**Bio 419. Ecology**

A survey of ecological principles underlying the spatial and temporal distribution of populations and biological communities. Credit 3 units.  
(Sexton [Biology])

**Bio 4201. Selected Topics in Life History: Strategies of Tetrapod Vertebrates**

Lectures, discussions and field trips devoted to the analysis of vertebrate life tables, growth, reproductive cycles, predation and distribution in space and time, with

special reference to amphibians and reptiles. Individual research projects will be required. Credit 3 units.

(Sexton [Biology])

#### **Bio 424. Immunology**

The basic molecular and cellular aspects of the vertebrate immune response, emphasizing the specificity of antibody reactions, the molecular structure of antibodies, the genetic origin of their diversity, and the cellular basis of their formation. Other topics will include tolerance, autoimmunity, allergy, blood groups, immunogenetics, and tissue transplantation. Credit 3 units.

(Fleischman [Microbiology and Immunology])

#### **Bio 425. Microbial Physiology**

An in-depth coverage of selected topics in microbial physiology and molecular biology. Topics may vary from year to year but could include cell regulation and growth, bioenergetics, sporulation, bacterial genetics, plasmid structure, and recombinant DNA research. Credit 3 units.

(Silver [Biology])

#### **Bio 428. Developmental Neurobiology**

Lectures and assigned reading, including original literature, will be used to explore in some detail the basic principles of the development of the central and peripheral nervous system. Subjects will include classical experimental neuroembryology, spinal cord development, neuronal differentiation and axonal growth, neural crest derivatives, gliogenesis, myelination, synaptogenesis, specificity, trophic interactions, cortical development and regeneration. Credit 3 units.

(M. Johnson & Neuroscience faculty [Anatomy and Neurobiology])

#### **Bio 435. History of Biology and Related Sciences, Antiquity through the Seventeenth Century**

The first of two semesters, this course will cover the basic development of the life sciences from antiquity through the scientific revolution. Emphasis will be placed on the interaction of biology with physics, chemistry, cosmology, philosophy and the social sciences. The course is approached from a Marxist perspective. Credit 3 units.

(Allen [Biology])

#### **Bio 436. History of Biology and Related Sciences from the Seventeenth Century to the Present**

The second of two semesters, this course covers the development of the life sciences from the seventeenth through the mid-twentieth centuries. Emphasis will be placed on the development of biology, and its interactions with physics, chemistry, astronomy, philosophy, and the social sciences. The course is approached from a Marxist perspective. Credit 3 units.

(Allen [Biology], Hall)

#### **Bio 437. Laboratory on DNA Manipulation**

Isolation of DNA, use of restriction endonucleases, electrophoretic separation of DNA fragments, Southern blotting, *in vitro* labeling of nucleic acids and DNA hybridization are covered. A molecular cloning experiment employing colony hybridization is performed by each student. Prerequisite, either a biochemistry laboratory course or a microbiology laboratory course; enrollment limited, consent of instructor required. Credit 3 units.

(Chilton [Biology])

#### **Bio 441. Problems in Developmental Biology**

Examination of a variety of problems related to organismic development (such as cell-cell interactions, pattern formation and the regulation of gene expression) based largely on in-depth discussion of selected research papers. Prerequisite, Bio 301, Bio 302, or consent of instructor. 3 class hours a week. Credit 3 units.

(Yao [Biology])

#### **Bio 446. Biology of the Fungi**

General aspects of the biology of the major fungal groups, including their development, genetics, cytology, metabolism and ecology. Roles these microorganisms play in nature, research, medicine, and agriculture. Prerequisite, 6 units of Biology and permission of instructor. Two class hours and one laboratory period a week. Credit 3 units.

(Maniotis [Biology])

#### **Bio 448. Plant Systematics Workshop**

A series of workshops, each consisting of laboratories and tutorials for advanced undergraduates and graduates contemplating careers in systematics, ecology or natural history; Section 1—monographic studies; Section 2—cytotoxonomy; Section 3—palynology; Section 4—microtechnique; Section 5—chemosystematics. Credit 1 or 2 units for each section.

Staff (Biology)

#### **Bio 450. Topics in the History of Eugenics**

A research seminar in which students will carry out in-depth research projects on eugenics movements in the United States or Europe (1890-1960). Topics can include: genetic basis of eugenic theories, funding of the Eugenics Movement, connections between U.S. and other (e.g., Nazi) eugenics movements, etc. Credit 3 units.

(Allen [Biology])

#### **Bio 451. General Biochemistry**

See Department of Biological Chemistry.

#### **Bio 4521. Experimental Molecular Biology**

Laboratory designed to provide experience in current techniques and principles of molecular biology with emphasis on molecular genetics, protein synthesis, nucleic acid structure, gene expression, cloning and sequencing methods. Precise topics and instructors will be announced yearly. Credit 3 units.

Frazier, Staff (Biochemistry)

#### **Bio 453. Basic Principles of Nucleic Acids and Protein Synthesis**

A study of the basic principles of DNA replication, RNA synthesis, and protein synthesis. Credit 1 unit.

(Morris [Biology], Staff)

#### **Bio 454. History of Genetics**

A seminar dealing with selected topics in the history of genetics, focusing largely on the period since 1900. The first part of the seminar (weeks 1-7) will be devoted to exploration of specific topics (with primary and secondary source readings) such as: the background development of Mendel's work, cytology (1860-1930); the biometrical movement, heredity and evolution (1860-1900); the rediscovery of Mendel, the chromosome theory and the Morgan school, Mendelism and Darwinism (1900-1940); biochemical genetics, molecular genetics, the Eugenics Movement (1890-1940). The second part of the course will be devoted to presentation and discussion of student research papers. Credit 3 units. (Allen [Biology])



**Bio 455. Neurocytology**

A consideration at the light and electron microscopical level of the structure of neural tissues, including neurons and their processes, synapses, glial cells, myelin, etc., and their reaction to experimental injury. Lectures and laboratory. Prerequisites, Bio 341, Bio 544, or consent of instructor. Credit 2 units.

**Bio 458. Neurobiology and Biophysics of the Ear**

Discussion of the following topics: structure of various components of the ear; acoustic phenomena in the ear canal that are biologically generated inside the inner ear; biomechanics of the middle ear and the inner ear; neurobiology of the sensory hair-cells; biological control of the motion of cochlear partition; response patterns of single cochlear neurons to various sound stimuli; clinical applications of ear-canal acoustic phenomena and auditory evoked potentials; use of computers in conducting neurophysiological experiments and in systematically interpreting the data. Prerequisite, consent of instructor. Three class hours a week plus occasional laboratory demonstrations of animal experiment. Credit 3 units.

(Kim, Molnar [Physiology and Biophysics])

**Bio 459. Vision**

A course designed to bring together the anatomy, physiology, and psychology of vision to provide an understanding of function. Properties of light and receptors will be covered, and analysis of form, movement, color and depth in the vertebrate visual system, with some material on invertebrates. Credit 3 units.

(Daw [Physiology and Biophysics], Cohen, Miller, Pearlman)

**Bio 467, 468. Seminar in Floristic Taxonomy**

A survey of angiosperm families, their morphology, cytology, anatomy, palynology, chemistry and evolution. Credit 1 unit.

(Gentry [Biology])

**Bio 470. Ethology**

Advanced course dealing with selected in-depth topics: social organization and social ecology; behavior genetics; evolution; human behavior and development; neural and endocrine models. A Gestalt approach to the intrinsic complexities of organism-environment interaction will be made. Credit 3 units.

(Staff [Psychology])

**Bio 471. Phytogeography**

An introduction to the current and past geographical distributions of plants, emphasizing ecological, geological and historical factors. Credit 3 units.

(Gentry [Biology])

**Bio 481. Ecology and the Environment**

Possible topics include: the N-cycle and the use of fertilizer N, pests, pesticides and pest control; the Green Revolution, its advocates and its technical and social critics; Malthus and the Neo-Malthusians; the demographic transition, social and economic influences on population growth rates. Prerequisite, Bio 381 or consent of instructor. Credit 2 or 3 units.

(Kohl [Biology])

**Bio 482. Ecology: Ecosystems**

A study of selected topics including measurements of species diversity, productivity, carbon cycle, energy flow and secondary succession with emphasis on trophic dynamics of specific interactions such as predation and grazing. Credit 3 units.

(Covich [Biology])

**Bio 4851. Physiological Ecology of the Vertebrates**

An examination of the adaptations of organ and system physiology in the vertebrate which enable the animal to exploit difficult environments. Students will participate in a team project on behavioral thermoregulation involving biotelemetry of body temperature and location from free living vertebrates at Tyson. Credit 3 units.

(Coles [Biology])

**Bio 493. Seminar in Advanced Biology**

Topics tend to cut across disciplinary lines within biology. Topics, staff and prerequisites vary from semester to semester and are announced during the prior preregistration period. Credit to be arranged.

(Staff [Biology])

**Bio 4931. Vertebrate Structure**

A functional and comparative approach to the gross and microscopic anatomy of the vertebrates. The major organ systems, excluding the nervous system, are examined. A special project is assigned.

(Krukowski [Biology])

**Bio 500. Independent Work**

Prerequisite, junior or senior standing, consent of the sponsor and the department. Credit to be determined in each case. Maximum of 6 units may be applied toward upper-division credits required for the major. If the work is to be submitted for honors, further requirements are a B+ average in biology courses, a B+ average in related subjects required for a biology major, a B+ average overall, and registration for 3 units in each of 2 semesters; an honors thesis must be prepared. Credit/no credit only.

(Staff [Biology])

**Bio 501. Human Anatomy**

See Department of Anatomy and Neurobiology.

**Bio 502. General Physiology**

See Department of Physiology and Biophysics.

**Bio 5031. Endocrine Physiology and Pharmacology**

A lecture course consisting of both faculty and student presentations for in-depth coverage of selected areas of endocrinology, including neuroendocrinology, reproduction, steroids, and metabolic fuel regulation.

(J. Martin [Pharmacology])

**Bio 504. Environmental Pathology**

Lectures and seminars discussing the effect of modern industrial environment on man's health. The adaptability of man, his ability to manipulate his environment and the effects of these manipulations in regard to health and disease will be discussed. Topics include acute and chronic diseases associated with air and water pollution, waste disposal, pesticide usage, transportation, radiation, and noise. Credit 2 units.

(Kuhn [Pathology],

Schmidt, Staff)

**Bio 5051. Foundations in Immunology I**

An in-depth introduction to immunology for graduate students. Topics include: antibody structure and genetics, cellular immunology, complement, transplantation immunology, and clinical immunology. Credit 3 units.

(Kapp [Pathology and Microbiology/Immunology])



**Bio 506. Microscopic Anatomy**

See Department of Anatomy and Neurobiology.

**Bio 507, 508. Pharmacology**

See Department of Pharmacology.

**Bio 509, 510. Current Topics in Pharmacology**

Topics of current interest will be presented and discussed. Critical evaluation will be made of recent articles in the scientific literature. Required of all graduate students in the department. Credit 2 units for the year.

(Russell [Pharmacology], Staff)

**Bio 511. Intracellular Transport of Macromolecules**

A discussion of the organelles responsible for the movement of macromolecules in cells. Endoplasmic reticulum, the Golgi apparatus, secretory vesicles, plasma membrane, lysosomes. Part of the course will use the seminar format. Credit 2 units.

(Stahl [Physiology and Biophysics])

**Bio 512. Selected Topics in Developmental Biology**

A lecture-seminar course devoted to an in-depth analysis of a restricted number of topics of major current interest in developmental biology. A series of guest lectures whose research is at the forefront of the area of interest will be invited to the campus to discuss their research activities with the class. These guest lectures will be supplemented by extensive readings from the current literature, lectures by local faculty and informal discussions. Students will be evaluated on the basis of one or two research proposals they will prepare during the semester. Credit 2 units.

(Kirk [Biology])

**Bio 5141. Advanced Cell Biology**

For advanced students in the area of cell biology and related fields. Lectures stress recent advances in the field of eukaryotic cell biology. Emphasis on membranes, membranous organelles, and cell motility systems. Prerequisite, Bio 451 and Bio 334 or consent of instructor. 3 class hours a week. Credit 3 units.

(Goodenough [Biology],

Heuser [Physiology/Biophysics])

**Bio 515, 516. General Pathology**

See Department of Pathology.

**Bio 517. Introduction to Immunology**

A short introduction to Humoral and Cellular Immunology for nonspecialists. Students intending to take more advanced courses in Immunology or who are preparing for preliminary examinations in Immunology should take Bio 5051. Credit 2 units.

(Davie [Microbiology  
and Immunology])

**Bio 518, 519. Pathology Research Seminar**

Graduate students, MSTP students, postdoctoral trainees, and pathology faculty present discussions of current research from the literature, or when appropriate, from their own laboratories. Priority for presentation is given to graduate and MSTP students. Those wishing to obtain credit may do so (2 units/year). One hour per week.

(Baenziger [Pathology], Staff)

**Bio 520. Methods in Experimental Pathology**

Discussions and demonstration of routine and special microscopic techniques (light, phase, fluorescent, trans-

mission, and scanning electron microscopy); other techniques (bio-and immunoassay, various physiologic correlates). Design of experiments using laboratory animals and autopsy specimens will be emphasized. Students will be expected to do a short research project of interest to them. Limited enrollment by permission of instructors. Graduate students should have had at least one course in histology and also preferably a course in pathology. Two class hours per week. Credit 2 units.

(Hartoft, Greider [Pathology])

**Bio 521. Cellular Aspects of the Immune Response**

The mechanisms of regulation of immune responses by antigen, macrophages, T cells, B cells, and their products will be discussed. The material covered will vary in emphasis from year to year and will stress critical analysis of the literature. Credit 2 units.

(Pierce [Pathology])

**Bio 522. Immunogenetics**

Offered in spring semester only. Lectures on selected examples of application of immunologic techniques to detection of genetic variations in macromolecules (blood groups, allotypes, lymphocyte antigens), genetic dissection of immune mechanisms (immune response genes immunodeficiencies), and genetics and immunology of transplantation and of neoplasia. Prerequisite, consent of instructor. 2 class hours per week. Credit 2 units.

(Shreffler [Genetics])



**Bio 523. Microbial Physiology and Genetics**

Molecular and cellular aspects of microbial growth and reproduction. Lectures and laboratory in the first nine weeks of the fall semester. Credit 1 unit.

(D. Schlessinger [Microbiology and Immunology])

**Bio 524. Radiation Biology**

The action of ionizing radiation at the biochemical, cellular, tissue, and whole organism levels will be discussed. A cellular approach will be taken for a number of topics such as the target for lethality, the biological basis of radiation therapy, and radiation effects on specific tissues in mammals. Credit 2 units.

(Sapareto [Cancer Biology])

**Bio 525. Fundamental Concepts in Cell Membrane Physiology and Biophysics**

A lecture course devoted to theoretical principles underlying the physiological properties of biological membranes. Topics to be covered include (1) electrolyte solution properties including interface potentials, (2) diffusion, osmosis, and transport through pores, (3) electrodiffusion and membrane potentials, (4) selectivity and kinetics of transport through ion channels, and (5) kinetics and thermodynamics of carrier-mediated transport. Credit 3 units.

(De Weer [Physiology and Biophysics], Rakowski and Reuss)

**Bio 526. Selected Topics in the Physiology and Biophysics of Cell Membranes**

In-depth analysis of selected readings. Topics include: movements of salt and water across cell membranes and epithelia; ion channels in biological and artificial membranes; kinetics of carrier mechanisms; and the chemistry and kinetics of the sodium pump. Credit 3 units.

(De Weer [Physiology and Biophysics], Rakowski and Reuss)

**Bio 528. Cell Development in Animals and in Culture**

Lectures and student seminars on the fate of individual cell types in animals and in cell culture. Principles of cell renewal exemplified by muscle, liver, and kidney regeneration. General cell culture, including growth factors, hormonal factors, cyclic nucleotide effects, and genetics of cultured cells. The fate of normal cells will be discussed along with the relation of differentiation to cell division, the role of cell-cell interactions, mechanisms of carcinogenesis, and studies of teratomas. Prerequisite, Bio 451 and permission of instructor. Three class hours a week. Credit 3 units.

(D. Schlessinger [Microbiology and Immunology], Lieberman)

**Bio 529. Animal Virology**

A general introduction to animal and human viruses. Lectures in the second nine weeks of the fall semester. Credit 1 unit.

(Perrault [Microbiology and Immunology])

**Bio 530. Laboratory Computer Workshop**

A laboratory course supplemented by reading and occasional lectures. An interactive time-sharing computer programmed in PASCAL will be used to solve a series of problems, including collection and processing of data, representation of information in data files, and presentation of output in graphic form. Prerequisite, permission



of instructor, since enrollment is limited by computer availability. Two class hours a week. Credit 2 units.

(Holmes [Biochemistry])

**Bio 531. Advanced Biochemistry**

See Department of Biological Chemistry.

**Bio 532. Biochemistry of the Extracellular Matrix**

An in-depth survey of the chemistry and metabolism of the principal components of the extracellular matrix, principally collagen, elastin and the glycosaminoglycans. Chemical and physical properties of these molecules will be discussed, as well as aspects of their biosynthesis and degradation. Emphasis will be placed on the relationships between structural features and metabolic events involving these complex molecules and their physiologic function: the maintenance of the stable three-dimensional architecture of animal tissues. Credit 2 units.

(Jeffrey [Biochemistry])

**Bio 533. Pathogenic Microbiology**

A survey of the major genera of pathogenic bacteria, fungi and parasites. Lectures and laboratory in the second nine weeks of the fall semester. Credit 2 units.

(Staff [Microbiology and Immunology])

**Bio 536. Physical Chemistry of Macromolecules**

Application of physical chemistry to the study of proteins, nucleic acids and other natural and synthetic polymers. The thermodynamics of macromolecular solutions and the principles behind osmotic pressure, light scattering, viscosity, ultracentrifugation, diffusion, and electrophoresis experiments. Offered in alternate years. Prerequisites, two semesters of Physical Chemistry or permission of instructor. Credit 3 units. Identical with Chemistry 577.

(Holtzer [Chemistry])

**Bio 537. Protein Chemistry and Enzyme Mechanisms**

Protein chemistry; primary and three-dimensional structure; enzyme mechanism; development of enzyme kinetic theory, including concepts of regulatory enzymes. Credit 3 units. (Grant [Biochemistry])

**Bio 538. Structure and Function of Cell Membranes and Surfaces**

Topics include contemporary cell membrane models; membrane structure as revealed by electron microscopy, X-ray analysis, etc.; physical properties of lipids and membrane proteins; model membranes and their applications; permeability and active transport in mammalian and bacterial systems; cell recognition, contact inhibition, and transformation; immunological characteristics of membranes. Credit 3 units.

(Frazier/R. Kornfeld [Biochemistry])

**Bio 539. Topics in Animal Virology**

The course will consist of readings and seminars in specific areas of animal virology. The topics will vary from year to year. Credit 2 units.

(S. Schlesinger [Microbiology and Immunology])

**Bio 540. Cell Surface Receptors**

Course will consist of discussion of cell surface components which allow cells to interact specifically with a variety of environmental substances such as drugs, neurotransmitters, protein hormones, toxins and other cells. This course will include a consideration of cell-cell interactions, macromolecule receptors and small molecule receptors. Credit 3 units.

(Needleman [Pharmacology], Bradshaw, Frazier)

**Bio 541. Molecular Biology of Prokaryotes**

About 15 hours of lecture followed by seminar presentations on selected topics by each student. Growth, metabolism and genetics of the bacterial cell including transport mechanisms, the regulation of gene expression and protein synthesis and the molecular biology of virus infection by virulent and temperate bacteriophages. Classical and more recently developed experimental tools, such as genetic engineering, as well as the conceptual bases for present knowledge, will be emphasized. Credit 2 units.

(Kennell [Microbiology and Immunology])

**Bio 542. Topics in Gene Expression**

A weekly journal club discussing articles of current interest in the field of gene expression. Prerequisite, graduate status. One hour seminar per week. Credit one unit, contingent on one presentation per semester.

(Chirgwin [Anatomy], Waterston, Olson)

**Bio 543. Computer Modeling of Physiological Systems**

The fundamentals of interactive computing and its application to the numerical modeling of physiological systems. The illustration using models developed by the faculty for use in teaching. Some "hands-on" computer projects. Prerequisite, some familiarity with computing (FORTRAN or BASIC) or consent of instructor, 3 class hours per week. Credit 3 units. (Barry [Physiology])

**Bio 544. Mechanisms of Neoplasia**

The first part of the course provides a basic background in neoplasia in man and animals as a framework for the application of concepts in cell and molecular biology to neoplasia. The major part of the course will be devoted to analyzing the role of chemical, physical, and viral carcinogens in the induction of cancer, promoters, the role of mutation and gene expression in neoplasia, changes in the cell surface and metastasis. Credit 2 units. Minimum of ten students.

(Lieberman [Pathology], D. Schlessinger, Staff)

**Bio 545. Introductory Biophysical Chemistry**

Applications of physical chemistry to biochemical problems at an introductory level. There will be three sections: multiple equilibria, spectroscopy, and kinetics, each comprising about one third of the course. One section may be taken individually for one credit. Permission of instructor. Three class hours per week. Credit 3 units.

(Elson [Biochemistry])

**Bio 546. Antibodies: Structure, Function, and Formation**

The principal features will be examined in lectures, assigned reading of current research papers, and in student seminar presentations. Emphasis will be placed on the genetic and molecular events which govern the appearance of antibodies during the immune response. Offered in alternate years. Credit 2 units.

(Fleischman [Microbiology and Immunology])

**Bio 548. Nucleic Acids and Protein Biosynthesis**

Fundamental aspects of the structure, biosynthesis, and function of nucleic acids and the biosynthesis of proteins in eukaryotes and their viruses. Emphasis on mechanisms involved in the biosynthetic processes and the regulation thereof. Prerequisite, Bio 451 and 453 or equivalent, or consent of instructor. Three class hours a week. Credit 3 units.

(Olson [Genetics], Boime [Pharmacology])

**Bio 550. Medical Genetics**

Lectures and clinical conferences on human and medical genetics that include population and quantitative genetics, clinical cytogenetics, biochemical genetics and metabolic defects, counseling, and immunogenetics. Lectures and clinical conferences only. Credit 2 units. Prerequisite, an introductory genetics course or consent of instructor.

(Levine [Genetics])

**Bio 551, 552. Topics in Neurobiology**

A weekly seminar series on selected topics of current interest in neurobiology, such as synaptic and neuromuscular transmission, plasticity in the nervous system, the structure and function of receptors, etc., 9 a.m., Saturdays, 928 McDonnell. Open to graduate and medical students. No credit. (Staff [Anatomy and Neurobiology, Physiology and Biophysics and Pharmacology])

**Bio 553. Seminar in Cellular Basis of Behavior**

Motor control in annelids, molluscs, arthropods and vertebrates. Neural mechanisms responsible for the control of movement will be emphasized in student presentation of original papers. Prerequisite, Bio 3421 or Bio 554



and permission of instructor. Two class hours a week. Credit 2 units. (Stein [Biology])

**Bio 554. Neural Sciences**

See Departments of Anatomy and Neurobiology and Physiology and Biophysics.

**Bio 555. Neuropharmacology**

Basic and intermediate neuropharmacology for graduate and medical students. The course covers the principles and details of neurotransmission in nervous tissue and mechanisms of action of neurotropic drugs. Credit 3 units. (Ferrendelli [Pharmacology], Staff)

**Bio 559. Nerve, Muscle, and Synapse**

The ionic basis of the resting and action potentials and the mechanisms of synaptic transmission. Students will be expected to present two to five one-hour seminars based on assigned original papers. Credit 2 units. (Rovainen [Physiology and Biophysics])

**Bio 561. Topics in Molecular Neurobiology**

The course will consist of lectures and seminars on selected areas in which the function of the nervous system is being studied at the molecular level. Among topics considered will be: behavior in simple organisms, continuous neuronal lines, intraxonal transport, transmitter receptors, transmitter biosynthesis, cell recognition, filamentous proteins of the nervous system. Credit 2 units. (Willard [Anatomy and Neurobiology], D. Gottlieb)

**Bio 562. Neural Control of Posture and Movement**

Advanced seminar course. Part I—Sensory and motor innervation of muscle. Spinal reflex organization. Part II—Supraspinal control. Cerebral cortex, cerebellum, basal ganglia, brain stem. Offered odd-numbered years. Credit 2 units.

Part I—(Hunt [Physiology and Biophysics])

Part II—(Thach [Anatomy and Neurobiology])

**Bio 563, 564. Techniques in Neural Sciences**

A laboratory course for first-year graduate students in the Neural Sciences Program. Including practical experiences in: intracellular recordings from nerve cells and muscle fibers; growth of nerve tissue culture and electron microscopy of it; recording of synaptic potentials; extracellular recording in mammalian peripheral and central nervous system; tracing of CNS pathways by autoradiographic and histochemical techniques; and biochemical analysis of axonal transport.

(Woolsey [Anatomy and Neurobiology], Staff [Physiology and Biophysics], [Biology], [Pharmacology])

**Bio 565. Central Regulation of Autonomic and Visceral Systems**

For neural science students, introduction to the central control of the autonomic nervous system and the neural basis of various visceral functions (eating and drinking).

Discussion of cardiovascular regulation, respiratory pathways, the role of the hypothalamus and limbic system in visceral and neuroendocrine functions. Prerequisite, Bio 554 or consent of instructor. 2 class hours a week. Credit 2 units. Identical with Psychology 558.

(Loewy [Anatomy/Neurobiology] Staff)

**Bio 566. Sensory Receptors**

Advanced seminar course on structure and function of visual, auditory, vestibular, cutaneous and muscle receptors. Credit 2 units. (Hunt [Physiology])

**Bio 572. Seminar in Plant Biology: Plant Biochemistry**

Discussion of current research and concepts of morphogenesis, growth, and development. Credit 2 units.

(Varner [Biology])

**Bio 574. Systematics and Ecology of Monocotyledoneae**

The course will survey all monocotyledonous groups of plants with systematic emphasis given to the familial level. A review of modern evolutionary theories for the class Monocotyledoneae will be presented. The course outline will follow the system of Cronquist. Particular emphasis will be given to the families Cyperaceae, Gramineae, Bromeliaceae, Zingiberaceae, Marantaceae, Palmae, Cyclanthaceae, Araceae, Liliaceae and Iridaceae, for which instructors have a special interest. The morphology systematics and ecology of each family will be discussed, with special emphasis given to their phenological behavior, pollination and fruit dispersal biology when sufficient information is available. Credit 2 units.

(Croat [Biology])

**Bio 575. Advanced Studies in Plant Systematics**

Seminars in specific topics including anatomy, chemotaxonomy, cytology, ecotaxonomy, embryology, nomenclature, palynology, phytogeography and bibliography. Prerequisite, Bio 322 or 376. One seminar a week. Credit 1 unit a semester. (Staff [Biology])

**Bio 580. Seminar in Population Biology: Evolution**

This weekly seminar, covering topics in both population genetics and ecology, will be taken by graduate students in this program each semester. Research and literature reports will be given by staff, visitors and graduate students. Credit 2 or 3 units. (Staff [Biology])

**Bio 581. Seminar in Techniques in Field Biology**

Planning and presentation of techniques in selected areas of population biology. Coordinated with Bio 484. Prerequisite, consent of instructor. Credit 3 units.

(Staff [Biology])

**Bio 590. Research**

Credit to be arranged.

(Staff)

*Note*—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.



## PROGRAM IN BIOMEDICAL ENGINEERING

This course of graduate study is designed to provide education and training for students wishing to apply principles of modern engineering and mathematics to theoretical and practical problems in biology and medicine. Students and faculty of both the School of Engineering and Applied Science and the School of Medicine participate in the program.

Every student seeking an advanced degree in engineering must be admitted to one of the participating departments of the Sever Institute of Technology, the graduate division of the School of Engineering and Applied Science. The program permits the student to earn a certificate in biomedical engineering in addition to the M.S. or D.Sc. degree in a chosen engineering field. Students not candidates for a degree are welcome to take courses as electives.

Graduate study plans are tailored to the individual's needs and interests, and provide essential background in the related areas of life and medical sciences. Students with diverse undergraduate backgrounds may be admitted provided they have adequate preparation and experience in mathematics and the physical sciences. Areas of specialization include sensory communications, electrocardiography, flow and diffusion in biological systems, electrophysiology, technology in health care, biomedical statistics, modeling of biological systems, engineering of artificial organs, drug concentration control, urodynamics, and applications of advanced computer techniques to biology and medicine. Research facilities available to the program are located in the School of Engineering and Applied Science, the School of Medicine, and the Washington University Computer Laboratories. The faculty includes representatives from the Biomedical Computer Laboratory, the Departments of Biological Chemistry, Physiology and Biophysics, Preventive Medicine and Public Health, Radiology, Surgery, and Anatomy and Neurobiology in the School of Medicine; and the Departments of Computer Science, Chemical, Civil, Electrical, and Mechanical Engineering, and Systems Science and Mathematics in the School of Engineering and Applied Science.

Complete course listings and information about application and degree requirements may be found in the *Bulletin of the School of Engineering and Applied Science*.

*Professor and Chairman  
Executive Committee*  
Harold W. Shipton

*Professors*  
Saul Boyarsky  
Jerome R. Cox, Jr.

John L. Kardos  
Charles E. Molnar  
William F. Pickard  
Salvatore P. Sutura  
Michel M. Ter-Pogossian  
Curt Thies  
Donald F. Wann  
Reimut Wette

*Associate Professors*  
R. Martin Arthur  
Richard E. Clark  
Richard A. Gardner  
William F. Holmes  
Marcus E. Raichle  
Lewis J. Thomas, Jr.  
George I. Zahalak

*Assistant Professor*  
Stuart Boxerman

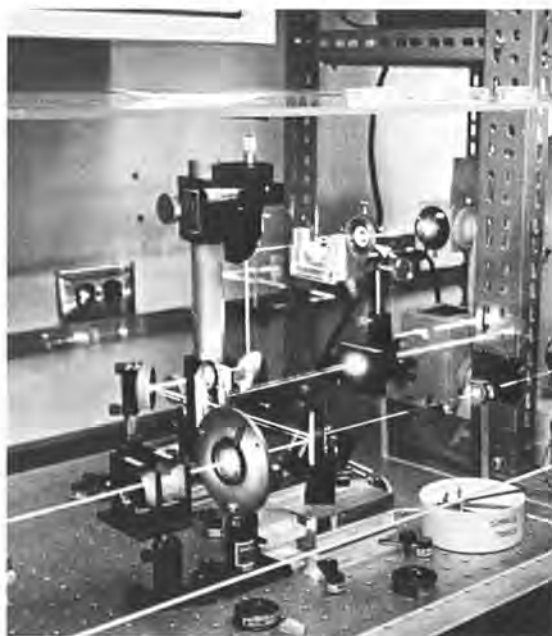
*Senior Research Associate*  
Norbert S. Mason

*Research Associate*  
Kenneth B. Larson

Biomedical Engineering course offerings:

- Bio 458. Biophysics of the Ear
- EE 481. Foundations of Bioengineering
- BMed 502. Mathematical Methods in Biophysics
- BMed 547. Biological Mass and Momentum Transfer
- BMed 560. Biomechanics
- BMed 576. Sensory Communications
- BMed 581. Principles of Clinical Engineering
- BMed 582. Biophysical Measurement
- BMed 600. Research for Doctoral Dissertation
- BMed 651. Science of Synthetic and Biological Polymers
- BMed 660. Biomedical Applications of Small Digital Computers
- BMed 682. Technology in Health Care
- BMed 693. Special Topics in Biomedical Engineering
- BMed 694. Special Topics in Clinical Engineering
- BMed 695. Clinical Engineering Internship

For additional related courses, see Biomedical Computer Laboratory in this *Bulletin* and the *Bulletin of the School of Engineering and Applied Science*.



# Allied Health Professions

Programs are conducted by the School of Medicine in health administration, occupational therapy, physical therapy, radiologic technology, and pediatric nursing practice. All courses are approved by the American Medical Association or other certifying agencies, and graduates qualify for certifying examinations. For further information, write to the director or educational director listed under the particular program, 660 South Euclid Avenue, St. Louis, Missouri 63110.

## HEALTH ADMINISTRATION AND PLANNING PROGRAM

### The Philosophy

The faculty of the Health Administration Planning Program of Washington University believes that administrative personnel in health organizations require not only a solid foundation in management but also in understanding of those aspects of finance, regulation, and planning unique to the health care field. Additionally, 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 will ultimately 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 specific management skills but an understanding of the many complexities unique to the health care sector.

### Curriculum and Sequence of Study

Required courses constitute 50 percent of the course sequence for the master of health administration degree, offering vital exposure to the generic knowledge in the health administration and planning area. In addition to the elective courses available within the Health Administration and Planning 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 fifteen semester hours of HAP courses are open to interested graduate students from other areas of Washington University. There is also a joint M.H.A.-J.D. degree between the Health Administration and Planning Program and the School of Law. In addition, there are joint degrees that are under development between the Health Administration and Planning Program and the graduate schools of Business Administration, the George Warren Brown School of Social Work and the School of Architecture.

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 which includes the required thesis, the student will receive a master 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-month postgraduate administrative residency. A certificate will be awarded by Washington University School of Medicine and the affiliated residency organization upon completion of the residency.



### Administrative Residency

The 12-month optional postgraduate administrative residency will be served in a hospital, health agency, or health organization which 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 residency 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 residency is strongly recommended, as this postgraduate clinical exposure is deemed necessary for adequate professional career preparation. The residency is completed under the direction of a well-qualified and experienced hospital administrator who is given an annual adjunct faculty appointment at Washington University School of Medicine.

The full-time faculty maintains close liaison with the administrative resident and the preceptor. An educational plan which outlines the resident's activities for the coming year must be filed by the preceptor. 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 residency site organization.

Within available resources an on-campus faculty member visits the residency site to meet with the preceptor

and resident. HAP also sponsors an annual preceptor conference at Washington University. Interaction of these site and campus visits enables joint review of the resident's progress, as well as evaluation and refinement of the administrative residency experience.

### Admission Requirements

Washington University's Health Administration and Planning 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), the Miller Analogies Test or the Graduate Management Aptitude Test. No specific undergraduate major field of study is required for admission into the program; however, introductory courses in accounting, economics, statistics (or their equivalents), and mathematics through college algebra are very strongly recommended.

Tuition per semester	\$ 3,125
(Four semesters)	12,500
Books and supplies (per semester)	280
Application fee (nonrefundable)	20

### Associate Professor and Director

**James O. Hepner**, B.A., University of Iowa, 1955; M.H.A., Washington University, 1959; Ph.D., University of Iowa, 1964.

### Associate Professor and Deputy Director

**Donald J. Horsh**, B.S.B.A., University of Nebraska, 1941; M.H.A., Washington University, 1951; J.D., St. Louis University, 1953.

### Professor

**David A. Gee**, B.A., DePauw University, 1949; M.H.A., Washington University, 1951.

### Associate Professors (Adjunct)

**Ted Bowen**, B.S., Austin College, 1941; M.H.A., Washington University, 1948.

**James A. Canedy**, B.A., Hastings College, 1950; M.H.A., Washington University, 1952.

**James D. Harvey**, B.A., University of South Dakota, 1950; M.H.A., Washington University, 1952.

**David H. Hitt**, B.S., University of Alabama, 1949; M.Sc., 1950; M.H.A., University of Minnesota, 1952.

**Linn B. Perkins**, A.B., Amherst College, 1949; M.H.A., Washington University, 1951.

### Assistant Professors

**Stuart B. Boxerman** (Biostatistics), B.S.E.E., Washington University, 1963; M.S.E.E., 1965; D.Sc., 1970. (See Department of Preventive Medicine and Public Health.)

**Mary Jane Budenstein**, B.A., University of Montevallo, 1973; M.A., Washington University, 1975; Ph.D., 1977.

**Bernard Feigenbaum** (Health Care Research), B.A., University of California, Los Angeles, 1974; M.A., 1976. (See Department of Preventive Medicine and Public Health.)

**Ronald E. Gribbins**, B.A., St. Norbert College, 1966; M.B.A., University of Wisconsin, 1971; Ph.D., 1975.

**Virginia D. Hennelly**, B.S., Maryville College, 1966; M.H.A., Washington University, 1971; Ph.D., 1977.

**Robert J. Hickok**, B.S., Washington University, 1953; M.H.A., 1971. (See Administration and Program in Physical Therapy.)

**Robert S. Woodward** (Health Care Research), B.A., Haverford College, 1965; Ph.D., Washington University, 1972. (See Department of Preventive Medicine and Public Health.)

### Assistant Professors (Adjunct)

**Donald W. Cordes**, A.B., Hope College, 1940; M.A., University of Michigan, 1941.

**Robert E. Frank**, B.S., St. Louis University, 1950; M.A., 1962.

**Frank S. Groner**, A.B., Baylor University, 1934; LL.D., East Texas Baptist College, 1946.

**Roy C. House**, A.B., Evansville College, 1939; M.S.H.A., Northwestern University, 1949; H.S.D., Southwestern College, 1978.

**Rita E. Numerof**, B.A., Syracuse University, 1969; M.S.S., Bryn Mawr, 1971; Ph.D., 1979.

**Boone Powell**, LL.D., Baylor University, 1958.

**Sister Mary R. Rocklage**, B.S., St. Xavier College, 1961; M.H.A., St. Louis University, 1963.

**Robert F. Scates**, B.A., Baylor University, 1939.

**Glenn N. Scott**, B.A., Oklahoma Baptist University, 1956; M.H.A., Washington University, 1962.

**Marc D. Smith**, B.S., University of Missouri, 1971; M.Div., Concordia (Seminex), 1975; Ph.D., St. Louis University, 1979.



**Gail L. Warden**, A.B., Dartmouth College, 1960; M.H.A., University of Michigan, 1962.

**Instructors (Adjunct)**

**Miner L. Brown**, B.A., St. Lawrence University, 1962; M.H.A., Washington University, 1965.

**Richard W. Brown**, B.A., Phillips University, 1968; M.H.A., Washington University, 1970.

**L. Gerald Bryant**, B.B.A., University of Oklahoma, 1964; M.H.A., Washington University, 1968.

**Sarah G. Burtram**, B.A., Dominican College, 1970; M.H.A., Washington University, 1972.

**Howard M. Chase**, B.S., Lewis and Clark College, 1959; M.H.A., University of Minnesota, 1966.

**Arthurline Clingman**, B.S., University of Houston, 1957; M.H.A., Washington University, 1959.

**Paul F. Detrick**, B.A., Kansas State Teachers College, 1949; M.H.A., Northwestern University, 1951.

**Carl J. Felling**, B.A., Westminster College, 1964; M.B.A., George Washington University, 1967.

**Robert D. Finney**, B.S., University of Utah, 1962; M.A., 1965; Ph.D., 1969; M.S.W., Washington University, 1971.

**Thomas W. Fourqurean**, B.B.A., Texas College of Arts and Industries, 1939; M.B.A., University of Chicago, 1949.

**Phillip H. Goodwin**, B.A., Hendrix College, 1943; M.H.A., Washington University, 1968.

**Fredrick J. Graves**, B.S., Southern Illinois University, 1961; M.B.A., George Washington University, 1965.

**H. Richard Grisham**, B.S., University of Oklahoma, 1968; M.H.A., Washington University, 1974.

**Howard L. Hays**, B.S., University of Omaha, 1957; M.H.A., Washington University, 1959.

**William B. Hope, Jr.**, B.S., University of Tennessee, 1960; M.S., 1962; M.P.H., Johns Hopkins University, 1968; Sc.D., 1971.

**Duane T. Houtz**, B.A., University of Kansas, 1955; M.H.A., Washington University, 1960.

**Mabel P. Howell**, B.Ed., Southern Illinois University, 1941; M.H.A., Washington University, 1966.

**James B. Humphreys**, B.S., Westminster College, 1963; M.H.A., Trinity University, 1969.

**Edgar O. Mansfield**, B.S., Northwestern University, 1950; M.H.A., 1952; Dr.P.H., Ohio Northern University, 1956.

**Larry L. Mathis**, B.S., Kansas State College, 1965; M.H.A., Washington University, 1972.

**Beverly B. Monical**, B.S., Washington University, 1960; M.H.A., 1972.

**John P. Nobel**, B.S., Florida A & M University, 1959; M.H.A., Columbia University, 1962.

**Robert J. O'Brien**, B.S., Phillips University, 1960; M.H.A., Washington University, 1965.

**Elwood P. Opstad**, B.S., State University of Iowa, 1947; M.H.A., Washington University, 1949.

**Joseph H. Powell**, B.A., University of Tennessee, 1950; M.H.A., University of Minnesota, 1955.

**Wynn E. Presson**, B.B.A., University of Texas, 1963; M.H.A., Washington University, 1965.

**J. Larry Read**, B.S., Lamar University, 1968; M.H.A., Washington University, 1974.

**James C. Ruthrauff**, B.S.B.A., University of Kansas, 1957; M.S., Northwestern University, 1959.

**Charles B. Stearns**, B.S., Northwestern University, 1960; M.H.A., Washington University, 1962.

**James D. Stewart**, B.A., Brigham Young University, 1960; M.H.A., Washington University, 1975.

**Richard C. Suchenski**, B.S., Fordham University, 1953; M.H.A., Virginia Commonwealth University, 1961.

**James H. Sullivan**, B.A., Michigan State University, 1950; M.H.A., University of Michigan, 1957.

**Charles E. Thoele**, B.Sc., St. Louis University, 1953; B.S., 1961; M.B.A., Southern Illinois University, 1976.

**John Warmbrodt**, B.S., St. Louis University, 1939.

**Paul H. Wunderlich**, B.A., Valparaiso University, 1962; M.H.A., Washington University, 1967.

**Lecturers**

**Harold Hinderer**, B.A., College of St. Thomas, 1952.

**Merlin E. Lickhalter**, B.A., Massachusetts Institute of Technology, 1957.

**Harry E. Panhorst**, B.S., University of Missouri, 1938; M.H.A., Washington University, 1949.

**Lecturers (Adjunct)**

**Jerry Garrett**, B.S.B.A., University of Missouri, 1964; M.A., Webster College, 1979.

**Terry L. Nimmicht**, B.S., University of Scranton, 1976; M.H.A., George Washington University, 1979.

**Henry Mandro**, B.S., Temple University, 1960.

**Kenneth W. Peters**, B.A., Luther College, 1950; M.H.A., Baylor University, 1958.

**Colin C. Rorrie, Jr.**, B.A., Beloit College, 1964; M.A., University of Iowa, 1966; Ph.D., 1968.





## PROGRAM IN PHYSICAL THERAPY

The program of instruction leading to the Bachelor of Science degree in physical therapy is an intensive two-year curriculum offered at the School of Medicine. Applicants for admission must have completed 60 hours at an accredited college or university. Requirements are specific courses in English, psychology, biology, physics, chemistry, mathematics, and social sciences.

Kinesiology and pathokinesiology form the core of the curriculum. Kinesiology/pathokinesiology is the integrative study and application of physical, biological, and applied science principles to normal and abnormal human movement. The basic and clinical sciences of kinesiology and pathokinesiology provide the foundation upon which the physical therapist can develop and apply scientific principles to patient care. The goal of the curriculum is to produce practitioners who can competently utilize the scientific approach to assess, remediate, and prevent pathokinesiological disorders.

### *Associate Professor Emeritus*

**Beatrice F. Schulz, B.S.,** Washington University, 1949; M.A., 1955.

### *Assistant Professor Emeritus*

**Lorraine F. Lake, B.S.,** Washington University, 1950; M.A., 1954; Ph.D., 1962.

### *Associate Professor and Director*

**Steven J. Rose, B.S.,** Ithaca College, 1962; Ph.D., Albert Einstein College of Medicine, 1977.

### *Visiting Associate Professor*

**Eugene Michels, B.S.,** University of Cincinnati, 1950; Certificate in P.T., University of Pennsylvania, 1951; M.A. University of Pennsylvania, 1967.

### *Assistant Professors*

**Robert J. Hickok, B.S.,** Washington University, 1953; M.H.A., 1971. (See Administration and Health Administration and Planning Program.)

**Shirley A. Sahrman, B.S.,** Washington University, 1958; M.A., 1971; Ph.D., 1973. (See Departments of Neurology and Neurological Surgery and Physiology and Biophysics.)

### *Instructors*

**M. Susan Beamer, B.S.,** Indiana University, 1969; M.A., Washington University, 1977.

**Donald M. Bitz, B.S.,** University of Illinois, 1973; M.D., Washington University School of Medicine, 1977.

**Robert H. Deusinger, B.S.,** Slippery Rock State College, 1967; M.S., University of Massachusetts, 1968; Ph.D., The University of Iowa, 1981.

The program provides an environment in which students, faculty, and physical therapy practitioners are guided in the acquisition of the requisite body of knowledge for the current and future practice of physical therapy. The program strives to bring scholarly knowledge to bear on the problems of the profession through research activities of the faculty. By providing an environment which permits expression of the individual's imagination and creativity, the program encourages the professional growth of its constituents.

Tuition per semester . . . . . \$3,563

Tuition for internship (estimate) . . . . . 100

Further information may be secured by direct correspondence with the Program in Physical Therapy, Campus Box 8083, 660 South Euclid Avenue, St. Louis, Missouri 63110.



**Susan Deusinger**, B.S., University of Kansas, 1968; M.A., Washington University, 1980.

**Sven G. Eliasson**, Swedish Medicine Candidate, Royal Caroline University of Lund, Sweden, 1954; (Ph.D.), University of Lund, Sweden, 1952.

**Judith Mange**, B.S., Washington University, 1968; M.B.A., University of Missouri; St. Louis, 1980.

**Barbara J. Norton**, B.S., Washington University, 1966.

**Richard F. Roettger**, B.S., Washington University, 1962.

**Jules M. Rothstein**, B.S., New York University, 1975; M.A., 1979.

**Debra L. Strobach**, B.S., University of Missouri, 1973; M.A., University of North Carolina, 1975.

#### *Instructors (Clinical)*

**Elaine Angelo**  
**Diane Antonocci**  
**Jolene Apprill**  
**Susan Barr**  
**Mary Beth Basile**  
**Barbara Baum**  
**Christine O. Bridwell**  
**Karen Burns**  
**Lawrence F. Chojecki**  
**Debby Davenport**  
**Steve Dickoff**  
**Bill Dierks**  
**Camilla Dude**  
**Patricia M. Ellis**  
**Frances L. Erlacker**  
**Gail Fisher**  
**Charlene M. Flynn**  
**Linda Grambow**  
**Ellen Jost**  
**Mark J. Gayer**  
**Ira Gorman**

**Elvera C. Guebert**  
**Barbara Hayes**  
**Betty Helfrien**  
**Judy Hembree**  
**Diedra Henneke**  
**Jeanette Hinrichsen**  
**Pamela Hoffman**  
**Helen Marie Holzum**  
**Major Norris Jesse**  
**Kathleen M. Keller**  
**Carol Knudson**  
**Gerald Kraft**  
**Joanne Ladd**  
**Sandra Lake**  
**Nick Laubenthal**  
**Mary Liedloff**  
**Judy Ligman**  
**Janet Lindsten**  
**June Macchiaverna**  
**Joann Markell**  
**Kathy Markensen**  
**Sandra Martin**  
**Juanita Mayer**  
**Charles Meacci**  
**Kyle Meyer**  
**Sharon L. McNeill**  
**Cathie Meglan**  
**JoAnn R. Niccum**  
**Mary Niemeyer**  
**Marilyn Raymond**  
**Richard Roettger**  
**Richard Rother**  
**Erica Rouvalis**  
**Phyllis Rowland**  
**Mary Rudd**  
**Suzanne B. Rutledge**  
**Cindy Rysgaard**  
**Ann Brown Short**  
**Dean Soder**  
**Barbara A. Tschoepe**  
**Sally Wasserman**  
**Barbara A. Woodall**  
**Maureen Wulf**

#### *Research Assistants*

**Ronna S. Kaiser**, B.S., State University of New York at Buffalo, 1979.

**Thomas P. Mayhew**, B.S., State University of New York at Buffalo, 1979.

**Peter Miller**, B.S., New York University, 1980.

**Julie M. McClure**, B.A., Brown University, 1975.

#### *Lecturers*

**Catherine C. Brodzinski**, B.S., St. Louis University, 1974.

**Suzanne M. Cornbleet**, B.S., University of Colorado, 1975.

**Anthony Delitto**, B.S., State University of New York at Buffalo, 1979.

**Janet L. Gourley**, B.S., University of Missouri, 1977.

**Kathleen M. Haralson**, B.S., University of Kansas, 1965.

**David R. Sinacore**, B.S., B.A., State University of New York at Buffalo, 1979.

## PROGRAM IN OCCUPATIONAL THERAPY

The efforts of the Program in Occupational Therapy are directed toward providing students with a thorough background in occupational therapy in preparation as practitioners in a rapidly developing field. The primary focus of occupational therapy is the development of adaptive skills and improved performance, not only in the realm of working for a living but also in tasks and activities concerned with leisure, daily living, and avocations. It follows that the occupational therapist must be concerned with external and environmental barriers as well as biological or psychological problems which inhibit occupational performance. The therapist must be equally alert to factors which enhance performance.

Within this context of concerns, occupational therapists work with individuals whose abilities to cope with tasks of living are threatened or impaired by such problems as the aging process, physical illness or injury, psychological and/or social disability, chronic conditions, poverty and cultural differences, or deficits in perceptual-sensory-motor control or in cognitive, emotional, or social development.

### Undergraduate Program

The curriculum consists of the junior and senior years of a four-year baccalaureate degree program. Applicants for transfer must present a minimum of 60 semester hours (including required prerequisites) from an accredited college or university. Students wishing to enroll at Washington University may enter the program as freshmen.

Upon completion of four academic semesters at the School of Medicine, the degree of bachelor of science in occupational therapy is conferred. Six months of supervised clinical internship is required following graduation.

Tuition, per semester .....	\$3,562
Fee, Department, per semester .....	40
Fee, Clinical Internship .....	700

For further information, contact the Office of Admissions, Washington University, Lindell and Skinker Boulevards, St. Louis, Missouri 63130. Phone: (314) 889-6000.

### Graduate Program

The Graduate Program in Occupational Therapy prepares students to become clinical specialists, researchers or educators in one of the major areas of current practice: sensorimotor integration, community pediatrics, psychiatry or physical dysfunction. By selectively ordering their studies, students may orient their specialization toward service delivery in community, medical or educational settings.

All candidates for the master of science degree complete a core program consisting of advanced courses and seminars in occupational therapy theory; clinical, research and teaching practice; research procedures; tests and measurements; and strategies of scientific practice. Students' interests and needs determine the selection of electives to complement core courses and to create indi-

vidual programs of study leading to clinical specialization. Occupational therapy students have access to the extensive resources of the medical school, the patients and clinics of the University hospitals, and to the resources of the Graduate School of Arts and Sciences located on the Lindell and Skinker campus. Electives applicable to area specialization may include courses offered throughout Washington University. All students are required to submit and defend a research thesis in their area of concentration.

Students without professional certification must complete basic courses in occupational therapy and biological sciences before beginning the graduate core-course sequence. These students must also complete six months of clinical internship in preparation for the national certification examination. These requirements can be fulfilled as part of the master of science degree.

Residency requirements are two academic semesters of full-time study. Students without professional certification must complete one summer and two additional academic semesters for residency requirements.

Persons with a baccalaureate degree, evidence of a strong academic record, and satisfactory Graduate Record Examination scores are encouraged to apply.

Tuition, per semester .....	\$3,562
Tuition, Summer School, per credit hour .....	90
Fee, Department, per semester .....	40
Fee, Department, Summer School .....	40
Administrative fee for scheduling clinical internships for students without professional certification .....	300

For further information, contact the Graduate Program in Occupational Therapy, 4567 Scott Avenue, St. Louis, Missouri 63110. Phone: (314) 454-2933.



**Professor and Elias Michael Director**

**Jerry A. Johnson**, B.S., Texas Woman's University, 1953; M.B.A., Harvard University, 1961; Ed.D., Boston University, 1970.

**Assistant Professor and Associate Director**

**Ellen T. Tyson**, B.S., Syracuse University, 1949; M.A., 1950; Cert. in O.T., University of Pennsylvania, 1952.

**Assistant Professors**

**Erika G. Gisel**, B.A., University of Zurich, 1963; B.S.O.T., Temple University, 1972; M.S., 1976; Ph.D., 1979.

**Ruthan B. Kannegieter**, A.B., University of California, 1950; Cert. in O.T., U.S. Army School of Occupational Therapy, 1954; M.A., San Francisco State University, 1958; Ph.D., Stanford University, 1968.

**Elsie S. Roush**, B.S., Madison College, 1943; M.S., University of Wisconsin, 1947; Ph.D., Washington University, 1950. (See Anatomy and Neurobiology.)

**Harriet Schmid**, B.S., Wayne State University, 1958; M.A., Western Michigan University, 1969; Ph.D., Ohio State University, 1979.

**Garth D. Tubbs**, B.S., Wisconsin State College, 1953; Cert. in O.T., Washington University 1955.

**Instructors**

**Susan M. Kusama**, B.S.O.T., Washington University, 1965; M.A., 1978.

**Mary K. Kuxhaus**, B.S.O.T., Washington University, 1973.

**Carol W. Niman**, B.S.O.T., University of Iowa, 1968; M.S., Spl. Ed., University of Texas at Dallas, 1977.

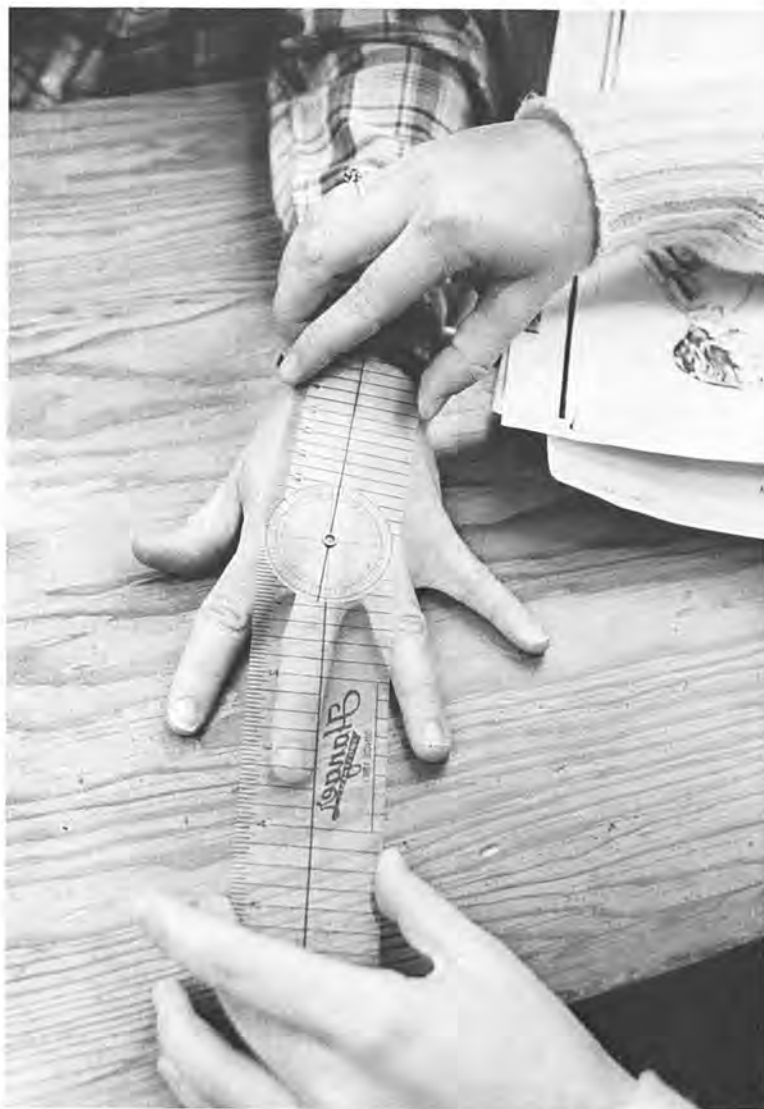
**Sandra Rafferty**, B.S.O.T., Washington University, 1966; M.A., San Francisco State University, 1975.

**Mary L. Rath**, B.S.O.T., Tufts University, 1969; M.S., University of Hartford, 1972.

**Dixie M. Sleight**, B.S., University of Kansas, 1959; M.A.T., Webster College, 1977.

**Sallie E. Taylor**, B.S.O.T., Richmond Professional Institute, 1961; M.Ed., University of Florida, 1964.

**Diane E. Ward**, B.S.O.T., Kansas University, 1972; M.Ed., University of Missouri, 1976.



**Instructors (Clinical)**

**Norma Battes**  
**Carolyn Baum**  
**Robbie Black**  
**Diana Brower**  
**Ing-Ing Chiou**  
**Jeff Cowdry**  
**Christine Dickmann**  
**Judy Doerr**  
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**Bette Ann Gilbert**  
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**Linda Kopetti**  
**Sharon Lian**  
**Beverly McClung**  
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**Margaret Russell**  
**Barbara Schob**  
**Susan Schroeder**  
**Marilyn Wiener**  
**Julia Williams**  
**Susan Wilson**  
**Francesca Woods**

**Lecturer**

**Joseph C. Kempe, Jr.**



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## **PHYSICIAN ASSISTANT PROGRAM, ST. LOUIS UNIVERSITY**

Washington University participates in the St. Louis University Physician Assistant Program administered through its School of Allied Health Professions. The 24-month program consists of three phases: preclinical sciences, clinical studies (didactic and practical), and a 20-week primary care preceptorship. Students are prepared to collect historical and physical data, perform diagnostic and therapeutic procedures, provide health maintenance services, and participate in patient education/counseling activities. The goal is to produce individuals capable of assisting the primary care physician and extending the effectiveness of his medical practice. Program accreditation is granted by C.A.H.E.A. (Committee on Allied Health Education and Accreditation). For applications and further information contact:

Director  
Physician Assistant Program  
School of Allied Health Professions  
St. Louis University  
1504 S. Grand Blvd.  
St. Louis, Missouri 63104



## PEDIATRIC NURSE PRACTITIONER PROGRAM

The School of Medicine through the Department of Pediatrics offers a program for preparing pediatric nurse practitioners in collaboration with the Department of Nursing of Maryville College. In addition to providing certification, the program provides the opportunity to obtain academic credit through Maryville College toward a baccalaureate degree in nursing.

The program was developed to help meet the challenge of needed health services in the pediatric community by preparing registered nurses to deliver primary pediatric health care.

The pediatric nurse practitioner (PNP) is a registered nurse whose special training enables her to play a larger role in pediatric health care. She obtains histories, performs physical examinations, and appraises physical, psychological, and intellectual growth and development. The pediatric nurse practitioner is competent to counsel families in matters concerning nutrition, accident prevention, and child-rearing. With the physician, she participates in the management of acute and chronic illnesses.

The program curriculum covers a nine-month period divided into a 16-week didactic portion followed by a 17-week practicum. The practicum may be obtained through the facilities of the program or, by special arrangement, at the site of future employment for those nurses who are sponsored by an employer or agency guaranteeing an appropriate position upon the completion of the program.

Supervised clinical practice is scheduled in a variety of settings, including public health clinics, neighborhood health centers, and private pediatricians' offices. Instruction is shared by medical and nursing faculties of Washington University and Maryville College.

Applicants must be registered nurses with at least one year of nursing experience, preferably in pediatric nursing or public health nursing. On completion of the program, the PNP is qualified to serve wherever pediatric services are needed. The program has been accredited by the American Nurses Association, and complies with the guidelines for such programs as proposed by the American Academy of Pediatrics and the American Nurses Association.

Program tuition (estimate) ..... \$2,850



## PROGRAMS IN RADIOLOGIC TECHNOLOGY

The Department of Radiology, which has its headquarters in the Edward Mallinckrodt Institute of Radiology, offers a basic course in X-ray technology and two one-year postgraduate courses. Each course leads to a certificate awarded by the Washington University School of Medicine, Department of Radiology.

### X-ray Technology

This two-year program is approved by the American Society of Radiologic Technologists, the American College of Radiology, the Joint Review Committee on Education in Radiologic Technology, the Council on Medical Education of the American Medical Association, and the Veterans Administration. It includes the following courses: radiation protection, professional ethics, anatomy and physiology, nursing procedures, radiation physics, medical terminology, survey of medical and surgical diseases, radiographic positioning, darkroom processing procedures, radiation therapy, radiation biology, nuclear medicine, special procedure radiography, room design and selection of equipment, and introduction to business administration and personnel management. Course work totals approximately 600 hours.

During the first six months, a student is on probation. Upon satisfactory completion of this work, he will be paid a monthly stipend of \$75 for the next six months. This stipend increases to \$100 for the third six months and \$125 for the last six months. During the 24 months, the student is assigned tours of duty in various diagnostic and therapeutic areas for practical experience, amounting to a total of 30 contact hours a week.

Candidates for admission must be graduates of an accredited secondary school and should rank in the upper third of their class. Special consideration is given to graduates of schools of nursing that are recognized by the State Board of Nurse Examiners and to students who have passed a college entrance examination. A one-year postgraduate course is offered in the fields of therapy and nuclear medicine.

### Nuclear Medicine Technology

This course covers 12 consecutive months, divided between didactic course material (225 hours) and practical experience. Persons admitted into the nuclear medicine technology program shall have completed high school, or its equivalent, and have completed post-secondary courses in the following areas: anatomy and physiology, basic physics, basic mathematics, medical terminology, oral and written communications, general chemistry, psychology and sociology, medical ethics, and jurisprudence.

Qualified medical technologists [MT (ASCP) or eligible], radiographers [RT (R) (ARRT) or eligible], and

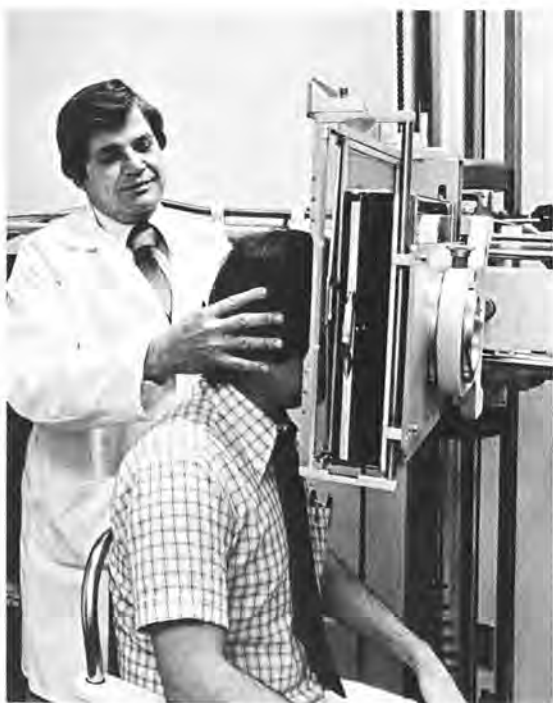
registered nurses [RN], are presumed to have the necessary credentials to meet the entrance requirements.

### Graduate Course in Radiation Therapy Technology

The Division of Radiation Oncology offers a 12-month post-graduate course in radiation therapy technology. This course consists of 260 hours of didactic material plus extensive practical experience and training in the clinical application and dosimetry procedures of radiation therapy. Approximately 1,400 new patients are treated each year. The equipment includes a 35 MV linear accelerator, a Clinac 20 linear accelerator, a 4 MV linear accelerator, a cobalt unit, a superficial ortho-voltage machine, and two simulators. Students obtain experience on each of the therapy machines as well as in the dosimetry and treatment planning area and in nursing procedures. Two on-site computers are used for dosimetry and treatment planning computations. The students rotate through the physics and treatment planning service in addition to attending practical demonstrations.

### Radiologic Technology Lecturer and Educational Director

Armand Diaz, R.N., R.T., Havana  
University School of Medicine, 1948.  
(See Department of Radiology.)



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# Administration

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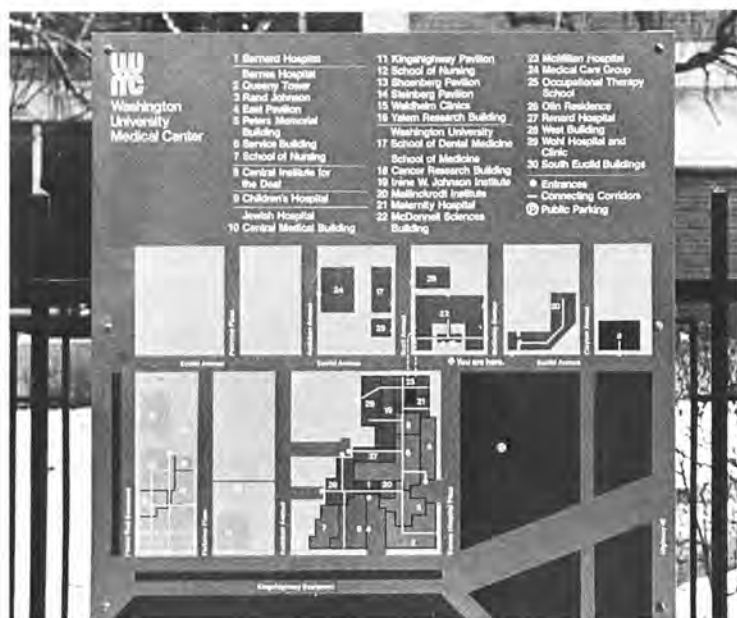
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## THE MEDICAL CENTER

The Washington University Medical Center comprises six institutions: Barnard Free Skin and Cancer Hospital, Barnes Hospital, Central Institute for the Deaf, Jewish Hospital of St. Louis, St. Louis Children's Hospital, and the Washington University School of Medicine.

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*Associate Dean*

Elmer B. Brown, Jr., A.B., M.D.  
*Associate Dean for Continuing Medical Education*

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*Assistant Dean for Minority Student Affairs*

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*Assistant Dean in Academic Administration, Registrar, and Secretary to the Executive Faculty*

Morton E. Smith, B.S., M.D.  
*Assistant Dean*

G. Michael Timpe, B.S., M.B.A.  
*Assistant Dean and Chief Financial Officer and Assistant Vice Chancellor for Medical Affairs*

John D. Vavra, B.A., M.D.  
*Assistant Dean for Post-Graduate Training*

John F. Walters, B.A., M.A.  
*Assistant Dean for Student Affairs*

John L. Midkiff, B.S.B.A.  
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Donald C. Shreffler

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James C. Warren

John L. Schultz  
*Recording Secretary*

## FACULTY COUNCIL

The Faculty Council consists of all fulltime members of the faculty with the rank of professor, associate professor, assistant professor, and those instructors who have been on the faculty for at least three years. The officers and executive committee are:

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Julio Santiago  
*Vice Chairman*

Barbel Holtmann  
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*Clinical Representative to the Executive Committee of the Faculty Council*

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Patrick Murray  
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David Scharp  
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Julian Fleischman  
*Preclinical Representative to the Executive Committee of the Faculty Council*

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Phillip Stahl  
*Preclinical Representative to the Executive Faculty*

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## STANDING COMMITTEES<sup>1</sup>

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Robert Lee

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John F. Walters

David Menton

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Selected faculty members

### Committee on Academic Review and Promotions II

Selected faculty members

### Committee on Academic Review and Promotions III

Selected faculty members

### Committee on Admissions

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Elmer B. Brown

Mokhtar Gado

James R. Gavin

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Susan Wilson-Krechel

### Committee for the Beaumont-May Institute of Neurology

William M. Landau

*Chairman*

### Faculty Rights Committee

Philip Cryer

Paul DeWeer

<sup>1</sup>Parttime faculty representative to the Executive Faculty during 1981-82.

<sup>2</sup>Representing the Faculty Council during 1982-83.

<sup>1</sup>The dean is ex officio a member of all standing committees.

Milton Goldstein  
F. Edmund Hunter, Jr.  
Gerald Medoff  
*Alternate*

John Halverson  
*Alternate*  
William McAlister  
*Alternate*  
David McDougal  
*Alternate*

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Steve Rovak  
Peter H. Ruger  
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Mildred Trotter  
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Philip Whyatt  
Ray Witter  
Gary R. Zuckerman

**Medical Science Training  
Placement and Curriculum  
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Mabel L. Purkerson  
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John C. Herweg  
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Carl Frieden  
*Co-Program Director*  
Thomas J. Braciale  
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*ex officio*  
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*ex officio*  
John L. Schultz  
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**Committee for Laboratory  
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John L. Schultz  
*ex officio*

# Register of Students

## DOCTOR OF MEDICINE

**Graduate**  
**July 17, 1981**

**No Medical Residency**

**Karp, Jeffrey W. M.S.,** Medical College of Virginia, '71, D.D.S., '71—Miami Beach, Florida

**Graduate**  
**August 28, 1981**

**Residency 1982-83**

**Grant, William T., A.B.,** Occidental College '77—University of California San Diego Affiliated Hospitals, San Diego, California

**Graduating Class**  
**May 21, 1982**

**Alfino, Paul Anthony, A.B.,** Harvard University, '78—Chesterfield, Missouri; Temple University Hospitals, Philadelphia, Pennsylvania

**Arnall, Michael Frank, B.A.,** University of California at LaJolla, '77—Redlands, California; University of Colorado Affiliated Hospitals, Denver, Colorado

**Ashworth, William Dean, Jr., B.A.,** University of Utah, '77—Salt Lake City, Utah; University of Michigan Affiliated Hospitals, Ann Arbor, Michigan

**Barnett, Robert Eugene, B.S.,** Washington University, '78—Wakarusa, Kansas; Barnes Hospital, St. Louis, Missouri

**Becker, Steven George, B.S.,** Brown University, '78—Hazel Park, Michigan; Ohio State University Hospitals, Columbus, Ohio

**Beeson, Debra Ann, B.A.,** Denison University, '78—Brookfield, Illinois; University of Utah Affiliated Hospitals, Salt Lake City, Utah

**Bellatti, John Walter, A.B.,** Illinois College, '71—Riverton, Illinois; University of Hawaii, Honolulu, Hawaii

**Benson, Robert Granger III, B.A.,** University of Kansas, '78—Topeka, Kansas; North Carolina Memorial Hospital, Chapel Hill, North Carolina

**Bermudez, Joseph Anthony, B.A.,** College of St. Thomas, '78—Miami Beach, Florida; Oakland Naval Regional Medical Center, Oakland, California

**Birkenmeier, Thomas Mayer, A.B.,** Washington University, '78—St. Louis, Missouri; Jewish Hospital, St. Louis, Missouri

**Black, William Howard, B.A.,** Washburn University, '77—Lawrence, Kansas; Barnes Hospital, St. Louis, Missouri

**Blackett, Melrose Ingle, B.A.,** Brown University, '78—Charlestown, Nevis, West Indies; University of Tennessee College of Medicine, Memphis, Tennessee

**Block, Joel Arthur, B.A.,** University of Chicago, '78—Wilmette, Illinois; University of Chicago Clinics, Chicago, Illinois

**Brown, Yvette Vanyce, B.S.,** The City College of City University of New York, '76—New York, New York; St. Louis Children's Hospital, St. Louis, Missouri

**Burton, James Edward, III, B.A.,** University of Rochester, '77—Arlington, Massachusetts; Keesler AFB Hospital, Keesler AFB, Biloxi, Mississippi

**Carr, Kenneston, B.S.,** Georgia Institute of Technology, '78—Conyers, Georgia; St. Mary's Hospital, San Francisco, California

**Carroll, Thomas Joseph, B.S.,** Iowa State University at Ames, '73; M.S., '74; Ph.D., University of South Dakota, '79—St. Louis, Missouri; University of Iowa Hospitals, Iowa City, Iowa

**Chang, Akemi Chu-Shih, B.S.,** Stanford University, '78—Los Angeles, California; Barnes Hospital, St. Louis, Missouri

**Chao, Ann Tien-Ling, B.S.,** Stanford University, '78—Anchorage, Alaska; University of Washington Affiliated Hospitals, Seattle, Washington

**Cohen, Alan Mathew, B.S.,** University of Illinois at Urbana, '64; Ph.D., University of Virginia, '69—Baltimore, Maryland; Jewish Hospital, St. Louis, Missouri

**Cook, Denise, A.B.,** Occidental College, '78—St. Louis, Missouri; Chicago Medical School Affiliated Hospitals, Chicago, Illinois

**Cormier, Lawrence Edward, B.A.,** Case Western Reserve University, '75—New York, New York; Jewish Hospital, St. Louis, Missouri

**Cosulich, William Francis, Jr., B.S.E.,** University of Pennsylvania, '78—Syosset, New York; McGaw Medical Center, Chicago, Illinois

**Couch, Michael Wayne, B.S.,** Massachusetts Institute of Technology, '78—Willow Grove, Pennsylvania; University of Hawaii, Honolulu, Hawaii





**Craig, Harry Randall, A.B.**, Grinnell College, '78—Phoenix, Arizona; Jewish Hospital, St. Louis, Missouri

**Curry, Raymond Howard, A.B.**, University of Kentucky, '77—Lexington, Kentucky; McGaw Medical Center, Chicago, Illinois

**Dannenberg, Andrew Jess, B.S.**, Tufts University, '78—Great Neck, New York; The New York Hospital, New York, New York

**Danziger, Eliot Jay, B.A.**, Wesleyan University, '78—New Hyde Park, New York; Bronx Municipal Hospital Center, Bronx, New York

**Donzis, Paul Bennett, A.B.**, Princeton University, '78—Beverly Hills, California; University of California, San Fernando Valley, Sepulveda, California

**Duncan, Eric DeWitt, B.A.**, Illinois Wesleyan University, '78—Polo, Illinois; McGaw Medical Center, Evanston, Illinois

**Dunkin, Pamela Ann, A.B.**, Indiana University, '78—Glenview, Illinois; University of Colorado Affiliated Hospitals, Denver, Colorado

**Eby, Patricia Lynn, B.S.**, Georgetown University, '78—Gordonville, Pennsylvania; Baylor College Affiliated Hospitals, Houston, Texas

**Ellis, Wilfred Joseph, B.S.**, University of Dayton, '75; M.S., '77—Dayton, Ohio; Wayne State University Affiliated Hospitals, Detroit, Michigan

**England, James Morris, A.B.**, Lafayette College, '64; Ph.D., Washington University, '70—Upper Darby, Pennsylvania; Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania

**Eresman, Robin Lee, B.S.**, University of Notre Dame, '78—Brewer, Maine; University of Colorado Affiliated Hospitals, Denver, Colorado

**Erickson, Nicolette Horbach, B.A.**, Wellesley College, '78—Bellevue, Washington; University of California Hospitals, San Francisco, California

**Feuerstein, Irwin Marc, B.A.**, Rutgers University, '78—Matawan, New Jersey; Sinai Hospital, Baltimore, Maryland

**Fochtmann, Laura Josephine, B.S.**, Washington University, '78—Creve Coeur, Missouri; Johns Hopkins Hospital, Baltimore, Maryland

**Gautt, Rory Steven, A.B.**, Washington University, '78—Oklahoma City, Oklahoma; Michael Reese Hospital, Chicago, Illinois



**Goldmeier, David Joseph, B.A.**, Dartmouth College, '78—Valley Stream, New York; Barnes Hospital, St. Louis, Missouri

**Goodlett, Karen Larissa, B.S.**, Furman University, '78—Moore, South Carolina; George Washington University Hospital, Washington, D.C.

**Gress, Daryl Ray, A.B.**, Washington University, '78—Albion, Nebraska; Johns Hopkins Hospital, Baltimore, Maryland

**Griffith, Robert Fleming, Jr., B.S.**, Kent State University, '78—Stow, Ohio; Michael Reese Hospital, Chicago, Illinois

**Gutierrez, Nancy Lieb, B.S.**, Washington University, '78—Joliet, Illinois; University of New Mexico Hospitals, Albuquerque, New Mexico

**Gutierrez, Ralph Aaron, B.A.**, University of Colorado, '78—Denver, Colorado; University of New Mexico Hospitals, Albuquerque, New Mexico

**Halvorson, Gary David, B.S.**, University of California at Davis, '78—Davis, California; McGaw Medical Center, Chicago, Illinois

**Harten, James Nash, B.A.**, University of Iowa at Iowa City, '77—St. Louis, Missouri; New England Center Hospital, Boston, Massachusetts

**Hasselbring, Caryn Grace, B.S.P.T.**, Washington University, '74—St. Louis, Missouri; McGaw Medical Center, Chicago, Illinois

**Hays, George Howard, Jr., A.B.**, William Jewell College, '77—Richmond, Virginia; University of Missouri Medical Center, Columbia, Missouri

**Hitchcock, Thomas Floyd, B.A.**, Greenville College, '78—Akron, New York; Loyola University Affiliated Hospitals, Maywood, Illinois

**Ho, Kau-Kwok Frederick, B.S.**, California Institute of Technology, '77—Brooklyn, New York; Jewish Hospital, St. Louis Missouri



**Hockenbery, David Mark, B.S.**, University of Rochester, '78—Rochester, New York; Johns Hopkins Hospital, Baltimore, Maryland

**Horn, Barbra Adrian, B.A.**, Clark University, '75—Elkins Park, Pennsylvania; Barnes Hospital, St. Louis, Missouri

**Hoynak, Bryan Clifford, B.A.**, Wilkes College, '78—Lakeville, Pennsylvania; Columbia Richmond Co. Hospital, Columbia, South Carolina

**Hutchison, William G., B.A.**, University of Dayton, '78—Kettering, Ohio; Jewish Hospital, St. Louis, Missouri

**Jiminez, Jose Francisco, B.A.**, Johns Hopkins University, '78—Baltimore, Maryland; Baylor College Affiliated Hospital, Houston, Texas

**Johnsrud, Lorraine Alice, B.A.**, Carleton College, '74; Ph.D., Harvard University, '78—Albert Lea, Minnesota; Stanford University Hospital, Stanford, California

**Kaminer, Lynne Susan, B.A.**, Washington University, '78—Morton Grove, Illinois; Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania

**Kamson, Solomon, B.S.**, University of Michigan, '78—Ann Arbor, Michigan; Mercy Hospital, San Diego, California

**Keim, Stephen George, B.S.**, Mercer University, '78—Springfield, Virginia; Barnes Hospital, St. Louis, Missouri

**Kerley, Suzanne Michelle, B.S.**, Stanford University, '78—St. Louis, Missouri; Barnes Hospital, St. Louis, Missouri

**Kiessling, Lou Ann, B.S.**, University of Michigan, '77—Jackson, Michigan; Michael Reese Hospital, Chicago, Illinois

**Killion, Douglas Joseph, B.S.**, University of Maryland, '75—Vienna, Virginia; Barnes Hospital, St. Louis, Missouri

**Kraus, David Jonathan, B.S.**, Yale University, '78—Larchmont, New York; Illinois Masonic Medical Center, Chicago, Illinois

**Kuhlengel, Keith Ralph, B.S.**, Bradley University, '78—Trenton, Illinois; Barnes Hospital, St. Louis, Missouri

**Lew, Brian Thomas, California** Institute of Technology—Monterey Park, California; University of Minnesota Hospitals, Minneapolis, Minnesota

**Lewis, Jeanne Dahlen, B.S.**, Gustavus Adolphus College, '61; Ph.D., University of Wisconsin at Madison, '68—Lafayette, Colorado; Mercy Hospital, Denver, Colorado

**Lewis, John Malin, B.A.**, Brigham Young University, '78—Wilmette, Illinois; Good Samaritan Hospital, Phoenix, Arizona

**Loar, Christopher Morton, B.S.**, Texas A & M University, '78—College Station, Texas; University of Texas Health Science Center, Houston, Texas

**Manary, Mark John, B.S.**, Massachusetts Institute of Technology, '77—Midland, Michigan; St. Louis Children's Hospital, St. Louis, Missouri

**Marn, Charles Stephen, B.A.**, Hiram College, '78—Conneaut, Ohio; McGaw Medical Center, Chicago, Illinois

**Maylock, Fallon, B.A.**, Johns Hopkins University, '77—Bowie, Maryland; George Washington University Hospital, Washington, DC

**McLean, Mary Susan, A.B.**, Washington University, '75—Munster, Indiana; Medical College of Virginia, Richmond, Virginia

**Mealman, Terence Lee, B.S.**, Stanford University, '78—Kansas City, Missouri; St. Luke's Hospital, Kansas City, Missouri

**Meeham, Patrick John, B.A.**, University of California at Santa Cruz, '78—Tustin, California; Natividad Medical Center, Salinas, California

**Merlo, Clifford Joseph, B.S.**, University of Michigan, '77—Troy, Michigan; St. Luke's Hospital, St. Louis, Missouri

**Mermel, Gary Warren, B.A.**, Oberlin College, '78—Skokie, Illinois; University of California Davis, Sacramento, California

**Michelson, Edward Allen, B.S.**, Massachusetts Institute of Technology, '78—Randallstown, Maryland; McGaw Medical Center, Chicago, Illinois

**Mink, Lisa Ann, B.A.**, Macalester College, '78—Dundee, Illinois; St. Mary's Hospital, Madison, Wisconsin

**Mink, Richard Bruce, B.A.**, Franklin and Marshall, '78—Flourtown, Pennsylvania; Children's Hospital, Washington, DC

**Morrison, Beverly Anne, B.A.**, Webster College, '76—St. Louis, Missouri; St. Luke's Hospital, St. Louis, Missouri

**Munger, John Speakman, A.B.**, Princeton University, '78—Rumson, New Jersey; Grady Memorial Hospital, Atlanta, Georgia

**Murphy, Mary Anne, B.A.**, Illinois Wesleyan University, '78—Pontiac, Illinois; St. Louis Children's Hospital, St. Louis, Missouri

**Neihart, Robert Earl, B.A.**, Baker University, '78—Kansas City, Missouri; St. Luke's Hospital, Kansas City, Missouri

**Neimeyer, John Hart, B.S.**, University of Michigan, '78—Cuyahoga Falls, Ohio; Barnes Hospital, St. Louis, Missouri

**Olsen, Mary Louise, B.S.**, University of Illinois, '78—Champaign, Illinois; University of Texas Affiliated Hospitals, Houston, Texas

**Olson, Linda Marian, B.S.**, Washington State University, '76—Tacoma, Washington; Charlotte Memorial Hospital, Charlotte, North Carolina

**Organ, Paul Gerard, A.B.**, Harvard University, '78—Omaha, Nebraska; Stanford University Hospital, Stanford, California

**Pace, Denise Karin, A.B.**, University of California at Berkeley, '76—Oakland, California; St. Louis Children's Hospital, St. Louis, Missouri

**Pan, Golden, B.S.**, Rice University, '78—Dallas, Texas; University of California Hospitals, Los Angeles, California

**Park, James Vance, B.S.**, University of Colorado, '78—Lodi, Wisconsin; University of Texas Southwest Affiliated Hospitals, Dallas, Texas

**Peters, Walter Russell, Jr., B.S.**, Western Illinois University, '78—Macomb, Illinois; Jewish Hospital, St. Louis, Missouri

**Pollei, Steven Ray, B.A.**, Luther College, '78—Fond du Lac, Wisconsin; LaCrosse Lutheran Hospital, LaCrosse, Wisconsin

**Randolph, Lilly, B.S.**, South Carolina State College, '78—Hopkins, South Carolina; Barnes Hospital, St. Louis, Missouri

**Ray, Daniel William, B.S.**, Vanderbilt University, '78—Nashville, Tennessee; Vanderbilt University Affiliated Hospitals, Nashville, Tennessee

**Reed, Fred D., B.S.**, Arizona State University, '78—Mesa, Arizona; Jewish Hospital, St. Louis, Missouri

**Rice, Karen Hoxworth, B.A.**, Wellesley College, '78—Mexico, Missouri; Barnes Hospital, St. Louis, Missouri

**Ronish, Ross Henry**, Carroll College—Denton, Montana; University of North Dakota, Grand Forks, North Dakota

**Rosenbaum, Peter Jon**, University of Minnesota—Milwaukee, Wisconsin; McGaw Medical Center, Evanston, Illinois

**Rosenwasser, Tamzin Amadeus, B.A.**, New College of the University of South Florida, '73—St. Louis, Missouri; Barnes Hospital, St. Louis, Missouri

**Rubin, Jeremy Bennett, B.S.**, Stanford University, '77—Beverly Hills, California; Cedars-Sinai Medical Center, Los Angeles, California

**Santmann, John Bryant, B.A.**, Johns Hopkins University, '77—Babylon, New York; Highland General Hospital, Oakland, California

**Segal, Paul Miles, B.S.**, University of Pennsylvania, '78—Livingston, New Jersey; University Hospitals, Madison, Wisconsin

**Shaw, Frederick Carl, B.A.**, Gustavus Adolphus College, '77—Clarksdale, Mississippi; University of Tennessee College of Medicine, Memphis, Tennessee

**Sherman, John Emery, B.A.**, St. Olaf College, '78—LaCrosse, Wisconsin; University of Minnesota Hospitals, Minneapolis, Minnesota

**Sherman, Stuart, B.A.**, State University of New York at Binghamton, '77—Douglaston, New York; Hospital University Health Center, Pittsburgh, Pennsylvania

**Simpson, Ross Wyatt, B.S.**, University of Illinois at Urbana, '78—Woodstock, Illinois; Mayo Graduate School, Rochester, Minnesota

**Stein, Jeffrey Stephen, B.S.**, Massachusetts Institute of Technology, '78—Whitestone, New York; Mount Sinai Hospital, New York, New York

**Szeto, Albert Kwok Choy, B.S.E.**, Princeton University, '78—Hong Kong; Case Western Reserve University Hospital, Cleveland, Ohio

**Taylor, Lynne Patricia, A.B.**, University of Illinois, '74—St. Louis, Missouri; Jewish Hospital, St. Louis, Missouri

**Tesi, Raymond Joseph, II, B.S.**, Utah State University, '77—Belle Vernon, Pennsylvania; State University Kings County Medical Center, Brooklyn, New York

**Thomasson, Jeffrey Lee, B.A.**, St. Louis University, '78—St. Louis, Missouri; St. Louis University Hospitals, St. Louis, Missouri

**Thompson, Van Eric, B.S.**, Washington University, '78—Ridgefield, Connecticut; Mayo Graduate School of Medicine, Rochester, Minnesota

**Thornquist, Robert Keith**, Stanford University—Saratoga, California; Jewish Hospital, St. Louis, Missouri

**Townsend, Ronald Ross, B.A.**, University of California at Irvine, '77; B.S., '77—Anaheim, California; St. Mary's Hospital, San Francisco, California

**Townsend, Susan Feldman, A.B.**, Radcliffe College, '77—Augusta, Georgia; University of California Hospitals, San Francisco, California





**Tung, Glenn Albert, B.A.,** Yale University, '78—Olivette, Missouri; Brigham & Women's Hospital, Boston, Massachusetts

**Walker, Janet Margaret, B.S.,** Ohio State University, '76—Mountain View, California; Medical Center Hospitals, Charleston, South Carolina

**Wanderman, Mark Joseph, B.A.,** State University of New York at Binghamton, '77—Lawrence, New York; University of Colorado Affiliated Hospitals, Denver, Colorado

**Weiner, Marc Alan, B.S.,** Massachusetts Institute of Technology, '78—DeWitt, New York; Cincinnati General Hospital, Cincinnati, Ohio

**Whaley, Dennis Ray, B.S.,** Emporia Kansas State College, '77—Emporia, Kansas; Vanderbilt University Affiliated Hospitals, Nashville, Tennessee

**Word, Bonnie Marie, B.S.,** Chestnut Hill College, '78—Willingboro, New Jersey; Children's Hospital, Washington, DC

**Yeung, Horatio Him-Tai, B.S.,** University of Wisconsin, '78—Cerritos, California; University of California, San Diego Affiliated Hospitals, San Diego, California

### Third Year Class 1981-82

**Aprill, Brian Scott, B.A.,** Whittier College, '79—Morton Grove, Illinois

**Austin, Mark Bickford, B.S.,** University of Michigan at Ann Arbor, '78—St. Louis, Missouri

**Ballin, Daniel Spencer, B.S.,** Brown University, '78—Stamford, Connecticut

**Benedett, Robert Edwin, B.A.,** Augustana College, '79—St. Charles, Minnesota

**Blatt, Mitchell Evan, B.Mus.A.,** University of Michigan at Ann Arbor, '79—Camp Springs, Maryland

**Blum, Julia Elizabeth, B.S.,** University of Pittsburgh, '79—Curwensville, Pennsylvania

**Blumenthal, David Evan, B.A.,** Brown University, '79—Fayetteville, New York

**Brown, Robert John, B.S.,** Saint Peter's College, '77—Jersey City, New Jersey

**Carpenter, David Adams, B.A.,** Amherst College, '79—Canandaigua, New York

**Chelmsky, Thomas Charles, A.B.,** Harvard University, '79—Fairfax, Virginia



**Chung, Mina Kay, B.A.,** University of California at San Diego, '79—Monterey Park, California

**Clanahan, James John, B.S.,** University of Illinois at Urbana, '79—Herrin, Illinois

**Cohen, Mark Allen, A.B.,** Washington University, '79—Chicago, Illinois

**Collins, Gregory, B.A.,** University of California at Santa Barbara, '75—Bonita, California

**Corteville, Jane Elizabeth, B.S.,** Michigan State University, '79—Grosse Pointe Woods, Michigan

**Cox, Janie Mae, B.A.,** Olivet Nazarene College, '79—Crawfordsville, Indiana

**Crowe, Paul James, Carleton College—**Minneapolis, Minnesota

**Davis, Andrew George, A.B.,** Brandeis University, '79—Chevy Chase, Maryland

**Dewitt, Steven Keith, B.S.,** University of Hawaii at Manoa, '79—Honolulu, Hawaii

**Doster, Sara Kathleen, A.B.,** Bryn Mawr College, '78—Clayton, California

**Dunagan, William Claiborne, B.E.S.,** University of Texas at Austin, '78—Monahans, Texas

**Dykman, Douglas David, B.E.S.,** Johns Hopkins University, '79, M.S., Johns Hopkins University, '80—Livingston, New Jersey

**Eggert, Bryan George, George** Washington University—West Deal, New Jersey

**Emanuel, James Patrick, B.S.,** University of Iowa, '77—Vermillion, South Dakota

**Epstein, David Marc, A.B.,** Columbia University, '79—Wilmington, Delaware

**Ettinger, Neil Allan, B.S.,** Vanderbilt University, '79—Miami, Florida

**Farber, Sharon Nancy, A.B.,** University of California at Santa Cruz, '74; B.A., California State College at Sonoma, '78—San Francisco, California

**Fay, Mark Terence, B.S.,** North Dakota State University, '79—Grand Forks, North Dakota

**Feingold, Anat Rachel, A.B.,** Dartmouth College, '79—Pittsburgh, Pennsylvania

**Feinstein, Steven Aaron, B.A.,** LaSalle College, '79—Philadelphia, Pennsylvania

**Fiedler, Brian S., B.S.,** University of Wisconsin at Madison, '79—Mt. Horeb, Wisconsin

**Fry, Edward T. A., A.B.,** Grinnell College, '79—Oak Ridge, Tennessee

**Fulwiler, Carl Edward, B.A.,** Hofstra University, '78—Mt. Laurel, New Jersey

**Groten, Dawn Marie, B.S.,** University of California at Davis, '78—Campbell, California

**Hall, Jonathan Daniel, B.A.,** Miami University, '79—Perrysburg, Ohio

**Hamm, John Richard, B.A.,** Stevens Institute of Technology, '71; Ph.D., State University of New York at Stony Brook, '78—Bronx, New York

**Hanko, Rodger Alan, B.A.,** University of Colorado at Boulder, '79—Colorado Springs, Colorado

**Hansen, Keith Allen, B.S.,** Carroll College, '79—Wall, South Dakota





**Harsch, John Arthur**, B.S., University of North Carolina at Chapel Hill, '78—Atlanta, Georgia

**Haskel, Ethan Jay**, B.S., Brown University, '79—Huntington, New York

**Hills, John Foster, Jr.**, B.A., Macalester College, '75; M.S., University of Colorado at Boulder, '78—Littleton, Colorado

**Horstman, William Glynn**, B.S., University of South Dakota at Vermillion, '79—Parkston, South Dakota

**Horwitz, Kenneth Bruce**, A.B., Dartmouth College, '79—Bethesda, Maryland

**Hubbard, Thomas Joseph**, B.S., University of Notre Dame, '79—Decatur, Illinois

**Iqbal, Vaseem**, University of Michigan at Ann Arbor—London, England

**Jacobs, Daryl Larkin**, B.S., Washington University, '77; M.S., Carnegie-Mellon University, '79—Broadview Heights, Ohio

**Jantz, Jonathan Willard**, B.A., Bethel College, '79—Liberal, Kansas

**Jenkins, Deborah Elaine**, A.B., Mount Holyoke College, '79—Tulsa, Oklahoma

**Jenkins, Gregory Dean**, A.A., College of the Cyns, '72, B.S., University State of New York, '79—Newhall, California

**Johnson, Jerry Avila**, A.B., University of Michigan at Ann Arbor, '78—Encorse, Michigan

**Jones, Robin Doreen**, B.A., Rutgers University, '79—East Orange, New Jersey

**Kellis, Dana Sterling**, B.S., Brigham Young University, '79—Glendale, Arizona

**Kilmer, Helen Margaret**, B.S.&B.A., Metropolitan State College, '79—Richardton, North Dakota

**King, Thomas Ray**, B.A., Washington University, '79—Winner, South Dakota

**Klem, Stephen Arthur**, A.B., Hope College, '79—Deerfield, Illinois

**Kramer, Robert Scott**, A.B., Harvard University, '79—Creve Coeur, Missouri

**Krieg, Arthur Mertz**, B.S., Haverford College, '79—Hershey, Pennsylvania

**Laitman, Robert Steven**, B.A., Northwestern University, '79—Wanamassa, New Jersey

**Lambie, Paul Benson**, B.S., University North Dakota, '79—Grand Forks, North Dakota

**Landon, Patricia**, A.B., Washington University, '79—Yreka, California

**Link, Robert Nathan**, B.S., Butler University, '79—Dayton, Ohio

**Lipinski, Irene Elizabeth**, B.S., University of Southern California at Los Angeles, '79—Monterey Park, California

**Lips, Daniel Lee**, B.A., University of Oxford, St. John's College, '80—Faribault, Minnesota

**Luecke, Gail Anne**, B.A., Kalamazoo College, '79—St. Louis, Missouri

**Malter, James Samuel**, A.B., Dartmouth College, '79—Boston, Massachusetts

**McCormick, Wayne C.**, A.B., University of Missouri at Columbia, '74—Webster Groves, Missouri

**Melamed, David Michael**, B.A., Columbia University, '78—Chicago, Illinois

**Moitoza, David John**, B.S., University of California at Davis, '79—San Pablo, California

**Monroe, Harry Keith**, B.S., Creighton University, '79—University City, Missouri

**Moore, Kenneth Earl**, B.S., Georgetown University, '79—Washington, D.C.

**Morrow, Jason Drew**, B.A., Vanderbilt University, '79—St. Louis, Missouri

**Morton, Kenneth Laurence**, B.S., Stanford University, '78—Kansas City, Missouri

**Munro, Douglas Alan**, A.B., Washington University, '79—Grand Junction, Colorado

**North, Carol Sue**, B.S., University of Iowa at Iowa City, '76—Clinton, Iowa

**Ohtani, Robb Kenji**, A.B., Occidental College, '79—Honolulu, Hawaii

**Parker, Christine Mershon**, B.A., Carleton College, '79—Webster Groves, Missouri

**Parker, Katherine Anne**, B.S., Stanford University, '79—Webster Groves, Missouri

**Pearson, Michele Leontyne**, B.A., Emory University, '79—Jacksonville, Florida

**Pfeffer, David Michael**, B.E.S., Johns Hopkins University, '79—Hewlett, New York

**Prater, Thomas G.**, B.A., Southern Methodist University, '79—Springfield, Missouri

**Puchalsky, David Ralph**, B.S., University of Connecticut, '78—Boston, Massachusetts

**Ragins, Mark**, B.S., California Institute of Technology, '79—Woodland Hills, California

**Ravenscraft, Mark Douglas**, A.B., Harvard University, '79—Fort Thomas, Kentucky

**Roberts, Craig Stanley**, B.S., George Fox College, '79—Central Point, Oregon

**Scanlan, Brian Edward**, B.S., University of Illinois at Urbana, '79—Hometown, Illinois

**Schuster, Erika Dale**, A.B., Washington University, '75—Atlanta, Georgia

**Schwartz, Benjamin**, A.B., Dartmouth College, '79—Evanston, Illinois

**Seacord, Lynne M.**, A.B., Princeton University, '75—Scituate, Massachusetts

**Selland, Mark Alan**, B.S., University of North Dakota, '79—Minot, North Dakota

**Shannon, Vicki Rene**, A.B., Smith College, '79—St. Louis, Missouri

**Shulman, Keith Lawrence**, B.A., Carleton College, '79—Highland Park, Illinois

**Siebens, David Phillips**, B.A., College of Wooster, '78—Baltimore, Maryland

**Slaker, Dirk Paul**, B.A., University of California-San Diego, '77—El Cajon, California

**Smith III, John Clair**, B.S., University of North Dakota, '78—Minot, North Dakota

**Smythe, Sandra Jean**, B.S., University of Wisconsin at Madison, '79—Austin, Minnesota

**Spaite, Daniel Wayne, B.A.**, Point Loma College, '79—Fresno, California

**Stark, Mark Edward, B.A.**, Northwestern University, '79—Fairview Heights, Illinois

**Steinboff, Margaret Mary, B.A.**, Washington University, '79—Miami, Florida

**Stene, Erik Nelson, B.A.**, Augustana College, '79—Crystal, Minnesota

**Strzembos, Andre Steve, B.S.**, Purdue University, '79—Hoopeston, Illinois

**Sullivan, Roger, B.S.**, North Dakota State University, '78—Grand Forks, North Dakota

**Swarm, Robert Alexander, B.A.**, Oberlin College, '77—Ridgewood, New Jersey

**Taylor, Megan Beth, B.S.**, University of North Carolina at Chapel Hill, '78—Pittsburgh, Pennsylvania

**Tsaltas, Theodore T., B.S.**, University of Pennsylvania, '78—Villanova, Pennsylvania

**Vernon, Hazel Jane, B.A.**, Baylor University, '79—Baton Rouge, Louisiana

**Wilkerson, Donald Keith, A.B.**, Washington University, '79—Memphis, Tennessee

**Winek, David Kent, B.S.**, University of Wisconsin at Madison, '79—Wauwatosa, Wisconsin

**Wollney, Dana E., B.S.**, Washington University, '79—Staten Island, New York

**Wu, Andrew Christopher, B.A.**, Johns Hopkins University, '79—Memphis, Tennessee

**Yi, Hokyun, B.A.**, Vanderbilt University, '78—Nashville, Tennessee

**Younkin, Casey Carrick, B.A.**, Johns Hopkins University, '79—Springfield, Illinois

## Second-Year Class 1981-82

**Allen, Steven Robert, B.S.**, Milligan College, '80—Tarpan Springs, Florida

**Appelbaum, John Kenneth, B.A.**, St. Louis University, '80—St. Ann, Missouri

**Bailey, Thomas Charles, A.B.**, William Jewell College, '80—Liberty, Missouri

**Barga, Bruce Edward, B.S.**, Washington State University, '77; M.S., University of Wisconsin at Madison, '80—St. Louis, Missouri

**Bigler, Carl Frederick, B.A.**, Williams College, '80—Garden City, Kansas

**Boos, Richard John, A.B.**, Washington University, '79—Clearwater, Florida

**Bregg, Kenneth Joel, A.B.**, Washington University, '79—Clifton, New Jersey

**Brent, Dale J., B.S.**, Yale University, '80—Los Angeles, California

**Burgerman, Robert Stephen, B.S.**, Washington University, '79—Bethesda, Maryland

**Chien, Walter Waitak, A.B.**, Washington University, '79—Kowloon, Hong Kong

**Chun, Gary Paul, B.S.**, Stanford University, '77; M.S., Harvard University, '80—Sacramento, California

**Close, James Michael, A.B.**, Washington University, '80; A.B., '80—Edwardsville, Illinois

**Cole, Jenifer Wray, A.B.**, Washington University, '80—St. Louis, Missouri

**Cole, Rhonda Audrey, B.A.**, Yale University, '80—St. Louis, Missouri

**Cooper, Mark Dale**, University of Oklahoma at Norman—Pryor, Oklahoma

**Cruvant, Ethan Milton, A.B.**, Harvard University, '80—Clayton, Missouri

**Droege, Gerard Francis, B.S.**, St. John's University, '80—Washington, Missouri

**Edelstein, Michael Charles, A.B.**, Cornell University, '80—Silver Springs, Maryland

**Edmunds, Laure, B.A.**, Johns Hopkins University, '80—Worcester, Massachusetts

**Eisen, Ruth Susan, B.A.**, University of Pennsylvania, '80—Kew Gardens, New York

**Ennen, Randy Mark, B.S.**, University of Iowa, '80—St. Louis, Missouri

**Evans, Gregory, Herbert H.**, Lehman College of the City University of New York—New York, New York

**Eveloff, Scott Eugene, A.B.**, Washington University, '80—Kansas City, Missouri

**Francis, Joseph, Jr., B.A.**, Johns Hopkins University, '80—New Castle, Delaware

**Frank, Mark Steven, A.B.**, Transylvania University, '79—Somerset, Kentucky

**Frank, Thomas Seymour, B.A.**, Northwestern University, '79—Clayton, Missouri

**Friedman, Jon Robert**, University of Pennsylvania—Wynlote, Pennsylvania

**Gallagher, Christopher J., B.S.**, University of Wisconsin at Madison, '80—LaCrosse, Wisconsin

**Gray, Patricia Anne, B.S.**, University of California at Irvine, '79—Irvine, California

**Greene, Laura Bari, A.B.**, Washington University, '80; A.B., '80—Osceola, Arkansas

**Hansbrough, James Randall, B.S.**, Southeast Missouri State University, '76, Ph.D., Vanderbilt University, '80—Popular Bluff, Missouri

**Herr, Robert Douglas, B.S.**, Yale University, '80—Kensington, Connecticut

**Hillery, Cheryl Ann, B.S.**, University of Wisconsin at Madison, '80—Lancaster, Wisconsin

**Huang, Shirley Jane, B.S.**, Stanford University, '80; M.S., '80—Delmar, New York

**Hvostik, George Robert, A.B.**, University of Illinois at Urbana, '80; B.S., '80—Berwyn, Illinois

**Jerabeck-Willett, Michael William, B.S.**, Georgetown University, '70—St. Louis, Missouri

**Jones, Robert W., B.S.**, Brigham Young University, '80—Orem, Utah

**Joyce, Stephen Thomas**, Massachusetts Institute of Technology—Rochester, Michigan



**Kennedy, Thomas Campbell, A.B.**, Stanford University, '80—Yakima, Washington

**Kent, Joseph H., B.S.**, University of Notre Dame, '80—Oak Lawn, Illinois

**Kidney, Selwyn Anthony, B.S.**, State University of New York at Plattsburgh, '79—St. Augustine, Trinidad

**Kirsch, William Arthur, B.A.**, Northwestern University, '80—Beech Grove, Indiana

**Klashman, David Jordan, B.S.**, Massachusetts Institute of Technology, '80—Newton, Massachusetts

**Kogan, Melanie G., B.A.**, Johns Hopkins University, '77—St. Louis, Missouri

**Kolodziej, Michael Alex, A.B.**, Washington University, '80—East Chicago, Indiana

**Langston, Amelia Ann, B.A.**, Williams College, '80—Lakeland, Florida

**Larkins, Joan Marie, B.S.**, Stanford University, '78—Kentfield, California

**Latorue, Rosemary Therese, B.S.**, Carnegie-Mellon University, '80—Washington, D.C.

**Lawrence, Michael Kevin, B.S.**, Northwestern University, '80—Elgin, Illinois

**Lazan, David Walter, A.B.**, Washington University, '76—Hewlett, New York

**Lee, Robert Alan, B.S.**, University of Illinois at Urbana, '80—Prophetstown, Illinois

**Lerman, Steven Elliot, B.A.**, Rutgers University, '80—Paramus, New Jersey

**Leung, Cheung Kwok, B.S.**, University of Illinois at Urbana, '74; M.S.E., University of Michigan at Ann Arbor, '75—St. Louis, Missouri

**Lindemann, Steven Roger, B.S.**, Washington University, '80—Cincinnati, Ohio

**Linder, Barry J., B.S.**, Massachusetts Institute of Technology, '78; M.S., University of Connecticut, '80—Lenox, Massachusetts

**Loeffler, Roberta Lynn, B.S.**, Emporia State University, '78; M.S., Purdue University, '80—Newton, Kansas

**Loper, Keith Allen, B.A.**, University of California at Berkeley, '80—Rolling Hills, California

**Lubarsky, David Alan, B.A.**, Washington University, '80—Scarsdale, New York

**Maguire, Kathryn Lael, B.S.**, Washington University, '80—Manchester, Missouri

**Mahony, Margaret Anne, B.S.**, University of Illinois at Urbana, '80—Toulon, Illinois

**Martin, Julie Ann, B.S.**, University of Washington, '80—Tacoma, Washington

**McAllister, John William II, B.S.**, University of Missouri at Columbia, '80—Joplin, Missouri

**McCool, Robert Edward, B.A.**, Greenville College, '77—St. Louis, Missouri

**Merine, Dimitri Serge, A.B.**, Columbia University, '80—Brooklyn, New York

**Mitchell, Gary Frank, B.A.**, Vanderbilt University, '80—Kingsport, Tennessee

**Moore, Charles Kevin, B.S.**, Indiana University at Bloomington, '80—Kokomo, Indiana

**Morehouse, Jeffrey Dean, B.S.**, Stanford University, '80—Mesa, Arizona

**Morrell, Louise Ellen, B.A.**, Indiana University at Bloomington, '80—Park Ridge, Illinois

**Natter, Lonny Ray, Brigham Young University—Sunnyside, Washington**

**Nii, Lenore Tomoye, B.S.**, University of California at Los Angeles, '80—Dinuba, California

**Obeid, Robert James, B.M.Sc.**, Emory University, '77—St. Louis, Missouri

**Okun, Neil Jeffrey, A.B.**, Dartmouth College, '80—St. Louis, Missouri



**Onufer, John Robert, B.S.**, University of Notre Dame, '80—Glenview, Illinois

**Organ, Gregory Michael, B.S.**, Stanford University, '80—Omaha, Nebraska

**Pack, Michael Alan, B.A.**, State University of New York at Binghamton, '80—Brooklyn, New York

**Penny, William Francis, Jr., B.A.**, University of California at Los Angeles, '78—La Jolla, California

**Perednia, Douglas Alan, B.A.**, Swarthmore College, '79—Roseville, California

**Polk, Mary Olivia, B.S.E.**, Duke University, '80—St. Louis, Missouri

**Powers, Timothy Bernard, A.B.**, Washington University, '78—St. Louis, Missouri

**Reichman, Alexandra Ilma, B.A.**, University of California at Berkeley, '80—San Francisco, California

**Richter, James Robert, B.S.**, University of Nebraska at Omaha, '80—Omaha, Nebraska

**Ritter, Edmond Frederick, University of Cincinnati—Cincinnati, Ohio**

**Robinson, Gordon Howard, B.A.**, St. Louis University, '80—St. Louis, Missouri

**Rollins, Edward Sterling, B.A.**, University of California at Davis, '80—Woodland, California

**Rollins, Susan Davidson, B.S.**, Davidson College, '80—St. Louis, Missouri

**Rosenthal, John Gregory, B.S.**, University of Notre Dame, '80—St. Louis, Missouri

**Ross, Theodore, B.A.**, Mississippi Valley State University, '80—Tchula, Mississippi

**Ross, Willie Ray, B.A.**, Yale University, '80—Memphis, Tennessee

**Rowley, Howard Andrew, B.S.**, University of Illinois at Urbana, '80—Lockport, Illinois

**Ruben, James Bradford, B.A.**, University of Colorado at Boulder, '80—Rye, New York

**Saltzman, Andrew Kenneth, A.B.**, Washington University, '80—Flushing, New York

**Scannell, Lynne Marie, B.A.**, University of California at Davis, '80—San Rafael, California

**Schick, Karen Sue, B.S.**, University of Kansas, '80—Wichita, Kansas

**Schwartz, Daniel Richard, B.A.**, Hamilton College, '80—Scarsdale, New York



**Schwartz, David Brian, B.S.**, University of Michigan at Ann Arbor, '80—St. Louis, Missouri

**Seiden, Michael Can, B.A.**, Oberlin College, '80—Pittsburgh, Pennsylvania

**Sila, Mehmet Kaya, B.A.**, Swarthmore College, '80—Towson, Maryland

**Slack, Stephen Francis, A.B.**, Dartmouth College, '80—Louisville, Kentucky

**Snow, Daniel Perry, A.B.**, Washington University, '80—Shawnee Mission, Kansas

**Suba, Eric John, A.B.**, Princeton University, '80—St. Louis, Missouri

**Surratt, Robert Stephen, B.A.**, Vanderbilt University, '80—Jackson, Mississippi

**Tartell, Paul Brendan, A.B.**, Washington University, '80—Elmhurst, New York

**Thompson, James Anderson, B.S.**, University of Illinois at Urbana, '80—Chicago, Illinois

**Tobler, Randall Wayne, B.A.**, University of Missouri at St. Louis, '80—St. Louis, Missouri

**Toliver, James Edward, Jr., B.A.**, Johns Hopkins University, '80—St. Louis, Missouri

**Travis, Mark Stephen, B.S.**, University of Illinois at Urbana, '80—Chicago, Illinois

**Tung, Rebecca Lillian, A.B.**, Radcliffe College, '80—St. Louis, Missouri

**Uranek, Katherine Irene, B.S.**, Cornell University, '80—Bartlesville, Oklahoma

**Vehe, Richard Karl, B.S.**, University of Wisconsin at Madison, '80—Mt. Prospect, Illinois

**Wainz, Ronald John, B.S.**, University of Dayton, '80—Springfield, Ohio

**Wilson, Carl Thayne, B.S.**, Brigham Young University, '77—Provo, Utah

**Wirt, Gregory Thomas, A.B.**, William Jewell College, '80—St. Louis, Missouri

**Wright, Cheryl Danita, B.A.**, University of California at San Diego, '80—San Diego, California

#### First-Year Class 1981-82

**Armistead, Joseph Jackson, B.S.**, Washington University, '81—Olive Branch, Mississippi

**Auchus, Alexander Patrick, B.A.**, Johns Hopkins University, '81—Totown, New Jersey

**Azrin, Michael A., B.S.**, Brandeis University, '81—Carbondale, Illinois

**Baudendistel, Allen D., A.B.**, St. Louis University, '81—St. Louis, Missouri

**Belnick, Lucille B., A.B.**, University of California-Berkeley, '77—Berkeley, California

**Bennett, Vera Elizabeth, A.B.**, Harvard University, '81—Bloomfield, Connecticut

**Buck, Gregory William, B.S.**, Morehouse College, '81—Atlanta, Georgia

**Cave, Anita Margaret, B.S.**, Trinity University, '73, B.A., Washington University, '81—Princeton, Texas

**Celin, Scott Edward, B.S.**, University of Pittsburgh, '81—Pittsburgh, Pennsylvania

**Chang, Elise Sophia, A.B.**, Harvard University, '78—San Francisco, California

**Chang, Thomas Sehoon, B.S.**, Massachusetts Institute of Technology, '81—Rockville, Maryland

**Cohen, Jeffrey, B.A.**, Washington University, '80—Plantation, Florida

**Collin, Gary Richard, B.A.**, Dartmouth College, '81—Guttenberg, New Jersey

**Colombo, Mark Anthony, B.A.**, Johns Hopkins University, '81—Aurora, Ohio

**Coplen, Sharon Elizabeth, B.S.**, Butler University, '81—Warsaw, Indiana

**Demonchaux, Elisabeth Lucille, B.A.**, Northwestern University, '81—Topeka, Kansas

**Durant, Lynette Lee, B.A.**, Tuskegee Institute, '81—Christiansted, Virgin Islands

**El-Badry, Amr Morry, B.A.**, Haverford College, '80—New York, New York

**Faber, Kathy Lynn, B.A.**, Calvin College, '81—Grand Rapids, Michigan

**Ford, Neville Finch, B.S.**, University of Bristol, '55, Ph.D., University of Bristol, '58—Millington, New Jersey

**Frost, Timothy William, B.A.**, Duke University, '81—Dunwoody, Georgia

**Gaines, Sharon Elaine, B.A.**, Atlantic Union College, '81—Nashville, Tennessee



**Gitelman Darren Ross, B.A.,** Washington University, '81—Brooklyn, New York

**Goldblum, Kenneth David, B.A.,** Washington University, '80—Broomall, Pennsylvania

**Griffith, Patrick Keith, B.A.,** Northwestern University, '81—Chicago, Illinois

**Grow, Pamela Keller, B.A.,** University of Nebraska, '80—St. Louis, Missouri

**Hale, Kenneth Douglas, A.A.,** Glendale College, '74, B.A., California State University, Northridge, '80—LaCrescenta, California

**Helfer, Donald Lee, B.A.,** University of Illinois, '81—Morton, Illinois

**Hershey, Jonathan Marc, B.A.,** Johns Hopkins University, '81—Glencoe, Illinois

**Himelstein, Andrew Louis, B.A.,** Harvard University, '81—Garden City, New York

**Hing, Andrew William, B.A.,** Duke University, '81—San Jose, California

**Hingsbergen, Elizabeth Ann, B.A.,** Northwestern University, '81—Delaware, Ohio

**Hopson, David Kent, B.S.,** Southeast Missouri State University, '80—Chesterfield, Missouri

**Huppenbauer, Bob, B.A.,** University of California-Berkeley, '80—Plymouth, Michigan

**Huppert, Jill Suzanne, B.A.,** Johns Hopkins University, '81—Perry Hall, Maryland

**Hutchison, Anne Victoria, B.A.,** Capital University, '81—Livonia, Michigan

**Jankowski, Dorian Elaine, B.S.,** Massachusetts Institute of Technology, '80—Highland Springs, Virginia

**Jarka, Robert Michael, B.S.,** University of Notre Dame, '81—Grand Rapids, Michigan

**Johnson, Corbin Ross, B.A.,** Harvard University, '81—N. Miami Beach, Florida

**Jones, Dennie Vance, B.S.,** Washington University, '81—Chicago, Illinois

**Jones, Sheila Bertha, B.S.,** Yale University, '80—Philadelphia, Pennsylvania

**King, Karl Wei-Han, B.A.,** Washington University, '80—Omaha, Nebraska

**Klein, Marisa Sue, B.A.,** Stanford University, '80—Aptos, California

**Klein, Mitchell Alan, B.A.,** Washington University, '81—Pembroke Pines, Florida



**Koch, Gregory Edward, B.A.,** University of California-Irvine, '77, B.S., University of California-Irvine, '81—Irvine, California

**Kritz, Alan Daniel, B.A.,** University of Pennsylvania, '81—Baldwin, New York

**Larson, Leann Janet, B.A.,** St. Olaf College, '80—Madison, Wisconsin

**Lenzi, Victor Daniel, B.S.,** University of Illinois, '81—Farmington, Illinois

**Levisohn, Dianne Rae, B.A.,** Washington University, '76—Lakewood, Colorado

**Litwin, Sheldon Ellis, B.S.,** Colorado College, '81—Topeka, Kansas

**Locke, Susan Marie, B.A.,** Washington University, '81—University City, Missouri

**Lund, Jr. Herluf Gyde, B.A.,** Tufts University, '78—Frontenac, Missouri

**Machlin, Steven Robert, B.A.,** Washington University, '81—Livingston, New Jersey

**Manber, Yvonne Marie, B.S., B.A.,** University of Illinois, '81—Canton, Illinois

**Mathews, Karen Michelle, B.S.,** Bowling Green State University, '81—Dayton, Ohio

**Melnyk, Christine Marie, B.S.,** University of Illinois, '81—Dixon, Illinois

**Mensah, George Akowua, B.A.,** Harvard University, '80—Kokofu, Ashanti, Ghana

**Mittl, Robert Louis**, B.S., M.S., Yale University, '81—Convent Station, New Jersey

**Muchmore, Heather Edwina**, B.S., University of Illinois, '81—Carbondale, Illinois

**Nattiv, Aurelia**, B.S., University of California—Los Angeles, '81—W. Los Angeles, California

**Noordsy, Douglas Louis**, B.S., St Lawrence University, '81—Dewitt, New York

**Nordlund, John Richard**, B.S., Rensselaer Poly Institute, '75—St. Louis, Missouri

**Nowotny, Thomas John**, B.S., Washington University, '80—St. Louis, Missouri

**O'Neill, Conor William**, B.A., College of St. Thomas, '81—St. Paul, Minnesota

**Pearlstone, Anthony Craig**, B.S., Washington University, '81—Creve Coeur, Missouri

**Pennington, MaryJane**, B.S., Duke University, '81—Birmingham, Alabama

**Pitts, Eric Wayne**, B.A., Yale University, '81—Kansas City, Kansas

**Pohl, David Lee**, B.A., Miami University, '76—Osgood, Ohio

**Randle, Gregory Clayton**, B.A., Washington University, '81—St. Louis, Missouri

**Resta, Regina Marie**, B.A., Washington University, '81—Brooklyn, New York

**Rokaw, Joshua Alan**, B.A., Washington University, '81—Downey, California

**Roth, Judith Ann**, B.S., Indiana University, '76—St. Louis, Missouri

**Rurik, Gregory**, B.S., Stanford University, '81—Fresno, California

**Sande, Craig Martin**, B.S., Stanford University, '81—Reno, Nevada

**Scates, Steven Michael**, A.A., Modesto Junior College, '75. B.S., University of California, '78—Modesto, California

**Schertz, Larry David**, B.A., Northwestern University, '81—Lombard, Illinois

**Scholz, Thomas Dean**, B.S., Swarthmore College, '81—Clarendon Hills, Illinois

**Sedlack, Jeffrey David**, B.A., Northwestern University, '81—Rochester, Minnesota

**Shapiro, Michael Alan**, B.A., Dartmouth College, '81—Watchung, New Jersey

**Shields, Steven Miller**, B.S., Washington University, '81—El Dorado, Kansas

**Sikich, Linmarie**, B.A., Washington University, '81—Potosi, Missouri

**Sivier, Robert Alan**, B.A., Illinois Wesleyan University, '81—Mahomet, Illinois

**Smart, Steven Craig**, B.A., Harvard University, '81—Milwaukee, Wisconsin

**Smith, Page Armand**, B.A., University of California, '77—San Francisco, California

**Steele, Dean Wesley**, B.A., Washington University, '81—Anchorage, Alaska

**Stern, Richard Curtis**, B.A., Brandeis University, '81—Valley Stream, New York

**Stevens, Jr. John Kirwin**, B.S., Washington University, '81—St. Louis, Missouri

**Strickland, Adrianne Patric**, B.A., Duke University, '81—Tampa, Florida

**Sun, Francis Roma**, B.S., Massachusetts Institute of Technology, '81—Hebron, Indiana

**Swanson, Todd Victor**, B.A., Augustana College, '81—Brooks, South Dakota

**Szeles, Leslie Steven**, B.A., Dartmouth College, '81—Granite City, Illinois

**Tannin, Grace Michele**, B.A., Washington University, '81—Chappaqua, New York

**Tenaglia, Alan Nicholas**, B.S., University of Pennsylvania, '78—Philadelphia, Pennsylvania

**Thulborn, Keith Raymond**, B.S., University of Melbourne, '76—Victoria, Australia

**Tobin Garry Stuart**, B.S., University of Missouri-Rolla, '81—St. Louis, Missouri

**Villanueva, Merceditas Santos**, B.A., Harvard University, '81—New York, New York

**Volck, Brian Edward**, B.A., Washington University, '81—Cincinnati, Ohio

**Watson, Blanche Evangeline**, B.A., Washington University, '77—Los Angeles, California

**Weiss, Peter John**, B.A., Washington University, '81—St. Petersburg, Florida

**Whiting, David Wade**, B.S., Stanford University, '81—Stanford, California

**Willerford, Dennis Michael**, B.A., University of California, '81—Kensington, California

**Winokur, Patricia Lee**, B.A., Brown University, '81—Iowa City, Iowa

**Wolford, Thomas Leo**, B.A., St. Louis University, '76—Louisville, Kentucky

**Wong, Ella Hoy**, B.S., Caltech University, '78—Skokie, Illinois

**Wren, Megan Elizabeth**, B.A., Washington University, '81—Pennington, New Jersey

**Yerman, Howard Mark**, B.S., University of Michigan, '81—Oak Park, Michigan

**Zuckerman, Jordan Spence**, B.A., Washington University, '81—Bayside, New York

#### Summary of Students in the School of Medicine, 1980-1981

Graduate—June 6, 1980	1
Graduate—December 12, 1980	1
Graduate—January 16, 1981	1
Graduating Class—May 22, 1981	
Doctor of Medicine Degree	124
Doctor of Medicine and Doctor of Philosophy Degrees	9
Doctor of Medicine Degree	
Third Year Class	129
Second Year Class	108
First Year Class	109
Medical Scientist Training Program	
Doctor of Medicine and Doctor of Philosophy Degrees	
Seventh Year Trainees	2
Sixth Year Trainees	3
Fifth Year Trainees	8
Fourth Year Trainees	10
Third Year Trainees	6
Second Year Trainees	11
First Year Trainees	13
<b>Total</b>	<b>535</b>

## DOCTOR OF MEDICINE AND DOCTOR OF PHILOSOPHY DEGREES

### Medical Scientist Training Program

#### Graduates—May 22, 1982

**Gibson, Ronald Lyne, Jr., B.S.,** University of Washington, '75—Seattle, Washington

**Hempstead, Barbara Louise, B.A.,** Tufts University, '76—Andover, Massachusetts

**Kane, William Harrison, B.S.,** University of Iowa, '76—Iowa City, Iowa

**Lebovitz, Russell Martin, B.S.,** University of Michigan, '75—Pittsburgh, Pennsylvania

**Schieber, Marc Hudson, A.B.,** Washington University, '74—Winter Park, Florida

**Udey, Mark Charles, B.S.,** University of Wisconsin at Madison, '75—Fort Atkinson, Wisconsin

#### Eighth-Year Trainee 1981-82

**Rubin, Jeffrey Steven, A.B.,** Harvard University, '74, A.M., '74—New York City, New York

#### Seventh-Year Trainee 1981-82

**Schwob, James Edward, B.S.,** University of Iowa, '75—Iowa City, Iowa

#### Sixth-Year Trainees 1981-82

**Barshop, Bruce Allen, A.B.,** Brandeis University, '76—Freehold, New Jersey

**Bloch, Michele Helene, B.S.,** Cornell University, '76—Flushing, New York

**Boothby, Mark Robin, B.S.,** University of Wisconsin, '76—St. Louis, Missouri

**Hortin, Glen Lee, B.S.,** Illinois State University, '76—Zion, Illinois

**Natowicz, Marvin Roy, A.B.,** Washington University, '76—Oak Park, Michigan

#### Fifth-Year Trainees 1981-82

**Ginsberg, Ann Meredith, A.B.,** Radcliffe College, '77—New York, New York

**Hofman, Sandra Lee, B.A.,** University of Virginia, '77—Monroeville, Pennsylvania

**Kastan, Michael Barry, B.S.,** University of North Carolina, '77—Chapel Hill, North Carolina

**Kreisle, Regina Ann, B.A.,** Kalamazoo College, '77—South Bend, Indiana

**Mellis, Scott Jeffrey, B.A.,** Johns Hopkins University, '77—Hempstead, New York

**Neil, Jeffrey Joseph, A.B.,** Washington University, '77—North Olmstead, Ohio

**Reitman, Marc Lionel, B.S.,** Massachusetts Institute of Technology, '77—Stanford, Connecticut

**Rothenberg, Paul Louis, B.S.,** Cornell University, '77—Douglaston, New York

**Tait, Jonathan Francis, A.B.,** Harvard University, '77—Salisbury, Connecticut

**Weinman, Steven Alan, A.B.,** Harvard University, '77—Elmont, New York

#### Fourth-Year Trainees 1981-82

**Faustman, Denise Louise, B.S.,** University of Michigan, '78—Dearborn Heights, Michigan

**Karp, David Ross, B.S.,** Massachusetts Institute of Technology, '78—Northfield, Ohio

**King, Thomas Charles, B.A.,** Washington University, '78—Rancho Palos Verdes, California

**Kleinschmidt, Donn Craig, B.A.,** University of Wisconsin at Madison, '75—University City, Missouri

**Klunk, William Edward, B.A.,** Shippensburg State College, '78—Hanover, Pennsylvania

**Milstone, Dave Stanley, B.A.,** University of California at Santa Barbara, '76—Mountain View, California

#### Third-Year Trainees 1981-82

**Darnell, Robert Bernard, A.B.,** Columbia University, '79—Larchmont, New York

**Floeter, Mary Kay, B.S.,** University of Illinois at Urbana, '78—Crystal Lake, Illinois

**Goldberg, Daniel Eliot, A.B.,** Harvard University, '78—Brookline, Massachusetts

**Harding, Clifford Vincent, A.B.,** Harvard University, '79—Detroit, Michigan

**Hollifield, William Claude, Jr., B.S.,** University of California at Berkeley, '74, M.A., '78—Sacramento, California

**Lentz, Steven Russell, B.S.,** Iowa State University of Science and Technology, '79—St. Paul, Minnesota

**Ling, Richard Takkam, B.A.,** Johns Hopkins University, '79—M.A., '79—Hong Kong





**Martin, Paul Langlie, A.B.**, Harvard University, '79—New Britain, Connecticut

**Nelson, Raoul Devin, B.A.**, St. Olaf College, '79—Bloomington, Minnesota

**Neufeld, Ellis Jacob, B.A.**, Wesleyan University, '79—Bethesda, Maryland

**Usdin, Ted Bjorn, B.A.**, Johns Hopkins University, '78—Arlington, Virginia

#### Second-Year Trainees 1981-82

**Arkin, Martin Samuel, B.S.**, University of Michigan at Ann Arbor, '80—Novi, Michigan

**Barr, Frederic Glenn, B.A.**, Williams College, '80—Baltimore, Maryland

**Boguski, Mark Stanley, B.A.**, Johns Hopkins University, '76—Clayton, Missouri

**Chan, Andrew Chee-Yuen, B.A.**, Northwestern University, '80—M.S., '80—Irvine, California

**Lang, Leslie Mark, A.B.**, Brandeis University, '79—North Bergen, New Jersey

**Lukacher, Aron Eliot, A.B.**, Brandeis University, '80—Rochester, New York

**Mirski, Marek Alexander, B.S.**, Massachusetts Institute of Technology, '80—Washington, D.C.

**Simmons, Barbara Marie, B.A.**, Johns Hopkins University, '80—St. Louis, Missouri

**Starren, Justin Bruce, A.B.**, Washington University, '80—San Diego, California

**Wilson, David Brian, B.A.**, Kalamazoo College, '80—Winfield, Illinois

#### First-Year Trainees 1981-82

**Baum, Charles Michael, B.A.**, Colorado University, '80—Denver, Colorado

**Behlke, Mark, B.S.**, Massachusetts Institute of Technology, '81—El Paso, Texas

**Chou, Hubert Shin-Han, B.S.**, University of California-Irvine, '81—Santa Ana, California

**Corless, Christopher Lee, B.A.**, University of California-Berkeley, '81—Orinda, California

**Faust, Phyllis Lynn, B.A.**, State University, '80, B.S., Clarkson College, '81—Locust Valley, New York

**Grant, Paula, B.S.**, Catholic University, '81—Stratford, Connecticut

**Green, Eric Douglas, B.S.**, University of Wisconsin, '81—Frontenac, Missouri

**Henkel, Timothy John, B.S.**, Southwestern College, '81—Lawrenceburg, Tennessee

**Kane, Steven, B.S.**, Miami University, '81—University Heights, Ohio

**Macarthur, Craig Alan, B.S.**, University of California-Berkeley, '81—Berkeley, California

**Mink, Jonathan Walter, B.A.**, Wesleyan University, '80—St. Paul, Minnesota

**Selleck, Scott Brian, B.A.**, University of Washington, '79—Seattle, Washington

**Smith, Roderic Lee, B.A.**, Harvard University, '80—Port Isabel, Texas

**Taniuchi, Megumi, B.S., M.S.**, Yale University, '81—Bethesda, Maryland

**Tripp, Catherine Susan, B.A.**, University of New Hampshire, '78—St. Louis, Missouri

#### Health Administration and Planning Program Part-Time Students 1981-82

**Brooks, Sue W., B.A.**, Michigan State University, '69; M.A., Michigan State University, '70—St. Louis, Missouri

**Collins, John W., B.S.**, St. Louis College of Pharmacy, '77—St. Louis, Missouri

**Golden, Michael G., B.B.A./B.A.**, University of Notre Dame, '81—St. Louis, Missouri

**Jansson, Susanne E., B.A.**, SUNY University, '76; M.A., Hofstra University, '79—Brentwood, New York

**Jewell, Robert E., B.A.**, Cardinal Glennon College, '71—East St. Louis, Illinois

**Johnson, Joan Carter, B.A.**, University of Pennsylvania, '64; M.S., Southern Connecticut State, '73—St. Louis, Missouri

**Moss, Grover Zack, B.S.**, Southern Illinois University, '79

**Nations, David W., B.A.**, Webster College, '80—St. Louis, Missouri

**Siffring, Connie K. B.S.**, College of St. Mary, '74—Rising City, Nebraska

**Zoller, Gregg G., B.S.**, Marquette University, '77; M.S.P.A., University of Missouri-Columbia, '80—Milwaukee, Wisconsin

#### First-Year Class 1981-82

**Anderson, Gary W., B.S.**, Brigham Young University, '81—Provo, Utah

**Boles, Mark D., B.S.**, Ohio State University, '76—Cuyahoga Falls, Ohio

**Bruhn, Susan M., B.S.N.**, University of Wisconsin, '79—Madison, Wisconsin

**Chandler, Richard H., B.E.D.A.**, North Carolina State, '75—Charlotte, North Carolina

**Coffman, Cheryl, B.S.N.**, St. Louis University, '81—Manchester, Missouri

**Crahan, Dorothy K., B.A.**, St. Louis University, '71—St. Louis, Missouri

**DeYoung, Joy M., A.B.**, Stanford University, '81—Bay City, Michigan

**Dude, Kenneth M., B.S.**, University of Illinois, '81; B.A., University of Illinois, '81—Park Ridge, Illinois

**Fritzhall, Alan J., B.S.**, Southern Illinois University, '81—Skokie, Illinois

**Gauss, David L., B.S.**, SUNY at Buffalo, '81—Spencerport, New York

**Glow, Robert J., B.A.**, Creighton University, '81—Omaha, Nebraska



**Gosser, Bruce M.**, B.S., Northeast Missouri State, '70; M.Div., Phillips University, '72; M.A., Wake Forest University, '75—St. Joseph, Missouri

**Harris, Margaret J.**, B.A., University of Iowa, '57—Galesburg, Illinois

**Hetlage, Charles K.**, B.A., DePauw University, '81—St. Louis, Missouri

**Joseph, Nesakumar**, Diploma in Personnel Management, Xavier Labour Relations Institute, India, '77—Vellore, India

**Kanter, Beth H.**, B.A., Drake University, '81—Winnetka, Illinois

**Lee, Edward**, B.A., College of Medicine, National Taiwan University, '80—Taichung, Taiwan

**Leiberton, Margaret**, B.S., University of Pittsburgh, '81—Cheswick, Pennsylvania

**Mann, Ethel L.**, B.A., Tennessee State University, '78—Brownsville, Tennessee

**Meyer, Steven M.**, B.A., St. Louis University, '77—St. Louis, Missouri

**Murrell, John J.**, B.S., Georgetown College, '81—Middlesboro, Kentucky

**Paul, Jerry W.**, B.A., Elmhurst College, '71; M.Div., Eden Theological Seminary, '74—Schofield, Wisconsin

**Paul, Rashel D.**, B.S., St. Xavier College, '79—Chicago, Illinois

**Phegley, Timothy L.**, B.S., Massachusetts Institute of Technology, '71; M.S., Harvard School of Public Health, '76—St. Louis, Missouri

**Phillipi, David W.**, B.S., Murray State University, '79—Quincy, Illinois

**Pool, Christopher**, B.S., Florida State University, '72; M.B.A., Golden Gate University, '79—Ft. Walton Beach, Florida

**Pritts, Robert W.**, B.A., University of Puget Sound, '80—Boulder City, Nevada

**Reifsteck, Mark W.**, B.A., Cardinal Glennon College, '77—St. Louis, Missouri

**Roth, Patricia L.**, B.A., Trinity University, '81—St. Louis, Missouri

**Russell, Kimberly**, B.S., Purdue University, '81—Rocky River, Ohio

**Scrivner, Robert A.**, B.A., Columbia College, '78—St. Louis, Missouri

**Shattes, Wayne S.**, B.S., State University College of New York, '78—Huntington, New York

**Smith, Pamela K.**, B.S.B.A., Washington University, '81—Basking Ridge, Nebraska

**Teig, Carol D.**, A.B., Washington University, '70; A.M., Washington University, '71—St. Louis, Missouri

**Yang, Juinhong**, B.A., National Taiwan Institute, '79; M.A., Virginia Polytechnical Institute, '81—Changhwa, Taiwan



## PROGRAM IN PHYSICAL THERAPY

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**Brown, Karen Charlotte**, University of Maryland—Bethesda, Maryland

**Caruso, Timothy John**, University of Illinois—Chicago, Illinois

**Clanahan, Mary Beth**, University of Illinois—Herrin, Illinois

**Dallal, Donna Margaret**, B.A., Washington University, '76—New Hartford, New York

**Darnauer, Kathleen Rose**, Washington University—Ft. Washington, Maryland

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**Grossmann, Jeanine R.**, Indiana University—Jennings, Missouri

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**Mann, Kristi Marie**, St. Louis University—Kankakee, Illinois

**Million, Suzanne Webb, B.S.,** Vanderbilt University, '80—St. Louis, Missouri

**Modica, Mary Ellen,** University of Illinois—Berwyn, Illinois

**Nuessen, Julie,** Iowa State University—Quincy, Illinois

**Phillips, Margaret Louise, B.S.,** Western Kentucky University, '79—Nashville, Tennessee

**Russell, Jennifer Marguerite,** University of Pittsburgh—Murrysville, Pennsylvania

**Ruzensky, Catherine Mary,** Washington University—Florissant, Missouri

**Schulte, Leah Marie,** Washington University—Marthasville, Missouri

**Schwab, Lynn Annette,** Washington University—Palatine, Illinois

**Smith, Kendra Kay, B.S.,** Southern Illinois University, '80—West Frankfort, Illinois

**Weis, Jennifer Joanne,** University of Colorado—Englewood, Colorado

**Weismann, Joyce Ann,** Meramec Community College—St. Louis, Missouri

**Wenzel, Barbara K.,** Belleville Area College—Belleville, Illinois

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**Wolfe, Eileen Owens,** West Virginia University—Edgewater, Maryland

**Woodcock, Edith J., B.A.,** Macalester College, '76—St. Louis, Missouri

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## PROGRAM IN OCCUPATIONAL THERAPY

### Graduate Class 1981-82

**Bowman, O. Jayne, B.A.,** Baylor College, '58—Belton, Texas, B.S., University of Wisconsin, '73—Madison, Wisconsin

**Buckley, Margaret Mary, B.A.,** St. Louis University—St. Louis, Missouri

**Burson, Katherine Ann, B.S.,** Washington University, '81—St. Louis, Missouri

**Cantieri, Annette Elaine, B.S.,** University of Wisconsin, '78—LaCrosse, Wisconsin

**DuBuske, Susan Greboski, B.S.,** University of Illinois, '78—Chicago, Illinois

**Erwin, S. Ellen, B.S.,** Texas Woman's University, '75—St. Louis, Missouri

**Fletcher, Catherine Spademan, B.A.,** Newcomb College, '70—Boulder, Colorado

**Franz, Jane Renee, B.S.,** University of Missouri, '70—Columbia, Missouri

**Hegberg, Anne Marie Phillips, B.A.,** Valparaiso University, '79—Wheaton, Illinois

**Kalscheur, Jean Ann, B.S.,** University of Wisconsin, Madison, '74—Middleton, Wisconsin

**Koziol, Catherine Mary, B.A.,** Rockhurst College, '76—Chicago, Illinois

**Lawler, Ann Louise, B.S.,** Washington University, '81—St. Louis, Missouri

**Lewis, Terry Lynn, B.A.,** Ohio State University, '78—New Philadelphia, Ohio

**Mallonee, Nancy Lee, B.S.,** St. Louis University, '63—St. Louis, Missouri

**Mendelson, Mary Lavis, B.S.,** Washington University, '53—St. Louis, Missouri

**Miller, Kathleen Anne, B.S.,** Ohio State University, '78—Macomb, Illinois

**Montoya, Tamar Anette, B.A.,** North Dakota State University, '75; B.S., University of North Dakota, '77—Fargo, North Dakota

**Mueller, Cynthia Haffner, B.S.,** Fontbonne College, '76—St. Louis, Missouri

**Overhuls, Pamela, B.S.,** University of Oklahoma, '77—Norman, Oklahoma

**Pennington, Dorothy Johnson, B.A.,** University of Mississippi, '65—St. Louis, Missouri

**Prins, Steven Scott, B.S.,** Grand Valley State College, '76—Zeeland, Michigan

**Rankin, Cathy Ann, B.S.,** Tufts University, '78—Manchester, Maine

**Stemmler, Loren JoAnn, B.S.,** Fontbonne College, '79—St. Louis, Missouri

**Veloze, Craig Antonio, B.A.,** College of the Holy Cross, '77—Worcester, Massachusetts

**Yang, Min-lan, B.S.,** National Taiwan University, '77—Taipei, Taiwan

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Washington State University—  
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University—St. Louis, Missouri

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University—Hewlett, New York

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**Merrell, Margaret Ruth**, Colorado  
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**Nemergut, Laurie Beth**, Valparaiso  
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**Swanson, Debra Lynn**, Washington  
University—Alma, Nebraska

**Traina, Anna Marie**,  
University of Missouri, Columbia—  
St. Louis, Missouri

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University—New Rochelle, New York

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Nebraska Wesleyan University—  
Lincoln, Nebraska

**Wiegert, Lynn Elizabeth**, Southeast  
Missouri State University—  
St. Louis, Missouri

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## Schools of Washington University

All schools are located on the main campus at Lindell and Skinker Boulevards, St. Louis, Missouri 63130, except Medicine (660 South Euclid Avenue, 63110) and Dental Medicine (4559 Scott Avenue, 63110). A University-sponsored shuttle bus travels between the main campus and the medical/dental campus every 20 minutes.

THE COLLEGE OF ARTS AND SCIENCES

THE GRADUATE SCHOOL OF ARTS  
 AND SCIENCES

THE SCHOOL OF ENGINEERING AND  
 APPLIED SCIENCE

THE SEVER INSTITUTE OF TECHNOLOGY

THE SCHOOL OF ARCHITECTURE

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 ADMINISTRATION

THE GRADUATE SCHOOL OF BUSINESS  
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THE SCHOOL OF FINE ARTS

THE SCHOOL OF SOCIAL WORK

THE SCHOOL OF LAW

THE SCHOOL OF MEDICINE

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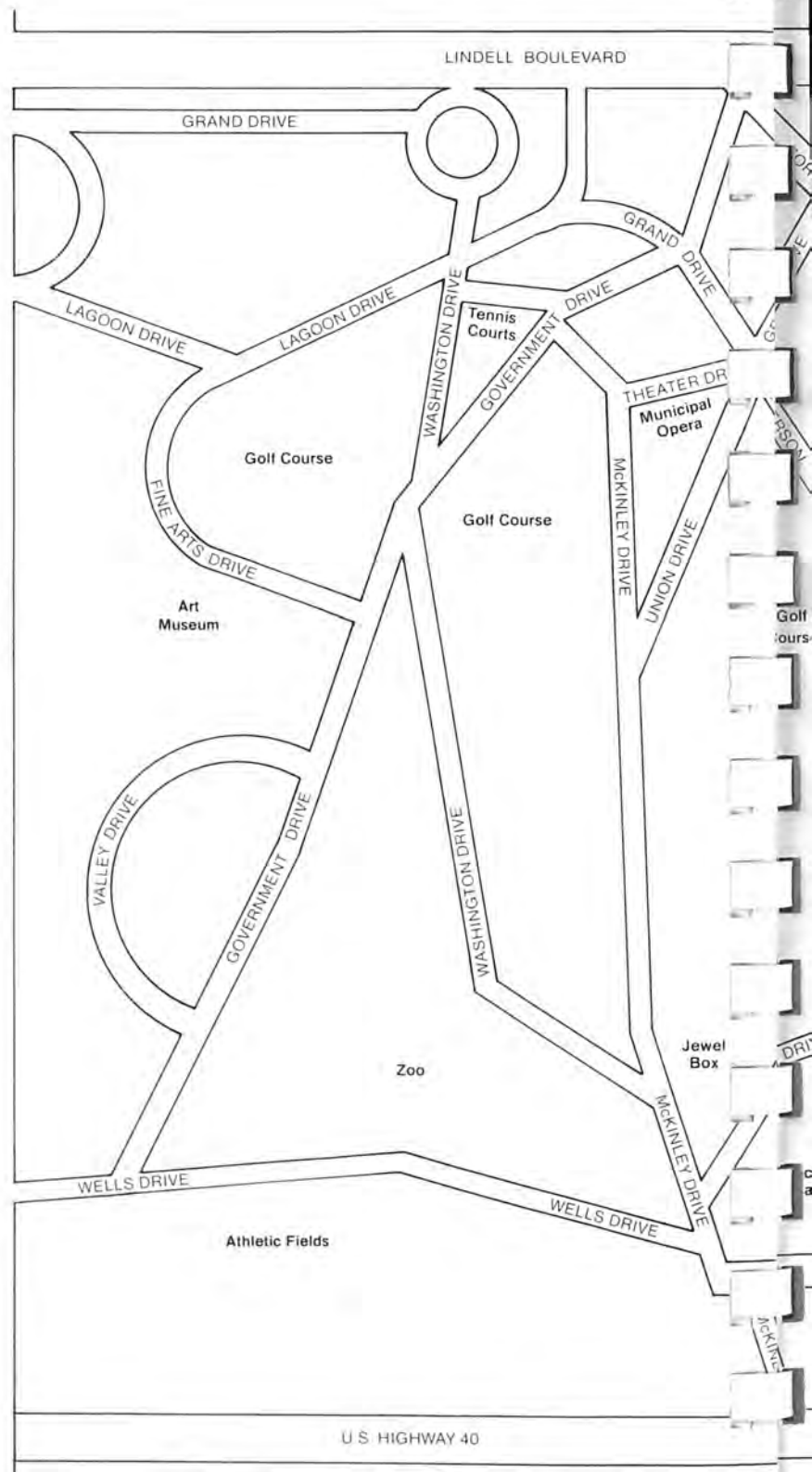


Medical Center

FOREST PARK

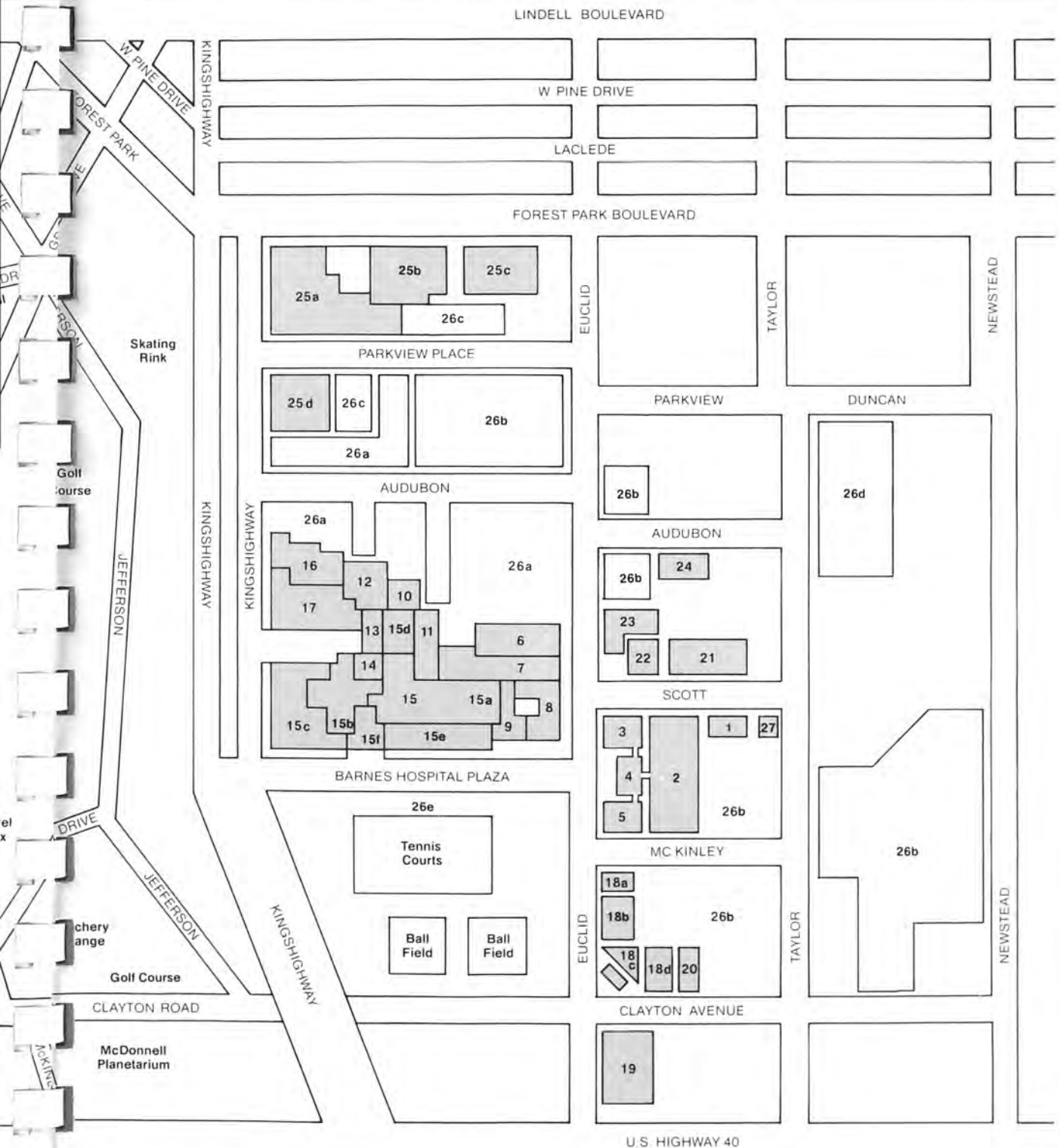
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2. McDonnell Medical Sciences Building
3. North Building
4. Cancer Research Building
5. South Building
6. West Building
7. Irene Walter Johnson Institute of Rehabilitation
8. McMillan Hospital and Oscar Johnson Institute for Medical Research
9. St. Louis Maternity Hospital
10. David P. Wohl, Jr., Memorial-Washington University Clinics
11. Renard Hospital
12. David P. Wohl, Jr., Hospital
13. Barnard Free Skin and Cancer Hospital
14. Edward Mallinckrodt Institute of Radiology
15. Barnes Hospital
  - a. Medical Wing
  - b. Rand-Johnson Memorial Surgical Wing
  - c. Queeny Tower
  - d. Diagnostic Laboratories, Service Center
  - e. East Pavilion
  - f. West Pavilion
16. Clinical Research Building
17. St. Louis Children's Hospital
18. 700 and 724 South Euclid Buildings
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  - b. Physical Therapy
  - c. Hospital Administration, Biostatistics
  - d. Computer Systems Laboratory
19. Central Institute for the Deaf
20. Central Institute for the Deaf Residence
21. School of Dental Medicine
22. Occupational Therapy
23. Power Plant
24. Medical Care Group
25. Jewish Hospital
  - a. West Building
  - b. Shoenberg Pavilion
  - c. Medical Building
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  - a. Public
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U S HIGHWAY 40

# WASHINGTON UNIVERSITY MEDICAL CENTER





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