AAB INSTITUTE OF BIOMEDICAL SCIENCES

The Aab Institute of Biomedical Sciences is the centerpiece of a 10-year, $400-million strategic plan to expand the Medical Center's research programs in the basic sciences. The new, 240,000-square-foot Arthur Kornberg Medical Research Building, which opened on the Medical Center campus in 1999, serves as the headquarters for the Institute.

The Institute capitalizes on the research strengths of the University by bringing together researchers from multiple disciplines to work on a single area of health, such as cancer or vaccines. Researchers within the Institute benefit from close associations with colleagues within the Institute and throughout the University.

To complement the strengths of the Medical Center's existing faculty and programs, the Institute is organized into interdisciplinary research centers that provide excellent opportunities for graduate students and postdoctoral fellows.

CENTER FOR AGING AND DEVELOPMENTAL BIOLOGY

The researchers of the Center for Aging and Developmental Biology examine the process of aging and the diseases that often accompany it. Special attention is paid to the area of neuroscience, with the goal of developing a better understanding of and new treatments for diseases such as Parkinson's and Alzheimer's, as well as conditions that occur with the normal aging process, such as memory loss and cognitive decline.

Faculty

Howard J. Federoff . . . *Professor of Neurology and Director of Center for Aging and Developmental Biology* and Professor of Medicine, and of Microbiology and Immunology. B.A. Earlham College, 1974; M.S., Ph.D. Albert Einstein, 1979; M.D. 1983.

CENTER FOR CANCER BIOLOGY

Cancer is a multifaceted and complex disease. It is caused by multiple genetic defects resulting in loss of cell proliferation control, de novo angiogenesis, tumor cell invasion, and ultimately, metastasis. The mutations involved are found in genes encoding key components of cellular signaling networks regulating such diverse cellular behavior as cell cycle progression, apoptosis, differentiation, migration, and homing. The research in the new Center for Cancer Biology aims to understand how signaling networks control this multitude of cellular responses. This is one of the fundamental challenges in cancer biology for the next decade and will be critical for the design of novel therapeutic strategies targeting specific cancer cell characteristics. The research program is multidisciplinary and includes faculty trained in cell biology, biochemistry, genetics, and development.

Faculty

Hartmut Land . . . *Director of the Center for Cancer Biology and Division of Genetics*, Robert and Dorothy Markin Professor of Cancer Biology, Professor of Genetics and Biochemistry and Biophysics. Ph.D. University of Heidelberg (Germany), 1982.

Professors

Dirk Bohmann. Ph.D. University of Tubingen (Germany), 1986.

Mark D. Noble. Ph.D. Stanford, 1977.

Assistant Professors

Willis Li. Ph.D. Columbia, 1995.

Margot Mayer-Proschel. Ph.D. University of Wurzburg (Germany), 1990.

Yin Sun. Ph.D. University of California, 1993.

Jiyong Zhao. Ph.D. Iowa State, 1994.

Research Assistant Professor

Chris Proschel. Ph.D. University College London (U.K.), 1995.

CENTER FOR CARDIOVASCULAR RESEARCH

The Center for Cardiovascular Research, along with existing programs in cardiology, pharmacology, physiology, vascular medicine, thrombosis, and microcirculation, has a long-term goal of developing effective therapies for cardiovascular diseases such as atherosclerosis, hypertension, and congestive heart failure. Research programs include analysis of signal transduction in the vasculature, molecular genetic approaches to inherited disease in humans and animal models, integrative physiology with transgenic animals, and use of gene transfer technology to study disease pathogenesis and prevention.

Recent grant awards include study of fibronectin, angiogenesis, inflammation in the vasculature, oxidative stress and the cardiovascular response to ischemia/reperfusion, phosphodiesterase function, flow-mediated signal events, regulation of vascular smooth muscle differentiation, the dystrophin/dystroglycan system in cardiomyopathy, and the role of kinases and troponin phosphorylation in cardiac dysfunction.

Postdoctoral fellowships are an integral part of research efforts of the program. Support for these fellowships is provided from many sources, including training and research grants through the National Institutes of Health, the American Heart Association, private foundations, and pharmaceutical companies. These fellowships are awarded to individuals holding the M.D. or Ph.D. degree. Postdoctoral research fellows do not participate in patient care and are free to devote themselves to study and investigation in accordance with their scholarly interests. In addition, an NIH training grant provides the opportunity for research in cardiovascular disease by predoctoral students.

Faculty

Bradford C. Berk . . . *Charles A. Dewey Professor and Chair of Medicine, Paul N. Yu Professor and Chief of Cardiology Unit, and Director of the Center for Cardiovascular Research*. B.A. Amherst, 1975; M.D., Ph.D. Rochester, 1981.

Professor

Keigi Fujiwara. B.A. International Christian University (Japan), 1968; Ph.D. University of Pennsylvania, 1974.

Associate Professor

Jane M. Sottile. B.A. Marist College, 1979; Ph.D. SUNY (Albany), 1987.

Assistant Professors

Jun-ichi Abe. M.D. University of Yamagata (Japan), 1987; Ph.D. University of Tokyo (Japan), 1988.

Joseph M. Miano. B.S. SUNY (Cortland), 1986; M.S. New York Medical College, 1988; Ph.D. 1992.

Wang Min. B.S. Wuhan University (China), 1984; M.S. Shanghai Institute of Cell Biology, Academia Sinica (China), 1989; Ph.D. University of Wales (U.K.), 1993.

Ming Qi. B.S. South China Normal University, 1982; M.S. Fudan University (China), 1985; Ph.D. Pittsburgh, 1991.

Research Assistant Professor

Chen Yan. B.S. Fudan University (China), 1983; M.S. 1986; Ph.D. University of Washington, 1996.

CENTER FOR HUMAN GENETICS AND MOLECULAR PEDIATRIC DISEASE

Revolutionary advances in genetic and biomedical research and the success in mapping the human genome will transform, in the next decade, the practice of medicine. The genomic blueprint, when combined with an understanding of the specific function of genes and the control of their expression, will provide a framework to address the genetic and environmental factors that predispose individuals to disease. Research in the Center for Human Genetics and Molecular Pediatric Disease—the Institute's newest center—will be directed toward identifying, characterizing, and understanding gene-disease relationships and environmental contributions; defining the molecular basis and pathogenesis of human disease; identifying pathways of gene expression; and elucidating targets and interventions for the prevention and therapy of human disease.

The Center will establish expertise in the following areas: analysis of the genetic basis of multifactorial complex human genetic disease (e.g., cancer, diabetes, hypertension, asthma, arthritis, behavioral disorders); development and analysis of model systems of human disease with use of tractable genetic systems (e.g., mice, yeast, fly, etc.); proteomics/genomics and gene discovery to understand gene and protein function and pathways of gene expression and behavior of biological systems by taking advantage of genome-wide approaches with use of bioinformatics and computational biology; development of novel approaches to therapy of human genetic disease using small molecules; and evaluation of how to translate research in human genetics into improving the public health and addressing the ethical, legal, social, and economic issues of these biomedical and genetic advances.

Arthur Kornberg Medical Research Building

Faculty

Richard A. Insel . . . *Professor of Pediatrics and Microbiology and Immunology, and Director of Center for Human Genetics and Molecular Pediatric Disease*. B.S. Pennsylvania State, 1966; M.D. Jefferson Medical College, 1969.

CENTER FOR ORAL BIOLOGY

The principal objective of the Center for Oral Biology is to conduct research of the highest quality in the areas of craniofacial, dental, and oral science. Future research advances will come from studies at the interface of traditional disciplines. The Center for Oral Biology consists of several interdisciplinary research teams that integrate and blend aspects of biochemistry, developmental biology, genetics, immunology, microbiology, physiology, pharmacology, and structural biology to explore important problems of the oral/facial complex.

Current research areas within the Center for Oral Biology include craniofacial development (function of notch signaling pathway in embryonic development; cell surface glycoproteins and *C. elegans* development; role of O-glycans in mammalian development); exocrine gland biology (intracellular signaling mechanisms in stimulus-secretion pathways; neurotransmitter regulation of salivary exocrine cell function and differentiation; molecular physiology of ion exchangers and anion channel proteins; structure and function of salivary proteins; sialochemistry); glycobiology (biosynthesis of O-glycans; carbohydrate metabolism in Streptococci; Streptococcal glucosyltransferases); and Streptococcal genetics, physiology, and virulence (adaptive mechanisms of oral streptococci in response to low pH; biofilms; effects of environmental stimuli on expression of genes involved in virulence and persistence of oral bacteria; etiology of dental caries).

The Center is also engaged in training basic scientists and dentists for academic careers in research related to oral health and disease. In pursuit of these aims, the Center cooperates closely with the basic science departments of the school, and in addition conducts an independent research program. There is also close cooperation with the Eastman Department of Dentistry. Joint degree programs are offered with various departments and institutions.

FELLOWSHIPS

The Center is home to several NIH-sponsored training programs that support students seeking advanced scientific training (M.S. in dental science or Ph.D in biochemistry, biology, biophysics, chemistry, genetics, immunology, microbiology, neuroscience, pathology, pharmacology, physiology, or toxicology) with or without clinical specialty training (in collaboration with the Eastman Department of Dentistry). University grants-in-aid and support from industry enable the Center to offer additional fellowships to highly qualified individuals who desire advanced scientific training related to oral biology.

CARIOLOGY TRAINING PROGRAM

Support is available for pre- and postdoctoral candidates to receive training in cariology to the Ph.D. level. The objective of the program is to develop teachers and researchers to address the many facets of the pathogenesis and prevention of dental caries.

ORAL CELLULAR AND MOLECULAR BIOLOGY TRAINING PROGRAM

A training program designed to provide rigorous, multidisciplinary scientific training at either the pre- or postdoctoral level. Trainees typically pursue a Ph.D. or a two- to three-year postdoctoral fellow research experience.

SUMMER RESEARCH TRAINING PROGRAM FOR MINORITY STUDENTS IN DENTAL SCHOOL

Support is available for highly qualified minority students who are U.S. citizens or permanent residents and who are currently matriculated in a dental school. Selected students receive intensive research training during an 8- to 10-week summer session. The objective of the program is to expose students who are members of underrepresented groups to the research professions and the opportunities available in an academic-based career.

Courses Offered

493. Oral Microbiology
Credit—two hours
Prerequisite: permission of instructor
Associate Professor Burne

The major groups of microorganisms causing oral disease are reviewed with emphasis on basic biology, genetics, physiology, and pathogenic mechanisms. Fall, odd years.

495. M.S. Research
Credit—to be arranged
Prerequisite: D.D.S., D.M.D., or equivalent degree
Staff

The research program of the dental fellows is usually directed toward the solution of some problem pertinent to dentistry. Laboratory facilities are available in the Center for Oral Biology, the Eastman Department of Dentistry, or the preclinical departments of the School of Medicine and Dentistry. (Ph.D. research is registered with the appropriate center, department, or program.)

501, 502, 503, 504. Dental Research Seminar
Credit—one hour each semester
Prerequisite: permission of instructor
Associate Professor Quivey

The purpose of this series is to provide experience to participants in preparing, organizing, and presenting

material to a critical audience. The first semester is devoted to a systematic review of recent significant research developments in one of the basic sciences fundamental to dentistry. In the second semester the fellows report on original research. Required of all graduate students and trainees in oral biology and open to other graduate students and dentists. Fall and spring, yearly.

556. Biology of the Periodontium
Credit—one hour
Prerequisite: permission of instructor
Professor Caton

Stressing the biological behavior of the periodontium, the course reviews the fundamentals as well as the latest developments in periodontal research. Topics covered are the development, morphology, and physiology of the periodontal tissues, the epidemiology, etiology and histopathology of periodontal diseases, plus current concepts regarding mechanisms of periodontal tissue destruction and repair. Spring, odd years.

558. Craniofacial Growth and Development
Credit—one hour
Prerequisite: permission of instructor
Assistant Professors Jiang, Kyrkanides

This series covers the prenatal embryogenesis and postnatal growth and development of the craniofacial complex. Mechanisms of growth control, the development of occlusion, and methods of study and timing are presented. Clinical implications for normal and abnormal facial development are discussed. Spring, odd years.

563. Pharmacology and Therapeutics
Credit—one hour
Prerequisite: permission of instructor
Associate Professor Culp

Pharmacotherapeutics of drugs most often used in dentistry are reviewed with emphasis on critical analysis of the related literature and current directions in pharmacological research. Spring, even years.

570. Introduction to Dental Epidemiology and Research Design
Credit—one hour
Prerequisite: permission of instructor
Assistant Professor Moss

Students are introduced to the fundamentals of epidemiology. Emphasis is placed on the natural history of common dental diseases. Spring, yearly.

579. Saliva and Salivary Glands
Credit—two hours
Prerequisite: permission of instructor
Professor Melvin

This course gives students an understanding of the fundamental biology of the salivary glands. The regulation of salivary gland physiology is discussed, as is the structure/function relationship of salivary proteins and lipids. The molecular basis of salivary gland gene expression is explored. The etiology, pathogenesis, and consequences of salivary gland diseases are also discussed. Spring, odd years.

580. Fundamentals of Dental Caries
Credit—one hour
Prerequisite: permission of instructor
Professor Berkowitz

This course presents the latest developments in many aspects of dental caries, from the most fundamental basic science to its clinical application. Fall, yearly.

INTERDEPARTMENTAL COURSES

501. Ethics in Research
Credit—one hour
Professor Yeh

Various faculty participate in presenting this course. In 12 weekly, one-hour classes, they cover a broad range of topics and address issues related to professional standards of conduct. The material is presented in seminar format to encourage discussion among students, trainees, and faculty. A description of the University's policies and procedures in dealing with misconduct in research is included. Attendance is mandatory. Fall.

Faculty

James E. Melvin, *Interim Director*.

Professors

William H. Bowen, *Welcher Professor of Dentistry in the Center for Oral Biology,* and Professor of Microbiology and Immunology, and Environmental Medicine. B.D.S. National University of Ireland, 1955; M.Sc. Rochester 1959; Ph.D. University of London, 1965; D.Sc. University of Ireland, 1974.

Robert E. Marquis, *Associate Chair and Professor of Microbiology and Immunology*, and Oral Biology. B.A. Wayne State, 1955; M.S. Michigan, 1958; Ph.D. 1961.

James E. Melvin, *Professor of Dentistry in the Center for Oral Biology, and Pharmacology and Physiology*. D.D.S. Case Western Reserve, 1978; M.S. Rochester, 1983; Ph.D. 1987.

Associate Professors

Robert A. Burne, Jr., *Associate Professor of Microbiology and Immunology in the Center for Oral Biology*. B.S. Pennsylvania State, 1981; Ph.D. Rochester 1987.

David J. Culp, *Associate Professor of Pharmacology and Physiology in the Center for Oral Biology.* B.S. University of California (Berkeley), 1974; Ph.D. 1981.

Constantine G. Haidaris, *Associate Professor of Microbiology and Immunology*, and Oral Biology. A.B. Wittenberg, 1974; M.S. Miami (Ohio), 1976; Ph.D. Cincinnati, 1982.

Robert G. Quivey, Jr., *Associate Professor of Microbiology and Immunology in the Center for Oral Biology*. B.S. Pennsylvania State, 1977; M.S., 1979; Ph.D. Texas (Austin), 1984.

Research Associate Professor

Paul Reynolds, *Research Associate Professor of Pathology in the Center for Oral Biology*, B.S. Rensselaer Polytechnic Institute, 1973; Ph.D. University of Virginia, 1980.

Assistant Professors

Fred K. Hagen, *Assistant Professor of Biochemistry and Biophysics in the Center for Oral Biology*. B.S. University of California (Davis), 1981; Ph.D. Calgary, 1989.

Rulang Jiang, *Assistant Professor of Biology in the Center for Oral Biology*. B.S. Nanjing Normal University (PRC), M.S. Chinese Academy of Sciences, 1987; Ph.D. Wesleyan, 1995.

Research Assistant Professors

Jorge Arreola, *Research Assistant Professor of Pharmacology and Physiology in the Center for Oral Biology*. B.S. Universidad Autónoma Metropolitana-Xochimilco (Mexico), 1981; M.S. CINVESTAV-IPN (Mexico), 1985; Ph.D. 1988.

Gurrinder S. Bedi, *Research Assistant Professor of Biochemistry and Biophysics in the Center for Oral Biology.* B.S. Panjab University (India), 1968; Ph.D. SUNY (Buffalo), 1981.

Yi-Ywan Margaret Chen, *Research Assistant Professor of Microbiology and Immunology in the Center for Oral Biology.* B.S. Fu-Jen Catholic University, 1984; M.S. Georgia, 1987; Ph.D. Texas (San Antonio), 1993.

Yu Lan, *Research Assistant Professor of Biochemistry and Biophysics in the Center for Oral Biology.* B.S. Sichuan University (PRC), 1983; M.S. Chinese Academy of Sciences, 1986; Ph.D. Maine, 1992.

Patricia Perez, *Research Assistant Professor of Dentistry in the Center for Oral Biology,* B.S. Universidad Michoacana (Mexico), 1988; Ph.D. Rochester, 1996.

Keith Nehrke, *Research Assistant Professor of Dentistry in the Center for Oral Biology.* B.S. SUNY (Binghamton), 1989; Ph.D. Rochester, 1994.

Ha-Van Nguyen, *Research Assistant Professor of Dentistry in the Center for Oral Biology*, B.Sc. University of Wales, 1993; Ph.D. 1997.

Anne Vacca Smith, *Research Assistant Professor of Dentistry in the Center for Oral Biology.* B.S. St. John Fisher, 1986; M.A. SUNY (Buffalo), 1989; Ph.D. 1992.

DAVID H. SMITH CENTER FOR VACCINE BIOLOGY AND IMMUNOLOGY

Building on strong programs in immunology, microbiology, and vaccine biology at the University, the David H. Smith Center for Vaccine Biology and Immunology focuses on basic research into immunological mechanisms with the long-term goal of helping to design the next generation of vaccines. This is an exciting time to apply recent advances in our understanding of immune regulation to the design of new vaccines for "difficult" infectious diseases such as tuberculosis, malaria, and AIDS, and also to create new types of vaccines for treating cancer, allergy, and autoimmunity.

Faculty

Tim R. Mosmann . . . *Professor of Microbiology and Immunology and Director of the David H. Smith Center for Vaccine Biology and Immunology*. B.Sc. University of Natal (South Africa), 1968; B.Sc. Rhodes University (South Africa), 1969; Ph.D. University of British Columbia (Canada), 1973. Postdoctoral MRC Fellow, Hospital for Sick Children, Toronto, Canada, 1973–75; MRC Centennial Fellow, Glasgow University, United Kingdom, 1975–77; Assistant Professor, Department of Immunology, University of Alberta, Edmonton, Canada, 1977–81; Scholar, Alberta Heritage Fund for Medical Research, 1981; Senior Scientist, DNAX Research Institute, Palo Alto, California, 1982–1990; Professor and Chair, Department of Immunology, University of Alberta, 1990–95; Professor, Department of Medical Microbiology and Immunology, University of Alberta,1996–98; Director, Center for Vaccine Biology and Immunology, University of Rochester,1998– ; Professor of Microbiology and Immunology, University of Rochester School of Medicine and Dentistry, 1998– .

Professor

I. Nicholas Crispe, *Professor of Microbiology and Immunology and Associate Director of the David H. Smith Center for Vaccine Biology and Immunology*. B.Sc. University of London (U.K.), 1975; MB.BS. Medicine and Surgery, 1978; Ph.D. 1984.

Assistant Professors

Deborah J. Fowell, *Assistant Professor of Microbiology and Immunology in the David H. Smith Center for Vaccine Biology and Immunology*. B.Sc. University of Bristol (U.K.), 1988; Ph.D. Oxford (U.K.), 1992.

David J. Topham, *Assistant Professor of Microbiology and Immunology in the David H. Smith Center for Vaccine Biology and Immunology*. B.S. University of Vermont (Burlington), 1985; M.S. 1992; Ph.D. 1994.

Wei-ping Zheng, *Assistant Professor of Microbiology and Immunology in the David H. Smith Center for Vaccine Biology and Immunology*. B.S. Jiangxi University (China), 1996; Graduate Studies, Shanghai Institute of Cell Biology (China), 1990; Ph.D. SUNY, 1995.

Research Associate Professor

Alexandra Livingstone, *Research Associate Professor of Microbiology and Immunology in the David H. Smith Center for Vaccine Biology and Immunology*. B.Sc. Edinburgh University (U.K.) 1977; Ph.D. Cambridge (U.K.), 1983.

Research Assistant Professor

Daniela Metz, *Research Associate Professor of Microbiology and Immunology in the David H. Smith Center for Vaccine Biology and Immunology*. Arbitur, Kaiserin-Friedrich-Gymnasium (Germany), 1983; B.Sc. University College of North Wales (U.K.), 1987; M.Sc. University of Birmingham (U.K.), 1988; Ph.D. University of London (U.K.), 1993.