

MOLECULAR MICROBIOLOGY

• biological chemistry • cancer

biology • cell regulation • genetics and development • immunology •

integrative biology • molecular biophysics • neuroscience



MOLECULAR MICROBIOLOGY■ **CHAIR, GRADUATE PROGRAM**

Vanessa Sperandio, Ph.D.

■ **DEGREE OFFERED**

Doctor of Philosophy

FACULTY AND RESEARCH INTERESTS**Neal Alto, Assistant Professor**

Ph.D., Oregon Health & Science University, 2003
The intersection between human signal transduction and bacterial pathogenesis; use of biochemical and cell biological analysis to define mechanisms of microbial infectious disease.

Michael Bennett, Professor

M.D., Baylor College of Medicine, 1961
Bone-marrow transplantation; graft-versus-host reactions; NK cell receptors.

Paul Blount, Associate Professor

Ph.D., Washington University School of Medicine, St. Louis, 1990
Bacterial mechanosensitive channels and their role in allowing the cell to adapt to different osmotic environments.

Cheng-Ming Chiang, Professor

Ph.D., University of Rochester, 1991
Transcriptional regulation in human papillomavirus and other small DNA-tumor viruses; epigenetic control of viral minichromosomes; modulation of protein function by post-translational modification.

Nicholas K. Conrad, Assistant Professor

Ph.D., Johns Hopkins University, 2001
RNA transcription, processing and decay in Kaposi's sarcoma-associated herpesvirus and its human host cells.

Pinghui Feng, Assistant Professor

Ph.D., University of Missouri-Kansas City, 2001
Host recognition and virus escape; gamma herpesvirus infection under immunosuppression; pathogenesis of human Kaposi's sarcoma-associated herpesvirus.

Beatriz M.A. Fontura, Associate Professor

Ph.D., New York University School of Medicine, 1996
Role of nuclear transport factors in interphase and mitosis, from viral pathogenesis to cell division.

Marie-Alda Gilles-Gonzalez, Associate Professor

Ph.D., Massachusetts Institute of Technology, 1988

Heme proteins that serve as oxygen sensors in *M tuberculosis*, *E coli* and Rhizobia; characterization of signal-transduction mechanisms of these sensors and their roles in host-microbial interactions.

Eric J. Hansen, Professor

Ph.D., University of Michigan, 1977
Molecular basis of microbial pathogenesis; use of genetic analysis to identify bacterial virulence factor.

David Hendrixson, Assistant Professor

Ph.D., Washington University, St. Louis, 1999
Bacteria-host interactions; bacterial genetics; bacterial pathogenesis; *Campylobacter jejuni*.

Lora Hooper, Assistant Professor

Ph.D., Washington University, St. Louis, 1997
Host-microbial interactions; mucosal immunology.

Jeffrey S. Kahn, Professor

M.D., Ph.D., State University of New York Health Science Center at Brooklyn, 1991
Human respiratory viruses, including syncytial virus, human metapneumovirus and new/emerging viruses such as human parvoviruses and human polyomaviruses.

Nitin J. Karandikar, Associate Professor

M.D., University of Pune, India, 1990; Ph.D., Northwestern University, 1997
Immunology of MS/autoimmune demyelination; immune responses to HCV infections; allodepletion to prevent graft-versus-host disease; immune regulation by T cells.

Beth Levine, Professor

M.D., Cornell University Medical College, 1986
Host-pathogen interactions; autophagy in innate immunity against intracellular pathogens; autophagy in cell-death regulation and cancer biology.

Jerry Y. Niederkorn, Professor

Ph.D., University of Arkansas, 1977
Immunology of parasitic diseases; immune privilege of the anterior chamber of the eye; immune surveillance of intraocular tumors; immune modulation of cancer metastases.

Michael V. Norgard, Professor

Ph.D., New Jersey Medical School, 1977
Molecular biology and immunology of syphilis and Lyme disease.

Julie K. Pfeiffer, Assistant Professor

Ph.D., University of Michigan, 2001
Evolution of virus populations; genetic recombination; drug resistance; viral pathogenesis.

Vanessa Sperandio, Associate Professor

Ph.D., State University of Campinas, Brazil, 1995
Pathogenesis of *E. coli* O157:H7; bacterial virulence gene regulation by quorum sensing.

Nancy E. Street, Assistant Professor

Ph.D., UT Southwestern Medical Center, 1987
Activation and differentiation of murine T-helper cell; the role of T-helper cells in tumor dormancy and infectious disease.

Iwona Stroynowski, Professor

Ph.D., Stanford University, 1979
Structure and function of immunologically relevant molecules.

Gürol Süel, Assistant Professor

Ph.D., UT Southwestern Medical Center, 2003
Utilizing systems and synthetic biology approaches to study how interactions between genes and proteins at the molecular level control differentiation at the cellular level.

Jonathan W. Uhr, Professor

M.D., New York University School of Medicine, 1952
Antibody-induced signaling for apoptosis; cancer dormancy.

Nicolai S.C. van Oers, Associate Professor

Ph.D., McGill University, Canada, 1990
Regulation of antigen receptor signal-transduction systems.

Ellen S. Vitetta, Professor

Ph.D., New York University School of Medicine, 1968
Therapy of B-cell tumors; immunotoxins in cancer and AIDS; tumor dormancy; AIDS latency.

Wade Winkler, Assistant Professor

Ph.D., Ohio State University, 2002
RNA biology; biochemistry of gene regulation; RNA structure and function; post-transcriptional genetic control; microbial metabolism.

Felix Yarovinsky, Assistant Professor

M.D., Russian State Medical University, 2000
Toll-like receptor signaling; dendritic cells and host-pathogen interactions.

Dorothy C. Yuan, Professor

Ph.D., UT Southwestern Medical Center, 1977
Molecular analysis of regulation of immunoglobulin synthesis; interactions between B and T lymphocytes and NK cells.

OBJECTIVES

The graduate program in Molecular Microbiology emphasizes an integrated approach to the study of prokaryotic and eukaryotic organisms. The major emphasis areas are microbial pathogenesis: analysis of virulence factors, bacterial toxins, lipopolysaccharides, outer membrane proteins, interactions of pathogens and their products with eukaryotic host cells (cellular microbiology), antigenic variation, contemporary vaccine strategies, bacterial gene regulation (osmoregulation, quorum sensing), bacterial export and secretion, and genetic regulation of bacterial virulence expression; virology: human immunodeficiency virus, West Nile virus, polio virus, Dengue virus, hepatitis C virus, resistance to viral infections, viral replication and persistence, viral vaccines, eukaryotic gene regulation, signal transduction pathways, and cellular and molecular mechanisms of human oncogenesis; cellular and molecular immunology: functions of natural killer cells, antigen processing and presentation, functions of T-cell subsets, mechanisms of immune cell activation by microbial modulins, immunotoxins, immunoprivileged sites, mechanisms of inflammation, dendritic cells, tumor immunology, and generation of antibody diversity.

The overall objective is to provide a rich environment of multidisciplinary training in research strategies and technology in order to prepare the graduate for a career as an independent investigator in both the basic and applied biomedical sciences.

SPECIAL REQUIREMENTS FOR ADMISSION

Students wishing to join the Molecular Microbiology Graduate Program must be enrolled in the Division of Basic Science and be in good standing academically. Students enter the program after successfully completing the first-year Core Course and selecting a mentor. Initiation of the student's dissertation research then commences. The faculty offers advanced courses in the areas of medical microbiology and infectious diseases (including immunology), molecular basis of microbial pathogenesis, microbial genetics, virology, viruses in human cancer, cell and molecular immunology, and genetic manipulation of the immune system. Participation in selected journal clubs, seminars and electives offered within the Molecular Microbiology Graduate Program and other programs of the Division of Basic Sciences provide an array of additional educational opportunities. The program is supported in part by an NIH training grant and the S. Edward Sulkin endowment that awards up to \$1,000 annually to a highly deserving graduate student in the program.

CURRICULUM

All Division of Basic Science students take the Core Course beginning in the fall of the first year of graduate study. Upon officially joining the Molecular Microbiology Graduate Program, students take the required courses and attend the Microbiology Seminar course (which includes the student works-in-progress series and the Department of Microbiology Seminar Series) and the journal club (Contemporary Topics in Microbiology). Preparation for and completion of the qualifying examination should be done during the spring semester of the second year. For electives, students may select from courses offered by any program in the Division of Basic Science.

■ REQUIRED COURSES

Molecular Mechanisms of Infectious Disease
Fundamentals of Immunology
Core Concepts in Molecular Microbiology
Immunobiology of Infectious Disease
Elective



Seminars
Contemporary Topics
Research

Course descriptions are listed in the Division of Basic Science chapter of the catalog.

During the spring of the second year, students are required to pass a qualifying examination for admission to candidacy for the Ph.D. The qualifying examination consists of a written research proposal and its oral defense. Successful completion of the qualifying examination is required to advance to candidacy for the Ph.D. The goal of the examination is to assess the student's knowledge of fundamental facts in advanced molecular microbiology and his or her ability to synthesize these facts and apply them to scientific research. It is designed to foster the development of useful skills such as original thinking, critical reading of the literature, logical design of experiments and focused interpretation of data.

After the student is admitted to candidacy, a supervisory committee is appointed with the supervising professor as chair. This committee reviews and evaluates the student's progress annually and, upon completion of the dissertation based on original research and the student's public presentation of the work, participates in the final oral examination of the student.