Department of Cell Biology and Physiology

Cell biology is one of the primary disciplines in medical research, influencing all areas of basic and clinical investigation. The future holds great opportunities in cell biology research due to inventories of the genes and proteins from which cells are built, new experimental techniques and various model organisms. Further discoveries about the cell biology of human genes will continue to translate into therapeutics. Also on the horizon is a better understanding of how proteins and sets of proteins (e.g., macromolecular complexes) are assembled and integrated to produce function.

The Department of Cell Biology and Physiology (http://cellbiology.wustl.edu) is ranked among the top 10 cell biology departments in the country, and the research carried out by its faculty covers a broad range of fields within cellular physiology and molecular cell biology. A unifying theme is the study of fundamental processes and their regulation. These cellular processes include genome maintenance, apoptosis, cell cycle control, dynamic cell motility, angiogenesis, signal transduction and membrane trafficking, presynaptic processes, prion protein misfolding, RNA metabolism, and the structure and function of ion channels. The department’s research activities provide a foundation for studies in cancer biology, immunobiology, developmental biology, neurobiology and vascular biology. Its faculty use model organisms as well as human stem cells and a variety of techniques such as deep-etch electron and confocal microscopy to carry out their research. Cellular imaging is a particular strength of the department.

The Department of Cell Biology and Physiology oversees the course Physiology (CellBio 501), which is designed to provide first-year medical students with a foundation for their further study of clinical and applied physiology. The Molecular Cell Biology course for first-year graduate students conveys an understanding of fundamental cell biology research strategies and principles. In addition, advanced courses open to medical and graduate students provide for more detailed study of specific areas of cell biology, physiology and cellular biophysics.

Website: http://cellbiology.wustl.edu

Degrees & Requirements

More information about Department of Cell Biology and Physiology degrees (http://bulletin.wustl.edu/grad/gsas/dbbs) and requirements can be found in the Graduate School Bulletin.

Research

M75 CellBio 900

Cross-listed with L41 Biol 590

Kendall J. Blumer, PhD
506 McDonnell Sciences Building
Phone: 314-362-1668

Signaling mechanisms in cardiovascular and neurological disorders.

Sergej Djuranovic, PhD
514 McDonnell Sciences Building
Phone: 314-362-9706

Molecular mechanisms of translational control. Research examines the cellular processes that are regulated by changes in RNA metabolism.

Phyllis I. Hanson, MD, PhD
4625 Cancer Research Building
Phone: 314-747-4233

Study of protein-protein and protein-membrane interactions involved in neuronal and synaptic membrane trafficking using biochemical, biophysical, and cell biological techniques.

James E. Huettner, PhD
4929 South Building
Phone: 314-362-6628

Excitatory amino acid receptors and synaptic transmission in the central nervous system; neural differentiation of embryonic stem cells.

Vitaly Klyachko, PhD
9610 BJC Institute of Health
Phone: 314-362-5517

The mechanisms and regulation of neurotransmitter release at individual synapses; the functional roles of presynaptic processes in synaptic plasticity and information processing.

Robert P. Mecham, PhD
4606 Cancer Research Building
Phone: 314-362-2254

Understanding the complex process of extracellular matrix assembly and organization, including studying the intracellular pathways used to transport matrix components to the cell surface and identifying helper or accessory proteins that facilitate trafficking and matrix assembly. Cell-matrix interactions in development and cellular mechanisms associated with connective tissue remodeling in vascular disease and heritable diseases of connective tissues.

Michael M. Mueckler, PhD
416 McDonnell Sciences Building
Phone: 314-362-4160

Molecular biology of mammalian glucose transporters. Regulation of glucose transport by insulin and the mechanism of insulin signaling. Subcellular trafficking of the insulin-regulated glucose transporter. Structure and function relationships of...
glucose transporters. Mechanism of insertion of complex polytopic proteins into the rough endoplasmic reticulum membrane.

Colin G. Nichols, PhD
9611 BJC Institute of Health
Phone: 314-362-6630

Ion channel biology. Multiple levels of analysis from the molecular basis of channel function to in vivo physiology and disease.

David W. Piston, PhD
4912 South Building
Phone: 314-362-9121
The intracellular and intercellular dynamics of cells within the islet of Langerhans play a key role in the regulation of blood glucose levels. The islet is made up of different cell types, but very little is known about the interplay between the different cell types and how this affects their secretion of various hormones. The islet a-cells secrete insulin in response to increased blood sugar, and also in response to neurotransmitters and hormones. Glucagon also plays a key role in blood glucose homeostasis, and it is secreted by the islet a-cells. High glucose levels inhibit glucagon secretion from a-cells within the islet, but not from dispersed a-cells, but the mechanism underlying this phenomenon has not been defined. We use quantitative live cell microscopy to measure single cell parameters within intact islets held within microfluidic devices in order to expose them to spatially heterogeneous levels of various stimuli. The resulting data are fit using mathematical models of islet functional dynamics, which we are continually modifying to better fit the observed islet physiology.

Paul H. Schlesinger, MD, PhD
401 McDonnell Sciences Building
Phone: 314-362-2223
Molecular mechanism of BCL-2 family protein function, intracellular channels, biophysics of lipids, proteins and their interaction in cells and nanotechnology.

Sheila A. Stewart, PhD
7610 BJC Institute of Health
Phone: 314-362-7437
Delineation of the molecular mechanisms by which aged stromal cells contribute to tumorigenesis and the molecular mechanisms that ensure high fidelity telomere replication and genomic stability.

Heather L. True-Krob, PhD
413 McDonnell Sciences Building
Phone: 314-362-3934
Biological consequences of yeast prions — in both their capacity to function as a novel epigenetic elements, and in their utility to serve as a tractable model for the analysis of protein misfolding and aggregation that occurs in several neurodegenerative disorders.

Zhongsheng You, PhD
514 McDonnell Sciences Building
Phone: 314-362-9893
Studies of the cellular responses to DNA damage and their cancer relevance, focusing on the functional interplays between the DNA damage checkpoint, DNA repair and chromatin structure.

Peng Yuan, PhD
9608 BJC Institute of Health
Phone: 314-747-3793
Structure and function of ion channels and transporters. Ion channels and transporters play essential roles in human physiology and disease. How do channels and transporters recognize their specific substrate ions? How do they respond to various stimuli including chemical ligand, temperature, membrane voltage, and mechanical force? How do they interact with the lipid membrane where they reside? To answer these fundamental questions, we use multidisciplinary approaches including X-ray crystallography, biochemistry, biophysics and electrophysiology. Dysfunction of these membrane proteins could lead to a variety of diseases such as asthma, hypertension, cancer, heart failure, diabetes, chronic pain, and many more. The long-term goal is to provide detailed mechanistic understanding of ion channels and transporters, which will offer novel strategies for drug development and better treatment of diseases.

Faculty

Department Head

David W. Piston, PhD

Visit our website for more information about our faculty (http://www.cellbiology.wustl.edu/faculty) and their appointments.

B

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Professor of Cell Biology and Physiology (primary appointment)
BA Rice University 1977
PHD Duke University 1986

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Instructor in Cell Biology and Physiology (primary appointment)
BA University of MO St Louis 1977
MS University of MO St Louis 1982

D

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MS CENTRAL SOUTH UNIVERSITY 2001
PHD CENTRAL SOUTH UNIVERSITY 2004

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PHD Harvard University 1987
BA Indiana University 1981

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PHD Katholieke Universiteit 2007
MS Katholieke Universiteit 2003

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R
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Professor of Medicine
Professor of Pediatrics
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PHD Boston University 1977

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BA Univ of Wisconsin Madison 1976

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BS University of Leeds 1982
PHD University of Leeds 1985

P
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PHD University of Tubingen 2006
DIP UNIVERSITY OF BELGRADE 2001
BS UNIVERSITY OF BELGRADE 1999

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PHD University of Illinois 1989
MS University of Illinois 1985
BS Grinnell College 1984

Helen Piwnica-Worms, PHD
Adjunct Professor of Cell Biology and Physiology (primary appointment)
BA St Olaf College 1979
PHD Duke University 1984

Jasmina Profirovic, PHD
Adjunct Assistant Professor of Cell Biology and Physiology (primary appointment)
BS University of Belgrade 1997
PHD University of Illinois Chicago 2005

Robyn Roth
Instructor in Cell Biology and Physiology (primary appointment)

**M75 CellBio 501 Physiology**
The structures of cells, tissues and major organ systems are studied in relationship to their functions. Lectures integrate histology with cell biology and physiology. The laboratories consist of the study of prepared slides and electron micrographs using an iBook or eBook (ePub) guide. An extensive online digital annotated atlas (https://slide-atlas.org) and a video library are used to supplement the slides and electron micrographs. Presentations of case studies provide examples of clinical relevance. A dual-view microscope and slide set will be issued for each pair of students. Limited space is available for non-medical students, who must have permission from the course director to enroll.
Credit 125 units.

**M75 CellBio 900 Research Elective - Cell Biology and Physiology**
Research opportunities may be available. If interested, please contact the Department of Cell Biology & Physiology.