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/prior/2017-18/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 the 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.
PHD University of Tubingen 2007

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BA Indiana University 1981

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PHD Katholieke Universiteit 2007

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PHD Moscow State University 2002
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BS University of Minnesota 1990

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PHD University of Illinois 1998

Shizhen Wang, PHD
Adjunct Instructor in Cell Biology and Physiology (primary appointment)
PHD Tsinghua University, China 2007

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PHD University of CA San Diego 2002
MS Shanghai Inst of Biochemistry 1997
BS Zhejiang Medical University 1994

Peng Yuan, PHD
Assistant Professor of Cell Biology and Physiology (primary appointment)
PHD University of Pennsylvania 2008
BS University of Science & Tech 1997

Courses
The Department of Cell Biology and Physiology also offers courses through the Graduate School. For a full listing of courses, please visit the university online course catalog (https://courses.wustl.edu/CourseInfo.aspx?sch=L&dept=L41&crsrlv=5:9).


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.