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
discrete 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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MS Katholieke Universiteit 2003

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PHD Boston University 1977

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BA San Jose State University 1974

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

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PHD University of Illinois 1989
MS University of Illinois 1985

Helen Piwnica-Worms, PHD
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BA St Olaf College 1979
PHD Duke University 1984

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

R
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.

### 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&crsLv=5:9).