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 physiology contents within the Washington University School of Medicine's Gateway curriculum, 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

Faculty

David W. Piston, PhD (http://cellbiology.wustl.edu/People/Faculty/piston_d/)
Department Head

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

A

Ghazaleh Ashrafi, PHD
Assistant Professor of Cell Biology and Physiology (primary appointment)
Assistant Professor of Genetics
PHD Harvard University 2020

B

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

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MS University of MO St Louis 1982

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PHD CENTRAL SOUTH UNIVERSITY 2004
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Sergej Djuranovic, PHD
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PHD University of Tubingen 2007

G

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Assistant Professor of Medicine
PHD University of North Caroline C 2019
BSCS Rensselaer Polytechnic Institu 2010

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PHD Cornell University 2002

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MD Stanford University 1993
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PHD Stanford University 1993

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Professor of Neuroscience
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PHD Univ of Wisconsin Madison 2002
MS Moscow State University 1998

L
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BS Handong Global University 2000
MS Kwang-Ju Inst. Of Sci & Tech 2002

M
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Professor of Otolaryngology
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PHD Universidad del Buenos Aires 2012

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Professor of Medicine
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PHD Syracuse University 1980

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Carl F Cori Professor
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P
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Professor of Genetics
PHD Univ. of California San Diego 2020

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BS UNIVERSITY OF BELGRADE 1999
PHD University of Tubingen 2006
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David William Piston, MS, PHD
Professor of Cell Biology and Physiology (primary appointment)
Head of the Department of Cell Biology and Physiology
BS Grinnell College 1984
MS University of Illinois 1985
PHD University of Illinois 1989

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)
PHD University of Illinois Chicago 2005
Research Electives

Cell Biology and Physiology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Ghazaleh Ashrafi, PhD
510 McDonnell Sciences Building
Phone: 314-273-5518

Uncovering novel regulators of glycolytic and mitochondrial metabolism at the synapse and their role in the pathology of Alzheimer's disease.

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; cellular processes regulated by changes in RNA metabolism.

Denis Goldfarb, PhD
408 McDonnell Sciences Building
Phone: 314-273-3669

Computational mass spectrometry, proteomics, and their applications in biology.

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.

Silvia Jansen, PhD
4900 South Building
Phone: 314-273-1853

This lab's focus is on elucidating the molecular mechanisms that regulate the architecture, dimensions and dynamics of actin filament networks and then tuning them to support essential cellular functions that range from cell migration and cytokinesis to neurogenesis.
We are an interdisciplinary team of scientists driven to understand the biochemical underpinnings of mitochondrial dysfunction in human diseases. Together, we integrate large-scale methodologies with traditional biochemistry to investigate the modulation, adaptation, and basic metabolic function of mitochondria.

David W. Piston, PhD
4912 South Building
Phone: 314-362-9121

The intracellular and intercellular dynamics of cells within the islets of Langerhans play a key role in the regulation of blood glucose levels. The islets are 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 islets' 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 islets' a-cells. High glucose levels inhibit glucagon secretion from a-cells within the islets but not from dispersed a-cells, and 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.

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.

Amber N. Stratman, PhD
416 McDonnell Sciences Building
Phone: 314-273-7928

Mechanisms regulating blood vessel formation, stabilization, and blood flow sensing during development and disease.

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 novel epigenetic elements and 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

The focus of this lab is on the structure and function of ion channels and transporters, which 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 a detailed mechanistic understanding of ion channels and transporters, which will offer novel strategies for drug development and better treatment of diseases.

Courses
The Department of Cell Biology and Physiology also offers courses through the Graduate School. For current courses, please visit the university’s online course listings (https://courses.wustl.edu/CourseInfo.aspx?sch=L&dept=L41&crslvl=5:9). Visit online course listings to view offerings for M75 CellBio (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M75).

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 (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 coursemaster 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.