

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

Thomas J Broekelmann, MS

Instructor in Cell Biology and Physiology (primary appointment)

BA University of MO St Louis 1977
MS University of MO St Louis 1982

D

Panyue Deng, MS, PHD, MD

Associate Professor of Cell Biology and Physiology (primary appointment)

MS CENTRAL SOUTH UNIVERSITY 2001
PHD CENTRAL SOUTH UNIVERSITY 2004
MD Hunan Medical University 1995

Lai Kuan Dionne, PHD

Instructor in Cell Biology and Physiology (primary appointment)

PHD University of Colorado 2010 2010

Sergej Djuranovic, PHD

Associate Professor of Cell Biology and Physiology (primary appointment)

PHD University of Tubingen 2007

G

Denis Goldfarb, PHD, BSCS

Assistant Professor of Cell Biology and Physiology (primary appointment)

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

Subhadra C Gunawardana, MS, PHD

Associate Professor of Cell Biology and Physiology (primary appointment)

MS Iowa State University 1995
PHD Cornell University 2002

H

Phyllis I Hanson, MD, PHD

Adjunct Professor of Cell Biology and Physiology (primary appointment)

MD Stanford University 1993

BA Yale University 1985

PHD Stanford University 1993

James E Huettner, PHD

Professor of Cell Biology and Physiology (primary appointment)

Professor of Biomedical Engineering

BA Indiana University 1981

BS Indiana University 1980

PHD Harvard University 1987

J

Silvia Jansen, MS, PHD

Assistant Professor of Cell Biology and Physiology (primary appointment)

MS Katholieke Universiteit 2003

PHD Katholieke Universiteit 2007

K

David John Edward Kast, PHD, MS

Assistant Professor of Cell Biology and Physiology (primary appointment)

PHD University of Minnesota 2018

MS University of Minnesota 2004

BS University of Minnesota 2000

Vitaly A Klyachko, PHD, MS

Professor of Cell Biology and Physiology (primary appointment)

Professor of Biomedical Engineering

Professor of Neuroscience

BS Moscow State University 1997

PHD Univ of Wisconsin Madison 2002

MS Moscow State University 1998

L

Sun Joo Lee, PHD, MS

Instructor in Cell Biology and Physiology (primary appointment)

PHD Washington Univ in St. Louis 2010

BS Handong Global University 2000

MS Kwang-Ju Inst. Of Sci & Tech 2002

M

Michael Benjamin Major, PHD, BS1

Professor of Cell Biology and Physiology (primary appointment)

Alan A and Edith L Wolff Distinguished Professor

Professor of Otolaryngology

PHD University of Utah 2004

BS1 Michigan State University 1997

Grigory Maksaev, MS, PHD

Instructor in Cell Biology and Physiology (primary appointment)

MS Moscow Inst of Physics & Techn 1998

PHD Moscow State University 2002

Dario Maschi, PHD

Assistant Professor of Cell Biology and Physiology (primary appointment)

PHD Universidad del Buenos Aires 2012

Robert Paul Mecham, PHD

Alumni Endowed Professor of Cell Biology and Physiology (primary appointment)

Professor of Biomedical Engineering

Professor of Medicine

Professor of Pediatrics

PHD Boston University 1977

BS University of Utah 1973

Robert W Mercer, PHD

Professor of Cell Biology and Physiology (primary appointment)

BA San Jose State University 1974

PHD Syracuse University 1980

N

Colin G Nichols, PHD

Professor of Cell Biology and Physiology (primary appointment)

Carl F Cori Professor

BS University of Leeds 1982

PHD University of Leeds 1985

P

David James Pagliarini, PHD

Professor of Cell Biology and Physiology (primary appointment)

Professor of Biochemistry and Molecular Biophysics

Professor of Genetics

PHD Univ. of California San Diego 2020

Slavica Pavlovic Djuranovic, PHD, DIP

Assistant Professor of Cell Biology and Physiology (primary appointment)

BS UNIVERSITY OF BELGRADE 1999

PHD University of Tübingen 2006

DIP UNIVERSITY OF BELGRADE 2001

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

BS University of Belgrade 1997

S

Paul Henry Schlesinger, MD, PHD

Associate Professor of Cell Biology and Physiology (primary appointment)

MD University of Chicago 1970

PHD University of Chicago 1973

BS University of Illinois 1966

Sheila Stewart-Wigglesworth, PHD

Professor of Cell Biology and Physiology (primary appointment)

Gerty Cori Professor of Cell Biology and Physiology

Professor of Medicine

PHD University of CA Los Angeles 1996

BS University of Minnesota 1990

Amber Nicole Stratman, BS1, PHD1

Assistant Professor of Cell Biology and Physiology (primary appointment)

Assistant Professor of Developmental Biology

BS1 Truman State University 2006

PHD1 University of MO Columbia 2010

T

Heather L. True, PHD, MS

Professor of Cell Biology and Physiology (primary appointment)

Associate Director of the Division of Biology and Biomedical Sciences

PHD University of Illinois 1998

BS Univ of Wisconsin Madison 1992

MS University of Illinois 1995

W

Shizhen Wang, PHD

Adjunct Instructor in Cell Biology and Physiology (primary appointment)

PHD Tsinghua University, China 2007

Y

Zhongsheng You, MS, PHD

Associate Professor of Cell Biology and Physiology (primary appointment)

Associate Professor of Medicine

MS Shanghai Inst of Biochemistry 1997

BS Zhejiang Medical University 1994

PHD University of CA San Diego 2002

Peng Yuan, PHD

Associate Professor of Cell Biology and Physiology (primary appointment)

PHD University of Pennsylvania 2008

BS University of Science & Tech 1997

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

406 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.

David J. Kast, PhD

4900 South Building
Phone: 314-273-1852

The long-term goal of this lab's research is to understand the fundamental cellular and molecular mechanisms that drive the biogenesis and dynamics of intracellular membrane compartments, including the endocytic vesicles, the endoplasmic reticulum, the Golgi apparatus and the mitochondria.

Vitaly Klyachko, PhD

501 McDonnell Sciences Building
Phone: 314-362-5517

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

Michael Benjamin Major, PhD

406 McDonnell Sciences Building
Phone: 314-273-3669

The Major lab studies how perturbation of specific signal transduction pathways contributes to the initiation, progression and dissemination of cancer.

Robert P. Mecham, PhD

4606 Cancer Research Building
Phone: 314-362-2254

This lab strives to understand 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. We also study cell-matrix interactions in development and cellular mechanisms associated with connective tissue remodeling in vascular disease and heritable diseases of the connective tissues.

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 J. Pagliarini, PhD

1127 Couch Building
Phone: 314-273-2330

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' α -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' α -cells. High glucose levels inhibit glucagon secretion from α -cells within the islets but not from dispersed α -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?sched=L&dept=L41&crslvl=5:9>).

Visit online course listings to view offerings for M75 CellBio (<https://courses.wustl.edu/CourseInfo.aspx?sched=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.
