Department of Pathology & Immunology

The Department of Pathology & Immunology (http://pathology.wustl.edu/) is involved in the clinical diagnosis and monitoring of disease, in the teaching of pathology and immunology, and in research on the molecular basis of disease and immunology.

The department is responsible through its divisions for studying the pathogenesis and the biochemical and anatomical basis of diseases. Pathologists do research on disease processes using molecular, genetic and structural analysis. Pathologists have the responsibility for the cytological and anatomical diagnosis of diseases and for developing novel structural and molecular approaches for the analysis of them, particularly cancers and infectious diseases. The divisions of Anatomic and Molecular Pathology (https://pathology.wustl.edu/divisions/amp/), Immunobiology (https://pathology.wustl.edu/divisions/imunobiology/), Laboratory and Genomic Medicine (http://pathology.wustl.edu/divisions/lgm/) and Neuropathology (http://pathology.wustl.edu/divisions/neuropathology/) have faculty involved in teaching, clinical service and research. Prominent areas of research include experimental diabetes, hematology, bone pathophysiology, cancer, and gastrointestinal and vascular pathology.

The department teaches an extensive course during the second year of the curriculum and presents a number of conferences that third- and fourth-year students can attend. The department also offers a number of clerkships. The course director of the second-year Pathology course is Erika C. Crouch, PhD, MD. Students can take clerkships in Autopsy Pathology, Surgical Pathology or Laboratory Medicine, or they may participate in the research activities of the faculty.

The Division of Immunobiology (https://pathology.wustl.edu/divisions/imunobiology/) integrates immunobiology activities at the school. It is responsible for the teaching of immunology during the first year of the curriculum (Brian T. Edelson, MD, PhD, is the course director) and for conducting basic research in immunobiology and in the immunological basis of disease.

Many faculty in the department are involved in graduate teaching and participate in the various programs offered by the Division of Biology and Biomedical Sciences (http://dbbs.wustl.edu/Pages/). The department has strong participation in the Immunology graduate program.

Website: https://pathology.wustl.edu

Faculty

Joseph Gaut, MD, PhD (https://pathology.wustl.edu/people/joseph-gaut-md-phd/)
Anatomic and Molecular Pathology Division Head

Robert Schreiber, PhD (https://pathology.wustl.edu/people/robert-schreiber-phd/)
Immunobiology Division Head

Charles Eby, MD (https://pathology.wustl.edu/people/charles-eby-md/)
Laboratory and Genomic Medicine Division Head

Robert E. Schmidt, MD, PhD (https://pathology.wustl.edu/people/robert-schmidt-md-phd/)
Neuropathology Division Head

Visit our website for more information about our faculty (https://pathology.wustl.edu/people/) and their appointments.

A

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Bachelor of Science, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1974
Master of Science, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1977
Doctor of Philosophy, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1981

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Professor of Biochemistry and Molecular Biophysics
Professor of Molecular Microbiology
Alumni Professorship - Pathology and Immunology #2
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Doctor of Philosophy, University of Maryland Baltimore County, 2001

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Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Pediatrics
Madison, 2005
Madison, 2009

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Professor of Pathology and Immunology (primary appointment)
Master of Science, University of Chicago, 2005
Doctor of Philosophy, Massachusetts Institute of Technology, 2009
Samuel James Ballentine, M.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, New York University, 2013

Michael James Barratt, Ph.D.
Associate Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, Kings College London, 1994

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Bachelor of Science, Nebraska Wesleyan University, 1998
Doctor of Philosophy, University of Nebraska, 2004
Doctor of Medicine, University of Nebraska, 2006

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Doctor of Philosophy, University of California Berkeley, 2001

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Bachelor of Science, American University of Beirut, 1996
Doctor of Medicine, American University of Beirut, 2001

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Doctor of Philosophy, University of Alabama in Tuscaloosa, null

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Master of Science, University of Milan, 2010
Doctor of Philosophy, University of Freiberg, 2018

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Bachelor of Science, Boston University, 2001
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Doctor of Medicine, University of Texas Galveston, 1981

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Professor of Molecular Microbiology
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Bachelor of Science, University of Alberta, 2002

Doctor of Philosophy, University of Alberta, 2007

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Bachelor of Science, Washington University in St Louis, 2008
Doctor of Medicine, Tulane University, 2013

Yang Cao, Ph.D.
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Doctor of Philosophy, University of Wisconsin Madison, 2014

Marina Cella, M.D.
Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, University of Genova, 1989

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Instructor in Pathology and Immunology (primary appointment)
Master of Science, Ohio State University, 2010
Main Campus, 2011

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Professor of Otolaryngology
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Doctor of Medicine, University of Pennsylvania, 2004

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Bachelor of Science, Seoul National University, 1982
Master of Science, Seoul National University, 1984
Doctor of Philosophy, University of Illinois, 1988

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Doctor of Medicine, Washington University in St Louis, 2012

Marco Colonna, M.D.
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Professor of Medicine
Robert Rock Belliveau MD Professor of Pathology
Doctor of Medicine, Parma University, 1983

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Assistant Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Centenary College Louisiana, 1998
Doctor of Philosophy, Vanderbilt University, 2005
Doctor of Medicine, Vanderbilt University, 2008

Joseph C. Corbo, Ph.D., M.D.
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Professor of Genetics
Professor of Ophthalmology and Visual Sciences
Baccalaureatus, Stanford University, 1990
Bachelor of Science, Stanford University, 1990
Doctor of Philosophy, University of California, 1997
Doctor of Medicine, University of California, 1999

**Richard James Cote, M.D.**
Professor of Pathology and Immunology (primary appointment)
Head of the Department of Pathology and Immunology
Edward Mallinckrodt Professorship in Pathology
Doctor of Medicine, University of Chicago, 1980

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Professor of Pathology and Immunology (primary appointment)
Vice Chair - Education
Doctor of Philosophy, University of Washington, 1978
Doctor of Medicine, University of Washington, 1979

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Doctor of Medicine, Kasturba Medical College, 2000

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Professor of Molecular Microbiology
Division Chief
Professor of Pediatrics
Bachelor of Science, Macalester College, 2000
Doctor of Philosophy, University of Washington, 2005

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Doctor of Medicine, Washington University in St Louis, 1966

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Doctor of Medicine, Saint Louis University, 1985

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Doctor of Philosophy, Indiana University Bloomington, 1992

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Bachelor of Science, University of Delaware, null
Doctor of Philosophy, Duke University, null

**Eric James Duncavage, M.D.**
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Bachelor of Science, Vanderbilt University, 1998
Doctor of Medicine, University of Tennessee, 2004

**Gavin P. Dunn, Ph.D., M.D.**
Associate Professor of Pathology and Immunology
Associate Professor of Neurology
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Doctor of Philosophy, Washington University in St Louis, 2006
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Bachelor of Science, Chestnut Hill College, 2014
Doctor of Philosophy, Vanderbilt University, 2019

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Bachelor of Science, Duke University, 1977
Doctor of Medicine, Vanderbilt University, 1981

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Doctor of Philosophy, Washington University in St Louis, 1995
Doctor of Medicine, Washington University in St Louis, 2004

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Doctor of Medicine, Osaka University, 1994
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Doctor of Medicine, University of Cincinnati, 1989

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Doctor of Philosophy, University of Tennessee Health Science Center, 2011

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Doctor of Philosophy, University of Rochester, 2017

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Doctor of Medicine, Medical College of Ohio, 1996

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Bachelor of Science, University of Wisconsin Madison, 1986
Doctor of Philosophy, University of California San Diego, 1993

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Doctor of Medicine, Washington University in St Louis, 2004

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Doctor of Philosophy, Stanford University, 1990

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Doctor of Medicine, American University of the Caribbean School of Medicine, 2005

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Bachelor of Science, University of Illinois, 1985

Master of Science, Iowa State University, 1988
Doctor of Philosophy, University of Wisconsin Madison, 1992

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Professor of Medicine
Bachelor of Science, Ohio University, 1976
Doctor of Medicine, Medical College Georgia, 1980
Master of Science, Saint Louis University, 2003

H

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Bachelor of Arts, Princeton University, 2000
Doctor of Philosophy, Washington University in St Louis, 2008
Doctor of Medicine, Washington University in St Louis, 2008

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Bachelor of Science, Missouri State University (Formerly Southwest Missouri State), 1998
Doctor of Philosophy, Washington University in St Louis, 2006

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Doctor of Veterinary Medicine, Tufts University, 1995

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Master of Science, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1972
Doctor of Philosophy, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1975

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Doctor of Medicine, Aga Khan University, 1989

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Doctor of Medicine, Fudan University, 1993
Doctor of Philosophy, Rutgers University, 2001

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Master of Science, University of Cologne (Koln), 2004
Doctor of Philosophy, University of Cologne (Koln), 2008

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Bachelor of Science, Lincoln School of Commerce, 2007
Doctor of Philosophy, Washington University in St Louis, 2016

J

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Bachelor of Science, Washington University in St Louis, 2000
Doctor of Philosophy, University of Illinois Chicago, 2008
Doctor of Medicine, University of Illinois Chicago, 2008

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Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
Bachelor of Science, Manipal University, 2007
Master of Science, Manipal University, 2009
Doctor of Philosophy, Dalhousie University, 2015

K

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Professor of Neurology
Professor of Neuroscience
Professor of Neurological Surgery
Alan A and Edith L Wolff Distinguished Professor
Aviv University, 1998
Master of Science, Weizmann Institute of Science, 1999
Doctor of Philosophy, Weizmann Institute of Science, 2004

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Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, Baylor University, 2007

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Doctor of Medicine, University of North Carolina, 1988

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Bachelor of Science, University of Illinois, 2006
Doctor of Philosophy, Washington University in St Louis, 2014

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Doctor of Medicine, Albert Einstein College of Medicine, 1962

L

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Oree M Carroll and Lillian B Ladenson Professor of Clinical Chemistry in Pathology and Immunology
Bachelor of Science, Pennsylvania State University, 1964
Doctor of Philosophy, University of Maryland, 1971

Yi-Shan Lee, Ph.D., M.D.
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Doctor of Medicine, National Taiwan University, 2000
Doctor of Philosophy, Duke University, 2008

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Doctor of Science, Duke University, 1993

Chieh-Yu Lin, M.D.
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Doctor of Medicine, National Taiwan University, 2009

Chang Liu, Ph.D., M.D.
Associate Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, Peking Union Medical College, 2004
Doctor of Philosophy, Oregon Health Science University, 2010

Ta-Chiang Liu, Ph.D., M.D.
Associate Professor of Pathology and Immunology (primary appointment)
Ming University, 1997
Doctor of Philosophy, Imperial College, 2003

Xiuli Liu, Ph.D.
Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, University of Arkansas for Medical Sciences, 2002

Ulrike Lorenz, Ph.D.
Professor of Pathology & Immunology (Pending Executive Faculty Approval) (primary appointment)
null, Freie Universität Berlin, 1989

M

Changqing Ma, Ph.D.
Associate Professor of Pathology and Immunology (primary appointment)
Health System, 2005

Mena Magdi Zaki Mansour, M.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, Alexandria University, 2005

Nidia Messias, M.D.
Associate Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, Faculdade Medicina Estadual (ISEP), 1998

Denis Mogilenko, M.S., Ph.D.
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
Bachelor of Science, St Petersburg State University, 2005
Master of Science, St Petersburg State University, 2007
Doctor of Philosophy, Academy of Sciences of USSR, 2011

Martina Molgora, M.S., Ph.D.
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
Bachelor of Science, University of Milan, 2011
Master of Science, University of Milan, 2013
Doctor of Philosophy, Open University, 2018

Nima Mosammaparast, Ph.D., M.D.
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Medicine
Bachelor of Science, University of Rochester, 1998
Doctor of Medicine, University of Virginia, 2005
Doctor of Medicine, University of Virginia, 2006

Kenneth M Murphy, Ph.D., M.D.
Professor of Pathology and Immunology (primary appointment)
Eugene Opie First Centennial Professor of Pathology and Immunology
Doctor of Philosophy, Johns Hopkins University, 1984
Doctor of Medicine, Johns Hopkins University, 1984

Theresa L Murphy, Ph.D.
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Bachelor of Science, University of Arizona, 1978
Doctor of Philosophy, Johns Hopkins University, 1983

Rakesh Nagarajan, Ph.D., M.D.
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Bachelor of Arts, University of Virginia, 1994
Doctor of Philosophy, Washington University in St Louis, 2002
Doctor of Medicine, Washington University in St Louis, 2002

Pooja P Navale, M.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, Tata Inst of Fundamental Resch, 2013

Julie Ann Neidich, M.D.
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Associate Professor of Pediatrics
Doctor of Medicine, George Washington University, 1983

Christopher A Nelson, Ph.D.
Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, University of Wisconsin Madison, 1985
Doctor of Philosophy, Washington University in St Louis, 1995

Eugene Merle Oltz, Ph.D.
Adjunct Professor of Pathology and Immunology
Bachelor of Science, Cornell University, 1982
Doctor of Philosophy, Columbia University, 1987

Vijayalakshmi Padmanabhan, M.P.H., MBBS
Professor of Pathology and Immunology (primary appointment)
Foreign MD equivalent, Kasturba Medical College, 1988
Master of Public Health, Dartmouth College, 2015

Bijal A. Parikh, Ph.D., M.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, Rutgers University, 2004
Doctor of Medicine, University of Medicine and Dental Of New Jersey, 2006

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Bachelor of Science, Skidmore College, 2008
Master of Science, University College Cork, 2010
Doctor of Philosophy, University of Pennsylvania, 2015
Doctor of Medicine, University of Pennsylvania, 2016

Jacqueline Elise Payton, Ph.D., M.D.
Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Bradley University, 1996
Doctor of Philosophy, University of Illinois, 2002
Doctor of Medicine, University of Illinois, 2004

Richard J. Perrin, Ph.D., M.D.
Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Yale University, 1992
Doctor of Philosophy, University of Illinois, 2001
Doctor of Medicine, University of Illinois Chicago, 2004

Stephen P. Persaud, Ph.D., M.D.
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Bachelor of Science, Cornell University, 2005
Doctor of Philosophy, Washington University in St Louis, 2015
Doctor of Medicine, Washington University in St Louis, 2015

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Professor of Pathology and Immunology (primary appointment)
Professor of Obstetrics and Gynecology
Bachelor of Arts, University of California, 1981
Doctor of Philosophy, University of California, 1987
Doctor of Medicine, University of California, 1988
R

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Professor of Medicine
Unanue Distinguished Professor of Immunology
Bachelor of Science, Temple University, 1991
Doctor of Philosophy, State University of New York, 1995

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Robert L. Kroc Professor of Pathology and Immunology

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Bachelor of Arts, Mankato State University, 1983
Doctor of Medicine, University of Minnesota, 1988

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India Inst of Medical Sci, 2005

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Bachelor of Science, Texas Tech University, 2004
Master of Science, Texas Tech University, 2007
Doctor of Philosophy, Medical University of South Carolina, 2015

Marianna B Ruzinova, Ph.D., M.D.
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Doctor of Philosophy, Cornell University, 2004
Doctor of Medicine, Cornell University, 2005

S

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Bachelor of Science, PONTIFICIA UNIV CATOLICA do PA, 2008
Master of Science, PONTIFICIA UNIV CATOLICA do PA, 2011
Doctor of Philosophy, PONTIFICIA UNIV CATOLICA do PA, 2016

Robert Edward Schmidt, Ph.D., M.D.
Professor of Pathology and Immunology (primary appointment)
Division Chief - Division of Neuropathology
Bachelor of Arts, Washington University in St Louis, 1969
Doctor of Philosophy, Washington University in St Louis, 1976
Doctor of Medicine, Washington University in St Louis, 1976

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Professor of Pathology and Immunology (primary appointment)
Professor of Molecular Microbiology
Andrew M Bursky and Jane M Bursky Distinguished Professor

Bachelor of Arts, State University of New York, 1968
Doctor of Philosophy, State University of New York, 1973

Molly Schroeder, Ph.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Saint Louis University, 2006
Doctor of Philosophy, Baylor College of Medicine, 2012

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Associate Professor of Pathology and Immunology (Pending Executive Faculty Approval) (primary appointment)
Bachelor of Science, Washington University in St Louis, 2002
Master of Science, Washington University in St Louis, 2005
Doctor of Philosophy, Washington University in St Louis, 2011
Doctor of Medicine, Washington University in St Louis, 2011

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Bachelor of Arts, Columbia University, 1979
Doctor of Medicine, Columbia University, 1984

Kathleen C Sheehan, Ph.D.
Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, University of Notre Dame, 1980
Doctor of Philosophy, Saint Louis University, 1986

Igor Smirnov, D.V.M.
Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Veterinary Medicine, Moscow Veterinary Academy, 1993

Lulu Sun, Ph.D., M.D.
Assistant Professor of Pathology and Immunology (Pending Executive Faculty Approval) (primary appointment)
Bachelor of Science, McGill University, 2007
Doctor of Philosophy, Washington University in St Louis, 2016
Doctor of Medicine, Washington University in St Louis, 2016

Sanjay Joshua Swamidass, M.A., Ph.D., M.D.
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Biomedical Engineering
Bachelor of Science, University of California, 2000
Master of Arts, University of California, 2006
Doctor of Philosophy, University of California, 2007
Doctor of Medicine, University of California, 2009

Steven L Teitelbaum, M.D.
Professor of Pathology and Immunology (primary appointment)
Professor of Medicine
Messing Professor of Pathology and Immunology
Bachelor of Arts, Columbia University, 1960
Doctor of Medicine, Washington University in St Louis, 1964

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Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Tulane University, 2005
Doctor of Philosophy, University of Texas Health Sciences at San Antonio, 2011
Doctor of Medicine, University of Texas Health Sciences at San Antonio, 2013

Ning Tsao, Ph.D.
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
Doctor of Philosophy, National Taiwan University, 2015

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Bachelor of Science, University of Tulsa, 2011

Emil Raphael Unanue, M.D.
Professor of Pathology & Immunology (primary appointment)
Paul and Ellen Lacy Professor of Pathology and Immunology
Bachelor of Science, Institute of Secondary Education, 1952
Doctor of Medicine, Havana University, 1960

Steven John Van Dyken, Ph.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Calvin College, 1998
Doctor of Philosophy, University of San Diego, 2006

Siddarth Venkatesh, Ph.D.
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Doctor of Philosophy, Rockefeller University, 2015

William Vermi
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Bachelor of Arts, Harvard University, 1977
Doctor of Philosophy, Harvard University, 1985
Doctor of Medicine, Harvard University, 1985

Xiaoxiao Wan, Ph.D.
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Doctor of Philosophy, University of Missouri Columbia, 2015

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Instructor in Pathology and Immunology (primary appointment)
Bachelor of Science, Peking University, 2008
Doctor of Philosophy, University of Pennsylvania, 2015

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Bachelor of Arts, University of Pennsylvania, 1985
Doctor of Philosophy, Washington University in St Louis, 1992
Doctor of Medicine, Washington University in St Louis, 1992

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Bachelor of Science, University of Arkansas Main Campus, 2006
Napoca, 2006
Doctor of Philosophy, University of Arkansas for Medical Sciences, 2017
Doctor of Medicine, University of Arkansas for Medical Sciences, 2017

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Doctor of Osteopathic Medicine, Kirksville College of Osteopathic Medicine, 2013

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Professor of Pathology & Immunology (primary appointment)
Bachelor of Arts, Princeton University, 1975
Master of Science, University of North Carolina, 1978
Doctor of Medicine, University of North Carolina, 1989

Parker C Wilson, Ph.D., M.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Johns Hopkins University, 1975
Main Campus), 1977
Doctor of Philosophy, Medical University of South Carolina, 2013
Doctor of Medicine, Medical University of South Carolina, 2013

Terry A Woodford-Thomas, M.S., Ph.D.
Adjunct Assistant Professor of Pathology and Immunology
Bachelor of Science, Eastern Illinois University, 1975
Main Campus), 1977
Doctor of Philosophy, Virginia Polytechnic Institute and State University, 1982

Chao Wu, Ph.D.
Instructor in Pathology and Immunology (primary appointment)
Bachelor of Science, China Agriculture University, 2008
Doctor of Philosophy, Washington University in St Louis, 2016

Melanie Leann Yarbrough, Ph.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, University of Texas Southwestern Medical Center at Dallas, 2009

Pavel Zakharov, M.S., Ph.D.
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
Master of Science, Moscow State University, 2016
Doctor of Philosophy, Moscow State University, 2016

Mark A. Zaydman, M.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Case Western Reserve University, 2007
Doctor of Medicine, Washington University in St Louis, 2016

Bernd Heinrich Zinselmeyer, Ph.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, University of Strathclyde, 2006

Wei Zou, M.A., Ph.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Master of Arts, Sathyabama Institute of Science and Technology (SIST), 1994
Doctor of Philosophy, Hebrew University, 2003

Research Electives
Pathology and Immunology Research Electives
During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Paul M. Allen, PhD
BJC Institute of Health, 8th Floor
Phone: 314-362-8758
This lab’s focus is on research in immunology and the recognition of antigen by T cells. We are investigating how the T cell receptor functions developmentally, biochemically and structurally. We utilize in vivo models to study the role of T cells in alloreactivity/graft rejection and inflammatory bowel disease.

Jacques U. Baenziger, MD, PhD
Kingshighway Building, 2nd Floor, Room 2423
Phone: 314-362-8730
Glycobiology: informational role of carbohydrates in protein targeting and reproductive endocrinology.

Jeffrey I. Gordon, MD
4444 Forest Park, 5th Floor
Phone: 314-362-7243
Genomic and metabolic foundations of symbiotic host-microbial interactions in the human gut; impact on obesity and malnutrition.

Michael McDaniel, PhD
3709 West Building
Phone: 314-362-7435
The focus of this laboratory is to study the function and growth of pancreatic islets in Types 1 and 2 diabetes. Mammalian target of rapamycin (mTOR) is a protein kinase that integrates signals from growth factors and nutrients to regulate DNA and protein synthesis. G-protein–coupled receptor agonists such as GLP-1 have been shown to enhance proinsulin biosynthesis and secretion and to stimulate cellular growth and proliferation. Our objective is to further explore the mechanisms of action of GLP-1 to enhance DNA and protein synthesis via mTOR in rodent and human islets. These studies are of fundamental interest for optimizing mTOR to induce cellular growth and proliferation, to enhance pre- and post-islet transplantation in Type 1 diabetes, and to prolong b-cell compensation in response to insulin resistance in Type 2 diabetes. The failure of b-cells in obesity-associated Type 2 diabetes is believed to correlate with the intracellular accumulation of lipids that contribute to defects in insulin secretion and the maintenance of b-cell mass. Our studies have identified lipoprotein lipase in b-cells; this is a key enzyme for catalyzing the hydrolysis of lipoprotein-associated TAG to produce free fatty acids (FFAs) for local cellular uptake. We are also characterizing the effects of enhanced FFA uptake through fatty acid transporters and determining the regulation of lipid droplet synthesis and breakdown by lipid droplet–associated proteins. Recent studies suggest that FFAs upregulate mitochondrial uncoupling proteins proposed to dissipate the proton gradient across the mitochondrial inner membrane. The objective of this study is to delineate the link between FFAs and b-cell mitochondrial dysfunction in Type 2 diabetes.

Kenneth M. Murphy, MD, PhD
Clinical Sciences Research Building, 7th Floor, Room 7766
Phone: 314-362-2009
Function of dendritic cells in T cell responses and anti-tumor vaccines.

Robert D. Schreiber, PhD
BJC Institute of Health, 8th Floor
Phone: 314-362-8747
Tumor immunology and cancer immunoediting; research on natural and therapeutically induced responses to tumors; definition of the molecular roles of interferon-gamma and interferon-alpha/beta in these processes.

Carl H. Smith, MD
St. Louis Children’s Hospital
Phone: 314-454-6029
Placental transport; surface membrane structure and function.

**Thaddeus S. Stappenbeck, MD, PhD**  
Clinical Sciences Research Building, North Tower, Room 1020  
Phone: 314-362-4214  
My lab studies the cause of inflammatory bowel disease, a condition that leads to spontaneous inflammation of the intestine. We study the mechanisms of host gene mutations as well as abnormalities in host-microbial interactions that drive this disease.

**Steven Teitelbaum, MD**  
Barnes-Jewish Hospital  
Phone: 314-454-8463  
This lab studies the cellular and molecular mechanisms of bone remodeling, with particular emphasis on osteoclast biology as it relates to the pathogenesis and prevention of diseases such as osteoporosis. We focus on integrin and cytokine biology utilizing a variety of genetically manipulated mice.

**John Turk, MD, PhD**  
6609 Wohl  
Phone: 314-362-8190  
This lab looks at phospholipase A2 (PLA2) enzymes in the regulation of insulin secretion from pancreatic islet cells (e.g., a novel iPLA2 that does not require Ca2+ cloned from rat and human islets that is involved in cell secretion and proliferation). We also perform studies of iPLA2, its post-translational modifications, and its interactions with other proteins involving mice that are iPLA2-deficient globally or in selected tissues, transgenic mice that overexpress iPL in -cells, and insulinoma cells with genetically manipulated iPLA2 expression. The mass spectrometric characterization of proteins and complex lipids is an important tool in these studies.

**Emil R. Unanue, MD**  
BJC Institute of Health, 8414  
Phone: 314-362-8748  
Our focus is research that involves immunobiology and immunopathology. We examine cellular interactions that result in immune induction and cellular immunity. These cellular interactions are examined in normal immune responses and in autoimmune diseases. The focus is to identify the proteins responsible for the activation of lymphocytes in Type 1 diabetes.

**Herbert Virgin, MD, PhD**  
Clinical Sciences Research Building, Room 8849  
Phone: 314-362-9223  
We work on issues at the interface of virology and immunology by analyzing aspects of viral immunity, viral pathogenesis and viral genetics that contribute to virulence and disease.

**Mark A. Watson, MD, PhD**  
Clinical Sciences Research Building, North Tower, Room 1029  
Phone: 314-454-7919  
Our laboratory is interested in defining patterns of somatic gene mutation, gene expression and quantitative tumor clonality that can be used to predict distant site metastases and therapeutic vulnerability in patients with lung and breast cancer. Experimental approaches use histopathological review as well as the next-generation DNA exome and RNA sequencing (NGS) of primary cancer patient tissues, coupled with bioinformatics and statistical modeling, to identify candidate biomarker patterns that may be useful for the clinical management of cancer patients.

**Courses**

Visit online course listings to view offerings for M60 Path (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M60).

**M60 Path 523 Immunology**  
The course consists of lectures, laboratory exercises and clinical correlations. It covers all aspects of the immune response - general properties of the immune system, effector molecules, cells and their function, cellular interactions, vaccines, and immunological diseases. Two laboratory exercises focus on blood typing and allergy. Students will also meet in groups (20-25 students) with clinicians to discuss a variety of clinical cases that relate to the course material.  
Credit 37 units.

**M60 Path 665 Pathology**  
This course is a comprehensive survey of the biology and morphology of human disease through a combination of lectures and laboratory sessions. The year begins with a review of basic disease mechanisms at the cellular and molecular level. Subsequently, the pathogenesis and characteristics of important diseases involving each organ system of the body are presented. During the year, students will become familiar with the methods of contemporary pathologic analysis. They will also learn how the results of pathologic studies are used in the clinical setting to establish diagnoses, to assess prognosis and response to therapy, and to evaluate the quality of patient care.  
Credit 115 units.

**M60 Path 702 Laboratory Medicine Clerkship**  
This elective is designed to teach the student how clinical laboratory assays are used in the diagnosis of disease and to understand the quality assurance tools the laboratory utilizes to assure the reliability of tests. The two-week elective includes rotations through laboratories in clinical chemistry, clinical microbiology, transfusion medicine, molecular diagnostics and hematology. During the elective the student will have a daily schedule, which includes didactic sessions with senior staff and house staff. Particularly useful clinical skills to be acquired include: morphology of peripheral blood smears and bone
marrow biopsies; interpretation of coagulation tests, biomarkers of cardiac damage and serum protein electrophoresis patterns. Also covered are appropriate use of blood component therapy, and therapeutic apheresis and identification of infectious organisms. Students will attend quality assurance meetings with senior staff, participate in microbiology rounds and present case discussions during this elective. Credit 77 units.

M60 Path 750 Surgical Pathology Clerkship
This elective is designed to familiarize students with the discipline of surgical pathology and to encourage the development of basic skills in gross pathology and histopathological interpretation. The Laboratory of Surgical Pathology at Barnes-Jewish Hospital receives a broad range of medical biopsy material in addition to specimens derived from the busy surgical subspecialty practices. As a result, this elective is beneficial not only for students considering a career in pathology, but also for students planning careers in internal medicine, surgery, obstetrics-gynecology, pediatrics, radiology, radiation oncology and dermatology. Students on this elective will (1) learn how patient specimens are received and processed, (2) acquire skills in the gross examination and microscopic diagnosis of disease through active participation and (3) learn the role of the pathologist in the preoperative, intraoperative, and postoperative care and management of patients. Students will function as junior house staff managing their own cases with supervision from residents, fellows and attending pathologists. Students may also wish to participate in ongoing research projects within the Department as time, and interest, allows. The daily schedule for students begins at 8:00 a.m. with morning conference. In general, the student will be able to complete all gross examination and sign-out activities by 4:30 p.m. Students are welcome to stay beyond 4:30 p.m. to participate in any of the academic or other working activities of the Division. Student time distribution: Clinical duties 85%, Conference/Lectures 15%; Major teaching responsibility: Attending staff, residents and fellows; Patients seen/weekly: N/A; On call/weekend responsibility: None. Credit variable, maximum 77 units.

M60 Path 805 Autopsy Pathology
This elective is designed to introduce students to autopsy pathology. Students will assist in performing autopsies, and together with the first-year pathology residents, will participate in all of the activities of the Autopsy Service including brain cutting, specialty microscopic conferences, and weekly autopsy case conferences. Students will be under the direction of senior pathology faculty. Note that this elective is not available during the COVID-19 pandemic.

M60 Path 807 Dermatopathology
The student will be involved in all activities of the dermatopathology service. These include review, discussion, and signout of microscopic skin specimens. Signout occurs each day with a team that includes an attending, fellow, and residents from both dermatology and pathology. The medical student will work closely with the residents and fellow to preview cases prior to signout. Dermatology Grand Rounds is held Thursday mornings and is mandatory. In addition, dermatopathology slide review conferences are held most Tuesday mornings and are mandatory (schedule will be provided). Other learning opportunities include informal unknown slide sessions and consensus conferences. The primary goal of this elective is to acquire basic competence in the diagnosis of skin diseases at the microscopic level.

M60 Path 812 General Cytopathology
This elective is designed to familiarize students with the discipline of Cytopathology and to encourage the development of basic skills. Cytopathology impacts many different areas of patient care and medical practice. The Cytopathology Laboratory at Barnes-Jewish Hospital receives a broad range of medical cytology material involving fine needle aspiration biopsies (FNA), body fluids and Pap tests. As a result, the elective is beneficial for students considering a career in pathology and for students planning careers in internal medicine, surgery, OB/GYN, ENT, and radiology. The focus of the experience can be customized based on the interest of the student. Desk space and a microscope are provided. Students on the elective will (1) learn how patient specimens are received and processed, (2) acquire skills in the microscopic diagnosis of disease through active participation, and (3) learn the role of the cytopathologist in the care and management of patients. Students will have the opportunity to function as junior house staff managing their own cases with supervision from residents, fellows, and attending cytopathologist. There are textbooks and extensive study sets to permit students to focus on specific areas of interest. The daily schedule for student begins previewing the cytology cases at 8:00 am. The student will attend daily pathology noon didactic conferences. In general, the student will be able to complete sign-out activities by 4:30 pm.

M60 Path 813 Molecular Pathology
This elective is designed to introduce students to the field of Molecular Pathology, including established molecular diagnostics and Next Generation Sequencing clinical assays. Students will learn through observation in the laboratory, didactic sessions, resident and fellow presentations, sign out with attending pathologists, and clinical informatics workshops. Opportunities for assay validation as well as additional instruction in cytogenomics are available and tailored to student interest. Students will work with residents/fellows on the rotation and participate as part of the team.

M60 Path 815 OB/GYN Pathology
This elective is a subinternship in Ob/Gyn pathology. The expectation is that the student participate in the service along with house officer rotating on the service. The elective stresses the principles of anatomic pathology when applied to operative material in obstetrics and gynecology. The sub-intern will examine gross and microscopic specimens in the Ob/Gyn Pathology Lab and review the histology along with pertinent literature with a senior pathologist. The elective is appropriate both for students intending a career in pathology, and those intending careers in other specialties. The student will gain familiarity with the diagnosis of more common OB/Gyn diagnoses, including malignancy, and premalignant conditions, as well as placental conditions. Ample time will be available for attending conferences in both OB/Gyn and Pathology.

M60 Path 820 Surgical Pathology
This elective is designed to familiarize students with the discipline of Surgical Pathology and to encourage the development of basic skills in gross pathology and histopathological interpretation. The Laboratory of Surgical Pathology at Barnes-Jewish Hospital receives a broad range
of medical biopsy material in addition to specimens derived
from the busy surgical subspecialty practices. As a result, this
elective is beneficial not only for students considering a career
in pathology, but also for students planning careers in internal
medicine, surgery, obstetrics-gynecology, pediatrics, radiology,
radiation oncology and dermatology. Students on this elective
will (1) learn how patient specimens are received and processed,
(2) acquire skills in the gross examination and microscopic
diagnosis of disease through active participation, and (3) learn
the role of the pathologist in the preoperative, intraoperative, and
postoperative care and management of patients. Students will
function as junior house staff, managing their own cases with
supervision from residents, fellows, and attending pathologists.
Students may also wish to participate in ongoing research
projects within the department as time and interest allow. At the
end of the rotation, students are required to do a formal case
presentation for the residents, fellows, and attending staff. The
daily schedule for students begins at 8:00 am with morning
conference. In general, the student will be able to complete all
gross examination and sign-out activities by 4:30 pm. Students
are welcome to stay beyond 4:30 pm to participate in any of the
academic or other working activities of the Division.

M60 Path 825 Introduction to Neuropathology
The course is structured to give the student a full-time immersion
in the specialty of Neuropathology, including both Neurosurgical
and Neuroautopsy derived material. The course is structured
to give the student a full-time immersion in the specialty of
neuropathology, including both neurosurgical and neuroautopsy
derived material. There are daily didactic sessions that cover the
spectrum of neurological diseases, review gross and microscopic
neuro-anatomy, discuss approaches to the diagnosis of
nervous system disease, and point out the interrelationships of
research to clinical problems. Multiple clinical conferences and
diagnostic working sessions complement reading, use of a large
microscopic divisional study set and project work.

M60 Path 860 Clinical Laboratory Medicine
This elective rotation is designed to teach the student how
clinical laboratory assays are used in the diagnosis of disease
and to understand the quality assurance tools the laboratory
utilizes to assure the reliability of tests. The elective includes
rotations through a variety of clinical laboratories including
clinical chemistry, clinical microbiology, hemopathology,
molecular pathology, and transfusion medicine. During the
elective the student will have a daily schedule, which includes
didactic sessions with faculty and regular interactions with
house staff. Some examples of useful clinical skills acquired
during the experience include: morphologic review of peripheral
blood smears and bone marrow biopsies; interpretation of
coagulation tests, biomarkers of cardiac damage and serum
protein electrophoresis patterns; identification of infectious
organisms; and appropriate use of blood component therapy
and therapeutic apheresis. The rotation culminates with a case
discussion presented by the medical student which focuses on
application of clinical laboratory evaluations to direct patient
care.

M60 Path 900 Research Elective - Pathology
Research opportunities may be available. If interested, please
contact the Department of Pathology and Immunology.