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/immunobiology/), 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/immunobiology/) 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 Chief

Kodi Ravichandran (https://pathology.wustl.edu/people/kodi-ravichandran-bvsc-phd/), PhD (https://pathology.wustl.edu/people/robert-schreiber-phd/) Immunobiology Division Chief

Guantam Dantas, PhD (https://pathology.wustl.edu/people/gautam-dantas-phd-2/) Laboratory and Genomic Medicine Division Co-Chief

Ann M. Gronowski, PhD (https://pathology.wustl.edu/people/ann-m-gronowski-phd-2/) Laboratory and Genomic Medicine Division Co-Chief

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

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

A

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Assistant Professor of Developmental Biology
Bachelor of Science, The College of New Jersey, 2011
Doctor of Philosophy, Washington University in St Louis, 2016

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Bachelor of Science, University of Michigan Ann Arbor, 1974
Master of Science, University of Michigan Ann Arbor, 1977
Doctor of Philosophy, 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 Pediatrics
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Doctor of Medicine, University of Wisconsin Madison, 2009

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Alumni Endowed Professor of Pathology and Immunology
Samuel James Ballentine, M.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, New York University School of Medicine, 2013

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

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Bachelor of Science, Nebraska Wesleyan University, 1998
Doctor of Philosophy, 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, 2008

Simone Brioscchi, M.S., Ph.D.
Instructor in Pathology and Immunology (Pending Dean’s Approval) (primary appointment)
Master of Science, University of Milan, 2010
Doctor of Philosophy, University of Freiberg, 2018

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Bachelor of Science, Boston University, 2001
Doctor of Medicine, Boston University, 2005

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Doctor of Medicine, University of Texas Galveston, 1981

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

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

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

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Professor of Otolaryngology
Bachelor of Science, Brown University, 1999
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
Champaign, 1988

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Doctor of Medicine, Washington University in St Louis, 2012

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Voluntary Clinical Professor of Pathology and Immunology

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Professor of Medicine
Robert Rock Belliveau MD Professor of Pathology
Doctor of Medicine, Parma University, 1983

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Bachelor of Science, Centenary College of Louisiana, 1998
Doctor of Philosophy, Vanderbilt University, 2005
Doctor of Medicine, Vanderbilt University, 2008

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Professor of Pathology and Immunology (primary appointment)
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Edward Mallinckrodt Professorship in Pathology
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Doctor of Philosophy, University of California Santa Barbara, 2006

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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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Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, Kasturba Medical College, 2000

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Professor of Biomedical Engineering
Professor of Molecular Microbiology
Division Chief
Professor of Pediatrics
Conan Professorship in Laboratory and Genomic Medicine
Bachelor of Science, Macalester College, 2000
Doctor of Philosophy, University of Washington, 2005

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Professor of Pathology in Pediatrics
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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, 2015
Doctor of Philosophy, Duke University, 2020

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Bachelor of Arts, Vanderbilt University, 1998
Doctor of Medicine, University of Tennessee, 2004

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Associate Professor of Neurology
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Doctor of Philosophy, Washington University in St Louis, 2006
Doctor of Medicine, 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
Doctor of Philosophy, Osaka University, 2002

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

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Bachelor of Science, Roberts Wesleyan College, 2009
Doctor of Philosophy, University of Rochester, 2017

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Doctor of Medicine, Medical College of Ohio, 1996

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Doctor of Philosophy, University of California San Diego, 1993

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Ladenson Professorship in Pathology
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Doctor of Medicine, Washington University in St Louis, 2004

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Doctor of Medicine, Shanghai Jiao Tong University (#####), 2000
Doctor of Philosophy, Karolinska Institute, 2007

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Bachelor of Arts, University of Denver, 1982
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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Doctor of Medicine, University of Chicago, 1973

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Doctor of Philosophy, Washington University in St Louis, 2016

Doctor of Medicine, Washington University in St Louis, 2018

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Champaign, 1985
Master of Science, Iowa State University, 1988
Doctor of Philosophy, University of Wisconsin Madison, 1992

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

H

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Assistant Dean for Admissions
Bachelor of Arts, Princeton University, 2000
Doctor of Medicine, Washington University in St Louis, 2008
Doctor of Philosophy, Washington University in St Louis, 2008

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Doctor of Philosophy, Washington University in St Louis, 2006

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Doctor of Veterinary Medicine, Tufts University, 1995
Doctor of Philosophy, Washington University in St Louis, 2008

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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
New Brunswick, 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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Professor of Genetics
Doctor of Philosophy, Washington University in St Louis, 1995
Doctor of Medicine, Washington University in St Louis, 1995
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Bachelor of Science, Lincoln School of Commerce, 2007
Doctor of Philosophy, Washington University in St Louis, 2016
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J

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Associate Professor of Pediatrics
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Doctor of Philosophy, University of Illinois at Chicago, 2008
Doctor of Medicine, University of Illinois at Chicago, 2008
Umang Jain, M.S., Ph.D.
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Bachelor of Science, Manipal University, 2007
Master of Science, Manipal University, 2009
Doctor of Philosophy, Dalhousie University, 2015

K

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Bachelor of Science, University of Delaware, 2006
Doctor of Philosophy, University of Pittsburgh, 2013
Doctor of Medicine, University of Pittsburgh, 2014
Sunkyung Kim, Ph.D.
Instructor in Pathology and Immunology (Pending Dean Approval) (primary appointment)
Bachelor of Science, Handong Global University, 2006
Doctor of Philosophy, Seoul National University, 2015
Jonathan Kipnis, M.S., Ph.D.
Professor of Pathology and Immunology (primary appointment)
Professor of Neurology
Professor of Neuroscience
Professor of Neurological Surgery
Alan A and Edith L Wolff Distinguished Professor
Bachelor of Science, Tel Aviv University, 1998

Master of Science, Weizmann Institute of Science, 1999
Doctor of Philosophy, Weizmann Institute of Science, 2004
Eynav Yafit Klechevsky, Ph.D.
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Doctor of Philosophy, Technion Israel Institute of Technology, 2007
Hannah Rachel Krigman, M.D.
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Bachelor of Arts, Amherst College, 1983
Doctor of Medicine, University of North Carolina at Chapel Hill, 1988
Kilannin Cathleen Krysiak, Ph.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Champaign, 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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Doctor of Medicine, National Taiwan University, 2000
Doctor of Philosophy, Duke University, 2008
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Bachelor of Arts, Hendrix College, 1988
Doctor of Philosophy, 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 (#-----#formerly # #), 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
Tiantian Liu
Instructor in Pathology and Immunology (Pending Dean Approval) (primary appointment)
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 (primary appointment)
Doctor of Philosophy, 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

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

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

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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

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Doctor of Philosophy, Johns Hopkins University, 1983

N

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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

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Doctor of Medicine, Tata Institute of Fundamental Research (TIFR), 2013

Julie Ann Neidich, M.D.

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Associate Professor of Pediatrics
Doctor of Medicine, George Washington University, 1983

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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

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Professor of Pathology and Immunology (primary appointment)
Foreign MD equivalent, Kasturba Medical College, 1988
Master of Public Health, Dartmouth College, 2015

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Assistant Professor of Pathology and Immunology (primary appointment)
New Brunswick, 2004
Doctor of Medicine, University of Medicine and Dentistry of New Jersey, 2006

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Assistant Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Skidmore College, 2008
Master of Science, University College Cork National University of Ireland, 2010
Doctor of Philosophy, University of Pennsylvania, 2015
Doctor of Medicine, University of Pennsylvania, 2016

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Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Bradley University, 1996
Champaign, 2002
Champaign, 2004

Richard J. Perrin, Ph.D., M.D.
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Bachelor of Science, Yale University, 1992
Champaign, 2001
Doctor of Medicine, University of Illinois at Chicago, 2004

Stephen P. Persaud, Ph.D., M.D.
Instructor in Pathology and Immunology (primary appointment)
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 Obstetrics and Gynecology
Bachelor of Arts, University of California, 1981
Doctor of Philosophy, University of California, 1987
Doctor of Medicine, University of California, 1988

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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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Professor of Pathology and Immunology (primary appointment)
Robert L. Kroc Professor of Pathology and Immunology
Division Chief of IMM
Doctor of Philosophy, University of Massachusetts Amherst, 1992

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Jon H Ritter, M.D.
Professor of Pathology and Immunology (primary appointment)
Mankato, 1983
Doctor of Medicine, University of Minnesota, 1988

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Instructor in Pathology and Immunology (primary appointment)
Doctor of Philosophy, All India Institute of Medical Sciences, 2005

Stephen Matthew Roper, M.S., Ph.D.
Associate Professor of Pathology and Immunology (primary appointment)
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.
Associate Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, Cornell University, 2004
Doctor of Medicine, Cornell University, 2005

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RS), 2008
RS), 2011
RS), 2016

Robert Edward Schmidt, Ph.D., M.D.
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Division Chief - Division of Neuropathology
Bachelor of Arts, Washington University in St Louis, 1969
Doctor of Philosophy, Washington University in St Louis, 1976

Robert D Schreiber, Ph.D.
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

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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

Mitchell G Scott
Voluntary Clinical Professor of Pathology and Immunology

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Adjunct Professor of Pathology and Immunology
Bachelor of Arts, Columbia University, 1979
Doctor of Medicine, Columbia University, 1984

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Bachelor of Science, University of Notre Dame, 1980
Doctor of Philosophy, Saint Louis University, 1986

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Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
Bachelor of Science, Southeast Missouri State University, 2002
Master of Science, Southeast Missouri State University, 2005
Doctor of Philosophy, Saint Louis University, 2010

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

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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
Mei San Tang, M.D.
Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, Monash University Malaysia Campus, 2013

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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

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Doctor of Philosophy, Medical University of Gdansk, 2014

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

Jackson S Turner, Ph.D.
Instructor in Pathology and Immunology (Pending Dean’s Approval) (primary appointment)
Bachelor of Science, University of Tulsa, 2011
Doctor of Philosophy, University of Michigan Ann Arbor, 2017

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Bachelor of Science, Calvin College, 1998
Doctor of Philosophy, University of San Diego, 2006

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Doctor of Philosophy, Rockefeller University, 2015

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Bachelor of Arts, Harvard University, 1977
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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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Vice Chair of Faculty Development
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

Daniel Morgan Webber, M.S., Ph.D., M.D.
Instructor in Pathology and Immunology (Pending Dean’s Approval) (primary appointment)
Bachelor of Science, University of Arkansas Main Campus, 2006
Master of Science, University of Arkansas Main Campus, 2006
Doctor of Philosophy, University of Arkansas for Medical Sciences, 2017
Doctor of Medicine, University of Arkansas for Medical Sciences, 2017

Cody Hudson Weimholt, D.O.
Assistant Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, University of Missouri Columbia, 2005
Doctor of Osteopathic Medicine, A T Still University of Health Sciences, 2013

Frances V White, M.S., M.D.
Professor of Pathology & Immunology (primary appointment)
Bachelor of Arts, Princeton University, 1975
Master of Science, University of North Carolina at Chapel Hill, 1978
Doctor of Medicine, University of North Carolina at Chapel Hill, 1989

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 Agricultural University, 2008
Doctor of Philosophy, Washington University in St Louis, 2016

Melanie Leann Yarbrough, Ph.D.
Associate Professor of Pathology and Immunology (primary appointment)
For the 2023-24 academic year, the Department of Pathology & Immunology at the University of Texas Southwestern Medical Center offers a variety of advanced clinical and research experiences. Here are some of the faculty members and their research interests:

**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, Ph.D., 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
Doctor of Philosophy, Washington University in St Louis, null

**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.**
Associate Professor of Pathology and Immunology (primary appointment)
Master of Arts, Sathyabama Institute of Science and Technology (SIST), 1994
Doctor of Philosophy, Hebrew University of Jerusalem, 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

- Mechanisms by which human gut microbiome development is linked to healthy postnatal growth
- Developing microbiome-directed therapeutics for treating childhood and maternal undernutrition

**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.
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 805 Autopsy Pathology (Clinical Elective)**

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 (Clinical Elective)**

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 Cytopathology (Clinical Elective)**

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 text books 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 (Clinical Elective)
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 817 OB/GYN Pathology (Clinical Elective)
The expectation for this elective is that the student participates 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 student 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 (Clinical Elective)
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 (Clinical Elective)
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 (Clinical Elective)
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, hematopathology, 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 910 Anatomic Pathology and Laboratory Medicine Advanced Clinical Rotation (ACR)
The purpose of the Anatomic Pathology and Laboratory Medicine Advanced Clinical Rotation involves the development of expertise related to diagnostic pathology and laboratory testing in a well-supervised teaching environment. ACR students are under the supervision of anatomic pathology and laboratory medicine residents, fellows and attending pathologists. ACR students have the same daily schedules as first year anatomic pathology/clinical pathology residents. They are assigned the primary workup of patient specimens or patients on each sign-out day. An approach to the specimen or patient and required follow up or ancillary testing is planned in consultation with the resident, fellow or attending physician. The trainees assume the primary responsibility for generating any required reports and communication with other healthcare providers. As for most entering residents, there is no formal after-hours call schedule. Students attend the same conferences as the house staff.

Credit 140 units.