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 in 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 participate in the research activities of the faculty.

The Division of Immunobiology (https://pathology.wustl.edu/divisions/immunobiology) integrates immunobiology activities in the school. It is responsible for the teaching of immunology in 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

Degrees & Requirements

While the Department of Pathology & Immunology does not offer its own degree, some of the department’s courses are open to students in the MD and MStP (MD/PhD) programs. Further information about the MD and MStP degrees can be found in the Degrees & Programs Offered (http://bulletin.wustl.edu/medicine/degrees) section of this Bulletin.

Research

Paul M. Allen, PhD
BJC Institute of Health, 8th Floor
Phone: 314-362-8758
Research in immunology. 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 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 in optimizing mTOR to induce cellular growth and proliferation to: (1) enhance pre- and post-islet transplantation in Type 1 diabetes and (2) prolong b-cell compensation in response to insulin resistance in Type 2 diabetes. b-cell failure in obesity-associated Type 2 diabetes is believed to correlate with the intracellular accumulation of lipids that contribute to defects in insulin secretion and maintenance of b-cell mass. Our studies have identified lipoprotein lipase in b-cells, a key enzyme for catalyzing the hydrolysis of lipoprotein-associated TAG, to produce free fatty acids (FFA) 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 FFA up-regulate 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 FFA and β-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 Immunoeediting. Research on natural and therapeutically induced responses to tumors and 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 and 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
Cellular and molecular mechanisms of bone remodeling with particular emphasis on osteoclast biology as relates to 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
Phospholipase A2 (PLA2) enzymes in regulating 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. Studies of iPLA2, its post-translational modifications, and its interactions with other proteins involve mice that are iPLA2-deficient globally or in selected tissues, transgenic mice that overexpress iPL2 in -cells, and insulinoma cells with genetically manipulated iPLA2 expression. 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
Research in immunobiology/immunopathology. Examination of cellular interactions resulting 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 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, and 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.

Faculty

Anatomic and Molecular Pathology Division Head
Steven L. Teitelbaum, MD

Immunobiology Division Head
Gwendalyn Randolph, PhD

Laboratory and Genomic Medicine Division Co-Heads
Charles Eby, MD
Thaddeus Stappenbeck, MD, PhD

Neuropathology Division Head
Robert E. Schmidt, MD, PhD

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

A
Paul M Allen, MS, PhD
Robert L. Kroc Professor of Pathology and Immunology (primary appointment)
MS University of Michigan 1977
PHD University of Michigan 1981
BS University of Michigan 1974

Gaya K Amarasinghe, PHD
Professor of Pathology and Immunology (primary appointment)
Professor of Biochemistry and Molecular Biophysics
Professor of Molecular Microbiology
PHD University of Maryland 2001
BS City College 1997

Ferdinand Enginco Amarillo, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Florida State University 2010

Neil William Anderson, MD, BS1
Assistant Professor of Pathology and Immunology (primary appointment)
Assistant Professor of Pediatrics
MD University of Wisconsin-Madison 2009
BS1 University of Wisconsin-Madison 2005

Maksym Artomov, PHD, MS
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Biomedical Engineering
PHD Massachusetts Institute of Technology (MIT) 2009
MS University of Chicago 2005

Michael James Barratt, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD King’s College London 1994

Melissa Anne Barrow, PHD
Instructor in Pathology and Immunology (primary appointment)
PHD University of Queensland 2003

Cory Thomas Bernadt, PHD, MD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD University of Nebraska 2004
BS Nebraska Wesleyan University 1998
MD University of Nebraska 2006

Deepta Bhattacharya, PHD
Adjunct Associate Professor of Pathology and Immunology (primary appointment)
BS Indiana University Bloomington 1996
PHD University of California Berkeley 2001

Carey-Ann Dawn Burnham, PHD
Professor of Pathology and Immunology (primary appointment)
Professor of Medicine
Professor of Molecular Microbiology

Maksym Artomov, PHD, MS
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Biomedical Engineering
PHD Massachusetts Institute of Technology (MIT) 2009
MS University of Chicago 2005

B

Professor of Pediatrics
BS University of Alberta 2002
PHD University of Alberta 2007

Dengfeng Cao, PHD, MD
Associate Professor of Pathology and Immunology (primary appointment)
PHD University of Pittsburgh 2001
MD Peking Union Medical College 1996

Yang Cao, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD University of Wisconsin-Madison 2014

Marina Cella, MD
Professor of Pathology and Immunology (primary appointment)
MD University of Genova 1989

Deyali Chatterjee, MD
Assistant Professor of Pathology and Immunology (primary appointment)
MD Calcutta University 2001

Rebecca D Chernock, MD
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Otolaryngology
MD University of Pennsylvania 2004
BS Brown University 1999

Kyunghoo Choi, PHD, MS
Professor of Pathology and Immunology (primary appointment)
PHD University of Illinois 1988
BS Seoul National University 1982
MS Seoul National University 1984

John Spellman Aranake Crisinger, MD
Assistant Professor of Pathology and Immunology (primary appointment)
BA Washington University in St. Louis 2004
MD Washington University in St. Louis 2012

Patrick L Collins, PHD
Instructor in Pathology and Immunology (primary appointment)
PHD Vanderbilt University 2011

Marco Colonna, MD
Robert Rock Belliveau MD Professor of Pathology (primary appointment)
Professor of Medicine
MD Parma University 1983

Leigh Anne Compton, MD, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
MD Vanderbilt University 2008
BS Centenary College Louisiana 1998
PHD Vanderbilt University 2005

Joseph C. Corbo, MD, PHD, AB
Professor of Pathology and Immunology (primary appointment)
Professor of Genetics
Professor of Ophthalmology and Visual Sciences
BS Stanford University 1990
MD University of California 1999
PHD University of California 1997
AB Stanford University 1990

Erika C Crouch, PHD, MD
Professor of Pathology and Immunology (primary appointment)
PHD University of Washington 1978
MD University of Washington 1979

Sonika M Dahiya, MD
Associate Professor of Pathology and Immunology (primary appointment)
MD Kasturba Medical College 2000

Gautam Dantas, PHD
Professor of Pathology and Immunology (primary appointment)
Professor of Biomedical Engineering
Professor of Molecular Microbiology
BS Macalester College 2000
PHD University of Washington 2005

Louis P Dehner, MD
Professor of Pathology and Immunology (primary appointment)
Professor of Pathology in Pediatrics
BA Washington Univ in St. Louis 1962
MD Washington Univ in St. Louis 1966

George J Despotis, MD
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Anesthesiology
MD Saint Louis University 1985
BA Greenville College 1981

Dennis J. Dietzen, PHD
Professor of Pathology and Immunology (primary appointment)
Professor of Pediatrics
PHD Indiana University Bloomington 1992
BS Marian College 1986

Eric James Duncavage, MD
Associate Professor of Pathology and Immunology (primary appointment)
BS Vanderbilt University 1998
MD University of Tennessee 2004

William Michael Dunne Jr, PHD
Adjunct Professor of Pathology and Immunology (primary appointment)
BS Univ of Wisconsin Madison 1975

PHD Univ of Wisconsin Madison 1981

E

Charles S Eby, MD
Professor of Pathology and Immunology (primary appointment)
Interim Head of the Department of Pathology and Immunology
Professor of Medicine
BS Duke University 1977
MD Vanderbilt University 1981

Brian T. Edelson, MD, UNKNOWN, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
MD Washington Univ in St. Louis 2004
UNKNOWN Brown University 1995
PHD Washington Univ in St. Louis 1995

Takeshi Egawa, MD, PHD
Associate Professor of Pathology and Immunology (primary appointment)
MD Osaka University 1994
PHD Osaka University 2002

David Eisenstein, MD
Associate Professor of Pathology and Immunology (Pending Executive Faculty Approval) (primary appointment)
MD University of Cincinnati 1989

Ali Hassan Ellebedy, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
Assistant Professor of Medicine
BS Cairo University 2004
PHD Univ of TN - Health Sci Center 2011

F

John Lawrence Frater, MD
Associate Professor of Pathology and Immunology (primary appointment)
BS University of Notre Dame 1992
MD Medical College of Ohio 1996

Daved H Fremont, PHD
Professor of Pathology and Immunology (primary appointment)
Professor of Biochemistry and Molecular Biophysics
Professor of Molecular Microbiology
PHD University of CA San Diego 1993
BS Univ of Wisconsin Madison 1986

G

Joseph P. Gaut, MD, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
Assistant Professor of Medicine
MD Washington Univ in St. Louis 2004
BA Washington Univ in St. Louis 1996
Susan Gilfillan, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Stanford University 1990
BA University of Denver 1982

Jeffrey I Gordon, MD
Professor of Pathology and Immunology (primary appointment)
Dr Robert J Glaser Distinguished University Professor
Professor of Developmental Biology
Professor of Medicine
MD University of Chicago 1973
BA Oberlin College 1969

Nicholas Wayne Griffin, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Washington Univ in St. Louis 2010

Ann Marie Gronowski, PHD, MS
Professor of Pathology and Immunology (primary appointment)
Professor of Obstetrics and Gynecology
BS University of Illinois 1985
PHD Univ of Wisconsin Madison 1992
MS Iowa State University 1988

Brenda Jean Grossman, MD, MS
Professor of Pathology and Immunology (primary appointment)
Professor of Medicine
MD Medical College Georgia 1980
MS Saint Louis University 2003
BS Ohio University 1976

Matthew Michael Gubin, PHD
Instructor in Pathology and Immunology (primary appointment)
PHD University of MO Columbia 2012
BS University of MO Columbia 2004

Ian Sean Hagemann, MD, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
Assistant Professor of Obstetrics and Gynecology
MD Washington Univ in St. Louis 2008
BA Princeton University 2000
PHD Washington Univ in St. Louis 2008

Scott A Handley, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Washington Univ in St. Louis 2006
BS Southwest Missouri St Universi 1998

Thomas Joseph Hannan, BA1, DVM
Instructor in Pathology and Immunology (primary appointment)
BA1 Georgetown University 1989
Friederike H. Kreisel, MD
Associate Professor of Pathology and Immunology (primary appointment)
MD Goethe University 1995

Hannah Rachel Krigman, MD
Associate Professor of Pathology and Immunology (primary appointment)
MD University of North Carolina 1988
BA Amherst College 1983

Jack H Ladenson, PHD
Oree M Carroll and Lillian B Ladenson Professor of Clinical Chemistry in Pathology and Immunology (primary appointment)
Professor of Clinical Chemistry in Medicine
PHD University of Maryland 1971
BS Pennsylvania State University 1964

Yi-Shan Lee, MD, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
MD National Taiwan University 2000
PHD Duke University 2008

Daisy W Leung, PHD
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Biochemistry and Molecular Biophysics
PHD University of Texas Southwest 2005
BS Amherst College 1997

Cheryl Faye Lichti, D SC, BAS
Assistant Professor in Pathology and Immunology (primary appointment)
D SC Duke University 1993
BAS Hendrix College 1988

Heide Maria Lind, MD
Associate Professor in Pathology and Immunology (Pending Executive Faculty Approval) (primary appointment)
MD University of Iowa 1979

Ta-Chiang Liu, MD, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
MD National Yang-Ming University 1997
PHD Imperial College 2003

Chang Liu, MD, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
MD Peking Union Medical College 2004
PHD Oregon Health Science Univers 2010

Latisha D Love-Gregory, BS2, PHD
Instructor in Pathology and Immunology (primary appointment)
BS2 Rust College 1995
PHD University of MO Columbia 2001

BS Rust College 1995

Olga Y. Lubman, PHD
Instructor in Pathology and Immunology (primary appointment)
PHD Washington Univ in St. Louis 2002
BA Goucher College 1998
BS Goucher College 1998

Horacio M Maluf, MD
Professor of Pathology and Immunology (primary appointment)
MD University of Cordoba 1984

Mena Magdi Zaki Mansour
Assistant Professor of Pathology and Immunology (Pending Executive Faculty Approval) (primary appointment)

Samantha N. McNulty, PHD
Instructor in Pathology and Immunology (primary appointment)
BS Saint Louis University 2005
PHD Washington Univ in St. Louis 2012

Nima Mosammaparast, PHD, MD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD University of Virginia 2005
BS University of Rochester 1998
MD University of Virginia 2006

Kenneth M Murphy, PHD, MD
Professor of Pathology and Immunology (primary appointment)
Eugene Opie First Centennial Professor of Pathology and Immunology
Howard Hughes Medical Institute Investigator in Pathology and Immunology
PHD Johns Hopkins University 1984
MD Johns Hopkins University 1984

Theresa L Murphy, PHD
Professor of Pathology and Immunology (primary appointment)
PHD Johns Hopkins University Medic 1983
BS University of Arizona 1978

Rakesh Nagarajan, PHD, BA1, MD
Adjunct Associate Professor of Pathology and Immunology (primary appointment)
PHD Washington Univ in St. Louis 2002
BA University of Virginia 1994
BA1 University of Virginia 1994
MD Washington Univ in St. Louis 2002

Julie Ann Neidich, MD
Associate Professor of Pathology and Immunology (primary appointment)
MD George Washington University 1983

Christopher A Nelson, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Washington Univ in St. Louis 1995
BS Univ of Wisconsin Madison 1985

Eugene Merle Oltz, PHD
Professor of Pathology and Immunology (primary appointment)
Vice Chair of Pathology and Immunology for Faculty Development
PHD Columbia University 1987
BS Cornell University 1982

Bijal A. Parikh, MD, PHD
Instructor in Pathology and Immunology (primary appointment)
MD U Medical-Dental Of New Jersey 2006
PHD Rutgers University 2004

Jacqueline Elise Payton, MD, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
MD University of Illinois 2004
BS Bradley University 1996
PHD University of Illinois 2002

Richard J. Perrin, PHD, MD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD University of California 1987
BS Yale University 1992

John David Pfeifer, PHD, MD
Professor of Pathology and Immunology (primary appointment)
Professor of Obstetrics and Gynecology
Vice Chairman for Clinical Affairs of Pathology and Immunology
BA University of California 1981
PHD University of California 1987
MD University of California 1988

Gwendalyn Jan Randolph, PHD
Unanue Distinguished Professor of Immunology (primary appointment)
Professor of Medicine
PHD State University of New York 1995
BS Temple University 1991

Alejandro Reyes
Adjunct Assistant Professor of Pathology and Immunology (primary appointment)

Jon H Ritter, MD
Professor of Pathology and Immunology (primary appointment)
MD University of Minnesota 1988

Stephen Matthew Roper, PHD, MS
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Medical University of Sth Car 2015
BS Texas Tech University 2004
MS Texas Tech University 2007

Marianna B Ruzinova, PHD, MD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Cornell University 2004
MD Cornell University 2005

Souzan Sanati, MD
Assistant Professor of Pathology and Immunology (primary appointment)
MD Iran Univ of Medical Sciences 1993

Robert Edward Schmidt, PHD, MD
Professor of Pathology and Immunology (primary appointment)
PHD Washington Univ in St. Louis 1976
MD Washington Univ in St. Louis 1976
BA Washington Univ in St. Louis 1969

Robert D Schreiber, PHD
Andrew M Bursky and Jane M Bursky Distinguished Professor (primary appointment)
Professor of Molecular Microbiology
BA State University of New York 1968
PHD State University of New York 1973

Molly Schroeder, PHD
Assistant Professor of Pathology and Immunology (Pending Executive Faculty Approval) (primary appointment)
BS Saint Louis University 2006
PHD Baylor College of Medicine 2012

Mitchell G Scott, MS, PHD
Professor of Pathology and Immunology (primary appointment)
Clinical Research Assistant Professor of Medicine
BS Washington Univ in St. Louis 1974
MS University of Missouri 1977
PHD Washington Univ in St. Louis 1982

Jennifer K Sehn, MD
Assistant Professor of Pathology and Immunology (primary appointment)
MD Washington Univ in St. Louis 2011
BS Georgia Tech 2007

Andrey S Shaw, MD
Adjunct Professor of Pathology and Immunology (primary appointment)
BA Columbia University 1979
MD Columbia University 1984

BA Mankato St University 1983
Kathleen C Sheehan, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
BS University of Notre Dame 1980
PHD Saint Louis University 1986

Thaddeus S. Stappenbeck, MD, PHD
Conan Professor of Laboratory and Genomic Medicine (primary appointment)
Professor of Developmental Biology
MD Northwestern University 1995
PHD Northwestern University 1994
BA Northwestern University 1987

Sanjay Joshua Swamidass, MA, MD, PHD
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Biomedical Engineering
MA University of California 2006
MD University of California 2009
BS University of California 2000
PHD University of California 2007

Wojciech A. Swat, PHD, MS
Associate Professor of Pathology and Immunology (primary appointment)
PHD University of Basel 1992
MS University of Warsaw 1989

Steven L Teitelbaum, MD
Messing Professor of Pathology and Immunology (primary appointment)
Professor of Medicine
BA Columbia University 1960
MD Washington Univ in St. Louis 1964

Suzanne Renee Thibodeaux, PHD, MD
Assistant Professor of Pathology and Immunology (primary appointment)
BS Tulane University 2005
PHD Univ Texas Health Sci San Anto 2011
MD Univ Texas Health Sci San Anto 2013

Emil Raphael Unanue, MD
Paul and Ellen Lacy Professor of Pathology and Immunology (primary appointment)
BS Institute of Secondary Educati 1952
MD Havana University 1960

Steven John Van Dyken, PHD
Assistant Professor of Pathology and Immunology (Pending Executive Faculty Approval) (primary appointment)
BS Calvin College 1998

PHD University of San Diego 2006
Kelli Lynn VanDussen, PHD
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
PHD University of Michigan 2010
BS Grand Valley St University 2004

William Vermi
Adjunct Assistant Professor of Pathology and Immunology (primary appointment)

Herbert W Virgin IV, PHD, MD
Mallinckrodt Professor of Pathology and Immunology (primary appointment)
Professor of Medicine
Professor of Molecular Microbiology
PHD Harvard University 1985
MD Harvard University 1985
BA Harvard University 1977

Xiaoxiao Wan, PHD
Instructor in Pathology and Immunology (primary appointment)
PHD University of MO Columbia 2015

Xiaoli Wang, MS, PHD, MD
Assistant Professor of Pathology and Immunology (primary appointment)
MS School Not Listed 1989
PHD University of Arkansas 2001
MD Third Military Medical Univ 1977

Mark A Watson, MD, PHD
Associate Professor of Pathology and Immunology (primary appointment)
MD Washington Univ in St. Louis 1992
PHD Washington Univ in St. Louis 1992
BA University of Pennsylvania 1985

Cody Hudson Weimholt
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)

George Randolphe Wettach, MD, MS
Associate Professor in Pathology and Immunology (primary appointment)
BS University of CA Berkeley 1995
MD Eastern Virginia Med School 2006
MS Eastern Virginia Med School 2002

Frances V White, MS, MD
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Pediatrics
MS University of North Carolina 1978
MD University of North Carolina 1989
BA Princeton University 1975
and laboratory sessions. The year begins with a review of morphology of human disease through a combination of lectures and cases that relate to the course material. (20-25 students) with clinicians to discuss a variety of clinical immunological diseases. Two laboratory exercises focus on cells and their function, cellular interactions, vaccines, and general properties of the immune system, effector molecules, and 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.

Y

Melanie Leann Yarbrough, PHD
Instructor in Pathology and Immunology (primary appointment)
PHD University of Texas Southwest 2009

Z

Guoyan Zhao, PHD, MS
Assistant Professor of Pathology and Immunology (primary appointment)
BS School Not Listed 1995
PHD Washington Univ in St. Louis 2003
MS School Not Listed 1998

Zhongren Zhou, PHD, MD, MS
Associate Professor of Pathology and Immunology (Pending Executive Faculty Approval) (primary appointment)
PHD Shanghai Medical University 1993
MD Hubei Medical University 1986
MS Capital U of Medical Sciences 1989

Bernd Heinrich Zinselmeyer, PHD
Assistant Professor of Pathology and Immunology (primary appointment)
PHD University of Strathclyde 2006

Wei Zou, PHD, MA
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Hebrew University 2003
MA Qingdao University 1994

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 four-week elective includes rotations through laboratories in clinical chemistry, clinical microbiology, transfusion medicine, molecular diagnostics and hematopathology. 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 154 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.

M60 Path 805 Autopsy Pathology
This full-time 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

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brain cutting, specialty microscopic conferences, and weekly autopsy case conferences. Students will be under the direction of senior pathology faculty.

**M60 Path 807 Dermatopathology**
The student will be involved in all activities of the dermatopathology service. These include review, discussion and signout of gross and 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 and dermatopathology lectures are held on Thursday mornings and are mandatory. In addition, dermatopathology slide review conferences are held on Friday mornings and are mandatory. Other learning opportunities include daily Consensus Conference, informal unknown slide sessions, weekly Dermatology Consult Clinicopathologic Conference and monthly Cutaneous Lymphoma Conference and Journal Club. The primary goal of this elective is to acquire basic competence in the diagnosis of skin diseases at the microscopic level. A secondary goal is to acquire understanding of the structure and function of the laboratory at the technical, administrative and medical professional level as it pertains to skin specimens.

**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 cytopathologists. There are text books and extensive study sets to permit students to focus on specific areas of interest. The daily schedule for students begins at 8:00 a.m. with morning slide review conferences are held on Friday mornings and are mandatory. In addition, dermatopathology rounds and dermatopathology lectures are held on Thursday mornings and are mandatory. Other learning opportunities include daily Consensus Conference, informal unknown slide sessions, weekly Dermatology Consult Clinicopathologic Conference and monthly Cutaneous Lymphoma Conference and Journal Club. The primary goal of this elective is to acquire basic competence in the diagnosis of skin diseases at the microscopic level. A secondary goal is to acquire understanding of the structure and function of the laboratory at the technical, administrative and medical professional level as it pertains to skin specimens.

**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. Students will work with residents/fellows on the rotation and participate as part of the team.

**M60 Path 815 OB-GYN Pathology Sub-Internship**
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 pertinent literature with a senior pathologist. Ample time will be available for attending regular conferences in OB-GYN and Pathology.
cytogenetic/molecular correlation conferences, journal club and interdepartmental bone marrow transplant and lymphoma conferences.

M60 Path 860 Clinical Laboratory Medicine
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 four-week elective includes rotations through laboratories in clinical chemistry, clinical microbiology, transfusion medicine and hematopathology. 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; 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.

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