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 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 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
Philip Patrick Ahern, PHD
Instructor in Pathology and Immunology (primary appointment)
PHD Oxford University 2010

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

Gaya K Amarasinghe, PHD
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Biochemistry and Molecular Biophysics
Associate 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
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MD University of Wisconsin-Madiso 2009
BS1 University of Wisconsin-Madiso 2005

Maksym Artomov, MS, PHD
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MS University of Chicago 2005
PHD Mass Inst of Technology (MIT) 2009

Michael James Barratt, PHD
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PHD KINGS COLLEGE LONDON 1994

Melissa Anne Barrow, PHD
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PHD University of Queensland 2003

Cory Thomas Bernadt, PHD, MD
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PHD University of Nebraska 2004
MD University of Nebraska 2006
BS Nebraska Wesleyan University 1998

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PHD University of CA Berkeley 2001
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B

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PHD University of Alberta 2007
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C

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MD Peking Union Medical College 1996
PHD University of Pittsburgh 2001

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PHD Univ of Wisconsin Madison 2014

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MA University of Puerto Rico 2000
BS Emory University 1996
PHD Washington Univ in St. Louis 2005

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MD University of Genova 1989

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MD Calcutta University 2001

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Associate Professor of Otolaryngology
MD University of Pennsylvania 2004
BS Brown University 1999

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PHD University of Illinois 1988
BS Seoul National University 1982
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MD Washington Univ in St. Louis 2012
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Patrick L Collins, PHD
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Marco Colonna, MD
Robert Rock Belliveau MD Professor of Pathology (primary appointment)
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PHD Vanderbilt University 2005
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PHD University of Washington 1978
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Sonika M Dahiya, MD
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Gautam Dantas, PHD
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Associate Professor of Molecular Microbiology
Associate Professor of Biomedical Engineering
BS Macalester College 2000
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Louis P Dehner, MD
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Professor of Pathology in Pediatrics
BA Washington Univ in St. Louis 1962
MD Washington Univ in St. Louis 1966

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Associate Professor of Anesthesiology
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BS Marian College 1986

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MD University of Tennessee 2004
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William Michael Dunn Jr, PHD
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BS Univ of Wisconsin Madison 1975
PHD Univ of Wisconsin Madison 1981

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PHD Washington Univ in St. Louis 1995
UNKNOWN Brown University 1995

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BS Cairo University 2004
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MD Medical College of Ohio 1996
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MD Washington Univ in St. Louis 2004
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Susan Gilfillan, PHD
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PHD Stanford University 1990
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Jeffrey I Gordon, MD
Professor of Pathology and Immunology (primary appointment)
Director of the Center for Genome Sciences
Dr Robert J Glaser Distinguished University Professor
Professor of Developmental Biology
Professor of Medicine
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Nicholas Wayne Griffin, PHD
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PHD Washington Univ in St. Louis 2010

Ann Marie Gronowski, PHD, MS
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Professor of Obstetrics and Gynecology
PHD Univ of Wisconsin Madison 1992
MS Iowa State University 1988
BS University of Illinois 1985

Brenda Jean Grossman, MS, MD
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Professor of Medicine
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Matthew Michael Gubin, PHD
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BS University of MO Columbia 2004
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PHD Washington Univ in St. Louis 2008
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BS Southwest Misouri St University 1998

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BA1 Georgetown University 1989
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Anjum Hassan, MD1, MD
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MD1 School Not Listed 1989
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MD Fudan University 1993
PHD Rutgers University 2001

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MD Goethe University 1995

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BA Amherst College 1983
MD University of North Carolina 1988

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MD Albert Einstein College of Med 1962
BS City College 1958

L

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Professor of Clinical Chemistry in Medicine
BS Pennsylvania State University 1964
PHD University of Maryland 1971

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MS Central Missouri St Universit 1980
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MD National Taiwan University 2000
PHD Duke University 2008

Daisy W Leung, PHD
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Assistant Professor of Biochemistry and Molecular Biophysics
PHD University of Texas Southwest 2005
BS Amherst College 1997

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Assistant Professor in Pathology and Immunology (Pending Executive Faculty Approval) (primary appointment)
D SC Duke University 1993
BAS Hendrix College 1988

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

Ta-Chiang Liu, MD, PHD
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PHD Imperial College 2003

Latisha D Love-Gregory, BS2, PHD
Instructor in Pathology and Immunology (primary appointment)
BA2 Rust College 2000
BS2 Rust College 1995
PHD University of MO Columbia 2001

Olga Y. Lubman, PHD
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BS Goucher College 1998
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M

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BS Saint Louis University 2005
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BS University of Rochester 1998

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Howard Hughes Medical Institute Investigator in Pathology and Immunology
MD Johns Hopkins University 1984
PHD Johns Hopkins University 1984

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PHD Johns Hopkins University Medc 1983
BS University of Arizona 1978

N

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MD Washington Univ in St. Louis 2002
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Julie Ann Neidich, MD
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Christopher A Nelson, PHD
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Vice Chair of Pathology and Immunology for Faculty Development
PHD Columbia University 1987
BS Cornell University 1982

Bijal A. Parikh, PHD, MD
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PHD Rutgers University 2004
MD U Medical-Dental Of New Jersey 2006

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MD University of Illinois 2004
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BS Bradley University 1996

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PHD University of Illinois 2001
BS Yale University 1992
MD University of Illinois Chicago 2004

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Professor of Obstetrics and Gynecology
Vice Chairman for Clinical Affairs of Pathology and Immunology
PHD University of California 1987
MD University of California 1988
BA University of California 1981

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
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BA Mankato St University 1983

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PHD Cornell University 2004
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Souzan Sanati, MD
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PHD Washington Univ in St. Louis 1976
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BA Washington Univ in St. Louis 1969

Robert D Schreiber, PHD
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Professor of Molecular Microbiology
PHD State University of New York 1973
BA State University of New York 1968

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

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

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

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

Thaddeus S. Stappenbeck, PHD, MD
Conan Professor of Laboratory and Genomic Medicine (primary appointment)
Professor of Developmental Biology
PHD Northwestern University 1994
Sanjay Joshua Swamidass, PHD, MA, MD
Assistant Professor of Pathology and Immunology (primary appointment)
Assistant Professor of Biomedical Engineering
BS University of California 2000
PHD University of California 2007
MA University of California 2006
MD University of California 2009

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, MD, PHD
Assistant Professor of Pathology and Immunology (Pending Executive Faculty Approval) (primary appointment)
MD Univ Texas Health Sci San Anto 2013
PHD Univ Texas Health Sci San Anto 2011
BS Tulane University 2005

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

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
Malinckrodt Professor of Pathology and Immunology (primary appointment)
Head of the Department of Pathology and Immunology
Professor of Medicine
Professor of Molecular Microbiology

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

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

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

Frances V White, MD, MS
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Pediatrics
BA Princeton University 1975
MD University of North Carolina 1989
MS University of North Carolina 1978

Craig B. Wilen, PHD, MD, AB
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
PHD University of Pennsylvania 2011
MD University of Pennsylvania 2013
AB Washington Univ in St. Louis 2016

Terry A Woodford-Thomas, MS, PHD
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BS Eastern Illinois University 1975
MS Purdue University 1977
PHD Va Polytechnic Inst & State U 1982

Melanie Leann Yarbrough, PHD
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
PHD University of Texas Southwest 2009

Guoyan Zhao, MS, PHD
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 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 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 a.m. The student will attend the cytology conference on Wednesday and Thursday. In general, the student will be able to complete sign-out activities by 4:30 p.m.

**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.

**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, allows. At the end of the rotation the 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 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.

**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 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. Time: 35 to 40 hours per week.

**M60 Path 855 Diagnostic Hematopathology**
Student electives in diagnostics of diseases of hematopoietic cells aims to foster understanding of acute and chronic leukemias, reactive conditions mimicking malignancies, and lymphomas affecting adults and pediatric populations. This diverse field involves multiple ancillary diagnostic tests such as immunohistochemistry, flow cytometry and genetic testing. This elective will offer medical students an in-depth insight into what goes behind the final pathologic diagnoses in hematologic malignancies before a treatment plan can be executed. This insight is crucial to understand the importance of correct diagnosis (the answer to the usual “What’s taking pathology so long?” comment) and accurate, timely communication of preliminary and final diagnosis to the clinicians. Under general faculty and fellow supervision, the students will be primarily responsible for handling of their own cases such as bone marrow biopsies, simple lymph node biopsies, ordering the required tests, dictating the final reports and communicating with the clinicians. They will also participate in several conferences per week including hematopathology consensus conference, weekly 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.