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

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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.

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Bachelor of Science, The College of New Jersey, 2011
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Baylor College of Medicine, 1981
Doctor of Obstetrics and Gynecology, University of California, 1987
Doctor of Medicine, University of California, 1988

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Mankato, 1983
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RS, 2008
RS, 2011
RS, 2016

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Associate Professor of Biomedical Engineering
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Doctor of Medicine, University of California, 1986
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<thead>
<tr>
<th>Name</th>
<th>Title/Division</th>
<th>Affiliation</th>
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<tr>
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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.
Carl H. Smith, MD  
St. Louis Children’s Hospital  
Phone: 314-454-6029  

Placental transport; surface membrane structure and function.

Thaddeus S. Stappenbeck, MD, PhD  
Clinical Sciences Research Building, North Tower, Room 1020  
Phone: 314-362-4214  

My lab studies the cause of inflammatory bowel disease, a condition that leads to spontaneous inflammation of the intestine. We study the mechanisms of host gene mutations as well as abnormalities in host-microbial interactions that drive this disease.

Steven Teitelbaum, MD  
BJC Institute of Health, 11th Floor  
Phone: 314-454-8463  

This lab studies the cellular and molecular mechanisms of bone remodeling, with particular emphasis on osteoclast biology as it relates to the pathogenesis and prevention of diseases such as osteoporosis. We focus on integrin and cytokine biology utilizing a variety of genetically manipulated mice.

John Turk, MD, PhD  
6609 Wohl  
Phone: 314-362-8190  

This lab looks at phospholipase A2 (PLA2) enzymes in the regulation of insulin secretion from pancreatic islet cells (e.g., a novel iPLA2 that does not require Ca2+ cloned from rat and human islets that is involved in cell secretion and proliferation). We also perform studies of iPLA2, its post-translational modifications, and its interactions with other proteins involving mice that are iPLA2-deficient globally or in selected tissues, transgenic mice that overexpress iPL2 in -cells, and insulinoma cells with genetically manipulated iPLA2 expression. The mass spectrometric characterization of proteins and complex lipids is an important tool in these studies.

Emil R. Unanue, MD  
BJC Institute of Health, 8414  
Phone: 314-362-8748  

Our focus is research that involves immunobiology and immunopathology. We examine cellular interactions that result in immune induction and cellular immunity. These cellular interactions are examined in normal immune responses and in autoimmune diseases. The focus is to identify the proteins responsible for the activation of lymphocytes in Type 1 diabetes.

Herbert Virgin, MD, PhD  
Clinical Sciences Research Building, Room 8849  
Phone: 314-362-9223  

We work on issues at the interface of virology and immunology by analyzing aspects of viral immunity, viral pathogenesis and viral genetics that contribute to virulence and disease.

Mark A. Watson, MD, PhD  
Clinical Sciences Research Building, North Tower, Room 1029  
Phone: 314-454-7919  

Our laboratory is interested in defining patterns of somatic gene mutation, gene expression and quantitative tumor clonality that can be used to predict distant site metastases and therapeutic vulnerability in patients with lung and breast cancer. Experimental approaches use histopathological review as well as the next-generation DNA exome and RNA sequencing (NGS) of primary cancer patient tissues, coupled with bioinformatics and statistical modeling, to identify candidate biomarker patterns that may be useful for the clinical management of cancer patients.

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

M60 Path 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 on 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 cytopathologists. 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 Neuropathology 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.