

# Department of Pathology & Immunology

Website: <https://pathology.wustl.edu>

## Research Electives

### Pathology and Immunology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

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#### 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.

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#### 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.

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#### 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

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#### 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.

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#### 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.

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#### 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.

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#### Carl H. Smith, MD

St. Louis Children's Hospital  
Phone: 314-454-6029

Placental transport; surface membrane structure and function.

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#### 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.

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#### Steven Teitelbaum, MD

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

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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.

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**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 Ca<sup>2+</sup> 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.

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**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.

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**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.

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**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.

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