Research Electives

Ophthalmology and Visual Sciences Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences. Below is a list of faculty that have ongoing research projects that involve medical students. If a student is interested in working with a faculty member that is not listed below, they can contact the faculty directly to see if there are any research opportunities in their lab.

Further descriptions of our research labs can be found on the Vision Core Researchers webpage (http://vrcore.wustl.edu/residentstudentresearchopportunities/RSROHome/).

- **Usha P. Andley, PhD**
  1114-C McMillan
  Phone: 314-362-7167
  Molecular basis of cataract; the function of molecular chaperones in cataract; proteomics, imaging and biochemical studies on cell culture and mouse models for crystallin gene mutations linked with cataract; testing drugs to inhibit cataract.

- **Rajendra S. Apte, MD, PhD**
  apte@vision.wustl.edu
  Innate immunity and immune effector mechanisms in the retina; oxidative stress and cell death; models of developmental angiogenesis and neovascularization; inflammation and photoreceptor survival; macular degeneration.

- **Steven Bassnett, PhD**
  1114 McMillan
  Phone: 314-362-1604
  Eye development; stochastic models of lens growth; stem cell biology; age-related cataract; UV-induced somatic mutation; ocular manifestations of Marfan syndrome; cell death suppression on the optic axis; cell biology of transparent tissues.

- **Anjali Bhorade, MD**
  Phone: 314-362-5343
  Evaluating the effect of glaucoma on visual function in older adults in the home; understanding the relationship between vision and driving in older adults with glaucoma.

- **Shiming Chen, PhD**
  618 McMillan
  Phone: 314-747-4350
  Our primary interests are molecular mechanisms regulating photoreceptor gene expression and the implications in understanding photoreceptor development and disease. We are focusing on three transcription factors (CRX, NRL and NR2E3) linked to photoreceptor degenerative diseases. Molecular genetics and biochemical approaches are used to identify the regulatory pathways associated with each factor. Mouse models are used to understand why mutations in these factors cause disease and to develop therapeutic strategies, including AAV gene therapy.

- **Steven M. Couch, MD**
  couch@vision.wustl.edu
  Orbital inflammatory diseases; surgical techniques and novel treatments of periocular/orbital disease.

- **Philip L. Custer, MD**
  custer@vision.wustl.edu
  Enucleation and anophthalmic socket disorders; orbital fractures and implants; hemorrhagic complications during oculoplastic procedures.

- **Thomas A. Ferguson, PhD**
  1207 McMillan
  Phone: 314-362-3745
  Molecular basis of immune tolerance and how apoptotic cells tolerize the immune response; role of immune privilege in the pathogenesis of eye diseases such as age-related macular degeneration; role of basal autophagy in the cells of the eye by using the cre-loxP system to delete essential autophagy genes from specific cell types in the eye.

- **Mae Gordon, PhD**
  Phone: 314-362-3716
  Ocular hypertension; glaucoma; keratoconus; adenoviral conjunctivitis; randomized clinical trial methodology; patient-reported outcome measures and measurement reliability.
### George J. Harocopos, MD

harocopos@vision.wustl.edu

Age-related cataract; ophthalmic pathology.

### Andrew Huang, MD, MPH

106 McMillan
Phone: 314-362-0403

Ocular surface stem cell biology; molecular therapy for corneal dystrophies and corneal neovascularization; oxidative stress of corneal endothelium; clinical research on dry eye and ocular surface disease.

### Michael A. Kass, MD

kass@vision.wustl.edu

Principal Investigator of the Ocular Hypertension Treatment Study; diagnosis, treatment and public health aspects of glaucoma.

### Vladimir Kefalov, PhD

625 McMillan
Phone: 314-362-4376

Our primary interests are photoreceptor neurobiology and retinal degeneration. We are a sensory neurobiology lab interested in the function of mammalian rod and cone photoreceptors. In addition, we are interested in the mechanisms of neurodegeneration in the retina, and we are working on developing pharmacological and gene therapy tools for preventing photoreceptor cell death.

### Daniel Kerschensteiner, MD

kerchensteinerd@vision.wustl.edu
(kerschensteinerd@vision.wustl.edu)

Our primary interest is in understanding the principles that guide the assembly of neural circuits and deciphering the way they process information. We hope to identify features of the retinal circuit architecture that perform particular computations and characterize how they arise during development. We will then probe underlying mechanisms of circuit assembly and function through genetically targeted manipulations of specific cells in the retina.

### Gregg T. Lueder, MD

lueder@vision.wustl.edu

Retinoblastoma; eye misalignment (strabismus); retinopathy of prematurity; abnormal tearing; nasolacrimal disorders; cataracts; glaucoma.

### Peter Lukasiewicz, PhD

1003C McMillan
Phone: 314-362-4284

Neurotransmitters; synapses; retinal function in health and disease; retinal information processing.

### Todd P. Margolis, MD, PhD

margolist@vision.wustl.edu

Cellular and molecular mechanisms that regulate herpes simplex infection neurons; inexpensive telemedicine for reducing blindness in underserved populations.

### Josh Morgan, PhD

jlmorgan@wustl.edu

Our primary interest in in the synaptic connectivity of visual circuits. Our goal is to understand the structure, development and pathology of the synaptic connectivity that gives rise to vision. Our core approach is to reconstruct neural circuits in the retina and visual thalamus using large-scale 3D electron microscopy.

### John R. Pruett Jr., MD, PhD

pruettj@wustl.edu

We use fcMRI to study the development of large-scale functional brain networks in infants at risk for autism spectrum disorder. We are specifically interested in fcMRI correlates of visual joint attention. Our collaborative projects involve fcMRI studies of visual-motor integration.

### Kumar Rao, MD

rao@vision.wustl.edu

Surgical and medical therapies for disorders of retina and choroid; novel intraocular markers in uveitis and lymphoma; ultrasound therapy for choroidal melanoma.

### Nathan Ravi, MD, PhD, MS, FAAO

ravi@vision.wustl.edu

Our research is directed toward understanding the pathophysiology of presbyopia and developing medical or surgical treatments for this condition.

### Alan Shiels, PhD

1128 McMillan
Phone: 314-362-1637
shiels@vision.wustl.edu

Retinoblastoma; eye misalignment (strabismus); retinopathy of prematurity; abnormal tearing; nasolacrinal disorders; cataracts; glaucoma.
Our primary interest is in the molecular genetic mechanisms underlying cataract, glaucoma and associated eye disorders. Specifically, we are interested in the following: (1) genome-wide linkage analysis and targeted (exome, amplicon) sequencing for the discovery of causative or susceptibility genes; and (2) genotype-phenotype and functional expression studies of naturally occurring and gene-targeted mouse models to characterize pathogenic mechanisms.

Carla J. Siegfried, MD
siegfried@vision.wustl.edu

Our research is focused on ocular oxygen metabolism and the development of open-angle glaucoma. We are studying how the oxygen gradient in the eye is altered in disease states as well as noninvasive methods of measuring corneal oxygen consumption.

Florentina Soto, PhD
sotolucasf@vision.wustl.edu

Studies in our laboratory aim to identify the molecular basis of dendrite and axon lamination and synapse formation during development and in the adult retina. In addition, we investigate how these molecules could be involved in the development of retinal pathologies, including retinal degeneration.

Larry Tychsen, MD
2S89 Eye Clinic, St. Louis Children’s Hospital
Phone: 314-454-6026

Principal Investigator of NIH-funded studies of visual brain maldevelopment and repair in infant primates as well as of clinical studies of visuomotor abnormalities in cerebral palsy and pediatric refractive surgery.

Gregory P. Van Stavern, MD
vanstaverng@vision.wustl.edu

Neuroimaging of the visual pathways; idiopathic intracranial hypertension; evidence-based medicine and clinical decision making; using the visual system as a model to study neurologic disorders.