John F. Hardesty, MD, Department of Ophthalmology and Visual Sciences

Instruction begins during the first year with examination of the eye and a lecture on various aspects of ocular disease. During the second year, students will receive a refresher lecture and lab on direct ophthalmoscopy as well as a lecture on ophthalmic manifestations of systemic disease and primary ocular disease. During the third year, students are given the opportunity during the surgery clerkship to spend four weeks on the ophthalmology services; in addition, there are lectures given to students during the Internal Medicine rotations. During the fourth year, a four-week intensive clinical rotation is tailored to students interested in pursuing ophthalmology as a career. Research electives are available under the guidance of numerous ophthalmology faculty members for fourth-year students.

Website: [http://ophthalmology.wustl.edu](http://ophthalmology.wustl.edu)

Degrees & Requirements

Although the Department of Ophthalmology and Visual Sciences 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 section of this Bulletin.

Research

M50 Ophth 900

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

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
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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
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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 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.

Susan M. Culican, MD, PhD (Adjunct Professor)
culican@wustl.edu

Clinical: Development of a low-cost, simple visual function task for screening for macular disorders in the primary care setting. Education: Examination of the utility of assessment tools for evaluating resident clinical progression during residency training; development of new metrics to gauge resident progress.

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.

**Humeyra Karacal, MD**  
karacal@vision.wustl.edu

Treatment of uveitis; prevention of cataracts with antioxidants; antioxidants in age-related macular degeneration; retinal imaging and analysis using data mining techniques; designing operating room equipment to facilitate ophthalmic surgery.

**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**  
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.

**John T. Lind, MD, MS**  
lindj@vision.wustl.edu

Glucoma education; resident education; pharmacologic and surgical treatment of glaucoma; ophthalmic microbiology.

**Gregg T. Lueder, MD**  
lueder@vision.wustl.edu

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

**Peter Lukasiewicz, PhD**  
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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 is 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
pruettjl@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
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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
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Our research is directed toward understanding the pathophysiology of presbyopia and developing medical or surgical treatments for this condition.

Alan Shiels, PhD
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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
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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
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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.

Faculty

Pediatric Ophthalmology Director
R. Lawrence Tychsen, MD

Adult Ophthalmology Clinical Director
P. Kumar Rao, MD

Ophthalmology Research Director
Peter Lukasiewicz, PhD

Ophthalmology Director of Translational Research
Rajendra Apte, MD, PhD

Visit our website for more information about our faculty (http://ophthalmology.wustl.edu/Faculty) and their appointments.

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**H**

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MA Washington Univ in St. Louis 1972  
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Charles R Harris, PHD  
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Associate Professor of Biomedical Engineering (Courtesy)
Associate Professor of Neuroscience
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Instructor in Ophthalmology and Visual Sciences (primary appointment)
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S

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BS Saint Louis University 2001
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BS Illinois College of Optometry 1957
OD Illinois College of Optometry 1957

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BA University of Missouri 1971
OD University of MO St Louis 1984

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MD University of Illinois 1993

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BS School Not Listed 1979

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BS Illinois College of Optometry 1972
OD Illinois College of Optometry 1974

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OD University of Missouri 1992

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BE1 Vanderbilt University 2008

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BS School Not Listed 1953
MBA Southern Ill Univ Edwardsville 1988
OD School Not Listed 1954

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BA Johns Hopkins University 2008
MD Cornell University 2014
BA Johns Hopkins University 2008

Brian Patrick Sumner, OD
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OD Illinois College of Optometry 1978  
Kenneth V Swanson  
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)  

T  
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BS Mass Inst of Technology (MIT) 1981  
MD State Univ of NY Stonybrook 1991  
PHD State Univ of NY Stonybrook 1990  
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BS Harvard University 1977  
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BA Northwestern University 1990  
MD Northwestern University 1995  
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Professor of Ophthalmology and Visual Sciences (primary appointment)  
John F Hardesty MD Distinguished Professor of Ophthalmology and Visual Sciences  
Professor of Neuroscience  
Professor of Ophthalmology and Visual Sciences in Pediatrics  
BS Georgetown University 1975  
MD Georgetown University 1979  

V  
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Professor of Neurology  
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MD Pennsylvania State University 1993  
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OD Ohio State University 1977  
BA University of Iowa 1970  
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Associate Professor of Ophthalmology and Visual Sciences (primary appointment)  
MD Ohio State University 2006  

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BS Illinois College of Optometry 1990  
BA Saint Louis University 1987  
OD Illinois College of Optometry 1991  
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OD University of Houston 1972  
BS University of Houston 1971  
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Assistant Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)  
BA De Paul University 1950  
MD Ohio State University 1954  
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MD Yale University 1964  
BS Mass Inst of Technology (MIT) 1961  
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MD University of Michigan 1982  
BS University of Michigan 1977  
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BS University of Illinois 1982  
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Assistant Professor of Neuroscience  
PHD Washington Unv in St. Louis 2009  
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OD University of Missouri 1987  
BS University of Missouri 1979  
Ming-Fong Agnes Wong, MD, PHD  
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MD McGill University 1994  
PHD University of Toronto 2001  
BA Boston University 1990  

Courses  
Curriculum courses for Ophthalmology and Visual Sciences are listed below (p. 13).
Curriculum Courses

First Year
Introduction to clinical ophthalmology begins during the first year with a lecture and practicum (peer exam) on taking an ocular history and performing an ocular exam. Emphasis is on ophthalmoscopic. The lectures and the practicum session will be led by Dr. Andrew Lee.

Second Year
During the second year, students will receive a refresher lecture and lab on direct ophthalmoscopy as well as a lecture on ophthalmic manifestations of systemic disease and primary ocular diseases.

Third Year
Third-Year Clerkship Opportunities
During the third year, students are given the opportunity to spend four weeks of their surgery rotation on the ophthalmology service. The students work closely with the ophthalmology residents and review the differential diagnosis of the "red eye," how to interpret an ophthalmologic consult note, and how to handle ocular emergencies. During this rotation, there is again emphasis on the use of the ophthalmoscope. Additional clinical skills introduced to student rotators include the use of the slit lamp and indirect ophthalmoscopy. All third-year students must complete the "Case Studies in Ophthalmology for Medical Students" and attend the periodic "feedback/oral exam" session with Dr. Andrew Lee.

Third Year/Fourth Year
Ophthalmology Sub-Internship Rotation ("The Sub-Eye") occurs during this time. During the month of June prior to their fourth year, students interested in pursuing a career in ophthalmology are encouraged to complete this intensive four-week rotation. Students will have personal indirect ophthalmoscopy lenses available for use on the rotation. Formal didactic sessions and workshops will be used to teach students how to perform a detailed ophthalmic history and exam, including the mastery of advanced slit lamp techniques and indirect fundoscopy. There will be an intense schedule of both live and recorded lectures delivered by ophthalmology faculty members, with post-lecture quizzes. Students will be expected to perform daily required reading. Retention and understanding of reading materials will be gauged by frequent quizzes. Students are strongly encouraged to present a case at the department's grand rounds. By the end of the rotation, students will be expected to function at the level of a first-year ophthalmology resident.

M50 Ophth 801 Ophthalmology
This elective is for senior students who plan to apply for a residency in Ophthalmology. In accordance with any subinternship, medical students will be expected to function at the level of a beginning first-year ophthalmology resident on this rotation. The students will rotate through the resident eye clinic and the subspecialty clinics of the full time faculty of the Washington University Medical School Department of Ophthalmology and Visual Sciences (e.g., neuro-ophthalmology service, cornea/external disease service, etc.). The first day of the rotation will consist of an orientation day in which students will receive extensive didactics and participate in workshops to learn the basics of a complete ophthalmic history and examination. Students may opt to check out indirect ophthalmoscopy lenses that may be used for the month to facilitate the acquisition of fundoscopy skills. During the rotation, the student's responsibilities range from observation (including observing surgery) to working at a resident level and completing full eye examinations. There will be a rigorous academic curriculum for the rotation, including a weekly case presentation, bi-monthly wet lab sessions with a resident, weekly attendance at grand rounds, and a mix of medical student-oriented and resident-oriented conferences. On day one, students will receive a rotating call schedule for the entire month. A medical student is expected to be present at all times to assist the primary call ophthalmology resident during the rotation. By the end of the four-week rotation, the student is expected to be proficient in taking an ocular history and performing a complete eye exam including slit lamp biomicroscopy and indirect ophthalmoscopy.

M50 Ophth 816 Away Rotation in Ophthalmology
This four-week elective is for senior students from medical schools across the United States who are in good standing at their home institution and who are planning to apply for a residency in ophthalmology. To enroll in this elective, students must first apply online for the elective via the visiting student application service (VSAS). These applications will be reviewed and invitations will then be sent to individuals to enroll in the elective. Due to large demand, not all eligible away students will be accepted for the rotation. The dates for this elective are not flexible. The students will rotate through the resident eye clinic and the subspecialty clinics of the full time faculty of the Washington University Medical School Department of Ophthalmology and Visual Sciences (e.g., neuro-ophthalmology service, cornea/external disease service, etc.). In exchange for a refundable deposit, students may opt to check-out indirect ophthalmoscopy lenses that may be used for the month to facilitate the acquisition of fundoscopy skills. During the rotation, the student's responsibilities range from observation (including observing surgery) to working at a resident level and completing full eye examinations. Didactics will include weekly case presentation sessions, weekly attendance at grand rounds, and a mix of medical student-oriented and resident-oriented conferences. Also, there will be medical student-oriented workshops to learn the basics of the slit lamp and indirect ophthalmoscopy. On day one, students will receive a schedule of conferences that they are expected to attend during the month. By the end of the four-week rotation, the student is expected to be proficient in taking an ocular history and performing a complete eye exam including slit lamp biomicroscopy and indirect ophthalmoscopy.

M50 Ophth 900 Research Elective — Ophthalmology
Research opportunities may be available. If interested, please contact the Department of Ophthalmology.