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

The John F. Hardesty, MD, Department of Ophthalmology and Visual Sciences has a strong legacy and is a national leader in clinical ophthalmology and research. It is ranked among the top ten best overall programs in the United States, and it is also considered one of the top ten best research programs by *U.S. News & World Report*. Our ophthalmology department is fourth in National Institutes of Health funding for research and has one of the nation’s largest ophthalmology research faculty. The department’s mission is as follows: “As world leaders in patient care, teaching and research, we strive to touch lives and preserve and restore vision through innovation and compassionate service.” We hope that students will join us to enrich their medical education and to experience the collaborative culture of ophthalmology.

Although only a small percentage of physicians in the United States specialize in ophthalmology, there is no doubt that all physicians need a basic understanding of the eye and what it can reveal about a patient’s condition. In a recent article published in the journal *Ophthalmology*, it was stated that "ophthalmology-related issues arise in the diagnosis and treatment of inpatients and outpatients on internal medicine, pediatrics, trauma surgery, neurology, endocrinology, neurosurgery, otolaryngology, dermatology, oncology, and rheumatology services.”

The article went on to state that “[m]ost primary care program directors believe fewer than 50% of incoming residents have sufficient ophthalmology skills when entering the internship period of medical education. Ophthalmoscopy is one of many ophthalmic skills in which there seems to be a gap in the training of medical students. [A study] demonstrated that emergency medicine physicians often do not perform an ophthalmoscopic examination when it is indicated, and when they do, they are unlikely to detect abnormal findings. This presents a serious issue, because patients with visual impairments are more likely to be hospitalized, and from 2006 through 2011, there were 12 million eye-related emergency department visits nationwide. If they are unable to view or interpret fundus findings with either an ophthalmoscope or fundus photography, the students must know when it is necessary to refer their patients to an ophthalmologist for further evaluation.” In other words, even if a physician does not plan to make ophthalmology their career, deepening their knowledge of this field will enhance their skills as a physician in any field.

At Washington University School of Medicine, medical students under the Legacy Curriculum begin ophthalmology-based instruction during the first year with examination of the eye and a lecture on various aspects of ocular disease. During the second year, students 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. Newer medical students under the Gateway Curriculum have the option of choosing ophthalmology for a three-week-long clinical experience during their first-year Procedural Immersion. More intensive clinical rotations will be available in later phases of the new curriculum.


Website: http://ophthalmology.wustl.edu

Faculty

Our staff includes full-time university attending physicians for all subspecialties in ophthalmology, including ocular tumors, oculoplastics and uveitis. We have a very healthy mix of senior established faculty and junior members.

Todd Margolis, MD, PhD (https://ophthalmology.wustl.edu/people/todd-margolis-md-phd/)
Alan A. and Edith Wolff Distinguished Professor and Chairman

R. Lawrence Tychsen, MD (https://wuphysicians.wustl.edu/for-patients/find-a-physician/lawrence-tychsen/)
Pediatric Ophthalmology Director

P. Kumar Rao, MD (https://profiles.wustl.edu/en/persons/kumar-rao/)
Adult Ophthalmology Clinical Director

Peter Lukasiewicz, PhD (https://profiles.wustl.edu/en/persons/peter-lukasiewicz/)
Ophthalmology Research Director

Rajendra Apte, MD, PhD (https://profiles.wustl.edu/en/persons/rajendra-apt/) Ophthalmology Director of Translational Research

Visit our website for more information about our faculty (http://ophthalmology.wustl.edu/Faculty/) and their appointments.
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Professor of Medicine
Vice Chair of Translation and Innovation Department of Ophthalmology
PHD University of Texas Southwest 1997
MD University of Bombay 1993

B

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BS University of California 2010
MD University of Miami 2016

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<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Institution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kevin Jay Blinder, MD</td>
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<tr>
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</tr>
<tr>
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</tr>
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<td>Carmen F Castellano, OD</td>
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</tr>
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Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
OD School Not Listed 1954
BS School Not Listed 1953
MBA Southern Ill Univ Edwardsville 1988

Leanne Denise Stunkel, MD
Assistant Professor of Ophthalmology & Visual Science (primary appointment)
Assistant Professor of Neurology
BA Johns Hopkins University 2008
MD Cornell University 2014
BA Johns Hopkins University 2008

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

Kenneth V Swanson
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)

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Paul M Tesser, MD, PHD
Associate Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD State Univ of NY Stonybrook 1991
BS Mass Inst of Technology (MIT) 1981
PHD State Univ of NY Stonybrook 1990

Matthew A Thomas, MD
Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD Harvard University 1991
BS Harvard University 1977

Linda Mei-Lin Tsai, MD
Professor of Ophthalmology and Visual Sciences (primary appointment)
MD Northwestern University 1995
BA Northwestern University 1990

Robert Lawrence Tychsen, MD
Professor of Ophthalmology and Visual Sciences (primary appointment)
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.

Phillip 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 tolerate 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; nasolacrinal 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
jimorgan@wustl.edu
Our primary interest 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
pruettj@wustl.edu
We use fMRI to study the development of large-scale functional brain networks in infants at risk for autism spectrum disorder. We are specifically interested in fMRI correlates of visual joint attention. Our collaborative projects involve fMRI 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
shields@vision.wustl.edu
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
2589 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.

Courses
Curriculum courses (p. 13) for Ophthalmology and Visual Sciences are listed below.
Gateway Curriculum: First Year
Under the new Gateway Curriculum, medical students spend their four years split between three phases. Phase I involves the first 16 months of medical school. During Phase 1, students participate in three Procedural Immersions, which are three-week-long clinical and surgical experiences. The primary goals of the Procedural Immersions are to socialize the student to different clinical settings, to hone their clinical skills, and to allow them to explore the impact of society and health systems on an individual patient’s health. This 360-degree approach to early clinical exposure allows students to view practicing medicine through physician, patient, and systems lenses. In these rotations, medical students will often focus on longitudinal patient care by following a specific patient from the time they arrive until they leave and seeing how all health care team members are involved in that patient’s visit. During the Ophthalmology Procedural Immersion, students spend time in the University Eye Clinic and in the pediatric and adult subspecialty clinics and operating rooms, and they attend rounds with an inpatient consult team. This early exposure to clinical experience helps students to contextualize the classroom and clinical learning that they continue with over the next two phases.

Legacy Curriculum: Second Year
During the second year of the Legacy Curriculum, 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.

Legacy Curriculum: Third Year
During the third year, students are given the opportunity to spend four weeks of their surgery clerkship 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 rotating students include the use of the slit lamp and indirect ophthalmoscopy. All third-year students on the ophthalmology rotation meet weekly for case presentations with faculty and other medical students on the rotation. They also attend lectures periodically throughout their month in ophthalmology.

Legacy Curriculum: Fourth Year
The Ophthalmology Sub-Internship Rotation 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 assessed 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.

Curriculum Courses

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.). 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 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, 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. All students interested in this senior elective must contact Course Director in March of year WUMS-III. The final grade of the student is determined by input from the director of the particular service(s) through which the student rotated, plus the case presentations.

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.