



DEPARTMENT OF OPHTHALMOLOGY AND VISUAL SCIENCES (DOVS)

RESEARCH INTERESTS

Basic Science Faculty



Curtis Brandt, PhD

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- Ocular infections, gene delivery, retinal gene therapy, and immunology, cornea, CORE lab
- Genetic drivers of virulence in ocular viral infection
- Innate/intrinsic immune responses to ocular gene delivery vectors
- Gene therapy for ocular diseases
- Antimicrobial drug discovery and development
- The role of microtubule associated proteins in HSV neuronal infection



**Amitha Domalpally, MD,
PhD**

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domalpally@wisc.edu

- Discovery, development, and translation of imaging biomarkers for clinical trials in retinal diseases
- Artificial Intelligence for retinal imaging
- Clinical Trials in diabetic retinopathy, AMD, retinal vein occlusion and uveitis
- Imaging artifacts



David Gamm, MD, PhD

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- Diseases of the retina, stem cell biology
- Human pluripotent stem cells
- Disease modeling
- Regenerative medicine
- Retinitis pigmentosa
- Age-related macular degeneration
- Retinal, photoreceptor, and RPE cell development
- Retinal stem cell biology/human pluripotent stem cell biology
- Retinal development biology
- Inherited and acquired retinal degenerations
- Cell and gene therapies for retinal degenerations
- Stem cell-based retinal disease modeling



**Shaoqin "Sarah" Gong,
PhD**

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- Multifunctional drug/gene/cell delivery systems
- Nanomedicines
- Biomaterials
- CRISPR genome editing
- Tissue engineering
- Antimicrobial materials
- Cancer immunotherapy



Mrinalini Hoon, PhD

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- Diseases of the retina
- Determine the molecular and activity-dependent mechanisms that regulate synaptic connectivity between retinal neurons during development and circuit assembly
- Determine the structural and functional impact of retinal disease on synaptic connectivity between outer and inner retinal neurons
- Correlate synaptic plasticity mechanisms during retinal development and during disease conditions
- Determine genetic and/or pharmacological strategies that can recover synaptic organization and function in retinal disease conditions



Paul Kaufman, MD
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paul.kaufman@wisc.edu

- Glaucoma, accommodation/presbyopia, intraocular pressure regulation/aqueous humor dynamics
- Devise methods for obtaining accurate, reproducible measurements of Schlemm's canal pressure as the gateway to the distal aqueous outflow apparatus
- Develop gene therapies to enhance aqueous humor outflow and reduce intraocular pressure
- Study the anatomic and pathophysiological relationship between presbyopia and glaucomatous optic neuropathy
- Characterize all anatomical movements during accommodation (i.e., ciliary muscle, lens, sclera, choroid, vitreous fluid, vitreous membranes/ fibers/strands) and their changes with age
- Elucidate the full mechanism of accommodation and the extra lenticular pathophysiology of presbyopia



Julie Mares, PhD, MSPH
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jmarespe@wisc.edu

- Epidemiology, diet and nutrition and eye diseases
- Assess the status of retinal carotenoids and relationship to genotypes and phenotypes
- Retinal carotenoids to retinal neurodegeneration, and relation to age-related macular degeneration, glaucoma and vision function
- Conduct epidemiological studies of the relationships of healthy diets and lifestyles to common age-related eye diseases



Colleen McDowell, PhD
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cmmcdowell@wisc.edu

- Molecular mechanisms for glaucomatous trabecular meshwork damage
- Regulation of Intraocular Pressure (IOP)
- Effect of elevated IOP on retinal ganglion cells (RGC) and optic nerve head (ONH) damage
- Cell culture models
- Multiple mouse model systems
- Profusion organ culture system for human donor eyes
- Co-Director of DOVS Biobank



Gillian McLellan, BVMS, PhD
DOVS, School of Veterinary Medicine
gillian.mclellan@wisc.edu

- Glaucoma, neuroprotection, ocular development, drug development, genetic ocular disease in animals
- Comparative glaucoma, including imaging of the retina and optic nerve, electrophysiology, aqueous humor dynamics, genetics and pathology of glaucoma in animals and humans
- Gene therapy for glaucoma
- Intersection of glaucoma and Alzheimer's disease pathology



Freya Mowat, BVSc, PhD
DOVS, School of Veterinary Medicine
mowat@wisc.edu

- Retinal aging and aging of the senses and the brain
- The relationship between diseases of the brain and diseases of the retina
- Multifactorial risk factors for retinal aging and age-related diseases
- Naturally occurring animal models of retinal dysfunction and degeneration
- Retinal diseases of dogs; Sudden Acquired Retinal Degeneration Syndrome (SARDS)
- Genetic variation in PPARGC1a and photoreceptor health in the aging retina



Donna Neumann, PhD
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- HSV-1 infections in corneal scarring and blindness
- Epigenetic controls regulating HSV-1 latency



Robert Nickells, PhD

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- Glaucoma, neuroprotection
- Regulation of ganglion cell death and the role of Bax
- Epigenetic changes in apoptotic ganglion cells leading to gene silencing
- Identification of ganglion cell death susceptibility alleles
- Development of a cold storage solution for the preservation of whole eyes used for transplantation



T. Michael Nork, MD, MS

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- Diseases and surgery of the retina and vitreous
- Mechanisms by which various ocular diseases affect the outer retina
- How injury to the outer retina might, in turn, affect disease pathogenesis



Nader Sheibani, PhD

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- Ocular vascular biology
- Identification of molecular and cellular mechanisms driving ocular neovascularization
- Animal modeling of ocular neurovascular degenerative diseases
- Molecular and cellular action of endogenous inhibitors of angiogenesis
- Evaluation and development of new treatment modalities for ocular neovascular diseases
- Ocular metabolic activity and cellular dysfunction



Terri Young, MD, MBA

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tyoung6@wisc.edu

- Pediatric ophthalmology, molecular genetics of eye diseases, myopia
- Gene discovery and animal modeling of childhood glaucoma
- Gene discovery and animal modeling of heritable, degenerative high- grade myopia
- Whole-eye imaging in ocular development and with refractive states such as myopia



Ismail Zaitoun, PhD

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- Hypoxic ischemic insult on retinal vascular integrity and function
- Hypoxia-inducible factors (HIFs) to retinal vascular damage
- Ischemic stroke insult on the neurovascular unit at the cellular level, both in vivo and in vitro
- Pro- and anti-apoptotic proteins in eye vasculature under developmental and pathologic conditions

Clinical Faculty



Michael Altaweel, MD

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mmaltaweel@wisc.edu

- Retina imaging, reading center
- Diabetic retinopathy, uveitis, macular edema
- Diseases of the retina
- Adalimumab vs conventional Immunosuppression therapy for patients with non-infectious, intermediate, posterior, and panuveitides
- Uveitic macular edema
- Ocular melanoma



Barbara Blodi, MD

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bablodi@wisc.edu

- Clinical trials in dry and wet age-related macular degeneration, diabetic retinopathy, diabetic macular edema, retinal vein occlusion
- Retinal imaging research including new retinal modalities
- Use of artificial intelligence for retinal imaging in reading center research and clinical trials



Yasmin Bradfield, MD

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- Pediatric ophthalmology
- Anterior segment OCT imaging
- Pediatric glaucoma
- Pediatric access to eye care



Cat Burkat, MD

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- Ophthalmic reconstructive and cosmetic surgery



Jonathan Chang, MD

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- Diseases of the retina and vitreous
- Outcomes of retina surgery
- Determining cost-effectiveness and utility of clinical interventions
- Use of imaging to evaluate retinal diseases
- Big data



Roomasa Channa, MD

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- Diabetic retinopathy and diabetic retinal neurodegeneration
- Leveraging technology, such as artificial intelligence, to reduce disparities in diabetic eye care
- Retinal imaging
- Diseases of the retina, macula and vitreous
- Big data



Yanjun “Judy” Chen, MD, PhD

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ychen344@wisc.edu

- The pupil as a biomarker of brain aging and degeneration
- Machine learning in pupil analyses
- Virtual reality mirror eye tracker
- Optic neuropathy related to MS, brain tumors, and genetic mutations



Karina Conlin, OD

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kconlin@uwhealth.org

- Specialty contact lens optometry
- Ocular surface disease



Justin Gottlieb, MD

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- Age-related macular degeneration, diabetic retinopathy, diseases of the retina



Daniel Knoch, MD

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dwknoch@wisc.edu

- Research in medical student education
- Research in resident education
- Curriculum development and assessment
- Surgical procedures



Laura Kopplin, MD, PhD

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ljkopplin@wisc.edu

- Epidemiology and clinical trials for inflammatory eye diseases
- Clinical trials of uveitis therapeutics
- Biomarkers for uveitis outcomes
- Clinical management of ocular inflammatory disease



Yao Liu, MD

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liu463@wisc.edu

- Clinical trials of new medications and surgical devices
- Telemedicine for diabetic eye screening
- Macular pigment as a glaucoma risk factor
- Clinical and surgical glaucoma management
- Community-based research and health equity



Mark Lucarelli, MD

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mlucarel@wisc.edu

- Oculoplastic, cosmetic facial and orbital surgery
- Small incision/minimal minimally invasive oculo-facial surgical techniques
- Facial synkinesis
- Orbital and adnexal malignancies
- Orbital, facial, and periocular anatomy
- Thyroid eye disease clinical trial (Immunovant)



Michele Martin, OD

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- Dry Eye
- Graft versus host disease



Alexander Miranda, MD

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- Pediatric eye diseases
- Eye disease registries
- Big data



Mihai Mititelu, MD, MPH

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- Retina, age-related macular degeneration, diabetic retinopathy
- Multimodal imaging, intravitreal injections, retinal vascular disease, medical education and mentoring
- Clinical trials
- International health
- Autoimmune retinopathy



Anna Momont, MD

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- Ergonomics in residency training
- Glaucoma therapies, clinical trials participation



Sanbrita Mondal, OD

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- Low vision disparities, quality improvement
- Low vision technology
- Wisconsin Low Vision Registry and Data Repository (WILVR)



Sarah Nehls, MD

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- Cornea, infectious eye disorders, dry eye
- Clinical Trials



Nayan Patel, OD

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- Pediatric myopia
- Clinical trials
- Specialty contact lenses



Heather Potter, MD

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hpotter@wisc.edu

- Comprehensive ophthalmology, anterior segment & cataract surgery, pathology
- Co-Director of DOVS Biobank



Kathleen Schildroth, MD

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- Diabetic retinopathy
- Macular degeneration
- Ocular trauma
- Retinal detachment
- Retinal laser
- Retinal vascular disease
- Vitreoretinal surgery



Melanie Schmitt, MD

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- Pediatric ophthalmology, hereditary retinal disorders
- Inherited Retinal Degeneration Database (IRD)



Kimberly Stepien, MD

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- Inherited Retinal Diseases
- Diseases of the Retina including age-related macular degeneration, diabetic retinopathy, vascular occlusion
- Adaptive Optics Retinal Imaging
- High Resolution Retinal Imaging
- PI – Inherited retinal disease clinical trials
- Co-founder Wisconsin Advanced Imaging of Visual Systems (WAIVS) lab at UW-Madison
- Developer, UW Ocular Genetic Disease Registry
- Investigator, Wisconsin Reading Center at UW-Madison



Suzanne van Landingham, MD

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- Oculoplastic, orbital, and facial cosmetic surgery
- Big data in ophthalmology - SOURCE and IRIS eye disease registries
- Facial nerve injury and facial synkinesis
- Functional impact of ophthalmic and ddnexal disease, including the impact of vision loss on driving
- Clinical trials in thyroid eye disease



Evan Warner, MD

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- Clinical trials in medical and surgical management of corneal disease
- Eye banking, cornea donor pool expansion, and cornea graft utilization
- Endothelial keratoplasty surgery and anesthesia
- Education and training of corneal transplantation
- Dry eye disease and neurotrophic keratitis

Affiliates



Anne Griep, PhD

Cell and Regenerative Biology
aegriep@wisc.edu

- Molecular and genetic pathways regulating mouse eye development and disease using mouse models
- Cell cycle regulation in the lens
- Molecular and genetic regulation of lens cell structure
- Transgenic, knockout and gene edited mice



Natascha Merten, PhD

Population Health Sciences
merten2@wisc.edu

- Investigation of general aging processes that affect multiple domains of brain aging focusing on sensory and cognitive aging and dementia
- Investigation of early biomarkers and potentially modifiable risk factors of brain aging to identify individuals at risk for decline in various health conditions



Bikash Pattnaik, PhD, MPhil

Pediatrics
pattnaik@wisc.edu

- Retinal diseases due to ion channelopathy
- Genomic medicine targeting RPE and PR channelopathy IRD
- Viral and non-viral therapeutic delivery to the posterior retina
- Hypoxic-ischemic encephalopathy (HIE) impact on impairment in pediatric vision



Donna Peters, PhD

Pathology and Laboratory Medicine
dmpeter2@wisc.edu

- Fibronectin's role in the modulation of intraocular pressure
- Role of integrin signaling in the trabecular meshwork and glaucoma



Raunak Sinha, PhD

Neuroscience
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- Visual processing in the retina



Yuhang Zhao, PhD

Computer Sciences
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- Human Computer Interaction (HCI)
- Accessibility
- Augmented and Virtual Reality (AR/VR)
- AI-powered interactive systems

PI Scientists



Jeremy Rogers, PhD

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jdrogers5@wisc.edu

- Optical design and instrumentation development (OCT, microscopy, spectroscopy, polarimetry, AOSLO)
- Development of novel image contrast
- Quantitative measurement of optical scattering in tissue (goniometry, EBS)
- Computational modeling of light scattering in tissue using Monte Carlo simulations



Robert Slater, PhD

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- Artificial intelligence development and algorithms
- Deep neural networks
- Large scale databases
- Retinal AI



Stuart Tompson, PhD

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- Determine the molecular genetic causes underlying childhood glaucoma and high-grade myopia
- Map familial genetic disease loci using high-density SNP genotyping arrays and linkage analysis
- Determine gene/genome variants in families using exome and whole-genome sequencing
- Assay variant gene function through protein overexpression in cultured cells
- Generate rodent models of human genome variation using CRISPR-Cas9 genome editing
- Perform detailed ocular phenotyping of rodent models, including IOP, OCT, and histology (FFPE/cryo)
- Profile the transcriptomes of ocular tissues using single cell RNA sequencing (scRNAseq), including ocular tissue dissociation techniques and data analysis using Loupe Browser and Seurat



James Ver Hoeve, PhD

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- Non-invasive Visual Electrophysiology
- Glaucoma
- Inherited retinal disease
- Visual Development, Normal and Abnormal
- Comparative Ophthalmology