Department of Ophthalmology, Visual and Anatomical Sciences

Wayne State University School of Medicine

Faculty Profiles
Fall 2025

KEY:

Research Track Mentor

Education Track Mentor

Elizabeth Berger, Ph.D.

Elizabeth Berger, Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
eberger@med.wayne.edu

The studies carried out by the Berger lab predominately focus on disease pathogenesis and the interplay between the immune and neuroendocrine systems. We mechanistically and therapeutically investigate the events of inflammation and resolution using models of ocular infectious disease and diabetes-induced ocular complications.

In addition to my research program, I am a core teaching member of M1 human gross anatomy, contribute to M1/M2 Research Elective and PBL sessions.

Bruce Berkowitz, Ph.D.

Bruce Berkowitz, Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
baberko@med.wayne.edu

Dr. Berkowitz's research is focused on developing and applying novel imaging methods to measure neuronal energy ecosystem biomarkers in vivo (including mitochondrial respiration and oxidative stress) to improve treatment efficacy during emerging neurodegeneration.

http://berkowitzlab.wayne.edu/

Google Scholar Link

Rodney Braun, Ph.D.

Rodney Braun, Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
rbraun@med.wayne.edu

Dr. Braun is heavily involved in the medical education mission of the school. As Director of Medical Histology and Embryology, Dr. Braun is the lead educator and director overseeing all of the lectures and lab sessions associated with those disciplines. This includes developing the curriculum for the 18 small group lab sessions that occur longitudinally throughout the M1 pre-clerkship curriculum. In addition, Dr. Braun is also co-Course Director for two of the M1 courses, co-Course Director for the M1 and M2 research electives, is the lead educator for the Embryology segment of the Post-Baccalaureate Program, and contributes a lecture to the Biology of the Eye course. Finally, Dr. Braun serves as Faculty co-Chair of the School of Medicine Curriculum Management Committee and is also a member of several education-associated committees and subcommittees.

Maria Bykhovskaia, Ph.D.

Maria Bykhovskaia, Ph.D.
Department of Neurology
Wayne State University
mbykhovs@med.wayne.edu

Our research is focused on molecular machinery that controls the release of neuronal transmitters from nerve terminals. Neuronal transmitters are packaged into synaptic vesicles and released by fusion of the vesicles with the neuronal membrane. These processes are highly dynamic and plastic, and disruptions in their regulation can produce severe neurological disorders, such as epilepsy. Our lab investigates the mechanisms that lead from disruptions in the synaptic vesicle fusion to imbalance in neuronal networks to epilepsy.

Andrew Garrett, Ph.D.

Andrew Garrett, Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
gm6614@wayne.edu

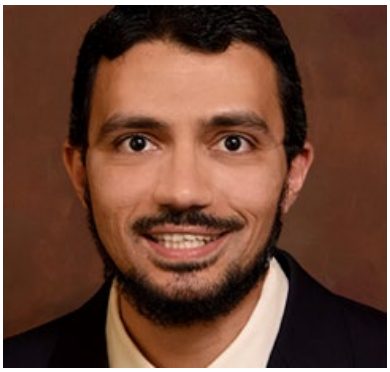
The Garrett lab is interested in how developing neurons use cell-surface recognition molecules called cell adhesion molecules (CAMs) during neural circuit formation. Our focus is on the process of self-avoidance, which prevents sister neurites from the same cell ("self") and from cells of the same type ("homotypic") from becoming entangled with each other. Our model is the mouse retina, where both self- and homotypic-avoidance is important for the orderly organization of the ~100 distinct types of neurons that process visual information.

Avril Genene Holt, Ph.D.

Avril Genene Holt, Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
agholt@med.wayne.edu

Both healthy aging individuals as well as military personnel that are exposed to loud noise or explosions often suffer from untreatable deterioration in auditory and vestibular function. Studies in the Holt Lab focus on the effect of loud noise and blast on central auditory and vestibular pathways and the impact on function (hearing and balance). To understand the biological basis of dysfunction in these pathways, we collect behavioral, neuronal, molecular, and biochemical, data related to ion channels and neurotransmission. The goal is to both understand the causes of auditory and vestibular dysfunction and identify new targets for treatment and prevention.

Ahmed Ibrahim, Ph.D.



Ahmed Ibrahim, Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
ahmed.ibrahim@wayne.edu

My research centers on investigating the underlying molecular and cellular mechanisms of Angiogenesis-driven diseases. The focus is primarily on pathological ocular angiogenesis which is the underlying mechanism of a variety of sight-threatening diseases such as Retinopathy of prematurity (ROP), proliferative diabetic retinopathy (PDR), and exudative age-related macular degeneration (wet AMD). The long-term goal of my research is to identify novel therapeutic targets, with specific focus on endothelial metabolic reprogramming, and to discover already FDA-approved drug(s) that could be repurposed to modulate the key proteins in the energy metabolism of angiogenic endothelial cells.

Tomomi Ichinose, M.D., Ph.D.

Tomomi Ichinose, M.D., Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
tichinos@med.wayne.edu

Our research is focusing on understanding the visual system. Using the mouse and human retina as the model system, we conduct electro-physiology and immunohistochemistry to investigate neural network and visual signal processing. We investigate how retinal neural network processes motion detection, light adaptation, and other visual functions.

Ryan Insolera, PhD

Ryan Insolera, PhD
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
rinsolera@wayne.edu

With their high energetic demands, neurons are critically reliant on a healthy population of mitochondria, which are constantly maintained through biogenesis, dynamics, and degradation. In the lab, we are interested in understanding the underlying cell biology of neurodegenerative diseases in which mitochondrial maintenance is disrupted. We primarily utilize the simple model organism Drosophila melanogaster (fruit flies) to achieve the goal of correlating subcellular perturbations with physiological dysfunction and neurodegeneration.

www.insoleralab.com

Renu Kowluru, Ph.D.

Renu Kowluru, Ph.D.
Department of Ophthalmology,
Visual and Anatomical Sciences
Wayne State University
rkowluru@med.wayne.edu

Our main goal is to understand the molecular mechanism(s) of the development of diabetic retinopathy, and research focus is on mitochondrial damage and epigenetic modifications. The lab uses both in vivo (rodents) and in vitro (primary cells in culture) models of diabetic retinopathy, and utilizes molecular, biochemical and functional techniques.

Ashok Kumar, Ph.D.

Ashok Kumar, Ph.D.
Department of Ophthalmology,
Visual and Anatomical Sciences
Wayne State University
akuma@med.wayne.edu

The research interests of laboratory are to study host-pathogen interactions in microbial infection caused by bacteria, viruses, and fungi. Specifically, our focus has been on developing immunomodulation strategies targeting Toll-like receptor (TLR) signaling in preventing and/or treating infectious diseases affecting the eye. We use cutting-edge and high throughput “omics” technologies such as transcriptomics, lipidomics, and metabolomics combined with systems biology to study host immune responses to infection. Another area of our research is to understand mechanisms of antibiotic resistance among bacteria, and develop alternative antimicrobial therapeutics to reduce antibiotic resistance.

Michael Landowski, Ph.D.

Michael Landowski, Ph.D.
Department of Ophthalmology,
Visual and Anatomical Sciences
Wayne State University
hx3376@wayne.edu

Dysregulation of lipid metabolism is strongly associated with the development of outer retinal diseases including Stargardt’s disease and age-related macular degeneration. However, the regulation of lipid metabolism within the retina remains unclear and understudied. My research program uses a combination of mouse models, cell culture systems, and human samples to investigate key pathways involved in retinal lipid metabolism. In the long term, this work will add to our understanding of the complex nature of retinal lipid metabolism, providing insight into outer retinal disease pathogenesis and generating novel therapeutic targets for preventing the vision loss occurring in patients with these diseases.

Alju Simon, M.D., M.S.

Alju Simon, M.D., M.S.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
hi7434@wayne.edu

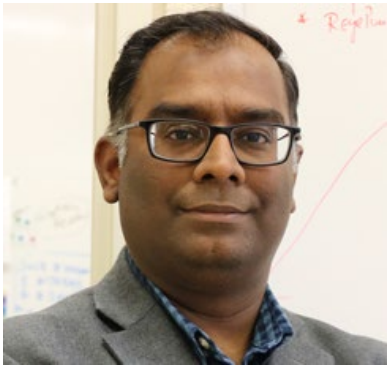
Dr. Simon contributes to the medical education mission at the School of Medicine with a strong passion for teaching anatomical sciences. A trained physician from India, she transitioned to academia after several years in surgical practice and began teaching anatomy, embryology, and neuroscience to medical and graduate students while completing her first Master's in Anatomy (2018). She later earned a second Master's in Anatomy at department of OVAS, Wayne State University (2021–2023) and joined the department since 2022. Dr. Simon plays an integral role in the cadaver-based dissection program in the Gross Anatomy Lab, a cornerstone of the M1 pre-clerkship curriculum. She also contributes to the neuroscience course, supports the revision of embryology content, and serves on the histology teaching faculty. She currently serves as Co-Director of the Gross Anatomy Lab for both medical and graduate programs. Dr. Simon is known for her approachable teaching style and her commitment to helping students navigate the complexities of human structure with confidence and curiosity.

Nikhlesh Singh, Ph.D.

Nikhlesh Singh, Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
nsingh2@wayne.edu

Vascular diseases are the leading cause of morbidity and mortality in developed societies. My research focuses on understanding the molecular mechanisms of vascular diseases particularly atherosclerosis, restenosis, and proliferative retinopathies. Our multidisciplinary approach includes biochemical and cell biology procedures (Western blot analysis, 2-D gel electrophoresis, HPLC, cell migration assay, transfections, imaging, and immunoprecipitation), molecular techniques (electrophoretic mobility shift assay, chromatin IP assay, site-directed mutagenesis, and cloning), and various animal models (Rat/mouse carotid artery injury, hind-limb ischemia, oxygen-induced retinopathy, and ApoE-/- mouse model). By defining the molecular bases for these pathologies, we hope to find new targets for therapeutics to improve vascular disease prevention and treatment.

Susmit Suvas, Ph.D.



Susmit Suvas, Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
ssuvas@med.wayne.edu

Tissue injury results in an initiation of inflammation. Acute mucosal inflammation developed in response to an infection is beneficial to host, as it helps in eradicating the infectious pathogen. However, the inflammation that persists (chronic inflammation) in mucosal tissue for longer time-period is detrimental to host because it prevents an effective healing and the normal functioning of the tissue. Depending upon the tissue that gets inflamed, chronic inflammation could cause morbidity or mortality to the host. The goal of our lab is to understand the cellular and molecular pathways involved in regulating sterile inflammation and viral infection induced chronic inflammation.

Ryan Thummel, Ph.D.

Ryan Thummel, Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
rthummel@med.wayne.edu

The main focus of the lab is to study the development and function the retina. We utilize all the genetic and developmental advantages of zebrafish as a model system – most notably their conservation to our human anatomy and physiology in regard to pigmentation, myelin formation, and visual function. In addition, we take advantage of the amazing capacity of the zebrafish to regenerate its entire retina following injury or disease. https://www.thummellab.com/

In addition to his research, Dr. Thummel is the Graduate Program Officer for OVAS, the co-course director for the M1 and M2 research elective courses, is a core member for the M1 histology and embryology disciplines, assists with M1/M2 problem-based learning exercises, and is a faculty facilitator for the First Patient Project.

Jennifer Vranish, Ph.D.

Jennifer Vranish, Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
jennifer.vranish@wayne.edu

Dr. Vranish is a joint-appointed teaching faculty member in the departments of Physiology and OVAS. In addition to directing and teaching graduate coursework in Physiology, she is a director of the gross anatomy program and cadaver lab experience for first-year medical students. She also teaches in active learning sessions throughout the M1 curriculum, including: problem-based learning, case-based learning, and neuroscience laboratories. Finally, she teaches gross anatomy in the Premedical Studies Certificate Program.

Shunbin Xu, Ph.D.

Shunbin Xu, Ph.D.
Department of Ophthalmology, Visual and Anatomical Sciences
Wayne State University
sxu@med.wayne.edu

The research interest of my laboratory is to study the roles of microRNAs (miRNAs) in the eye and ocular diseases. miRNAs are small, non-coding, regulatory RNAs and constitute a newly recognized level of gene expression regulation. Our long-term goal is to uncover the roles miRNAs in normal development and function of the eye, as well as in ocular diseases so as to identify novel miRNA-based therapeutic targets for the treatment of various ocular diseases. Currently, the major projects in the lab focus on the roles of miRNAs in neuroimmune interaction in the cornea and bacterial keratitis.

Fu-Shin Yu, Ph.D.

Fu-Shin Yu, Ph.D.
Department of Ophthalmology,
Visual and Anatomical Sciences
Wayne State University
FYu@wayne.edu

We have two NIIH/NEI funded projects: corneal innate immunity and diabetic wound healing and sensory nerve (de)regeneration. Using mouse model of diabetes, we investigate how hyperglycemia causes sensory neuropathy and delayed wound healing with focus on the role of exosomes, a newly rediscovered mediator of cell-cell communication. Our second project addresses molecular mechanisms underlying susceptibility and proneness of diabetic patients to microbial infection in the cornea.