RECENT FINDINGS
Nasal Sprays Linked to Intraocular Pressure in Glaucoma

Image-Guided Transorbital Therapy Targets Glaucoma

INSIDE VANDERBILT EYE INSTITUTE
First Gass Fellow:
Guri Bronner, M.D.

Staff Profile:
Richard Robinson

PIONEERING GLAUCOMA
Reducing Retinal Sensitivity to Ocular Pressure in Glaucoma
Bench to Bedside: Tackling Glaucoma Through Teamwork
Dear Friends,

Shortly after my arrival at Vanderbilt, we changed our name from the Department of Ophthalmology and Visual Sciences to the Vanderbilt Eye Institute. The dictionary defines institute as “a unit within a university organized for advanced instruction and research in a relatively narrow field of subject matter.” Thus, our new title reflected a renewed emphasis on vision research. However, as a clinical department, we have narrowed our focus to translational research: investigation that addresses the mechanisms of disease as a means to develop new treatments.

At the Vanderbilt Eye Institute, we have developed a strategic plan that emphasizes translational research on the leading causes of vision loss: age-related macular degeneration, diabetic retinopathy and other retinal vascular diseases, and the focus of the current issue: glaucoma. In this issue, we discuss our “bench to bedside” approach to glaucoma, a group of diseases that causes vision loss by damage to the optic nerve. Glaucoma affects over 3 million Americans, and accounts for approximately 10% of blindness in the United States. Although glaucoma has traditionally been described as a disease of elevated intraocular pressure, we now know that IOP is only one of several risk factors for vision loss from optic nerve damage.

To study glaucoma, we have gathered a talented group of scientists, clinicians, and clinician scientists: David Calkins, Ph.D., Karen Joos, M.D., Ph.D., Jeffrey Kammer, M.D., John Kuchtey, Ph.D., and Rachel Kuchtey, M.D., Ph.D. These individuals have a variety of expertise: neuroscience, animal models of disease, cell biology, and human genetics. Although they have distinct research groups, they perform their experiments in a common laboratory space on the 11th floor of Medical Research Building IV, where there is day-to-day interchange of ideas, common use of state-of-the-art technology, and a shared sense of mission and purpose. It is very stimulating to walk through this space and see this group of investigators, actively interacting with a large group of postdoctoral fellows, students, and technicians. This program is supported by the National Eye Institute, the National Institute of Aging, Research to Prevent Blindness, Fight for Sight, the Glaucoma Research Foundation, American Glaucoma Society, Department of Defense, the Vanderbilt Center for Molecular Toxicology, and several industry contracts.

As you will see from the articles in this issue, the Vanderbilt glaucoma research group is making valuable inroads into our understanding of this disease that I am confident will lead to innovative and meaningful therapies. I hope you enjoy this issue of Vanderbilt Vision.

Sincerely yours,

Paul Sternberg, Jr., M.D.
G. W. Hale Professor and Chair
Vanderbilt Eye Institute
EDITOR'S NOTES

Vanderbilt Vision is a publication of Vanderbilt Eye Institute, a department of Vanderbilt University Medical Center. Vanderbilt Vision provides ophthalmologists with information on current research and state-of-the-art clinical applications.

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Vanderbilt University Medical Center is a comprehensive research center committed to excellence in patient care and physician education.

Vanderbilt Vision is written for physicians and friends of the VEI and does not provide a complete overview of the topics covered. It should not replace the independent judgment of a physician about the appropriateness or risk of a procedure for a given patient.

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CONTENTS

2 RECENT FINDINGS
Karen Joos, M.D., Ph.D.
Nasal Sprays Linked to Intraocular Pressure in Glaucoma

3 Louise Mawn, M.D.
Image-Guided Transorbital Therapy Targets Glaucoma

4 PIONEERING GLAUCOMA
David Calkins, Ph.D.
Reducing Retinal Sensitivity to Ocular Pressure in Glaucoma

5 Catalyst for a Cure

6 Bench to Bedside: Tackling Glaucoma through Teamwork

8 FIRST J. DONALD GASS FELLOW
Jessica Pasley, The Reporter, VMC
Guri Bronner, M.D.

9 STAFF PROFILE
Richard Robinson

10 VANDERBILT EYE INSTITUTE AWARDS

12 VANDERBILT EYE INSTITUTE UPCOMING EVENTS

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Nasal Sprays Linked to Lower Intraocular Pressure in Glaucoma

30% of adults in the U.S. suffer from allergic rhinitis and approximately 17 million persons suffer from non-allergic rhinitis. Nasal steroids have proven to be an effective treatment for both. With the perceived safety of these steroids, their use in the treatment of upper respiratory allergy has become more common. However, these inhaled and nasal steroids might be absorbed systemically through the nasal mucosa, gastrointestinal tract (through swallowing) or the lungs.

The growing use of nasal sprays has caused concern among experts regarding their effect on glaucoma patients. While previous studies have shown no association of nasal steroids with glaucoma in patients with no previous history of the disease, steroids have been associated with increased intraocular pressure (IOP) in glaucoma patients. For individuals with glaucoma, even a few points’ increase in IOP can render long-term damage to their vision and visual fields.

A recent study in the Journal of Allergy and Clinical Immunology, published by researchers at the Vanderbilt Eye Institute, found a clinically and statistically significant reduction in IOP when glaucoma patients stopped using nasal steroid spray. The 16-month study, led by Karen Joos, M.D., Ph.D., monitored 24 eyes in 12 patients who had a diagnosis of glaucoma or ocular hypertension (OHT), were using nasal steroid spray and agreed to discontinue use, had been seen for at least one visit before steroid use, and agreed to be examined in two follow-up visits.

Participants were taking various combinations of glaucoma medications during the study. No subject received additional medical or surgical glaucoma therapy at the time of the nasal steroid discontinuation or at the subsequent visits. The researchers registered the changes in IOP and whether the subjects met their target IOPs during steroid use and after steroid discontinuation. All of the IOP measurements were taken by one ophthalmologist.

During the period the patients used nasal steroids, 18 of the examined eyes showed a greater IOP than the target level. Three of the subjects showed visual field deterioration in at least one eye. One experienced dense loss in the central 30 degrees that occurs with significant primary open-angle glaucoma. However, most of the patients met their target IOP by simply discontinuing the use of nasal spray. These individuals were able to avoid or delay additional glaucoma therapy.

Vanderbilt’s research suggests that ophthalmologists and other specialists should ask glaucoma patients about their use of nasal sprays. Any physician should be aware of a patient’s history of glaucoma before prescribing steroid intervention. If the patient does require steroids, an ophthalmologist should monitor his or her IOP and schedule an eye exam within 2 to 3 weeks. Patients should be educated about the risk of IOP increase with steroids and be made aware that nasal sprays contain them.

With 67 million people suffering from glaucoma worldwide, these findings could prevent many cases of unnecessary vision loss.
In glaucoma, it is dying retinal ganglion cells (RGCs) that can gradually lead to blindness. Current treatment focuses on lowering the most important risk factors – in particular, elevated intraocular pressure (IOP). But this approach doesn’t save RGCs or address possible injuries to the optic nerve. Even decreasing IOP still leaves open-angle glaucoma patients a 27% probability of eventual blindness.

Until now, there has been no effective glaucoma treatment that delivers drugs to the back of the eye where the optic nerve is located. While endoscopes can reach this area, current techniques are time-consuming, difficult to learn and risk collision with the nerve. Researchers at Vanderbilt University Medical Center are investigating a new transorbital therapy to address this issue.

Image-guided therapy (IGT) directly treats the optic nerve where damage is thought to occur. The research team, led by Louise Mawn, M.D., of Vanderbilt Eye Institute, includes an experienced orbital surgeon, a neuro-ophthalmologist, a laser physicist, and a cell biologist. Their mission is to develop a minimally invasive treatment strategy to prevent visual loss from optic neuropathy.

IGT is capable of delivering time-released neuroprotective drugs to the back of the eye where the optic nerve meets the retina. These drugs allow the nerves to resist the effects of glaucoma, i.e., reduced perfusion. The team will focus on one neurotrophin, brain-derived neurotrophic factor (BDNF), which has been shown to act directly on RGC axons. As part of the IGT study, researchers will evaluate BDNF’s neuroprotective effect.

IGT offers more specific, complete treatment with less damage to surrounding healthy tissue. This method uses standard medical tomograms (CT and MRI) as three-dimensional maps to guide the procedure. By showing the location of the tool on the images, the endoscope can be moved quickly into an area, where the optic nerve is most likely to be, and guided toward it to safely deliver the drug.

Over the past 15 years, Vanderbilt University Medical Center has been at the forefront of image-guided procedures. These procedures are rapidly becoming the standard of care for brain, spine and orthopedic applications. In the future, the Vanderbilt Eye Institute will examine additional neurotrophic factors in optic neuropathy.

Image guidance can revolutionize treatment of glaucoma. Invasive, risk-laden operating room surgeries can be replaced with treatment room procedures. Most importantly, this new therapy could possibly prevent retinal RGC death or even stimulate cell regeneration – and offer new hope for glaucoma sufferers.
Glaucoma remains the world’s second leading cause of blindness. While it is associated with sensitivity to elevated intraocular pressure and the death of retinal ganglion cells (RGCs), the exact relationship between them is still unknown. Before these cells die, some undefined molecular events are thought to trigger important signals in the cell axon. Understanding them could uncover important clues to what causes or exacerbates glaucoma.

A National Eye Institute grant enabled David Calkins, Ph.D., of Vanderbilt University Medical Center to pursue this question. Dr. Calkins and his team at the Vanderbilt Eye Institute sought to understand the early molecular signaling associated with dying RGCs and their axons in glaucoma.

Glaucoma is initiated in the eye’s anterior segment, believed to be the location of the source of increased pressure. Past research has focused on understanding pressure-associated pathology at the optic nerve head. Common treatments are currently focused on decreasing the intraocular pressure in the affected eyes.

Scientists at the Vanderbilt Eye Institute felt that glaucoma should be viewed not as a disease involving sensitivity to elevations in pressure, but rather as one in which pressure itself is a causative stimulus. Molecules that provoke axonal degeneration could possibly be targeted for therapy. Since excessive calcium (Ca2+) is linked to axonal injury, the researchers evaluated candidate molecules that could mediate a similar, but pressure-sensitive, mechanism in retinal ganglion cells.

The team found that RGCs express the transient receptor potential (TRPV1) – a channel with a robust calcium conductance linked to pressure sensitivity and calcium-dependent cell death. This led them to test whether pressure-induced activation of TRPV1 contributes to calcium-dependent degeneration of RGCs and their axons in glaucoma. It is still unknown how TRP channels affect the retina. But because those channels are broadly expressed in RGCs, and because of their role in many Ca2+ and pressure-dependent processes, the researchers believe that TRPV1 may be linked to glaucoma.

These breakthrough experiments are an important first step in defining what destroys retinal ganglion cells – and discovering key factors affecting the retina and optic nerve in health and disease. It could be a giant step toward curing a disease that affects 66 million people worldwide.
"Catalyst for a Cure is a unique approach to bringing collaborative investigation to the field, instead of individual scientists working by themselves. It’s innovative in that we are looking outside the field of glaucoma for people in neuroscience and genetics and microbiology that can bring their expertise to the field in new and different ways."

Thomas M. Brunner
President and CEO
Glaucoma Research Foundation

Catalyst for a Cure

The Glaucoma Research Foundation funds innovative research to speed the cure for glaucoma. Its latest initiative, Catalyst for a Cure, is a unique collaborative research consortium that is accelerating the pace of discovery of a cure by bringing together a team of scientists from the burgeoning fields of neuroscience and genetics.

The Vanderbilt Eye Institute’s David Calkins was asked to be part of this prestigious team. Other scientists include Monica Vetter, Ph.D., University of Utah, Phil Horner, Ph.D., University of Washington, and Nicolas Marsh-Armstrong, Ph.D., Johns Hopkins.

Catalyst for a Cure (CFC) breaks with the traditional approach to medical research. Typically, individual scientists work on separate projects and share the advances they make only at conferences and in publications. Often, scientists in the same field are in competition for grant money to fund their work. CFC researchers, however, are engaged in a full, ongoing partnership. By design, their collaborative efforts enable them to move more quickly toward their common goal. They draw on their diverse experiences in genetics, nerve regeneration, and neurodevelopment. They spend time together in each other’s labs. They share results as they go.

This unique partnership seeks to find ways to change the genetic and neurologic development of the eye so that glaucoma’s damage need never occur. CFC researchers employ state-of-the-art tools, including genetic mapping information and microchip technology, to learn more about how glaucoma progresses to actual vision loss. They have found, for example, that changes to the nervous system in the eye and the brain occur earlier than the disease appears, probably even as the eye is developing. Their goal is to identify exactly what to target in the disease pathway with new drug or genetic therapies and exactly when in the disease process (possibly before the process even begins) the therapies would be most effective.

The implications for treatment of glaucoma and other degenerative diseases are vast. The innovative design of the CFC and the talented scientists it has brought together are our best hope for finding a cure for this devastating disease.
Three-and-a-half years ago, when Paul Sternberg, M.D., arrived at Vanderbilt as Chairman of the Department of Ophthalmology and Visual Sciences, his goal was to foster collaboration and speed the process of research.

“The traditional 10-year process for developing new therapies is too long,” said Dr. Sternberg. “At Vanderbilt Eye Institute we are building a cohesive and collaborative research program where scientists partner with physicians. Our goal is to shorten the time from bench to bedside in three key areas of study: oxidative damage and aging, vascular biology and hemodynamics, and neuroprotection.”

In the area of neuroprotection, this collaborative approach is really generating results. Neuroprotection has become a topic of intense interest among scientists studying glaucoma – the number two leading cause of blindness both globally and in the U.S., and the leading cause of blindness in African- and Latin-Americans.

While glaucoma is traditionally viewed as a disease of the eye’s anterior segment, it is also a disease of the central nervous system. Like Parkinson’s disease and Alzheimer’s, glaucoma is considered a progressive, age-related axonopathy because it blinds through the degeneration of the optic nerve.

In fact, many experts believe that axonal pathology plays a major role in the early stages of glaucoma. If this is accurate, then learning about axonal degeneration can help scientists understand not only the causes of glaucoma, but also other diseases associated with brain aging.

The neuroprotection team studying glaucoma is focused on reducing optic nerve sensitivity and degeneration through pharmaceuticals and surgical innovations. In frequent team meetings, the clinicians articulate their problems, bringing patient information and broader health issues to the table. The work group sifts through these problems – forcing them into scientific paradigms. The researchers then take
the ideas and develop them in a way that is scientifically rigorous.

Members of the work team bring a variety of specialties:

**Dr. Calkins** conducts research into axonal degeneration in glaucoma, genetic regulation of neuronal function, neuronal-glial interactions, retinal gene expression in health and disease, and visual perception and physiology. In 2002, he was identified by the Glaucoma Research Foundation as one of the promising scientists working in vision research and asked to participate in its “Catalyst for a Cure” program (see page 5).

**Karen Joos, M.D., Ph.D.**, specializes in the management of glaucomatous diseases in children and adults. She has particular expertise in diagnosing and treating pediatric glaucoma, as well as adult glaucomas in the advanced stages. Her research studies the normal pressure and endstage of glaucoma, ocular blood flow and laser surgical techniques, including the free electron laser. In her laboratory, Dr. Joos has developed a novel rodent model of glaucoma, which is being utilized by the entire team to better understand the pathogenesis of the condition.

**Jeffrey Kammer, M.D.**’s specialty is diagnosing rare types and difficult cases of glaucoma. Dr. Kammer performs glaucoma surgery, including trabeculectomy with anti-metabolites, glaucoma drainage implants, and revision of dysfunctional blebs. He is also working with Dr. Calkins on a project to identify key signals between retinal neurons and glial cells, which help support the retina and optic nerve in disease.

**Rachel Kuchtey, M.D., Ph.D.**, specializes in the screening, diagnosis and management of different forms of glaucoma. Dr. Kuchtey performs laser procedures, glaucoma surgery and cataract surgery. Her basic research seeks to understand the molecular basis of impaired aqueous outflow, a critical event in the development of the condition.

**Louise Mawn, M.D.**, specializes in neuro-ophthalmology and ophthalmic plastic and reconstructive surgery. Her primary research interests are in surgical treatment of orbital disorders. She was the principal investigator for a research study funded by the National Eye Institute to examine endoscopic approaches to orbital disease.

The team encourages interaction and its members offer guidance to one another. The clinical scientists have complete access to tools the researchers are cultivating at every stage of development. Dr. Calkins: “This synergistic approach to research is really paying off. We're actually writing articles together!”
Bronner Named First Gass Fellow

Guri Bronner, M.D., was named the first J. Donald M. Gass Fellow at the Vanderbilt Eye Institute. The Gass fellowship was established in memory of the late Gass, a world-renowned retina specialist, and is awarded to a fellow who has performed at a superior level.

“Dr. Bronner possesses the intellectual curiosity, creativity and commitment to patient care for which Dr. Gass was so well known,” said Franco Recchia, M.D., director of the Fellowship Program at the Vanderbilt Eye Institute.

Bronner is completing his second year of a retina vitreous fellowship. He completed his ophthalmic residency at New Jersey Medical School, received his undergraduate degree from the University of Pennsylvania, and attended the Robert Wood Johnson Medical School.

“This is a great honor,” said Bronner. “I take it as a responsibil-

Gass authored the groundbreaking book “Stereoscopic Atlas of Macular Diseases: Diagnosis and Treatment,” detailing retinal diseases, which is now commonly referred to as the “Gass Atlas.”

Bronner was recognized during a luncheon hosted by Paul Sternberg, M.D., director of the Vanderbilt Eye Institute and chair of the Department of Ophthalmology and Visual Sciences. Margy Ann Gass and other family members were present at the event.
Every morning for the last 42 years, as he’s left for his commute to Vanderbilt, Richard Robinson has stopped to say good morning to his cows: “They’re beef cattle so they don’t take much work!” Richard lives 40 miles from Nashville, on a 120-acre farm that he and his wife share with their daughter, two sons and nine grandchildren. “It’s great having them all so close by,” he said.

When he graduated from college with a chemistry degree, Richard did a brief stint in agricultural chemical sales, but quickly decided the salesman’s life was not for him: “I gained too much weight driving around.” Having always loved lab work, Richard applied with an employment agency on Friday and got an interview at Vanderbilt on Monday. “My brother-in-law says I’m the luckiest fellow in the world,” he said. “To be able do work you love your entire career is a rare thing.”

When Richard began at Vanderbilt, the medical school, hospital, research labs and administration were all in one building. Now the Medical Center campus encompasses several blocks. He worked in microbiology (now the Department of Microbiology and Immunology) and then in Radiology. When he moved to Ophthalmology, he found a home. Dr. Denis O’Day had received a grant to study fungal eye diseases – and theirs was a collaboration that continued for 23 years. Dr. Day’s team made many important discoveries: “Our lab developed models for studying fungal diseases that are still being used.” One of Richard’s hypotheses about using the cornea as a sensitivity disk for drugs was pursued by a medical student and published in the journal Cornea.

And in 2004, he received the first Vanderbilt Award for Excellence in Research Contributing to Multi-Investigator Teams.

For the last 3+ years, Richard has assisted with pediatric and glaucoma projects, including work with Dr. Karen Joos and the free electron laser. He says he’ll work until it’s not fun anymore. Anyway, he has to get his nemesis, the Vanderbilt Parking Department, straightened out before he leaves. “I’ve been the carpoolers’ advocate for years,” he said. “I just stay after them until I get them to change policies or procedures that don’t work. I guess it’s just like research: persistence pays off!”
Anne L. Corn, Ed.D., received the Mary Kay Bauman Award from the Association for Education and Rehabilitation of the Blind and Visually Impaired (AER). This is the major organization for professionals working with blind and low vision children and adults. The award is the highest award for contributions to the education of children and youth. It was presented in Snowbird, Utah at the AER’s biennial conference in July 2006.

Professional Research Consultants, Inc. (PRC) recognizes healthcare organizations and individuals that have exhibited patient satisfaction excellence throughout the prior year. Excellence is a focus of PRC...they know that it is excellence that drives patient satisfaction scores and makes a hospital a better place to work, a better place to practice medicine, and a better place for patients to be treated.

PRC’s crystal Overall Top Performer award is given annually to each healthcare facility, clinic, provider, or inpatient specialty unit scoring at the 100th percentile for the Overall Quality of Care and Overall Quality of Doctor Care in the PRC national client database for the prior year. To reach the 100th percentile is an extraordinary accomplishment.

This year, in its first full year using PRC, Vanderbilt had 14 provider recipients of the award. Nationwide, there were fewer than 40. Four of these awards were in the Department of Ophthalmology. These Top Performer awards were presented to Drs. Paul Sternberg, Sean Donahue, Louise Mawn and David Morrison.

Rebecca Sappington, Ph.D. and David Calkins, Ph.D., produced the image that is featured on the cover of the September, 2006 edition of vision research journal IOVS (Investigative Ophthalmology & Visual Science). Drs. Sappington and Calkins demonstrate that pressure-induced production and release of IL-6 by microglia occurs via cellular mechanisms that also underlie IL-6 production in other neurological insults and diseases. The study supports the notion that as a neurodegenerative disease, glaucoma shares common disease mechanisms and characteristics with other neurological injuries and disorders. In particular, this work identifies both IL-6 and microglia as potential targets for therapeutics aimed at promoting health and survival of RGCs in glaucoma.

Rachel W. Kuchtey, M.D., Ph.D., received a grant-in-aid from Fight for Sight. With this generous funding, Dr. Kuchtey is investigating the biochemical and cellular mechanisms by which a gene, CDT6, may be involved in glaucoma. This gene is believed to encode a protein that blocks new blood vessel formation. The notion that it may play a role in glaucoma is completely novel. Better understanding of this gene will broaden our knowledge of the pathogenesis of glaucoma, and possibly con-
Lori Ann F. Kehler, O.D., F.A.A.O., was selected along with other young researchers from across the county to attend the intensive five-day Summer Research Institute on the campus of The Ohio State University. The Institute is co-sponsored by the American Optometric Association’s Council on Research and the American Academy of Optometry’s Research Committee. The goal of the Research Institute is to produce collaborative clinical research project proposals to be submitted for future funding. The faculty of the Institute included leading researchers and biostatisticians in optometry and ophthalmology, as well as administrators from the National Eye Institute.

Jeffery Sonsino, O.D., F.A.A.O., has received a grant from Project PAVE (Providing Access to the Visual Environment) for the 2006-2007 school year. PAVE is a pediatric low vision rehabilitation program funded by the Department of Education. It allows for every child in the state of Tennessee with vision impairment to receive a comprehensive low vision rehabilitation evaluation, prescribed optical devices, and training with a teacher of the visually impaired. PAVE’s mission is to teach visually impaired children to use optical devices to function at the same level as their peers.

Larry Merin, RBP, FIMI, FOPS, FBCA, will soon begin screening the underprivileged in Peru and Bolivia for a potentially blinding eye disease caused by diabetes, but he will have to travel only as far as his Nashville office. The long-distance exams are made possible when medical workers in the South American countries take pictures of diabetic patients’ eyes with a special camera and e-mail the images to specialists at the Vanderbilt Ophthalmic Imaging Center for evaluation. Vanderbilt is providing the equipment and services at no charge. The program is being funded for the first year by a $150,000 grant from the Vanderbilt Center for the Americas, which concentrates on building relationships with South American countries. Officials with the Vanderbilt University School of Nursing will be training the medical workers in Bolivia and Peru. The Washington-based Pan American Health Organization, an international agency that works to improve health in the Western Hemisphere, made government contacts and provided technical assistance. Officials are hoping to expand the program in the future so that specialists can evaluate other health conditions.

David Calkins, Ph.D., has received a $40,000 award from the Center for Molecular Toxicology. Dr. Calkins will test the hypothesis that the critical event in glaucoma is not elevated ocular pressure, but intrinsic RGC sensitivity to pressure itself that represents a toxic event.
Third Annual Paul Sternberg, Sr. Lecture
November 2, 2006
Innovations in the Surgical Treatment of Retinal Disease
Hilel Lewis, M.D., Chairman
Cole Eye Institute, Cleveland Clinic

Update on Ophthalmic Pathology
February 16-17, 2007
Curtis Margo, M.D., Clinical Professor and Director of Ophthalmic Pathology
University of South Florida

Pearls X
June 8 & 9, 2007
Presenters to date:
Gregory S. Kosmorsky, M.D.
Cole Eye Institute

Paul R. Lichter, M.D.
University of Michigan
Terry Kim, M.D.
Duke University Eye Center
Durham, North Carolina

The Vanderbilt Eye Institute
Academic Seminar Series
Each seminar will begin at 5 p.m. in the Elliott Conference Room.

December 11, 2006
Dong Feng Chen, Ph.D., The Schepens Eye Institute and Harvard University

January 8, 2007
Mike Iuvone, Ph.D., Department of Pharmacology, Emory University School of Medicine

February 12, 2007
M. Elizabeth Fini, Ph.D., The Bascom Palmer Eye Institute, University of Miami School of Medicine

March 12, 2007
Todd P. Margolis, M.D., Ph.D., Department of Ophthalmology, University of California San Francisco Medical Center

April 16, 2007
Steven J. Fliesler, Ph.D., Department of Ophthalmology, St. Louis University School of Medicine

For more information on these events contact Tammy Tankersley at 615-936-0044 or tammy.tankersley@vanderbilteyeinstitute.com
Paul Sternberg, Jr., M.D.
Chair, Vanderbilt Eye Institute
RETINA/Vitreous
Special interests: age-related macular degeneration and complex retinal detachments.

Anita Agarwal, M.D.
RETINA/Vitreous
Special interests: inflammatory diseases of the retina and diabetic retinopathy.

Jiyang Cai, M.D., Ph.D.
VISION RESEARCH
Special interests: mitochondrial oxidative damage and protection in aging and age-related degenerative diseases.

David J. Calkins, Ph.D.
VISION RESEARCH
Special interests: degenerative disorders of the visual system and the genetic mechanisms of retinal disease.

Min S. Chang, M.D.
VISION RESEARCH
Special interests: growth and maintenance of corneal epithelial cells.

Amy S. Chomsky, M.D.
COMPREHENSIVE OPHTHALMOLOGY
Special interests: Veterans Administration Hospital Chief Attending.

Sean P Donahue, M.D. Ph.D.
NEURO-OPHTHALMOLOGY/PEDIATRIC OPHTHALMOLOGY
Special interests: amblyopia, surgical management of complicated strabismus, pediatric neuro-ophthalmology, and visual field testing.

Robert Estes, M.D.
PEDIATRIC OPHTHALMOLOGY/ADULT STRABISMUS
Special interests: Childhood and adult strabismus, ophthalmic genetics.

Jin Hui-Shen, Ph.D.
VISION RESEARCH
Special interests: laser surgery and the invention of surgical devices.

Karen M. Joos, M.D., Ph.D.
GLAUCOMA
Special interests: low-pressure glaucoma and pediatric glaucomas.

Jeffrey A. Kammer, M.D.
GLAUCOMA
Special interests: neovascular glaucoma and complicated glaucoma cases.

Brad Kehler, O.D.
OPTOMETRY
Special interests: treatment and management of ocular diseases.

Lori Ann F. Kehler, O.D.
OPTOMETRY
Special interests: specialty contact lens fitting, both for adults and for children.

John Kuchtey, Ph.D.
VISION RESEARCH
Special interests: immunological aspects of anterior chamber pathology in glaucoma.

Rachel W. Kuchtey, M.D., Ph.D.
GLAUCOMA
Special interests: cellular and molecular mechanisms of aqueous outflow in glaucoma.

Patrick Lavin, M.D.
NEURO-OPHTHALMOLOGY
Special interests: eye movement disorders, nystagmus, neuro-otology, headache and metabolic disorders affecting the visual system.

Jennifer Lindsey, M.D.
COMPREHENSIVE OPHTHALMOLOGY
Special interests: Cataracts, eyelid disorders, ocular trauma, diabetic eye disease, and glaucoma.

Louise A. Mawn, M.D.
NEURO-OPHTHALMOLOGY/OCULOPLASTICS
Special interests: ophthalmic plastic surgery with a particular interest in orbital disease.

Lawrence M. Merin, RBP, FIMI
OPHTHALMIC IMAGING CENTER
Special interests: retinal imaging, epidemiology and diabetic eye disease.

David Morrison, M.D.
PEDIATRIC OPHTHALMOLOGY
Special interests: strabismus, pediatric cataracts, and retinopathy of prematurity.

Denis, M. O’Day, M.D., F.A.C.S.
CORNEA and EXTERNAL DISEASE
Special interests: ocular fungal infections.

John S. Penn, Ph.D.
VISION RESEARCH
Special interests: molecular basis of ocular angiogenesis.

Franco Recchia, M.D.
RETINA/Vitreous
Special interests: pediatric retinal disorders and retinal vascular disorders.

Chasidy D. Singleton, M.D.
COMPREHENSIVE OPHTHALMOLOGY
Special interests: refractive errors, cornea disorders, cataracts, glaucoma, diabetic eye disease, ocular trauma, and strabismus.

Jeffrey Sonsino, O.D., F.A.A.O.
OPTOMETRY
Special interests: complicated and difficult-to-fit contact lenses, and low vision rehabilitation of adults and children.

Uyen L. Tran, M.D.
CORNEA and EXTERNAL DISEASE/ LASER SIGHT
Special interests: corneal transplantation, cataract surgery, and refractive surgery.

Laura L. Weyman, M.D.
COMPREHENSIVE OPHTHALMOLOGY
Special interests: Director of Resident Training and cataracts.
This fall, Vanderbilt Eye Institute hosted one of the year’s most important events in eye research.

The 2006 Symposium on Neuroprotective Strategies in Degenerative Diseases of the Eye was held October 4–5, 2006 at Nashville’s Vanderbilt Marriott Convention and Meeting Center.

Over 20 established investigators presented their latest findings in neurodegenerative eye disorders. Distinguished guests included cell and molecular biologists, clinician-scientists and translational scientists from major centers and laboratories throughout the nation. Keynote speakers were internationally recognized experts on neuroprotective therapy issues:

Dr. William Hauswirth is the Rybaczki-Bullard professor of ophthalmic molecular genetics at the University of Florida. Dr. Hauswirth is the world’s foremost authority on viral transfection as a means to deliver gene therapy to the eye.

Dr. Michal Schwartz is Professor of Neuroimmunology and holds The Maurice and Ilse Katz Professional Chair in Neuroimmunology at the Weizmann Institute in Rehovot, Israel. Dr. Schwartz is recognized for her major contributions to the understanding of disease and injury processes in the visual system, particularly glaucoma.