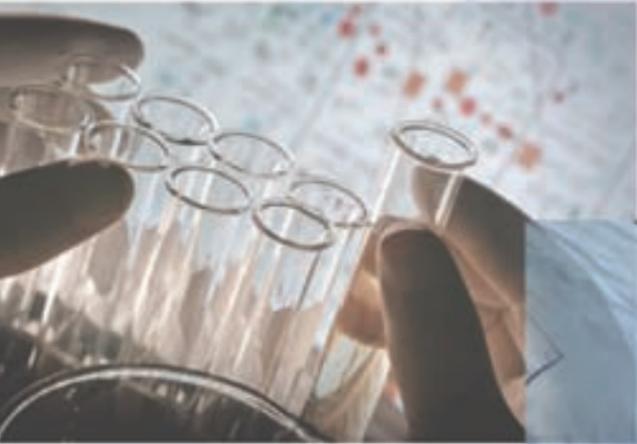


SUNY Downstate Medical Center

# Department of Ophthalmology



Experts in **Eye Care**

Pioneers in **Research**

Leaders in **Academics**



## Chairman's Message

The Department of Ophthalmology at SUNY Downstate Medical Center has a well-established history of accomplishment as an educator of physicians. The program's reputation as a center of research excellence has blossomed in the last few years, and our clinical service provides state-of-the-art care to residents of the Brooklyn community.

In assessing the potential of our ophthalmology program in Brooklyn, a comparison is instructive. SUNY Downstate's catchment area contains a population of approximately 685,000—roughly equal to that of the city of Boston. In 1996, the residents of Boston were served by 250 practicing ophthalmologists; in contrast, SUNY Downstate's catchment area had only eight. This paucity of ophthalmologists had historically motivated many Brooklynites to turn to Manhattan physicians for eye care, as evidenced by the fact that 30 to 40 percent of ophthalmology patients treated in Manhattan lived in Brooklyn. This trend has stopped as our faculty practice now boasts 18 UOC (University Ophthalmic Consultants) doctors who span all disciplines within ophthalmology and provide the most advanced care for the most complicated disease states.

These facts point to both an opportunity and an urgent need. The goals we have attained have promoted Brooklyn as a desirable practice environment for faculty physicians and residents-in-training. We have enthusiastically committed ourselves to providing desperately needed care for the many community residents with glaucoma, retinopathy of diabetes, and other disorders that are potentially blinding or that otherwise diminish their quality of life. Our faculty and residents come from all over the United States and we are fortunate to have many graduates of the program involved in many aspects of the teaching program after completing their training.

The department has been fortunate to win support and funding from the SUNY Downstate leadership and our affiliated clinical practice sites. This, in turn, has allowed for the recruitment of first-rate faculty. Single individuals are made responsible for each of six subspecialty programs networkwide, and many faculty

members rotate among the sites. This approach has permitted us to keep faculty fully occupied and challenged while extending the benefits of their special abilities to patients at several institutions. Additionally, we have purchased advanced diagnostic technologies in all subspecialty areas, allowing for the management of complex disease. In 2010, we added additional faculty in Retina and Oculoplastics who will work at both Downstate in the faculty practice, and at Kings County Hospital Center with residents.

Our faculty, plus our improved facilities and expanded clinical offerings, have, indeed, dramatically increased demand for ophthalmology services. At our largest clinical affiliate, Kings County Hospital, outpatient visits have increased significantly year after year over the last decade, and leadership has provided a wonderful opportunity for growth of our service in both the clinic and the operating room. We relocated to a modern 9,500 square foot Eye Clinic in Kings County in 2006 due to continued growth of the service, which now provides EMR, networked digital image analysis at the work station, simulated cataract training, and a minor procedure room in this state-of-the-art facility.

We have similarly expanded the faculty practice facility at Downstate, known as The Midwood Eye Center, located conveniently on Nostrand Avenue near the junction of Flatbush Avenue. This impressive facility boasts 16 exam rooms in addition to multiple other diagnostic and treatment areas.

Our eye research program has vastly grown in the basic science area. Long known for excellence in clinical research, we now are deeply committed to the study of various eye diseases at the cellular level, and our PhD scientists are working feverishly to find cures for eye disease. With many basic and clinical studies currently underway, I am proud to have led this significant expansion of research at Downstate, along with my Director of Research, William Brunken, PhD, one of the world's authorities on retinal extracellular matrix proteins.

We currently have National Eye Institute funding in addition to extramural grant support to help with our research endeavors. Ophthalmology residents and medical students have been fully integrated into our research program and actively participate in all phases of our studies. Furthermore, we have been leaders in the conception and formation of the SUNY Eye Institute, a statewide consortium of many of the top eye researchers across the state from SUNY's four academic medical centers and SUNY Optometry, which allows us to cross-train and teach, collaborate on projects, and at the same time share important resources.

Many other details of our program—and their positive results—are described in the report that follows. Suffice it to say that our diverse and expert faculty, plus our improved facilities and expanded clinical and research offerings, have dramatically increased demand for ophthalmology services in Brooklyn. We are poised to meet the challenge and serve as leaders in the field.

**DOUGLAS R. LAZZARO, MD, FACS, FAO**

Professor and Chairman

The Richard C. Troutman, MD, Distinguished Chair in Ophthalmology and Ophthalmic Microsurgery

# Leaders in Eye Care

The State University of New York Downstate Medical Center has a rich tradition in medical education, research and clinical care, dating back to 1860 when Long Island College Hospital became the first medical school in the United States to include bedside teaching in the curriculum.

The Division of Ophthalmology was formally instituted in 1873. Today, the Department of Ophthalmology employs state-of-the-art procedures to provide both adult and pediatric patients with the best possible care for a broad range of ocular disorders.



## Basic and Clinical Research

The Department of Ophthalmology has a long and distinguished history of research contributions in the field of ophthalmology. Current faculty continues that tradition as they employ cutting-edge technology in research projects that enhance our understanding of the structure, function and disorders of the eye and visual system. A particular focus of current research is the determination of the etiology, pathophysiology and treatment of eye diseases across ethnic boundaries.

Vision researchers at SUNY Downstate Medical Center are a multidisciplinary group of cell, molecular and developmental biologists, as well as clinical scientists. We join research efforts across departmental boundaries—ophthalmology, cell biology, neurology and pediatrics—forming a cohesive collaboration that addresses the clinical needs of Brooklyn, Queens and Staten Island. Our investigators include faculty, residents, and medical and graduate students who meet regularly to discuss their work as well as that of others.

Our outstanding facilities for basic science and clinical research and treatment all feature modern, state-of-the-art equipment. At Downstate there are a number of dedicated eye research laboratories in addition to other labs, where eye and other areas of cell biology research are being conducted simultaneously. A new animal facility is under construction at Downstate and will be opening shortly. The very significant expansion of vision research conducted on campus has led to National Eye Institute funding and other public and private funding.

Our large residency training program and faculty practice gives us the ability to examine a very diverse group of patients exhibiting the entire spectrum of eye disease. This allows us to perform clinical studies and, in addition, should give us an unprecedented opportunity to bring translational science to future clinical applications.

## SUNY Eye Institute [www.sunyeye.org](http://www.sunyeye.org)

**Groundbreaking Research, Novel Insights, Unlimited Possibilities**

In August 2009, the academic health science centers, responding to a faculty-generated initiative, formed the SUNY Eye Institute (SEI), a state-wide consortium of vision researchers from all four academic medical universities in the SUNY system (Downstate, Upstate, Stony Brook and Buffalo) and the SUNY College of Optometry. This group of investigators represents over 45 laboratories making great strides against blinding diseases. Through the SEI we provide statewide leadership in translational vision research.

The SEI Brooklyn is an integral part of the consortium. We are particularly focused on those disorders that affect patients in our culturally diverse community. These include glaucoma, age-related macular degeneration, diabetic retinopathy, sickle cell retinopathy, retinopathy of prematurity, and congenital and acquired refractive disorders.

Our multi-investigator research teams are made up of clinical and basic researchers from the Departments of Ophthalmology and Cell Biology. We have extensive collaborations across the state, the nation, even worldwide.

We provide research training opportunities for undergraduate, graduate and medical students. Moreover, all ophthalmology residents are required to complete one research project.

Our research staff is supported by federal grants from the National Eye Institute and from private foundations including the Foundation Fighting Blindness, Research to Prevent Blindness, and the E. Matilda Ziegler Foundation.

## Collaboration

Collaborative teams of basic and clinical scientists are working hard to advance our understanding of eye disease.

- Dr. William Brunken's group is interested in the role of laminins in eye development and disease. Their recent paper, published in *Investigative Ophthalmology & Visual Science*, shows that disruptions of laminins can cause congenital retinal disease. Dr. Brunken is funded by the NEI.
- Dr. John Danias was awarded a new grant of \$500,000 from the National Eye Institute to study steroid-induced glaucoma. Long-term steroid treatment can provoke glaucoma, and Dr. Danias, along with Dr. Oscar Candia of Mount Sinai Medical School, is studying the molecular and genetic changes caused by steroid use in the eye to better understand how to avoid these complications.
- Dr. Ivan Bodis-Wollner heads a team of neurologists, ophthalmologists and basic scientists studying the retinal effects of Parkinson's Disease. Their recent article in *Archives of Ophthalmology* demonstrates retinal thinning in persons with Parkinson's disease. Dr. Bodis-Wollner is funded by the Michael J. Fox Foundation for Parkinson's Research.
- Dr. Brahim Chaqour has teamed up with clinicians to address the role of extracellular matrix molecules in regulating vascular development. Their paper, published in *Endocrinology*, details how components of the ECM lead to blood vessel remodeling. Dr. Chaqour is funded by the NEI.
- Dr. Douglas Lazzaro and Dr. William Brunken have teamed up to study the role of the extracellular matrix in corneal disease and repair. Their recent presentation at the International Association for Research in Vision and Ophthalmology demonstrated that laminins and netrins regulate corneal epithelial proliferation.



## Clinical Services

### Set your sights high. We do.

- Comprehensive Ophthalmology
- Cornea and External Disease Service
- Corneal Refractive Surgery / Laser Vision Surgery / Intac Implants
- Contact Lens Services
- Dry Eye Service
- Glaucoma Service
- Neuro-Ophthalmology Service
- Oculoplastics / Orbital Service
- Retina Service
- Pediatric Ophthalmology & Strabismus Service
- Ocular Imaging Service
- Urgent Care Center

### Comprehensive Consultative Ophthalmology

The University Ophthalmic Consultant's comprehensive ophthalmologists can diagnose and treat most ocular disorders. When more advanced diagnosis or treatment is indicated, they will refer patients to one of UOC's outstanding subspecialists.

The Consultative Service's board-certified physicians perform a complete range of examinations, with appropriate diagnostic tests, and treat conditions such as myopia, infectious and allergic conjunctivitis, and cataracts. Our comprehensive physicians screen for diabetic retinopathy and also perform anterior segment surgery, such as cataract extractions. Referring physicians are sent expedited consult letters so necessary treatments can begin without delay.

#### Contact Us

For further information, or to make a referral or schedule an appointment, please call:

University Hospital of Brooklyn (718) 270-1714  
Long Island College Hospital (718) 780-1530  
Bay Ridge (718) 748-1334

#### Physician Staff

Kichiemon Asoma, MD – UHB, LICH  
Michael Ehrenhaus, MD – UHB, LICH  
Himani Goyal, MD – Bay Ridge  
Douglas Lazzaro, MD – Bay Ridge, LICH  
Bradley Phillips, MD – UHB

### Cornea, External Disease, and Refractive Surgery Service

University Ophthalmic Consultants provides subspecialty consultation, treatment and surgery in cornea, external disease and refractive surgery at both University Hospital of Brooklyn and Long Island College Hospital.

Consultations are offered for patients with conjunctival scarring diseases, including chemical burns and Steven Johnson Syndrome; corneal stromal dystrophies and degenerations; corneal endothelial disorders; herpetic disease (HSV, VZV); corneal ulcers; ocular trauma; and keratoconjunctivitis sicca (KCS), or dry eyes.

#### Testing

Ancillary corneal testing is available either in conjunction with a consult visit or by specific appointment. Test results are interpreted by the service's director. Tests offered include computerized video corneal topography; endothelial cell counts; corneal pachymetry; pneumotonometry; and anterior segment photography. Surgeons perform PRK, LASIK, Intacs, corneal transplantation and cataract procedures.

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#### Physician Staff

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Michael Ehrenhaus, MD – UHB, LICH  
Himani Goyal, MD – Bay Ridge  
Douglas Lazzaro, MD – Bay Ridge, LICH

### Dry Eye Service

More than six million Americans suffer from dry eyes, and the number of symptomatic individuals is increasing as our population ages. For the dry eye patient, early evaluation and treatment is important to prevent ocular surface damage before it occurs, as well as to relieve patient discomfort.

Typically, lid function, lacrimal system function and the conjunctival surfaces all play a role in the development of dry eye conditions. Successful treatment depends on complete evaluation of the patient and potential treatment modalities based on the specific etiology identified. Ocular lubricants are the mainstays of therapy, but punctal occlusion, repositioning of the eyelids or, occasionally, conjunctival transplants may be indicated.

Because a patient's work or lifestyle can exacerbate dry eye symptoms, our experts often prescribe a daily regimen specifically tailored to control his or her condition.

#### Contact Us

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Long Island College Hospital (718) 780-1530  
Bay Ridge (718) 748-1334

#### Physician Staff

Kichiemon Asoma, MD – UHB, LICH  
Michael Ehrenhaus, MD – UHB, LICH  
Himani Goyal, MD – Bay Ridge  
Douglas Lazzaro, MD – Bay Ridge, LICH

### Glaucoma Service

Several ethnic groups in the Brooklyn community suffer a high incidence of various forms of glaucoma. The UOC Glaucoma Service offers state-of-the-art technology to detect glaucoma-related diseases, and its dedicated, culturally sensitive physicians offer a wide range of treatment modalities. Glaucoma management and free community screenings are important aspects of our service.

Extensive patient evaluation is required for the effective treatment and management of glaucoma in its many forms. A full range of highly advanced medical tests is available to patients through UOC's Ocular Imaging Service and Ocular Blood Flow Service. Precise measurement of ocular blood flow is particularly important to the accurate evaluation of

normal tension glaucoma. This test also allows clinicians to gauge the effects of therapy on blood flow to the eye.

Management of high-risk glaucoma is among our service's specialties. Potential treatments include filtering surgery with antifibrotics, placement of aqueous drainage shunts, and various combined procedures. Many treatments are performed in collaboration with the UOC Cornea and Retina Service.

The Glaucoma Service also offers a multidisciplinary approach to anterior segment reconstruction. Services are available by appointment, and urgent consultations are always available.

#### Contact Us

For further information, or to make a referral or schedule an appointment, please call:

Long Island College Hospital (718) 780-1530  
University Hospital of Brooklyn (718) 270-1714

#### Physician Staff

John Danias, MD, PhD – LICH  
Jeffrey Freedman, MD, PhD – UHB  
Shobit Rastogi, MD – UHB, LICH  
Wayne Scott, MD – UHB, LICH

## Neuro-Ophthalmology Service

SUNY Downstate has a long-standing reputation for expertise in the evaluation and treatment of neuro-ophthalmic diseases, the ocular manifestations of neurological diseases, and defects in the neurosensory system. Patients who are candidates for evaluation include those with suspected optic neuritis, optic nerve tumors, chiasmal lesions, unexplained visual loss, disorders of perception, and other neurological maladies. UOC neuro-ophthalmology evaluations include the use of state-of-the-art imaging to pinpoint the location and characteristic features of suspected lesions.

Diagnosis and treatment is provided by an expert team of neuro-ophthalmologists, many of whom were fellowship-trained by Arthur H. Wolintz, MD, Distinguished Teaching Professor of the State University of New York and former Chairman of Ophthalmology at Downstate Medical Center.

#### Contact Us

For further information, or to make a referral or schedule an appointment, please call:

Long Island College Hospital (718) 780-1530  
University Hospital of Brooklyn (718) 270-1714

#### Physician Staff

Bradley Phillips, MD – UHB  
Lekha Gopal, MD – LICH

## Oculoplastics/Orbit Service

The Oculoplastics/Orbital Service evaluates and treats patients at both University Hospital of Brooklyn and Long Island College Hospital. Expedited consultations are available when necessary.

The service has particular expertise in thyroid ophthalmopathy and traumatic orbital fractures, and our surgeons also treat a wide range of other conditions. Commonly performed surgeries include lid and orbital oculoplastic procedures for tumors, infections and inflammatory conditions. Following a comprehensive evaluation, required corrective procedures are performed in a timely way. As soon as it is medically appropriate, patients are returned to the care of their referring physician.

Operating facilities of the Oculoplastics/Orbit Service support a broad range of eyelid and orbital surgeries. The majority of lid surgeries are performed under local anesthesia in the minor surgery suite of either University Hospital or Long Island College Hospital. Unless medically indicated, no pre-testing is needed for such procedures. More complex surgery is performed in a standard operating suite under monitored or general anesthesia. Except in rare circumstances, patients are discharged on the day of surgery.

#### Contact Us

For further information, or to make a referral or schedule an appointment, please call:

Long Island College Hospital (718) 780-1530  
University Hospital of Brooklyn (718) 270-1714

#### Physician Staff

Monica Dweck, MD – UHB, LICH  
Roman Shinder, MD – UHB, LICH

## Retina Service

The UOC Retina Service offers comprehensive medical and surgical management for a large variety of retinal conditions which include diabetic retinopathy, macular degeneration, epiretinal membranes, macular holes, retinal detachment, proliferative vitreoretinopathy, non-diabetic vascular diseases, and AIDS-related retinopathies.

The service maintains a fully-equipped retina surgical suite and an operating room equipped to manage all retinal surgical conditions. All instruments are state-of-the-art and fully up to date with the latest technology.

#### Diagnostic Testing

The Retina Service is equipped to provide:

- Spectral domain optical coherence tomography (SDOCT)
- Stereo fundus photography
- Digital fluorescein angiography
- ICG angiography
- B-scan ultrasonography
- Heidelberg retinal tomography/flowmeter
- Heidelberg retinal angiography

#### Contact Us

For further information, or to make a referral or schedule an appointment, please call:

Long Island College Hospital (718) 780-1530  
University Hospital of Brooklyn (718) 270-1714

#### Physician Staff

Kenneth Olumba, MD – UHB, LICH  
Eric Shrier, MD – UHB, LICH

## Pediatric Ophthalmology and Strabismus Service

The Pediatric Ophthalmology and Strabismus Service specializes in the medical and surgical treatment of eye muscle misalignment in children and adults. In addition, this service provides comprehensive care for all ocular disorders in children, including the treatment of amblyopia, tear duct obstruction, ocular infections, pediatric cataracts, and eye problems associated with arthritis, genetic disorders, premature birth or neurologic disease.

Service physicians evaluate and treat children with:

- Congenital nystagmus or early-onset nystagmus
- Congenital or genetic ocular abnormalities
- Systemic syndromes, metabolic disorders or chromosomal abnormalities, including:
  - Juvenile rheumatoid arthritis
  - Galactosemia
  - Diabetes mellitus
  - Marfan's syndrome
  - Down's syndrome
  - Retinopathy of prematurity
  - Ocular or periocular infection/inflammation
  - Congenital ptosis or eyelid hemangiomas
  - Poor vision or delayed attainment of vision
  - Congenital or childhood cataracts
  - Strabismus (eye misalignment)
  - Amblyopia

Service physicians are also available for optical or surgical correction of eye misalignment and double vision in adults with a history of childhood strabismus, thyroid eye disease/Grave's disease, myasthenia gravis, nerve palsies, or a history of ocular trauma.

#### Contact Us

For further information, or to make a referral or schedule an appointment, please call:

Long Island College Hospital (718) 780-1530  
University Hospital of Brooklyn (718) 270-1714

#### Physician Staff

James Deutsch, MD – LICH  
Ashima Kumar, MD – UHB, LICH

## Ocular Imaging Service

The Ocular Imaging Service aids in the diagnosis of a wide range of ocular disorders by providing physicians with comprehensive, highly detailed images of structures within the eye. Sophisticated ocular images typically are used to formulate a more effective treatment plan. Ocular imaging is also used to detect plateau iris syndrome or a partially dislocated lens.

At the referring physician's request, UOC ocular imaging test reports can include a complete evaluation by a UOC consultant, or images can be submitted to the referring physician without interpretation.

## Available Tests

- **Visual Field Testing** – Frequency Doubling Perimetry (FDT) has been shown to be the most sensitive test for detecting the initial defects caused by glaucoma. In addition, both conventional automated visual field testing and blue-on-yellow (SWAP) visual field testing are available. SWAP (short wave automated perimetry) testing demonstrates visual field loss as many as five years earlier than conventional testing, and it is more sensitive in detecting advancing visual field changes. Screening, full threshold, 24-3, 30-2, and customized testing are available upon request.
- **Optical Coherence Topography** – Measurement of retinal lesions and thicknesses are profiled by this state-of-the-art imaging system.
- **Nerve Fiber Layer Measurement** – Measurement of nerve fiber layer thickness is performed with the NFA/GDx scanning laser polarimeter, as well as with Heidelberg retinal tomography (HRT). Testing is completed in seconds and may document changes in nerve fiber layer thickness in very early disease, as well as in advanced optic atrophy with extensive cupping or pallor. This test is useful in glaucoma suspects, as well as in patients with documented glaucoma and other causes of optic neuropathy. Pupil dilation is not necessary. The HRT unit provides a measurement of the nerve fiber layer as well as an analysis of optic nerve topography.
- **Disc Topography - OCT and Heidelberg Retinal Tomography** – Computerized c:d ratio, rim area and cup area for comparison to a normative database and future self-comparative analysis. This instrument is currently considered the most reliable available for disc analysis. It also measures nerve fiber layer thickness.
- **Corneal Pachymetry** – Studies have shown that abnormal corneal thickness can lead to a false high or low intraocular pressure reading as well as independent high risk factor for progressive disease. Using appropriate nomograms, corneal thickness measurements can be used to obtain a closer approximation of the true intraocular pressure.
- **Ultrasound Biomicroscopy** – Ultrasound biomicroscopy (UBM) to evaluate the chamber angle without medication in a dark versus light room is the methodology of choice for determining if an angle is physiologically occludable.

UBM can also be used to determine if an angle is occludable after iridectomy (in plateau iris syndrome).

Biomicroscopy has proven increasingly useful for defining anterior segment pathology in patients with complex disease. Ultrasound biomicroscopy is available for imaging pathologic structure and physiologic abnormalities in the anterior segment with a resolution of 50 microns.

Uses include identification and location of intraocular lens haptics, location of glaucoma drainage tubes, vitreous strands, determining the integrity of scleral wounds, and locating inadvertent filtration blebs and cyclodialysis clefts. Using biomicroscopy to evaluate these and many other abnormalities allows the implementation of more exact modalities.

- **Corneal Topography** – Corneal topography with the Tomey instrument can be highly useful in managing patients with keratoconus and regular and irregular astigmatism, as well as in a host of other corneal conditions.
- **Confocal and Specular Biomicroscopy** – These modalities are used to evaluate all layers of the cornea and can be used to study corneal dystrophies and anterior segment dysgenesis. It also is a useful aid in preoperative evaluation of patients scheduled for cataract and other surgical procedures and can aid in the diagnosis of complicated corneal infectious disease.
- **Anterior Segment Photography** – This photography permits evaluation of lid position, external conjunctival lesions and other anterior segment disorders. Gonio-photography is also available.
- **Fluorescein Angiography** – Digital fluorescein angiography is performed by a certified ophthalmic photographer. It is useful in the diagnosis and management of a host of iris and retinal disorders. Digital angiography allows for instant viewing of the images obtained as well as the ability to transmit the images instantly via the internet.
- **Indocyanine Green (ICG) Angiography** – ICG angiography is useful in the diagnosis and management of sub-retinal disorders, including choroidal neovascularization, which are poorly imaged with conventional angiography.
- **Fundus and Disc Photography** – Photography of the optic nerve, nerve fiber layer, posterior pole and retinal periphery is useful in the documentation and follow-up of a variety of ocular disorders.

## To Schedule a Test

Tests should be scheduled through University Hospital of Brooklyn or Long Island College Hospital (see contact information below). On the day of the test, referred patients must bring with them a completed request form. Forms will be faxed to referring physician offices upon request.

### Contact Us

For further information, or to make a referral or schedule an appointment, please call:

Long Island College Hospital (718) 780-1530  
University Hospital of Brooklyn (718) 270-1714

## Urgent Care Center

Emergency eye care is available from 8:00 am to 6:00 pm in the ophthalmology departments of both University Hospital of Brooklyn and Long Island College Hospital.

In addition, emergency eye care is available 24 hours a day through the Department of Ophthalmology's Urgent Care Center, also at both Long Island College Hospital and University Hospital of Brooklyn.

Patients presenting at either location will be seen initially by an ophthalmology resident who is in direct consultation with an on-call ophthalmology attending physician.

### Referring Physician Contact

The ophthalmologists of non-referred patients are called by the resident/attending at the time of the patient visit. For referred patients, referring physicians will also be notified of patient results the same evening of the patient's emergency visit, if possible. If not, they will be contacted the following morning.

### Contact Information

Patients or their physicians may request urgent eye care at either location by calling (718) 780-2600, 24 hours a day, 7 days a week, including all holidays.

**Urgent Eye Care, University Hospital of Brooklyn**  
445 Lenox Road, Box 58  
Brooklyn, NY 11203  
(718) 270-1714

**Urgent Eye Care Center at Long Island College Hospital**  
Othmer Building, 4th Floor, 339 Hicks Street  
Brooklyn, NY 11201

## Practice Locations

### SUNY Downstate Medical Center

University Hospital of Brooklyn  
450 Clarkson Avenue, Box 58  
Brooklyn, NY 11203  
Phone (718) 270-1714

### Midwood

SUNY Downstate Eye Center  
2171 Nostrand Avenue @ Flatbush  
Brooklyn, NY 11210  
Phone (718) 270-1714

### Long Island College Hospital

Othmer Building  
339 Hicks Street, 4th Floor  
Brooklyn, NY 11201  
Phone (718) 780-1530

### Bay Ridge

7901 4th Avenue  
Brooklyn, NY 11209  
Phone (718) 748-1334

### Brooklyn Heights

110 Remsen Street  
Brooklyn, NY 11201  
Phone (718) 855-8700

142 Joralemon Street  
Brooklyn, NY 11201  
Phone (718) 596-6800

### Manhattan

229 East 79th Street  
New York, NY 10075  
Phone (212) 288-0905

### Laser Vision Correction Center

SUNY Downstate at Bay Ridge  
699 92nd Street  
Brooklyn, NY 11228  
Phone (718) 748-1334

# Laser Vision Correction Center

**A brand new, state-of-the-art laser center has been established due to the generosity of Dr. Richard C. Troutman and his wife, Dr. Suzanne Véronneau. Dr. Troutman has left a long-lasting imprint on the field of ophthalmic microsurgery that continues today.**

The Laser Vision Correction Center is located at SUNY Downstate at Bay Ridge. We offer both LASIK and PRK procedures. For appointments call 718-748-1334.



## **VISX STAR S4 Excimer Laser System with WaveScan**

WaveScan technology captures unique imperfections in each individual's vision that could not have been measured before. This new level of measurement provides 25 times more precision than measurements using standard methods for glasses and contact lenses. WaveScan technology produces a detailed map of the eye—much like a fingerprint, no two are alike—and translates this information into a set of CustomVue treatment instructions for the laser. WaveScan transfers these digital treatment instructions to the laser, providing a new level of precision and accuracy.



Dr. Troutman celebrating his birthday with his wife Dr. Suzanne Véronneau-Troutman on May 16, 2008

Dr. Troutman is a member and past officer of many ophthalmic specialty societies, including the prestigious American Ophthalmological Society, founded in 1864. In 1978, when his wife Dr. Suzanne Véronneau-Troutman was admitted as the 8th woman member, they became the first couple in the history of the society.

## **The Troutman Chair in Ophthalmology**

Dr. Richard Troutman headed the Department of Ophthalmology at Downstate from 1955 to 1983. In 2002, The Richard C. Troutman Distinguished Chair in Ophthalmology and Ophthalmic Microsurgery was initiated at SUNY Downstate Medical Center with a \$1 million gift from the Microsurgical Research Foundation. The endowment was completed by 2005 with an additional \$1 million. The Chair honors the foundation's legendary founder, Dr. Richard C. Troutman, a worldwide leader in ophthalmic microsurgery and one of the innovators in the design of the ophthalmic microscope.

## **Richard C. Troutman, MD, Distinguished Chair in Ophthalmology and Ophthalmic Microsurgery Endowment Fund**

To contribute to the Richard C. Troutman, MD, Distinguished Chair in Ophthalmology and Ophthalmic Microsurgery Endowment Fund, please call Downstate's Department of Institutional Advancement and Philanthropy at 718-270-4418. If you prefer, you may also donate online at: <http://www.downstate.edu/giving/ways.html>

# Achievements of Dr. Troutman

In June of 1955, Dr. Troutman was appointed as the first Professor and Head of the Division of Ophthalmology at the newly opened SUNY Downstate Medical Center. He had completed his residency in Ophthalmology at CUMC (New York Hospital Cornell Medical Center) under John McLean in 1951. Until his appointment, he was Instructor to Residents at MEETH (Manhattan Eye Ear and Throat Hospital) and served as Assistant Professor of Ophthalmology at CUMC. It was at that time he began his pioneering developments in ophthalmic microsurgery by modifying a Zeiss otologic microscope for use in anterior segment surgery. He soon realized that before the better visualization through the microscope could be utilized effectively, extensive changes in instrumentation, needles and suture materials, as well as in the microscope itself, would have to be made before its full potential could be realized.

His first priority, however, was the development of the new division. Fortunately, the National Institutes of Health (NIH) had recently inaugurated its Ophthalmology Training Grant program that provided support for Dr. Robert Jampel and Dr. Bernard Schwartz with their specialty training in strabismus and glaucoma, both of whom joined the full-time faculty. The further addition of specialized part-time faculty made possible this specialty-based training program, one of the first of its kind in the country, with 12 residents and 4 fellows. This group of residents and fellows were the first trained to use the microscope for their anterior segment surgery.

**In 1957, Dr. Troutman designed and had constructed at Downstate the first hydraulic, chair-supported ophthalmic surgical microscope for use in the operating suite.**

Two years later, in 1957, Dr. Troutman invited Dr. Joaquin Barraquer, who was travelling in Latin America demonstrating his surgery, to SUNY. He, too, was using a microscope that he had developed with his brother José.

They also developed specialized microsurgical instruments, in particular, a new suture material, 8-0 virgin silk armed with a 5mm Grieshaber needle, which was far superior to those being used in the US at the time. Dr. Troutman immediately incorporated this for his surgery and advocated the same to many of his colleagues.

**In 1962, Dr. Troutman, with the Keeler Instrument Company, developed and used the first remote-controlled, motorized, zoom-magnification microscope for ophthalmic microsurgery.**

That same year, Dr. Barraquer discovered alphachymotrypsin, an enzyme that facilitated the intracapsular extraction of cataract, and sent some to Dr. Troutman to try. Suitably impressed, he convinced the AAO to sponsor a national trial of its safety and efficacy, based at SUNY, and that resulted in its worldwide acceptance. This technique went unchallenged until extracapsular extraction and phacoemulsification (for which Dr. Troutman chaired a similar trial for the AAO in 1975) became the procedures of choice for cataract surgery. These studies and the Courses in Microsurgery held at SUNY and at the AAO, and taught by our residents, faculty and foreign guests, put our program “on the map.”

Meanwhile, Dr. Troutman continued his development of surgical microscopes, introducing the first motorized zoom microscope (Keeler) in 1962 and his ceiling mounted microscope with XYZ translation and focusing and planetary tilt (Weck) in 1967, concepts that continue to be used in contemporary surgical microscopes by many specialties.

In 1966, to further the development of ophthalmic microsurgery, with Günther Mackensen and Heinrich Harms of the Universität Tübingen in Germany he formed the IOMSG (International Ophthalmic Surgery Study Group). In 1963 they had introduced him to 10-0 monofilament

**Dr. Richard C. Troutman is a worldwide leader in ophthalmic microsurgery and one of the innovators in the design of the ophthalmic microscope.**

nylon that significantly improved corneal wound closure, but was unknown outside their institution. Dr. Troutman subsequently made 10-0 nylon universally available through the Ethicon Suture Division of J&J, as chair of the AAO Suture Committee in the United States.

**In 1967, Dr. Troutman developed, in conjunction with the Weck Surgical Company, the first ceiling-mounted zoom ophthalmic surgical microscope that incorporated remotely controlled focusing and centering, planetary tilting and multi-focal illumination. Contemporary surgical microscopes that incorporate Dr. Troutman's concepts continue to be the instruments of choice for ophthalmic microsurgery.**

Inert in tissue and elastic, 10-0 nylon suture could hold the cornea firmly in apposition for months, allowing first intention healing which prevented the optical changes in the cornea from tissue displacement. Using Dr. Troutman's corneal wedge resection it was possible for the first time to correct severe astigmatism post keratoplasty, and for lesser degrees with his corneal relaxing incisions (1975), the first effective, reproducible refractive keratoplasty procedures.

It was at the first IOMSG meeting that Dr. Troutman met José Barraquer. Because of their mutual interests in refractive keratoplasty, they developed a close relationship that would lead Dr. Troutman to perform the first lamellar refractive surgeries outside Colombia, keratophakia and keratomileusis in 1977, after he and his Corneal Fellow Dr. Casimir Swinger were trained in the technique by Dr. Barraquer in Bogotá. Two years later, at a meeting of the New Orleans Academy of Ophthalmology featuring Dr.

Barraquer, Dr. Troutman and Dr. Swinger reported their early results which would lead to safer, more effective refractive surgical techniques. With Dr. Miles Friedlander, they formed the ISRS (International Society of Refractive Surgery) which has become the primary forum for this specialty and is the first international specialty to be recognized by the AAO and included in its annual program.

**At SUNY Downstate, Dr. Troutman's Division of Ophthalmology post-graduate training program was one of the first in the United States to routinely teach microsurgery of the eye to its residents.**

Dr. Troutman has authored or co-authored 7 textbooks, many book chapters and more than 150 scientific publications, many of which detail his interests and innovations in microsurgical techniques and instrumentation for anterior segment surgery. In recognition of his pioneering advances, he has been recognized with numerous awards, citations and named lectureships. He is a member and past officer of many ophthalmic specialty societies, including the prestigious American Ophthalmological Society, founded in 1864. In 1978, when his wife Dr. Suzanne Véronneau-Troutman was admitted as the 8th woman member, they became the first couple in the history of the society.

**In 2000, Dr. Troutman received the Lifetime Achievement Award from the American Academy of Ophthalmology for “many years of distinguished service to the society.” He is one of the first seven ophthalmologists to have received this award from the AAO.**

# Residency Program



The department currently provides a three-year post-graduate training program for 21 residents, with seven new candidates accepted each year. Residents benefit from the wisdom of a large, expert faculty with a deep commitment to teaching, and they have the opportunity to



Dr. Douglas Lazzaro and Dr. Justin Gutman confer about a cornea patient

work with the latest diagnostic and therapeutic equipment. The organized teaching program consists of approximately 350 hours of didactic lectures per residency, covering all subspecialty areas within ophthalmology. On

one afternoon a week, residents leave the clinic areas and report to Downstate for an afternoon of grand rounds case presentations followed by didactics. Special program features include a one-week course in San Antonio for first year residents and a one-week Wills Review course for second-year residents, while third year residents attend an approved course of their choice. In addition, all residents attend a weekly, three-hour cooperative course collaboratively sponsored by several major New York City-based residency training programs. The SUNY Downstate program offers outstanding training in surgery, with in-house courses for strabismus, glaucoma surgery, vitrectomy and cataract techniques. All residents easily exceed the minimum surgical requirements set by the Accreditation Commission for Graduate Medical Education (ACGME). It is expected that the senior residents will all perform more than 120 cataract cases. A comparable experience is gained in ocular trauma, glaucoma surgery, retinal surgery and laser surgery.



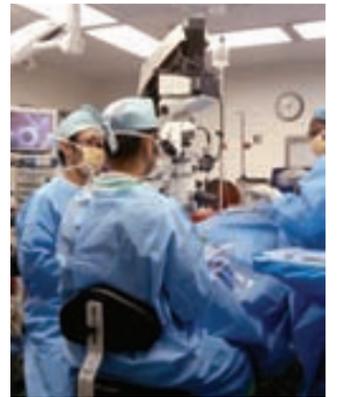
Dr. Gabriel Schaab and Dr. Josh Glatman examine a retina patient

The program includes monthly faculty grand rounds, often with visiting professors, updating residents and faculty on developing trends and techniques in ophthalmology, in addition to the weekly resident grand rounds.

All residents must execute a research project, and mentor-

Opposite: Dr. James Deutsch and Dr. Melanie Sobel examine a pediatric patient

ships are established in the first year of residency training. Other special program features include an oncology rotation at Memorial Sloan-Kettering and small group eye pathology teaching sessions.



Particularly popular with residents is the surgical course, with outstanding practice opportunities under expert faculty guidance. Strengths of the overall residency program, they say, include the extensive exposure to trauma cases it provides, and its well-structured rotations through programs at the various affiliated hospitals beginning in the first year. This gets residents off to a positive start through experience with a variety of patients and pathologies. Another outstanding aspect of the SUNY Downstate education program, according to residents and fellows, is the opportunity it affords them to work and learn in state-of-the-art facilities, where the most sophisticated equipment permits conducting the most advanced procedures. They also praise the dynamism of the faculty and the program's emphasis on research accomplishment.

Approximately 96 percent of the program's graduate residents pass their boards on the first attempt, and many who have sought fellowships have obtained prestigious ones throughout the US. Some graduates who have decided to remain in Brooklyn to practice are discovering a vast, barely tapped market for professional eye care. There has been a marked increase in the quality of applicants for residency program openings over the last decade, apparently attracted by the department's growing reputation nationally. At its most recent review by the ACGME in 2009, the department received a full four-year accreditation.

- **Largest residency program in the New York City area.**
- **Most diverse patient population in the nation.**
- **Eight residency training sites.**
- **Experienced, diverse faculty.**
- **High surgical volume.**
- **Wide breadth of pathology.**
- **Over 100,000 patients seen annually.**

# Residents and Fellows

## Graduates 2009

Dr. Habeeb Ahmed  
Dr. Kichiemon Asoma  
Dr. Carl Danzig  
Dr. Majida Gaffar  
Dr. Adam Jacobowitz  
Dr. Na Ma  
Dr. Preeti Poley  
Dr. Kirk Sturridge

## Fellowship

Cornea - University of Southern California  
Cornea - University of Texas Southwestern Medical Center  
Retina - University of Texas Southwestern Medical Center  
Pediatric Ophthalmology - Children's National Medical Center, Washington  
Uveitis - Johns Hopkins College of Medicine  
Neuro-Ophthalmology/Plastics - Kingsbrook/SUNY Downstate  
Retina - University of Nebraska  
Glaucoma - University of Iowa

## PL3 Class 2011-2012

Dr. Sara Ferri  
Dr. Sara Hanson  
Dr. Amy Kulak  
Dr. Akil Pascal  
Dr. Gabriel Schaab  
Dr. Melanie Sobel

## Medical School Attended

SUNY Buffalo  
Boston University School of Medicine  
University of Miami School of Medicine  
SUNY Downstate  
Rush Medical College  
Drexel College of Medicine

## Graduates 2010

Dr. Rodney Coe  
Dr. Gennifer Greebal  
Dr. Sheetal Patel  
Dr. Allison Rand  
Dr. Marjorie Rico  
Dr. Brandon Rodriguez  
Dr. Jeremy Shaw

## Fellowship

Retina - University of Pittsburgh  
Pediatric Ophthalmology - Children's National Medical Center, Washington  
Cornea - Cornell Medical Center  
Cornea - Mount Sinai Medical Center  
Oculoplastics - Dr. Janet Neigel  
Cornea - Cornell Medical Center  
Medical Retina - Duke University Medical Center

## PL2 Class 2011-2012

Dr. Cindy Calderon  
Dr. Justin Gutman  
Dr. David Mostafavi  
Dr. Chirantan Mukhopadhyay  
Dr. Sherry Narang  
Dr. David Rand  
Dr. Isaac Reich  
Dr. Shetal Shah

## Medical School Attended

SUNY Stony Brook  
SUNY Upstate  
University of Medicine and Dentistry of New Jersey  
University of Wisconsin School of Medicine  
Drexel College of Medicine  
University of Miami School of Medicine  
SUNY Downstate  
SUNY Downstate

## Graduates 2011

Dr. Ramanath Bhandari  
Dr. John Frisbee  
Dr. Andrew Greenberg  
Dr. Alex Karvelishvili  
Dr. Margaret Liu  
Dr. Monika Singh  
Dr. Beatrice Whitaker  
Dr. Lauren Yeager

## Fellowship

Retina - University of Colorado  
Retina - The Ochsner Foundation  
Glaucoma - NY Eye and Ear Infirmary  
Retina - Valley Retina Institute Texas  
Cornea - Johns Hopkins School of Medicine  
Private Practice  
Private Practice  
Pediatric Ophthalmology - Children's National Medical Center, Washington

## PL1 Class 2011-2012

Dr. Matthew Gorski  
Dr. Jason Moss  
Dr. Renelle Pointdujour  
Dr. Allison Rizzuti  
Dr. Jordan Spindle  
Dr. Adam Thode  
Dr. Frank Tsai

## Medical School Attended

Jefferson College of Medicine  
Stanford College of Medicine  
SUNY Downstate  
SUNY Downstate  
Texas A & M College of Medicine  
Jefferson College of Medicine  
Temple College of Medicine

# Annual Symposium Held in Atlantic City [www.eyecurrentconcepts.org](http://www.eyecurrentconcepts.org)

The Department of Ophthalmology is committed to the educational needs of the community ophthalmologist. To that end, a comprehensive Visiting Clinical Lecture series takes place along with a Research Lecture series as a component of the Thursday Grand Rounds Series.

In addition to this widely popular activity, there are two large symposia each year that bring together some of the world's top clinical scientists to share their knowledge on their particular specialty. The meetings cover a very wide area of ophthalmology and focus on the diagnostic testing and emerging therapies for eye disease.

**The 2-day symposium has taken place at Caesars Atlantic City the past four years and attracted attendees from seven states.**



**Cornea Presenters 2011**

Left to right: Drs. Sadeer Hannush, C. Stephen Foster, Douglas Lazzaro, David Hardten

The two-day January symposium has taken place at Caesars Atlantic City in New Jersey the past four years and has attracted attendees from seven states. It takes place on a Friday and Saturday, generally around the second weekend of the month. This scientific and social venue has become an excellent place for returning attendees each year, many of whom have commented that this is “the best CME event I have attended in my career.”



**2011 Current Concepts of Ophthalmology**

Drs. Himani Goyal, Sara Ferri, Peggy Liu and Anika Michael



Dr. Sonia Yoo of the Bascom Palmer Eye Institute of the University of Miami School of Medicine presented at our June 2009 CME meeting



**Retina/Oculoplastics Presenters 2011**

Left to right: Drs. JP Dunn, Peter Kaiser, Douglas Lazzaro, Roman Shinder, Dan Gombos, Lee Jampol



**Glaucoma Presenters 2011**

Left to right: Drs. Jeffrey Liebmann, Douglas Lazzaro, L. Jay Katz, Shobit Rastogi, Malik Kahook, John Danias



**2011 Current Concepts of Ophthalmology**

Drs. Sheetal Shah and Cindy Calderon



**2010 Current Concepts of Ophthalmology**

Left to right: Drs. Shobit Rastogi, Rand Allingham, John Danias, Jeffrey Freedman, Douglas Lazzaro, Gregory L. Skuta



**2010 Current Concepts of Ophthalmology**

Drs. Lekha Gopal and Kenneth Olumba



**2010 Current Concepts of Ophthalmology**

Dr. Aruoriwo Oboh-Weilke of  
Georgetown University School of Medicine



**AAO 2010**

Drs. Ashima Kumar and Howard Liu

“I had the pleasure of participating in SUNY Downstate’s Current Concepts in Ophthalmology meeting in Atlantic City in January 2010 and was highly impressed with the outstanding reputation and quality of the invited speakers, the clinical relevance of the superb presentations, the wonderful setting, and Dr. Douglas Lazzaro’s remarkable hospitality and organizational skills as the course director. This is truly one of the country’s outstanding continuing medical education experiences.”

— Gregory L. Skuta, MD  
President and Chief Executive Officer  
Dean McGee Eye Institute  
Edward L. Gaylord Professor and Chair  
Department of Ophthalmology  
University of Oklahoma College of Medicine



**2010 Current Concepts of Ophthalmology**

Left to right: Drs. Robert Nussenblatt, Carl Regillo, Steve Charles, Scott Cousins, Eric Shrier, Douglas Lazzaro



**2010 Current Concepts of Ophthalmology**

Left to right: Drs. Roy Rubinfeld, Angie Wen, Douglas Lazzaro, David Tse, Geoffrey Gladstone, Monica Dweck

# Continuing Medical Education

## Department of Ophthalmology Visiting Speaker Lecture Series

The SUNY Downstate Department of Ophthalmology is proud to present our 2011 Visiting Speaker Lecture Series, a forum for renowned clinicians and researchers to present their latest findings.

These lectures will feature advances in many areas of clinical ophthalmology and ophthalmic research, presented by noted clinical and basic scientists from throughout the world. Ample opportunity will be provided for questions and answers.

Most programs will be held in Lecture Hall 1A, SUNY Downstate Medical Center, in the afternoon. For your convenience, there is valet parking at the main entrance of University Hospital of Brooklyn, 445 Lenox Road.

Please join us for these insights into ophthalmic research and the promises they hold for patient care.

No registration is required.



### Lecture Series Course Directors

**Douglas R. Lazzaro, MD, FACS, FFAO**

Professor and Chair of Ophthalmology  
Richard C. Troutman, MD, Distinguished Chair  
In Ophthalmology and Ophthalmic Microsurgery  
Chief of Service: UHB, KCHC

**William J. Brunken, BS, PhD**

Director of Ophthalmic Research  
Professor of Ophthalmology and Cell Biology

## VISITING SPEAKER CLINICAL LECTURE SERIES 2011

### January 13, 2011

2:00-4:00 PM, Lecture Hall 1A

#### Jeanine K. Suchecki, MD

Associate Professor of Ophthalmology  
University of Connecticut School of Medicine  
**Contact Lenses**

### April 7, 2011

2:00-4:00 PM, Lecture Hall 1A

#### George Spaeth, MD

Professor of Ophthalmology  
Jefferson University School of Medicine  
**Compassionate Care of the Glaucoma Patient**

### April 7, 2011

4:00-5:00 PM, Lecture Hall 1A

#### Aruoriwo Oboh-Weilke, MD

Assistant Professor of Ophthalmology  
Georgetown University School of Medicine  
**The Value of a Systemic Workup: A Series of 3 Case Reports**

### May 19, 2011

2:00-4:00 PM, Lecture Hall 1A

#### Michael S. Ip, MD

Associate Professor of Ophthalmology  
University of Wisconsin School of Medicine  
**Retina 1 & Retina 2**

### June 2, 2011

#### Annual Alumni Meeting

8:00 AM-4:00 PM, LICH Avram Auditorium

#### Brandon Ayres, MD

Assistant Surgeon, Cornea Service  
Wills Eye Institute

#### Neil M. Bressler, MD

The James P. Gills Professor of Ophthalmology  
Chief of Retina Division, Wilmer Eye Institute  
Johns Hopkins School of Medicine

#### Steven J. Gedde, MD

Professor of Ophthalmology  
Bascom Palmer Eye Institute  
University of Miami Miller School of Medicine

#### Scott M. Goldstein, MD

Clinical Assistant Professor  
Wills Eye Institute  
Thomas Jefferson School of Medicine

#### Jayne S. Weiss, MD

Professor and Chairman, Ophthalmology  
Louisiana State University School of Medicine

### June 23, 2011

2:00-4:30 PM, Lecture Hall 1A

#### Sohan Singh Hayreh, MD, MS, PhD, FRCS, FRCOphth, DSc

Professor Emeritus of Ophthalmology  
Director, Ocular Vascular Clinic  
Department of Ophthalmology & Visual Sciences  
University of Iowa College of Medicine  
**Lecture 1 – CRVO Pearls**  
**Lecture 2 – GCA Pearls**  
**Lecture 3 – ARMD Pearls**

### August 4, 2011

2:00-4:00 PM, Lecture Hall 1A

#### Kenneth Rosenthal, MD

Associate Professor of Ophthalmology  
University of Utah Medical Center

#### Lecture 1 – Cataract Surgical Pearls

#### Lecture 2 – Innovative Eye Surgical Procedures

### October 13, 2011

2:00-4:00 PM, Lecture Hall 1A

#### Leonard B. Nelson, MD

Associate Professor of Pediatrics and Ophthalmology  
Jefferson University Medical Center  
Co-Director Pediatric Ophthalmology, Wills Eye Institute

#### Lecture 1 – Misconceptions in Pediatric Ophthalmology

#### Lecture 2 – The Odyssey of Where We Are in Congenital ET

### November 2-3, 2011

#### Grant T. Liu, MD

Professor of Neurology  
University of Pennsylvania School of Medicine

November 2, 2011, Troutman Library

#### Pediatric Optic Neuropathies 5:30-6:00 PM

November 3, 2011, Lecture Hall 1A

#### Chiasmal Disorders 2:00-2:45 PM

#### Optic Disc Swelling 3:15-4:00 PM

### December 8, 2011

2:00-3:15 PM, Lecture Hall 1A

#### Paul D. Langer, MD

Assistant Professor  
Institute of Ophthalmology and Visual Science  
Chief, Division of Ophthalmic Plastic & Reconstructive Surgery  
University of Medicine and Dentistry of New Jersey  
**Orbital Floor Fractures**

### January 6-7, 2012

#### Caesars Atlantic City Meeting

Full details on [www.eyecurrentconcepts.org](http://www.eyecurrentconcepts.org)

## VISITING SPEAKER RESEARCH LECTURE SERIES 2011

*All research talks will be held 3:00-4:00 PM in Lecture Hall 1A.*

### February 3, 2011

#### Ross Cagan, PhD

Professor, Dept. of Developmental and Regenerative Biology  
Associate Dean, Graduate School of Biological Sciences  
Mount Sinai School of Medicine

#### Developmental Mechanisms and Disease Therapeutics: A View from the Fly Eye

### February 24, 2011

#### Craig Evinger, PhD

Professor, Neurobiology & Behavior and Ophthalmology  
SUNY Stony Brook

#### Neurobiology of Blepharospasm

### March 24, 2011

#### Marion Gordon, PhD

Associate Professor of Pharmacology & Toxicology  
Ernest Mario School of Pharmacy Rutgers University  
**Pathobiology of Collagen and EMMPRIN in Cornea**

### May 26, 2011

#### Ching-Hwa Sung, PhD

Professor, Ophthalmology  
Weill Medical College of Cornell University  
**Retinal Pigment Epithelium and Retinal Disease**

### June 23, 2011

#### Terete Borrás, PhD

Professor, Ophthalmology  
University of North Carolina  
**Glaucoma Models and Treatment**

### July 28, 2011

#### Thomas White, PhD

Associate Professor  
Physiology and Biophysics  
SUNY Stony Brook  
**Connexins and Cell Signaling in the Lens**

### August 25, 2011

#### Mark Rosenblatt, MD, PhD

Assistant Professor, Weill Cornell Medical Center  
**Wound Healing in Cornea**

### September 22, 2011

#### Janet R. Sparrow, PhD

Associate Professor of Ophthalmic Science and Anatomy and Cell Biology  
Columbia University Medical Center  
**RPE Cell Death**

### October 27, 2011

#### John R. Heckenlively, MD

Paul R. Lichter Professor of Ophthalmic Genetics  
Professor, Ophthalmology and Visual Sciences  
Director, Center for Retinal and Macular Degeneration  
University of Michigan Kellogg Eye Center  
**Retinal Degeneration: A Tale of Mice and Men**

### December 1, 2011

#### Simon W. M. John, PhD

Investigator, Howard Hughes Medical Institute  
Senior Staff Scientist, The Jackson Laboratory  
Research Assistant Professor in Ophthalmology  
Tufts University School of Medicine

#### Mechanistic Insights to Glaucoma Provided by Experimental Mouse Genetics

**The entire CME lecture series  
can be viewed on our website  
[www.downstate.edu/ophthalmology](http://www.downstate.edu/ophthalmology)**

# RETINOPATHY RESEARCH

## TO SAVE **SIGHT** AND **LIVES**

The retina, the light-sensitive inner layer of the eye, is an area of great scientific significance. Not only does it enable vision, it is an extension of the brain. The retina is composed of neural tissue, much like that larger organ from which it emerges during fetal development. As a result, research into the workings of the retina has a great impact on medical science's understanding of and treatment of dysfunctions in the brain, as well as in the retina itself.

Douglas Lazzaro, MD, chairman of SUNY Downstate's Department of Ophthalmology, says "the retina is an area where there's tremendous new research activity going on," much of it featured here.

Downstate now has a director of ophthalmic research, William J. Brunken, PhD, whose investigations into retinal proteins called laminins and netrins may one day help restore sight to the visually impaired. Brahim Chaqour, PhD, investigates the molecular underpinnings of diabetic retinopathy, a microvascular disease that is one of the leading causes of blindness in the United States, all in an effort to develop treatments that may one day prevent the disease.

Gladys Teitelman, PhD, a diabetes researcher who has concentrated mostly on the regeneration of insulin-producing pancreatic beta cells, has widened her investigations to also include

diabetic retinopathy. Daniel Rosenbaum, MD, chairman of Downstate's Department of Neurology, uses the retina as a model for understanding what happens to brain cells during strokes. And Ivan Bodis-Wollner, MD, DSc, director of the Parkinson's Disease and Related Disorders, Center of Excellence of the National Parkinson Foundation, explores how changes in the retina both signal and influence the development of Parkinson's disease.

"The research we're doing at Downstate is leading to new understandings of retinal diseases and the nervous system," Dr. Lazzaro says. "Most importantly, we're creating potential new avenues of treatment."



# The Exquisite Beauty of Ocular Architecture

William J. Brunken, PhD, is keenly interested in the architecture of the eye's light-sensitive inner layer, the retina.

"As an undergraduate," says Dr. Brunken, an associate professor of anatomy and cell biology, ophthalmology, and neurology, "I got hooked on the retina's elegantly organized structure. Its columnar organization is very carefully constructed, with a gorgeous symmetry to it."

Dr. Brunken, director of SUNY Downstate's division of ophthalmic research, explores the molecular signals that create, maintain, and sometimes deform and destroy that structure.

His investigations into proteins found in the retina's extracellular matrix, the biological scaffolding that binds its cells together, may lead to treatment breakthroughs for a number of ocular diseases. These include diabetic retinopathy, age-related macular degeneration, and retinopathy of prematurity, a vision-loss problem associated with premature birth. His research



may even help restore vision to those whose retinal problems have resulted in blindness.

Dr. Brunken has spent much of his recent career studying two specific retinal proteins, laminins and netrins, which he describes as guidance molecules. "They tell cells where to go and how to function when they get there," he explains.

Without laminins and netrins, retinal development is disrupted and vision itself may well be impossible. Moreover, laminins and netrins

"stabilize synapses," the junctions between brain cells across which neural communication takes place, Dr. Brunken says.

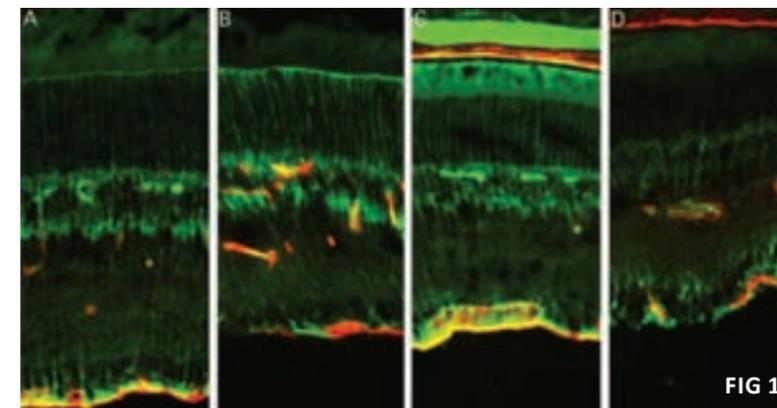
The connections between the light-sensitive cells in the retina and the cells that convey visual signals to the brain are held together by laminins, "which are the chief organizers of one of the retina's, and one of the body's, most important structures: the basement membrane."

In a series of papers published in *Neuron* and the *Journal of Neuroscience*, Dr. Brunken and his group were the first to demonstrate the presence of native laminins in the central nervous system.

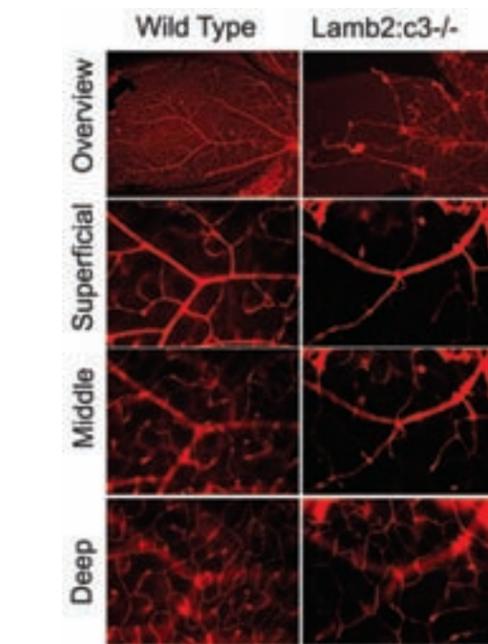
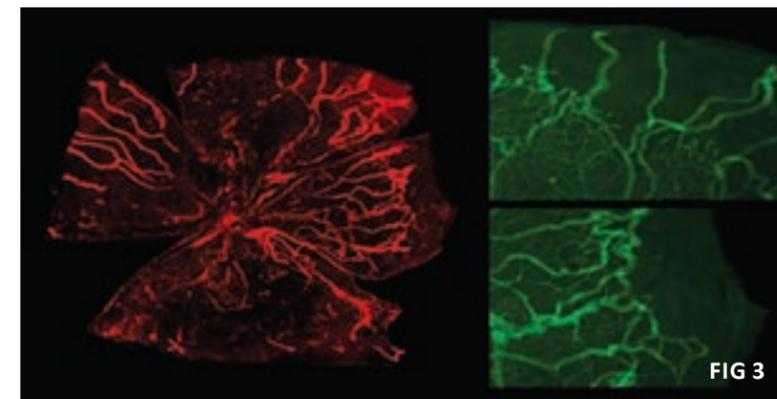
Basement membranes in the retina, and elsewhere, serve as platforms onto which cells attach themselves. They also orient tissue development, "telling cells what is top and what is bottom, and therefore how cells should organize themselves," Dr. Brunken notes. "These properties make them critical for retinal development. If the basement membrane doesn't form properly, then the attachment of cells is irregular and the retina's columnar organization, and its ability to transmit visual signals, is lost."

Dr. Brunken's lab has identified four of the approximately forty laminin variants that are active in retinal tissue. Mutations in one of the genes that produces the laminin beta-2 protein, a gene called LAMB2, "completely disrupts vascularization of the retina during fetal development," Dr. Brunken notes. "What results is a very altered pattern of vascularization, much like one sees in children with retinopathy of prematurity, where inflammation and, eventually, the death of retinal tissue, disrupts the visual field."

Other laminin mutations lead to

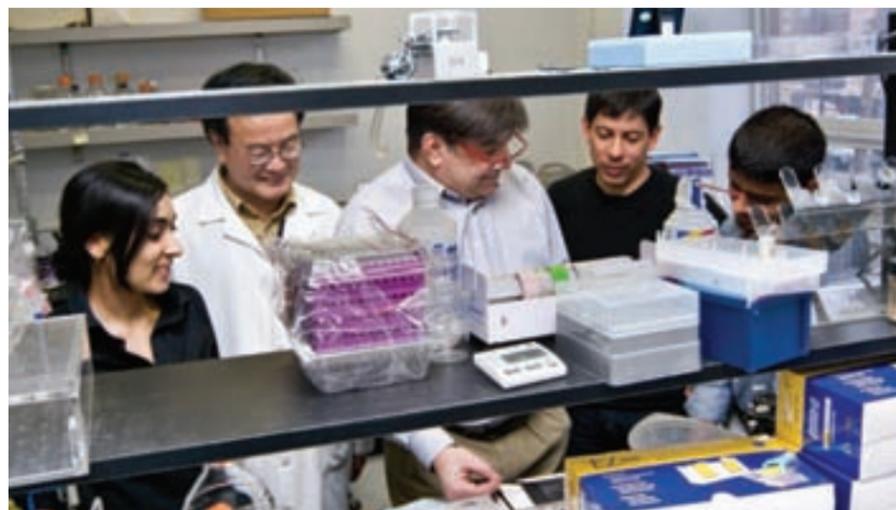


**Fig 1.** A section of the mouse retina stained with fluorescent protein markers. Support cells, Müller glia (green), span the whole retina and adhere to the retinal basement membrane (red line at bottom of the figures). The adhesion points are yellow. Some genetic deletions of laminins (B and D but not C) cause alterations in Müller cell and, secondarily, in retinal anatomy.



**Fig 2.** The development of retinal blood supply is dependent on laminin synthesis. Blood vessels spread over the normal retina (left side, overview) forming three different capillary networks at the surface, in the middle, and deep within the retina. In animals with laminin gene deletions (right column) the development of blood vessels is altered dramatically. The entire surface of the retina is not covered with blood vessels (overview) and the branching of all three levels of the capillaries are disrupted. These effects mimic a human disease called retinopathy of prematurity, a blinding disorder found in some premature children.

**Fig 3.** Blood vessels are underdeveloped in lamin mutants.



Members of Dr. Brunken's lab (from left to right): Aarti Kuver, PhD student; Zeng-Xiu Liu, MSc, research associate; Dr. Brunken; Germán Pinzón-Duarte, MD, research associate; Gopalan Gnanaguru, PhD student.

rare but complex diseases that involve the eye along with other bodily systems. These diseases include Pierson syndrome, Merosin-dependent muscular dystrophy, and Herlitz junctional epidermolysis bullosa.

Dr. Brunken has created a mouse model in which two laminin genes have been removed. These mice have all the symptoms of eye-brain-muscle disease, a complex neurodevelopmental disorder.

Of particular interest to Dr. Brunken is the role netrins play in the retina's organizing structure. "A netrin is nothing more than a small piece of a laminin," he explains. "Laminins are cross-shaped molecules and netrins are the ends of the arms of the cross." Working with Manuel Koch, PhD, of the University of Cologne, in Germany, Dr. Brunken's lab discovered that a novel type of netrin, called

netrin-4, regulates axon guidance in the retina.

"Netrin-4 helps bundle axons in the retina together, enabling communication between the retina and the rest of the brain's visual apparatus," Dr. Brunken says. Perhaps most importantly, netrin-4 regulates the branching

membranes of molecules—we can use those pieces for drug development."

Dr. Brunken's investigations may also lead to a new way of treating vision loss from retinal defects. "Given that laminins and netrins are guidance molecules and stabilize synapses," Dr. Brunken explains, "we hope we can in-

**Dr. Brunken's investigations may also lead to a new way of treating vision loss from retinal defects. "The hope would be to fool neurons into thinking a silicon chip is a photoreceptor."**

of the retina's deepest capillaries. Understanding the basic functions of these proteins may lead to new treatments for a number of eye diseases, Dr. Brunken says. "If we can separate out the cell-binding domains—the parts that interact with receptors on cell

corporate them into a microchip-based neuroprosthesis that would promote a kind of synapse between the prosthesis and the retina. The hope would be to fool neurons into thinking a silicon chip is a photoreceptor." □

Reprinted from Downstate Research: Profiles In Innovation, 2008, an annual publication of the Office of Institutional Advancement & Philanthropy. Reprinted with publisher's permission.

# Doc Focuses on Seeing Glaucoma Clearly



## The specialist

Dr. John Danias, Professor of Ophthalmology and Cell Biology  
Co-Director, Glaucoma Service, SUNY Downstate Medical Center  
Director, Glaucoma Service, Long Island College Hospital

A glaucoma specialist for the past 10 years, SUNY Downstate's Dr. John Danias (formerly at Mount Sinai Medical Center) helps glaucoma patients with every part

of their care, including diagnosis, management and surgery.

## The big story

July is Glaucoma Awareness Month. So to spotlight the illness, we "check up" with Dr. Danias, who's been providing care to New York's own Governor Paterson since his angle closure attack in May.

## Who's at risk

Glaucoma is a disease that affects the optic nerve in the back of the eye, leading to loss of peripheral vision and sometimes the complete loss of vision. It is often associated with high pressure inside the eye.

There are two main forms of glaucoma, open angle glaucoma and closed angle glaucoma. "They're different diseases," says Danias. "They both damage the nerve at the back of the eye, but the pathology of the diseases is different." Open angle glaucoma is more insidious, and closed angle glaucoma is more dramatic in its presentation.

Nearsighted people have a higher risk of developing open angle glaucoma, while farsighted people are more likely to develop closed angle.

For both forms of glaucoma, age is one of the most important risk factors. The disease is almost always diagnosed in people after the age of 60. About 1% of the population aged between 50 and 65 has glaucoma; up to 5% of the total population of people in their 70s and older have glaucoma. Patients with diabetes are also at higher risk of developing glaucoma.

Genes play a big part in glaucoma—so much so that people with a family history of glaucoma are

10 times more likely to develop it themselves. Doctors are working hard to identify the genes that cause glaucoma. "It's a complex genetic inheritance," says Danias. "We know some of the genes that cause open angle glaucoma, but they only cause 2% to 3% of the overall cases."

## Signs and symptoms

Patients with angle closure glaucoma are at risk of pressure within their eyes increasing abruptly over a short period of time. "The wall of the eye actually becomes distended from all the pressure," says Danias. "Patients feel a lot of pain." The onset of angle closure glaucoma can occur over the course of minutes or hours. The pain can be severe enough to cause headaches, vomiting and blurry vision. Patients are usually aware that something is wrong, and that the source of the problem is in the eye.

Unfortunately, open angle glaucoma often doesn't show any symptoms until the disease is quite far advanced. "It's almost asymptomatic," says Danias, and "people go for years with the disease without noticing. Then they notice problems with their peripheral vision."

"Glaucoma is not something we know how to prevent," says Danias. "Glaucoma is a chronic disease. We don't have a cure but it's something we can control." If glaucoma is caught early enough, doctors can usually prevent vision loss, or at least slow down the process. Treatment usually consists of some combination of drops, laser surgery and open surgery.

The treatment for open angle glaucoma usually starts with medication in the form of drops. "This treatment is trying to lower the pressure inside the eye," explains Danias. "The lower the pressure inside the eye, the lower the chance of damage."

For patients who can't tolerate drops, there is the option of laser therapy, a 10- to 15-minute procedure done in the office. "The doctor uses the laser to stimulate the cells in the eye



Dr. John Danias recommends regular eye check-ups—and more as you move into your 60s.

that allow the fluid to get out of the eye," says Danias. The success rate is very high, about 80%.

For angle closure glaucoma, the primary treatment is called laser iridotomy, in which lasers are used to create a passageway for the exit of fluid from the eye. This procedure can be used preemptively for patients at risk of the disease, and has an extremely high success rate of 95%. In a small percentage of cases, when the disease is severe and laser iridotomy fails, the next step is an open surgery done manually by the doctor to open a new passageway.

## Research breakthroughs

At Downstate, Danias's lab has been investigating the role of inflammation in causing glaucoma. "Our work indicates that the immune system may be involved," says Danias. "There might be some sort of misregulation of what we call the innate immunity (a nonadaptive system that protects us from viruses and bacteria), that gets activated somehow in glaucoma and causes damage." Dr. Danias is now working on gene therapy as a potential new avenue of treatment for glaucoma.

## Questions for your doctor

A good first question to ask your doctor is "Do I have any of the risk factors for glaucoma?" While Danias spelled out the major risk factors, there are some others—like corneal thickness—that are more complicated and

that most patients won't be able to spot themselves.

If you have high intraocular pressure, ask your doctor how problematic it is: "Can you give me an estimate of what my risk for developing glaucoma is?" If your doctor thinks you are at higher risk, ask how often you should be screened.

## What you can do:

### Know your family history

Because glaucoma has a genetic component, if your relatives have suffered from the disease, your risk is 10 times higher. Ask about your family's history, and be prepared to explain it to your doctor.

### See a specialist

If you have any of the risk factors, then get the opinion of a glaucoma specialist. Check the American Academy of Ophthalmology website ([www.aao.org](http://www.aao.org)), which allows you to search for eye doctors by their subspecialty and your zip code.

### Get frequent checkups

Danias recommends that anyone over 40 get an eye exam every two or three years (more often if they're having problems). After 60, people should get checked every year. Screening consists of a general eye exam, the "eye puff" exam, and often drops to dilate the eyes so the doctor can see the back of the eye. "It's not a painful process," says Danias, "and the expense is covered by insurance."

### Know your numbers

Ask for a reading of your intraocular pressure, and keep a log yourself. It's just one number per visit, and Danias says the log "can be helpful if you're traveling around or you have to change doctors." □

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# An Eye Into Parkinson's Disease

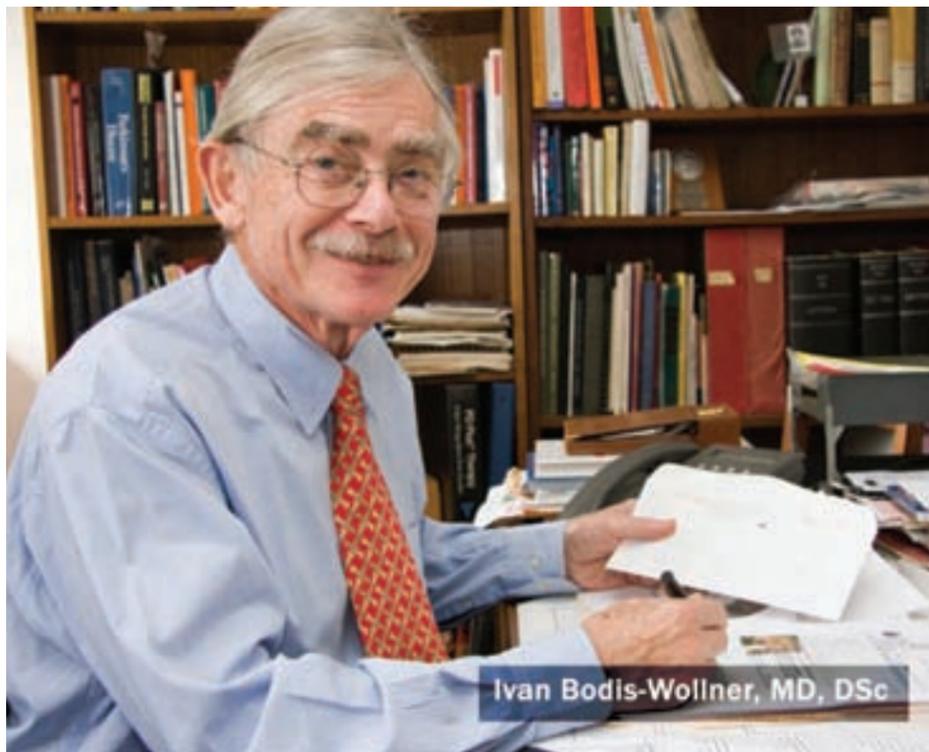
Like many illnesses affecting the nervous system, Parkinson's disease is difficult not only to treat but also to monitor.

New evidence suggests that the degenerative motor disorder begins in the peripheral nervous system and then works its way to the central nervous system—most importantly, to the brain. Once established there, this disease can cause a host of neurological problems: tremors, motor impairment, communications difficulties, and mental disturbances.

Visual problems were not thought to be part of Parkinson's disease, however. From the time the illness was first described in the early 1800s, until more than 150 years later, the loss of visual acuity and the difficulty in distinguishing contrast many Parkinson's patients experience were attributed to other causes, such as aging, cataracts and glaucoma.

But in the late 1970s, Ivan Bodis-Wollner, MD, DSc, professor of neurology and ophthalmology and director of University Hospital's Parkinson's Disease and Related Disorders Center, one of the National Parkinson Foundation's Centers of Excellence, showed that Parkinson's disease itself can have a negative impact on vision.

In 1978, using electrophysiology—brain-wave monitoring through externally applied electrodes—he was the first to document delayed visual processing in the brains of individuals with Parkinson's disease. Following that, he used the method again, this time discovering among Parkinson's patients deficits in contrast-sensitivity—



difficulty distinguishing an image from its background.

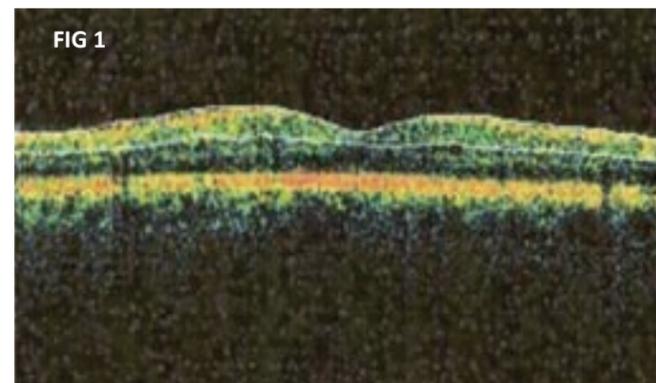
Importantly, as part of that research, he showed that vision changes in tandem with neurological functioning. “When a patient doesn't move well,” Dr. Bodis-Wollner explains, “he doesn't see well.”

Motor problems in Parkinson's disease are caused by the death of neurons that secrete and process an important neurotransmitter called dopamine. Dr. Bodis-Wollner's research established that the death of these neurons, called “dopaminergic” cells, is also responsible for Parkinson's-related visual problems. “With-

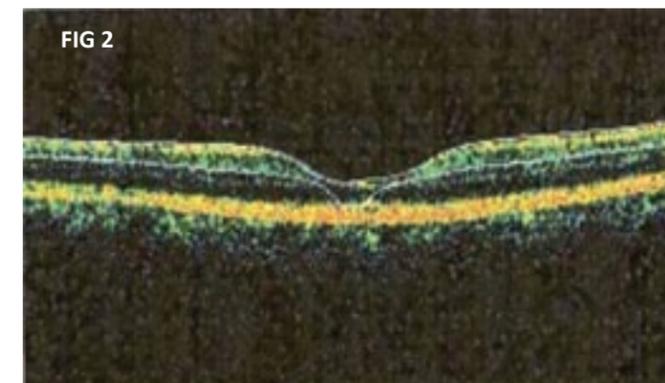
out dopaminergic cells, dopamine-sensitive cells are deprived of dopamine,” he notes, “and are no longer able to make very important decisions that relate to vision and to motor execution.”

In the late 1990s, intrigued by the role dopaminergic cells play in the vision of Parkinson's patients, Dr. Bodis-Wollner developed a quantitative description of the relationship between the retina's dopaminergic and dopamine-sensitive cells. A major advance in the Parkinson's disease field, the model has been used to predict the retina's response to new and existing Parkinson's treatments.

**“The ability to image the retina may revolutionize the process of evaluating and monitoring the neuronal changes that occur in Parkinson's disease.”**



**Fig 1.** The OCT of the retina of a healthy subject (46 years of age). The bottom of the picture represents the outer layers of the eye; the top, the inner layers. The dip, or “valley,” in the center is normal: retinal neurons are pushed to the side to allow light to penetrate to the outer layers, where photo-receptors are located.



**Fig 2.** The OCT of the retina of a Parkinson's disease patient (50 years of age). The valleys—top center—represent the loss of neurons in the inner retina, including the nerve cells which transmit visual information to the brain.

In the last several years, Dr. Bodis-Wollner has employed a new imaging technology called Optical Coherence Tomography (OCT) to detect microscopic changes in the retina. Says Dr. Bodis-Wollner, “the ability to image the retina may revolutionize the process of evaluating and monitoring the neuronal changes that occur in Parkinson's disease.”

Using OCT, he has been among the first to measure the retinas of individuals with Parkinson's disease. Often, they are 15 to 20 percent thinner than normal. “This loss may be a major reason why Parkinson's patients have trouble detecting contrast,” Dr. Bodis-Wollner says. “And we've learned that the area of the retina affected in Parkinson's may impair visual cognition,” the ability to respond to and categorize visual images.

Dr. Bodis-Wollner looks forward to furthering this research by acquiring the latest generation OCT equipment. “With these machines, we hope to be able to specify dopaminergic cells, in addition to measuring the retina's thickness,” he notes. Giving researchers access to cell counts could dramatically alter the course of clinical trials for new Parkinson's treatments.

Until recently, “investigators have had to rely on clinical observations and wait a minimum of 18 months to dis-

cover the impacts of potential neuro-protective treatments on the brain's dopaminergic pathways and, thus, on disease progression,” Dr. Bodis-Wollner explains. With the detailed counts of retinal dopaminergic cells and information on retinal thinning that advanced OCT equipment can provide, researchers may be able to assess much more quickly and accurately whether a new treatment has arrested neuronal

degeneration.

Dr. Bodis-Wollner notes, “OCT should be able to help quite a lot in our quest for neuroprotective agents—agents that can stop the dying-off of dopaminergic cells.” And with that, help stop the progression of Parkinson's disease itself. □



Dr. Bodis-Wollner with M. Asim Javaid, MD, postdoctoral research fellow, and Sofya L. Glazman, MD, coordinator, Parkinson's Disease and Related Disorders Center of Excellence of the National Parkinson's Foundation.

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# Decoding Diabetic Retinopathy

**B**etween 12,000 and 24,000 Americans go blind each year as a result of diabetic retinopathy.

Diabetic retinopathy usually develops over several years and has its origins in the body's poor control of blood sugar levels. At the onset, the tiny blood vessels in the retina begin to swell and leak. Next, some of these vessels close off. Then, as more of them are blocked, the retina sends molecular signals that initiate a frenzied formation of new and fragile blood vessels. In the advanced stages, called proliferative retinopathy, these weakened vessels invade the vitreous gel that fills the eye; when they leak, severe vision loss or blindness results.

To date, a high-tech vision-saving

technique called scatter laser surgery can, when administered early, improve the vision of people with diabetic retinopathy. But the procedure has limitations. Often, it can lead to the loss of peripheral vision, and, because new blood vessels continue to grow, the procedure must be repeated.

To develop better treatments for this vision-impairing disease, Brahim Chaqour, PhD, an assistant professor of anatomy and cell biology at SUNY Downstate, is decoding the molecular processes that underlie diabetic retinopathy. "My goal is to understand a number of mechanisms that affect blood vessel growth and degeneration," he says. These include the role of angiogenic factors, which lead to the proliferation of new blood vessel branches,

and the role of anti-angiogenic factors, which lead to the destruction of pre-existing blood vessels and the formation of new blood vessel branches.

"A better understanding at the molecular level will help us learn how to control the process, both in the early and later stages of the disease," he says.

Dr. Chaqour has made great progress towards this goal. He has identified a "small family of genes" that, in the presence of hyperglycemia (high blood sugar levels), plays a crucial role in all phases of diabetic retinopathy. Working in tissue culture and with laboratory animals, he has documented how these genes, normally active only during embryonic and fetal

development, initiate the weakening of healthy retinal blood vessels and promote the formation of new, leaky ones.

On a fundamental level, Dr. Chaqour is interested in the ways that cellular environment affects cell behavior. In the hyperglycemic milieu of the diabetic retina, the pericytes, the smooth muscle cells forming the outer layer of capillaries, begin to die. That process further deprives the retinal tissues of oxygen. Dr. Chaqour and his colleagues discovered that when this oxygen deprivation occurs, two long-dormant genes, CYR61 and CTGF, from the family Dr. Chaqour has identified begin to express themselves in the retina. Their proteins accumulate in the space surrounding blood vessel cells, further exacerbating pericyte death.

That's not the only role CYR61 and CTGF play in diabetic retinopathy. During the most advanced stage of diabetic retinopathy, their over-expression contributes to the uncontrolled proliferation of new, leaky blood vessels, Dr. Chaqour has concluded. "The proteins these genes express even cause blood vessels to grow into the eye's vitreous gel, which, under normal conditions, is completely free of blood vessels. There's no control mechanism in these newly activated genes that allows them to stop."

Dr. Chaqour's lab discovered that vasculogenesis, the creation of entirely new blood vessels from stem cells, is



Brahim Chaqour, PhD

promoted by the CYR61 protein as well. Until recently, scientists believed that angiogenesis—the branching off of new blood vessels from existing ones—was the only blood vessel-formation mechanism involved in the disease. In fact, "scientists believed

the process of vasculogenesis involved in diabetic retinopathy."

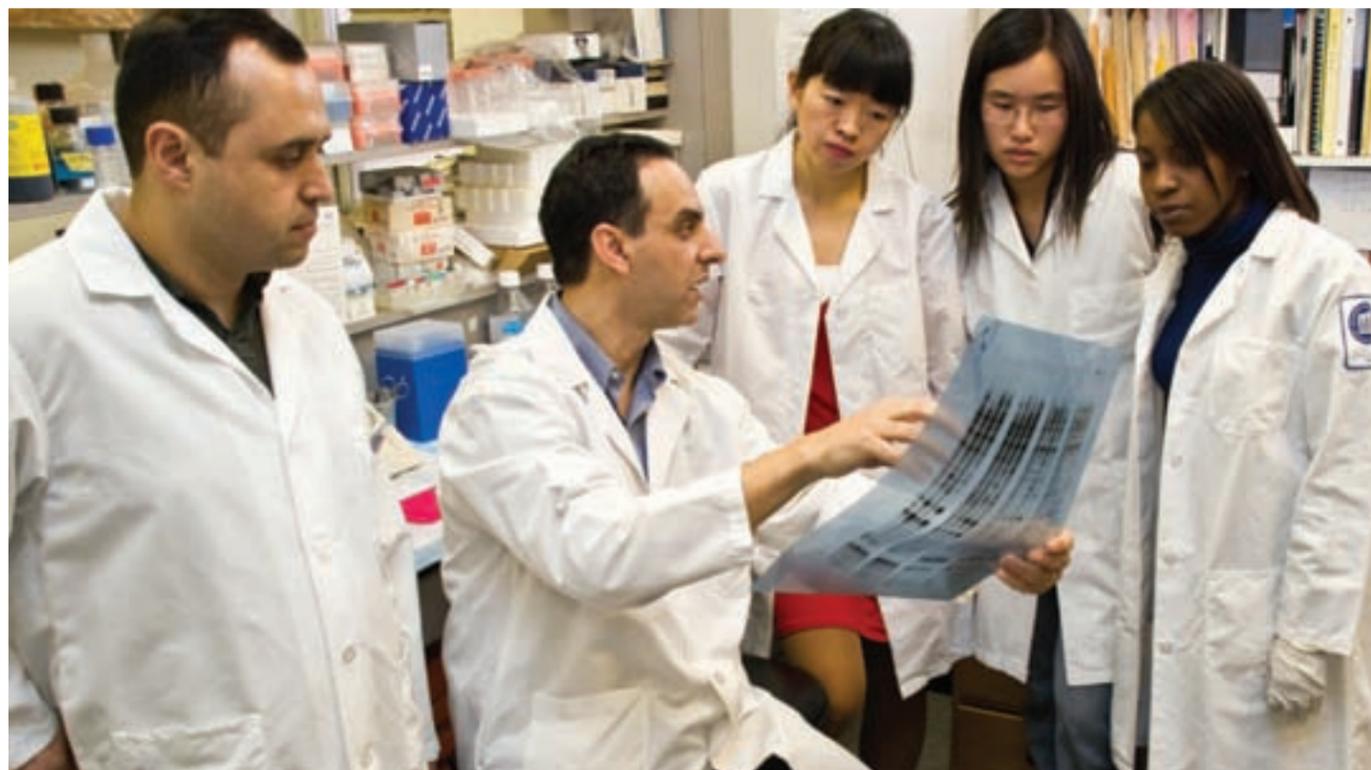
Another of his important discoveries is a protein called MMP-2. "In the normal retina," Dr. Chaqour explains, "there's almost no MMP-2. But in diabetic animals, CYR61 and CTGF induce expression of MMP-2." The protein destroys the extracellular matrix, the biological scaffolding that stabilizes and connects cells. "This further degrades the pericytes."

Dr. Chaqour is using these discoveries to develop pharmacological treatments that may derail diabetic retinopathy, even in the absence of tight blood sugar control. "We're trying," he says, "to put together recombinant peptides that will interrupt the growth of abnormal blood vessels and allow healthy retinal activity to occur." Already, Dr. Chaqour and his colleagues developed several compounds, still unnamed, that block the destruct-

## Dr. Chaqour has identified a "small family of genes," that in the presence of hyperglycemia, plays a critical role in all phases of diabetic retinopathy.

vasculogenesis took place only during embryonic development and then stopped altogether," he says. By exposing stem cells to CYR61 in tissue culture, Dr. Chaqour and his colleagues demonstrated "this protein promotes

tive action of MMP-2. "That's not enough to stop diabetic retinopathy, yet," Dr. Chaqour says. "But it's a start. One day, we may discover a pharmacological treatment that enables patients to avoid the current surgical one." □



Members of Dr. Chaqour's lab (from left to right): Jorge Espinoza, PhD student; Dr. Chaqour; Haibo Liu, PhD postdoctoral fellow; and Hunter College interns Michelle Lee and Tyesha Williams.

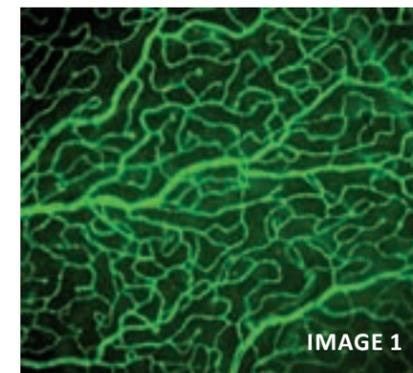


IMAGE 1

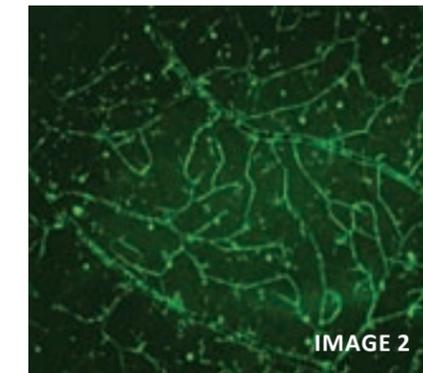


IMAGE 2

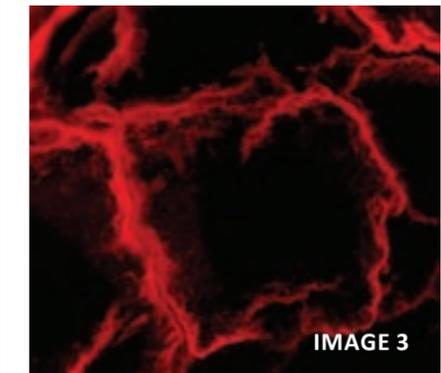


IMAGE 3

**Image 1:** A well-organized and functional network of blood vessels in the retina of an adult rat.

**Image 2:** A disorganized and dysfunctional network of blood vessels in the retina of an adult diabetic rat.

**Image 3:** An extensive degradation of blood vessels in the retina of a diabetic rat. Diabetes activates specific proteases responsible for the destruction of retinal vessels during diabetes.

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# Restraining Abnormal Blood Vessel Growth in the Retina

In the United States, almost 21 million people—7 percent of the population—are diabetic. Of these 21 million, an estimated 40 to 45 percent will eventually suffer from diabetic retinopathy, the leading cause of blindness among American adults.

Diabetic retinopathy has its origins in poor control of blood sugar levels. In the eye, high levels of circulating blood sugar, a condition called hyper-

glycemia, set off a years-long reaction that results in the formation of new, fragile blood vessels that grow along the retina and into the eye's clear vitreous gel. Ideally, people with diabetes can slow or even halt the advance of diabetic retinopathy by keeping their blood sugar levels under tight control. Such control, however, is difficult to achieve for the large majority of people with diabetes.

But what if unrestrained blood vessel growth, called proliferative retinopathy, could be kept in check with a recombinant molecule administered by injection or through eye drops?

That's the possibility being investigated by Gladys Teitelman, PhD, professor of anatomy and cell biology, and the two members of her lab, graduate student Jennifer Winkler and

research scientist Mamdouh Kedeas, PhD.

Dr. Teitelman is a diabetes researcher whose primary focus is the regeneration of insulin-producing B-cells in the pancreas. Yet she finds this new avenue of diabetes research and “the possibility that we might be able to intervene in diabetic retinopathy” compelling.

One promising focus involves proteins belonging to the CCN family, including connective tissue growth factor (CTGF), cystein-rich protein (CYR61), and nephroblastoma overexpressed gene (NOV), which play a role in new blood vessel formation and appear to be involved in the initiation of retinopathy's pathological changes.

Dr. Teitelman and her team are specifically focusing on the action of CTGF. “We're making progress in understanding how we might be able to interrupt its destructive action in the eye,” she says.

Under normal conditions, CTGF is involved in a host of healthy biological processes that include wound healing, cell division and nerve conduction. In the diabetic eye, however, its action

can be life altering.

“Because CTGF is involved in so many important biological processes, it's not a good target for a systemic therapy,” observes Ms. Winkler. “But the eye is encapsulated, which means we can block the action of CTGF in the eye without concern for the treatment's impact on the rest of the body.” Working first in tissue culture and then in diabetic laboratory rats, Dr. Teitelman and her team have developed recombinant molecules that bind to CTGF and prohibit its production. In their first experiment, the team used a bioengineered virus that reduced CTGF expression by 70 percent in cells in culture. Now, Dr. Teitelman's lab is using a small interfering RNA (siRNA) to accomplish the same task in laboratory rats with induced diabetes.

“One of siRNA's benefits is that it's very small — about a tenth the size of the virus we engineered,” says Dr. Kedeas. The smaller size means any treatment that involves siRNAs will be less likely to provoke immune or inflammatory responses.

Moreover, using siRNAs rather

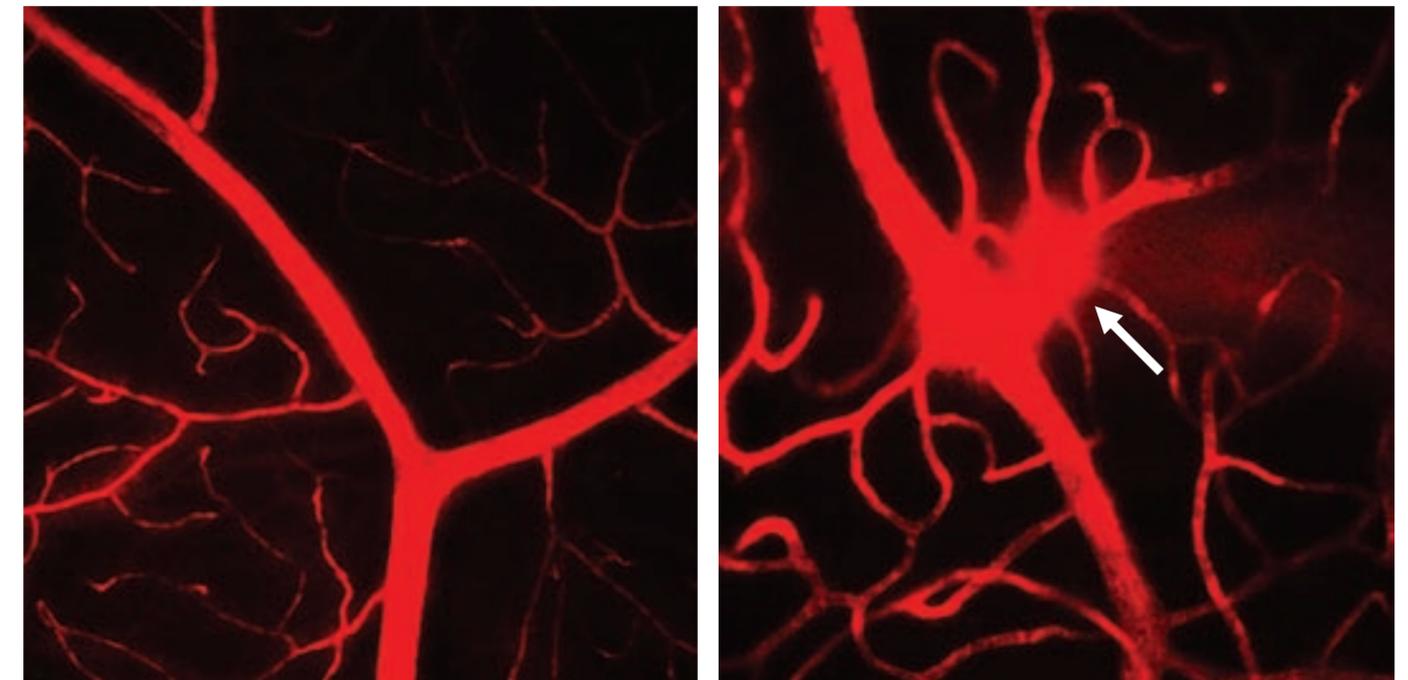
than viruses will facilitate a treatment's entrance into involved cells, since viruses enter cells through receptors on the cells' surfaces. During this process, viruses' relatively large size can hinder their entrance. “SiRNA, on the other hand,” Dr. Teitelman says, “is small enough to enter the cell simply through diffusion,” by the natural movement of molecules in the body.

Dr. Teitelman is hopeful the team's research will result in an effective treatment for what is becoming, in the United States and around the world, an increasingly common illness. “With the first sign of diabetic retinopathy—the presence of leaky blood vessels, for instance—we may be able to intervene and prevent further complications of the disease,” she explains.

Of course, Dr. Teitelman notes, “glycemic control is always important in preventing diabetic retinopathy. But given how hard that is to achieve, we must also pursue research that can lead to effective, minimally invasive treatments.” □



Dr. Gladys Teitelman and Jennifer Winkler, PhD student.



When blood vessels of the retina are infused with a red dye, leakage of the dye is found in the retinas of diabetic rats, but not in the retinas of rats with normal blood glucose levels. Arrow indicates area of leakage in the diabetic retina.

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# Glaucoma Implantation Started at Downstate in the 1970s



**Dr. Freedman helped pioneer the use of implantable devices for the treatment of glaucoma, and this remains a primary focus of his clinical practice and research.**

Dr. Jeffrey Freedman, an expert in glaucoma and corneal disease, and former director of the glaucoma subspecialty program, has played an important role in the Department of Ophthalmology. During an impressive career spanning almost four decades, Dr. Freedman has made a number of notable contributions in the field of ophthalmology.

## Molteno Glaucoma Implant

The Molteno Glaucoma Implant, which is the prototype of all long tube implants in use today, was first introduced into the United States by Dr. Freedman in 1975, and implanted into a patient at SUNY Downstate at that time. It was Dr. Freedman's work with the FDA that allowed for the subsequent use of glaucoma implants by other surgeons in the United States.

Dr. Freedman described the use of a patch graft over the long tube implants, which is now standard practice for these implants. This procedure was first done at SUNY Downstate by Dr. Freedman in 1985.

## Supra-Tenon's capsule placement of a single-plate Molteno implant

The supra-Tenons implantation of the Molteno implant was developed by Dr. Freedman and first published by him in the *British Journal of Ophthalmology* in 2007.

## EX-PRESS Glaucoma shunt implantation

The use of the Ex-PRESS shunt under a scleral flap was first performed in the USA by Dr. Freedman in 2003.

**Glaucoma implants have changed the way we manage complicated glaucoma cases.**

## Research

Dr. Freedman continues to teach part-time at University Hospital of Brooklyn while also conducting a private practice. His current research projects include studies to identify the most effective anti-fibrosis medications to improve outcomes following glaucoma surgery, as well as efforts to define factors contributing to the development of glaucoma in individuals who have undergone corneal transplantation.

**Dr. Freedman serves as chairperson of the Glaucoma Implant Session of the World Glaucoma Congress which occurs every two years.**

Dr. Freedman was the Chairperson for the Glaucoma Implant Session at the highly-acclaimed World Congress of Ophthalmology in Australia 2002, and was also invited to chair the session at the World Congress of Ophthalmology in Singapore in 2008 but had to decline due to health reasons.

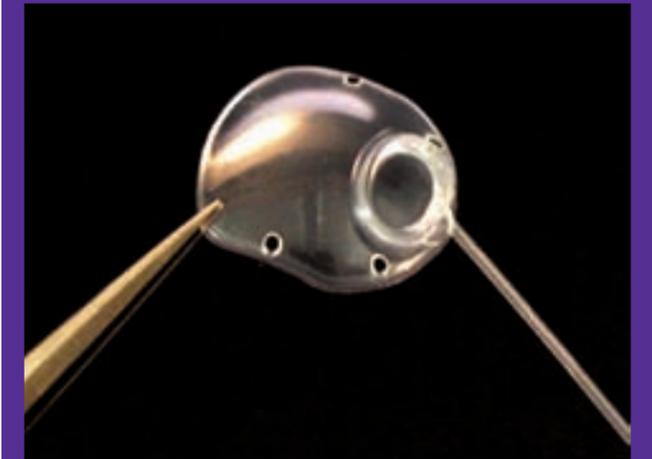
He was chairperson at the IGS (International Glaucoma Symposium), which is now the World Glaucoma Congress, in Prague 2001, Barcelona 2003, Cape Town 2005, Athens 2007, Singapore 2008, Boston 2009, and now in Paris 2011. He has had virtually the same faculty at all of these meetings.

**Implants now serve as part of the surgical armamentarium that the glaucoma surgeon can consider as a management option.**



Dr. Freedman has published over 70 articles in peer-reviewed journals. Following are some recent book chapters he has authored.

- 1) *Ophthalmic Surgery*, Fourth Edition, Spaeth 2010
- 2) *Management of Bleb Fibrosis. Glaucoma Complications*. AAO 2010
- 3) *Glaucoma Surgical Management*, Saunders 2009
- 4) "Drainage Implants" in *Ophthalmology*, Mosby. 3rd Ed 2009



Glaucoma implant devices offer a treatment option for advanced and complicated glaucoma. They are particularly well suited for uveitic glaucoma, failed trabeculectomy, neovascular glaucoma, and some selected primary glaucoma cases.

A new Molteno implant with Freedman modifications is currently in development and expected for use in late 2011 or early 2012.

# Recent Publications

**Case Report: Spontaneous Stenotrophomonas Maltophilia Keratitis in a Diabetic Patient.** Holifield K, Lazzaro DR. *Eye Contact Lens*. 2011. In Press.

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**Current Concepts in the Treatment of Retinitis Pigmentosa.** Musarella MA and MacDonald IM. *Journal Ophthalmology*. 2011, Article ID 75347, 8 pgs.

**Bone Invasion by Adenoid Cystic Carcinoma of the Lacrimal Gland: Preoperative Imaging Assessment and Surgical Considerations.** Michelle D. Williams, M.D., Nagham Al-Zubidi, M.D., J. Matthew Debnam, M.D., Roman Shinder, M.D., Franco DeMonte, M.D., and Bitá Esmaeli, M.D. *Ophthalm Plast Reconstr Surg*. 2010. Vol. 26, No. 6.

**Trypan Blue Capsulorhexis.** Smith EF, Desai RU, Schrier A, Enriquez B, Purewal BK. *Ophthalmology*. 2010 Jul;117(7):1462-1462.e1.

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**Intraoperative Floppy Iris Syndrome.** Panagis L, Basile M., Friedman AH, Danias J. *Arch Ophthalmology*. 2010;128(11):1437-1441.

**Journal of Ocular Pharmacology and Therapeutics (Can Intraocular Lenses Deliver Antibiotics Intracamerally?)** Shaw J, Smith EF, Desai RU, Enriquez B, and Schrier A. *J Ocul Pharmacol Ther*. 2010 Dec;26(6):587-9.

**What is New After 40 Years of Glaucoma Implants.** Freedman J. *J Glaucoma*. 2010 Oct-Nov;19(8):504-8.

**Morphologic Changes in the Outflow Pathways of Bovine Eyes Treated with Corticosteroids.** Tektas OY, Hammer CM, Danias J, Candia O, Gerometta R, Podos SM, Lutjen-Drecoll E. *Invest Ophthalmol Vis Sci*. 2010 Aug;51(8):4060-6. *Epub*. 2010 Mar 17.

**Repair of Limbal Dermoid With Excision and Placement of a Circumlimbal Pericardial Graft.** Douglas R. Lazzaro, M.D., and Rodney Coe, M.D. *Eye & Contact Lens*. Volume 36, July, 2010:228-229.

**Gene Expression Changes in Areas of Focal Loss of Retinal Ganglion Cells in the Retina of DBA/2J Mice.** Panagis L, Zhao X, Ge Y, Ren L, Mittag TW, Danias J. *Invest Ophthalmol Vis Sci*. 2010 Apr;51(4):2024-34.

**The Matricellular Protein Cysteine-Rich Protein 61 (CCN1/Cyr61) Enhances Physiological Adaptation of Retinal Vessels and Reduces Pathological Neovascularization Associated with Ischemic Retinopathy.** Hasan A, Pokeza N, Shaw L, Lee HS, Lazzaro D, Chintala H, Rosenbaum D, Grant MB, Chaqour B. *J Biol Chem*. 2011 Mar 18;286(11):9542-54. *Epub*. 2011 Jan 6.

**Survey of Orbital Tumors at a Comprehensive Cancer Center in the United States.** Roman Shinder, M.D., Nagham Al-Zubidi, M.D., Bitá Esmaeli, M.D. *Head & Neck*. March 2010, 1-7.

**Defective Formation of the Inner Limiting Membrane in Laminin B2 and Y3-Null Mice Produces Retinal Dysplasia.** Pinzón-Duarte G, Daly G, Li YN, Koch M, Brunken WJ. *Invest Ophthalmol Vis Sci*. 2010 Mar;51(3):1773-82.

**Repair of Necrotizing Scleritis in Ulcerative Colitis with Processed Pericardium and a Prokera Amniotic Membrane Graft.** Lazzaro DR. *Eye Contact Lens*. 2010 Jan;36(1):60-1.

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**Elevated Levels of Transforming Growth Factor B and Prostaglandin E2 in Aqueous Surgery for Glaucoma.** Jeffrey Freedman M.D., David Goddard. *Can J Ophthalmol*. 2008. Vol. 43, No.3.

# Our Faculty

## **Kichiemon Asoma, MD**

Clinical Assistant Professor of Ophthalmology

*Areas of Expertise:*

Cornea & Anterior Segment • Cataract Surgery • Corneal Transplantation • Refractive and LASIK Surgery • Comprehensive Ophthalmology

## **Ivan Bodis-Wollner, MD, DSc**

Professor of Neurology and Ophthalmology

Director, Parkinson's Disease Center of Excellence

*Areas of Expertise:*

Clinical Neurology • Clinical Neurophysiology • Movement Disorders • Parkinson's Disease

## **William J. Brunken, BS, PhD**

Director of Ophthalmic Research

Professor of Ophthalmology and Cell Biology

*Areas of Expertise:*

Retinal Angiogenesis • Extracellular Matrix • Laminins of the Eye

## **Brahim Chaqour, PhD**

Associate Professor of Cell Biology

*Areas of Expertise:*

Retinal Angiogenesis • ROP • CCN Proteins

## **John Danias, MD, PhD**

Professor of Ophthalmology and Cell Biology

Co-Director of the Glaucoma Service

Director, Glaucoma Service, LICH

*Areas of Expertise:*

Glaucoma • Glaucomatous Neurodegeneration • Gene Therapy

## **James A. Deutsch, MD**

Assistant Professor of Ophthalmology

*Areas of Expertise:*

Pediatric & Adult Strabismus • Pediatric Cataracts • Pediatric Eye Surgery • Amblyopia • Cataract Surgery

## **Monica Dweck, MD**

Assistant Professor of Ophthalmology

Director of Oculoplastics

Vice Chair & Program Director, Residency Program

*Areas of Expertise:*

Thyroid Ophthalmopathy • Orbital Wall Fractures • Orbital Tumors • Dry Eye • Lid Lacerations

## **Marcus S. Edelstein, MD, PhD**

Clinical Associate Professor of Ophthalmology

*Areas of Expertise:*

General Ophthalmology • Clinical Optics • Laser Theory Refractive Surgery • Ophthalmic Infections

## **Michael P. Ehrenhaus, MD**

Assistant Professor of Ophthalmology

Director, Cornea, External Disease & Refractive Surgery

*Areas of Expertise:*

Intralasek • Intacs • Cataract Surgery • Corneal Transplant Surgery • Anterior Segment Reconstruction

## **Jeffrey Freedman, MD, PhD**

Clinical Professor of Ophthalmology

*Areas of Expertise:*

Glaucoma • Corneal Disease • Implantable Devices for the Treatment of Glaucoma

## **Anthony Girardi, MD, FACS**

Clinical Assistant Professor of Ophthalmology

Director, Division of Ophthalmology, Coney Island Hospital

*Areas of Expertise:*

Comprehensive Ophthalmology • Sutureless Cataract Surgery • Intraocular Lens Implantation

## **Josh Glatman, MD**

Clinical Assistant Professor of Ophthalmology

*Areas of Expertise:*

Diagnosis and Management of Retinal and Vitreous Disorders • Advanced Vitreo-Retinal Surgery

## **Lekha Gopal, MD**

Clinical Assistant Professor of Ophthalmology

*Areas of Expertise:*

Comprehensive Ophthalmology • Neuro-Ophthalmology

## **Himani Goyal, MD**

Clinical Assistant Professor of Ophthalmology

*Areas of Expertise:*

Cornea & Anterior Segment • Cataract Surgery • Corneal Transplantation • Refractive and LASIK Surgery • Comprehensive Ophthalmology

## **Ashima V. Kumar, MD**

Assistant Professor of Ophthalmology

Director of Pediatric Ophthalmology & Strabismus

*Areas of Expertise:*

Pediatric Ophthalmology • Strabismus Surgery

## **Douglas R. Lazzaro, MD, FACS, FAAO**

Professor and Chair of Ophthalmology

Richard C. Troutman, MD, Distinguished Chair in Ophthalmology and Ophthalmic Microsurgery

Chief of Service: UHB, KCHC

*Areas of Expertise:*

Comprehensive Ophthalmology • Ophthalmic Surgery • Eye Surgery • LASIK Surgery • Corneal Transplants

## **E. Clifford Lazzaro, MD**

Associate Professor of Clinical Ophthalmology

Retired Chair of Ophthalmology, Lutheran Medical Center

*Areas of Expertise:*

Comprehensive Ophthalmology • External Disease • Neuro-Ophthalmology • Ocular Pathology • Optics

## **Howard Liu, MD**

Assistant Professor of Ophthalmology

Director Cornea, Kings County Hospital Center

*Areas of Expertise:*

Comprehensive Ophthalmology • Ophthalmic Surgery

## **Lois M. McNally, MD, FACS, FAAO, FCAP**

Associate Professor of Ophthalmology

*Areas of Expertise:*

Ophthalmic Pathology • Ocular Oncology

## **Maria Musarella, MD**

Professor of Ophthalmology

*Areas of Expertise:*

Pediatric Ophthalmology • Ocular Genetics

## **Kenneth Olumba, MD**

Clinical Assistant Professor of Ophthalmology

*Areas of Expertise:*

Diabetic Retinopathy • Retinal Detachment • Ocular Trauma • Macular Degeneration

## **Bradley Phillips, MD**

Assistant Professor of Ophthalmology

*Areas of Expertise:*

Neuro-Ophthalmology • Refractive Surgery • Small-Incision Cataract Surgery

## **Baljeet Purewal, MD**

Assistant Professor of Ophthalmology

*Areas of Expertise:*

Cosmetic Oculoplastics • Ophthalmic Plastic & Reconstructive Surgery

## **Shobit Rastogi, MD**

Assistant Professor of Ophthalmology

Co-Director, Glaucoma Service

*Areas of Expertise:*

Glaucoma • Cataracts • Comprehensive Ophthalmology

## **Frank Scalia, PhD**

Professor, Cell Biology and Ophthalmology

*Area of Expertise:*

Optic Nerve Regeneration

## **Wayne Scott, MD**

Assistant Professor of Ophthalmology

*Areas of Expertise:*

Advanced Glaucoma and Cataract Surgery • Management of All Forms of Glaucoma

## **Osher Sebwrow, MD**

Clinical Assistant Professor of Ophthalmology

Director, Division of Ophthalmology, Brookdale Hospital

*Areas of Expertise:*

Contact Lenses • Surface Ablation to Correct Refractive Errors

## **Roman Shinder, MD**

Assistant Professor of Ophthalmology

*Areas of Expertise:*

General Oculoplastics • Thyroid Ophthalmopathy • Orbital Wall Fractures • Orbital Tumors • Cosmetic Eye Surgery

## **Eric Shrier, DO**

Assistant Professor of Ophthalmology

Director, Retina Service

*Areas of Expertise:*

Diseases of the Posterior Segment (Vitreous, Retina and Macula)

## **Edward F. Smith, MD**

Clinical Associate Professor of Ophthalmology

Associate Chief of Ophthalmology & Director, Brooklyn VA

*Areas of Expertise:*

General Ophthalmology • Anterior Segment Surgery • Phacoemulsification for Cataracts • Pterygium

## **Arthur H. Wolintz, MD**

Former Chair and Distinguished Teaching Professor of Ophthalmology

Director, Neuro-Ophthalmology Service (Clinical Affiliates)

*Areas of Expertise:*

Optic Neuritis • GCA • Cranial Nerve Palsies • Headache



Dr. Ramanath Bhandari with Attending Baljeet Purewal, MD

Drs. William Brunken and Brahim Chaqour at ARVO 2010



Drs. Harry Flynn, Douglas Lazzaro and Joel Schuman at June 2010 Alumni Meeting at SUNY Downstate

Drs. Sara Ferri, E. Clifford Lazzaro and Baljeet Purewal



Dr. Sara Hanson in OR with Attending Dr. Kenneth Olumba



Dr. Douglas Lazzaro, Professor Eberhart Zrenner, MD, and Dr. William Brunken 2010 Pfizer Visiting Professorship Awarded to SUNY Downstate Department of Ophthalmology



Drs. Douglas Lazzaro and Monica Dweck with the 2011 Graduating Class



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