The reports are in! World Glaucoma Day (WGD) on March 6th was a resounding success – raising awareness and educating the public as well as professionals in the field through more than 1,000 events, programs and other activities in 59 countries on nearly every continent.

The global reach included 200 public screenings, 460 articles in the media, printed information distributed at 207 locations worldwide, over 150 educational events, including conferences for patients and professionals at hospitals, universities and public sites, and some very creative special activities.

On March 1st, a national holiday called Wadali Day, the Antigua & Barbuda Glaucoma Support Group spearheaded a “March for Sight” to officially launch the island’s month-long observance that included media and public screenings and concluded with the issuance of a commemorative WGD stamp. The March was led by members of the local Lion’s Club; the Prime Minister of Antigua not only joined in, but held the lead banner. Many organizations and individuals participated, including 100 Boy Scouts.

To raise awareness, the Israel Glaucoma Group produced a special rubber stamp that was sent to thousands of stamp collectors in Israel and beyond. Most importantly, on WGD, the stamp was used on thousands of letters and packages sent from the main post office in Tel Aviv.

From March 6th to 12th, a special bus, equipped to conduct glaucoma screenings, traveled to 11 French cities throughout the country – Paris, Strasbourg, Toulouse, Lyon, Grenoble, Nice, Clermont-Ferrand, Bordeaux, Nantes, Brest and Lille. This 4th annual “Tour de France,” sponsored by The French Glaucoma Society and others, is part of a national glaucoma information and free screening campaign called “Preserve Your Sight.”

There were also posters on view at over 800 optician stores throughout the United Kingdom as well as a WGD screening at the House of Commons, badges declaring “Stop Glaucoma” in Croatia, a charity regatta to benefit glaucoma in New Zealand – and the list goes on...and on!
Dear Friends:

“Connectivity” seems a very appropriate word when talking about the world glaucoma community in 2008. Increasingly, there is a shared realization that raising awareness about glaucoma, and finding new treatments and ultimately a cure, require a global effort with strong links among many partners. I’m delighted that The Glaucoma Foundation has been involved on many fronts.

As you will read in a brief wrap-up, the first World Glaucoma Day in March was observed throughout the world, with more than 1,000 events and programs in countries as distant as Argentina and Uzbekistan. One month later, TGF provided support for a researcher from Ghana – with a special interest in glaucoma in his home locale - to attend the annual U.S. meeting of The Association for Research in Vision in Ophthalmology (ARVO). And in June, I had the opportunity to speak about glaucoma patient care in Hong Kong, first at a symposium held at the University of Hong Kong and a few days later at the 2008 World Ophthalmology Congress.

At home in New York, we are busy planning our 15th International Think Tank on Optic Nerve Rescue and Restoration, our annual interdisciplinary gathering of scientists scheduled for September. This year’s attendees will continue the Think Tank’s recent focus on applications of micro and nanotechnology to major unsolved problems in glaucoma. The specific theme this year is the “Current Status of Translational Nanomedicine and Tissue Bioengineering in the Eye,” which refers to the attempt to more directly connect basic research to therapies for patient care.

Providing a real service to glaucoma patients of all ages is the primary goal of this newsletter. Your replies to our recent reader survey highlight the fact that large numbers of our “Eye to Eye” readers are glaucoma patients. In this issue you will find helpful information about some of the glaucoma medications currently in wide use.

The Glaucoma Foundation has a broad and loyal base and we want you to know that we value the participation of each and every one of you. We hope we can count on your continued support of our efforts to defeat this vision-threatening disease.

Sincerely,

Scott R. Christensen
President
Chief Executive Officer
Doctor, I Have a Question.

Questions answered by:
Philip P. Chen, MD
Professor, Ophthalmology
Chief of Ophthalmology
University of Washington Medical Center

In this issue’s “Doctor, I Have a Question” feature, the questions are answered by Philip P. Chen, MD Dr. Chen is one of the esteemed members of TGF’s Medical Advisory Board (MAB), the group of noted experts that keeps The Foundation abreast of all medical advances to ensure that educational, informational and outreach programs are current, accurate and responsive to patient needs. You’ll meet other MAB members as we share their expertise in future issues. – James C. Tsai, MD Chair, Medical Advisory Board

What type of doctor should I see about glaucoma?
Optometrists (ODs), ophthalmologists (MDs) and glaucoma specialists are all qualified eye care professionals who can provide comprehensive eye examinations.

Optometrists can examine the eye to diagnose and treat vision problems and abnormalities through non-surgical means, and prescribe glasses, contact lenses and some types of medications.

Ophthalmologists have received graduate training in a medical school and then specialized in the medical and surgical treatment of eye diseases and injuries. They see patients for routine eye care, do eye examinations, prescribe medications and perform eye surgery.

Glaucoma Specialists are ophthalmologists who have completed additional post residency fellowship training specific to glaucoma, including surgical care of complex glaucoma problems.

What are some common mistakes patients make in taking their medications?
Not using medications correctly, also known as non-compliance with treatment, is the biggest mistake. A very new survey from Canada just found that half of glaucoma patients do not use their medications properly because of either noncompliance or improper administration techniques. Such findings are not unique to Canada. It is crucial for patients to take their medications exactly as prescribed. Patients should also know their own medical history. For instance, if you once had laser surgery, or if you tried a specific eye drop in the past that didn't work, it's good to keep a brief journal and a log of the medications.

Be informed. Talk to your doctor. Make sure you understand why you need to take your medications and what they are doing for you. Write down your medication routine, including the drug name (generic and brand name), time to use, frequency, and dosage. And remember to take this info with you when you are traveling away from your home.

Are there any new eye drops on the horizon?
There may be additional combination eye drops that could be coming soon. Fixed combination medications simplify the regimen for some patients and may improve compliance. But this is taking time, as they are expensive to develop and to test. In addition, the FDA requires that combination agents have to be shown to work better than the two components agents taken separately and that's a difficult thing to prove. New medications that can be taken once a day would be welcome.
**Eye Drops**

Since eye drops are absorbed into the bloodstream, tell your doctor about all other medications you are currently taking. Almost all eye drops may cause an uncomfortable burning or stinging sensation at first, but this discomfort should last for only a few seconds. Some of the most widely used classes of eye drops are:

**Class of Drug: Prostaglandin Analogs**

This is the newest class of drug and acts differently from other glaucoma drops. IOP is lowered by the drug opening up a new pathway by which fluid flows out of the eye. The drug needs to be taken only once a day.

Generic and Brand Names:  
- Bimatoprost (Lumigan®)  
- Latanoprost (Xalatan®)  
- Travaprost (Travatan® and Travatan Z®)

Possible Side Effects: May cause redness of the eyes. With long term use, may darken the color of the iris (for example, from green to brown), as well as the skin around the eyes. May also cause eye lashes to grow darker, longer and thicker. Used with caution in patients with active inflammation of the eye.

**Class of Drug: Beta-Blockers**

Decreases production of intraocular fluid.

Generic and Brand Names:  
- Betaxolol (Betoptic® S), Carteolol (Ocupress®)  
- Levobunolol (Betagan®)  
- Timolol Maleate (Timoptic®) or (Istalol®)

Possible Side Effects: May worsen pulmonary disease, cause difficulty breathing, slow the pulse, lower blood pressure and heart rate, cause dizziness, fatigue, hallucination, insomnia, memory loss and difficulty with strenuous exercise. You should advise your doctor if you have asthma, emphysema, chronic obstructive pulmonary disease or other lung or heart diseases before starting this class of medicine. Rare side effects can include impotence, depression, hair loss, reduced libido. Note: Specific beta-1-blockers, such as betaxolol, are safer for patients who suffer from pulmonary diseases.

**Class of Drug: Alpha-2 Adrenergic Agonists**

Generic and Brand Name:  
- Apraclonidine (Iopidine®)

This drug is used at the time of laser treatment to prevent a sudden rise in IOP.

Generic and Brand Names:  
- Brimonidine (Alphagan®) (Alphagan® P)

Is a highly selective alpha-2 adrenoceptor agonist. Reduces aqueous humor production and increases drainage of intraocular fluid.

Note: Brimonidine should be avoided in infants and young children since the drug may cause excessive drowsiness and lethargy in these patients.

Possible Side Effects: May produce allergic reactions and itching in the eyes.

Advise your doctor if you are currently taking monoamine oxidase inhibitors or tricyclic antidepressants.

**Class of Drug: Miotics**

4
This class of drug helps open the eye’s drain and increases the rate of fluid flowing out of the eye.

Generic and Brand Names:  
Pilocarpine (Isoptocarpine®, Pilocar®)

Possible Side Effects: May cause pain around/inside the eye or a brow ache for the first few days of use. Blurred vision and extreme nearsightedness are most common in younger patients. As miotics reduce pupil size and prevent normal dilation, dim vision, especially at night or in dark rooms, may occur. Stuffy nose, sweating, increased salivation, and occasional gastrointestinal problems may occur with stronger miotics.

Class of Drug: Carbonic Anhydrase Inhibitors  
Decreases production of intraocular fluid.

Generic and Brand Names:  
Brinzolamide (Azopt®),  
Dorzolamide (Trusopt®)

Possible Side Effects: May cause burning and/or stinging of eyes and change in taste. Also may have side effects similar to those of the pills (see below) but with much lower frequency and severity.

Class of Drug: Sympathomimetic Nonselective  
Decreases the rate of aqueous humor production and increases its outflow.

Generic and Brand Name:  
Dipivefrin hydrochloride (Propine®)

Possible Side Effects: May cause redness, burning, stinging, blurred vision. Also, increased heart rate and palpitations.

Class of Drug: Fixed Combination Glaucoma Drugs  
Decreases production of intraocular fluid. Because many patients require more than one type of medication to control IOP, a few companies have produced combination drops that include two different medicines in the same bottle.

Generic and Brand Names:  
Brimonidine Tartrate & Timolol Maleate (Combigan™)  
Dorzolamide HC1 & Timolol Maleate (Cosopt®)

Possible Side Effects: Side effects of Combigan™ include the symptoms of alpha agonists and beta-blockers. Side effects of Cosopt® include the symptoms of carbonic anhydrase inhibitors and beta-blockers. May include burning and/or stinging of the eyes and changes in sense of taste.

Pills  
Sometimes, when eye drops don’t sufficiently control IOP, pills may be prescribed in addition to drops. These pills, which have more systemic side effects than drops, also serve to turn down the eye’s faucet and lessen the production of fluid. They are usually taken from two to four times daily. It is important to share this information with all your other doctors so they can prescribe medications for you which will not cause potentially dangerous interactions. The following are some commonly prescribed carbonic anhydrase inhibitors and their more common side effects.

Class of Drug: Carbonic Anhydrase Inhibitors  
Generic and Brand Names:  
Acetazolamide (Diamox®),  
Methazolamide (Neptazane®)

Pills will reduce fluid flow into the eye. These should be taken with meals or milk to reduce side effects. Bananas or apple juice should be added to the diet to minimize potassium loss.

Possible Side Effects: Frequent urination, tingling sensation in the fingers and toes. These symptoms often disappear after a few days. Kidney stones may occur. A rare but serious side effect is aplastic anemia. Rashes are not uncommon. Potassium loss may occur when these drugs are taken with digitalis, steroids, or chlorothiazide diuretics. Depression, fatigue, and lethargy are common. Other side effects include gastrointestinal upset, metallic taste to carbonated beverages, impotence, and weight loss.
Staying Fit is Good For Your Eyes

Exercise could provide an extra bonus if you are one of the 3 million Americans who have glaucoma, or among the many millions more who are at risk for developing the disease.

While the mainstay of glaucoma therapy remains lowering intraocular pressure (IOP) with medication, laser treatment or surgery, there is some evidence that a regular aerobic program can help support your medical therapy.

Numerous studies have looked at different types of dynamic aerobic exercise – bicycling, brisk walking, marathon running, jogging, swimming, gym conditioning – and determined that when exercise is intense, IOP falls substantially. The degree and duration of pressure reduction differs from study to study depending on the intensity and time span of the exercise. And the benefit continues only as long as you continue exercising. But even if you have been sedentary, simply going for a walk three or more times a week is a good start.

A few words of caution. Exercises in which you stand on your head or shoulders or invert your body – as in upside down yoga positions, scuba diving and bungee jumping – should be avoided as they can raise IOP. Exercises in which you inhale and then hold your breath – such as weightlifting – appear to have a negative impact on IOP as well.

Also, some forms of glaucoma (such as closed angle) are not responsive to the effects of exercise and other types of the disease (such as pigmentary glaucoma) may develop a temporary increase in IOP after vigorous exercise. The bottom line: always check with your ophthalmologist and your general physician before starting any new exercise regime!

A final note: while drinking plenty of fluid is important before, during and after exercising, drink fluids slowly. Drinking a quart of water within 15 to 30 minutes can cause a rise in IOP. Use common sense as to how fast it goes down!

TGF to Honor New York Governor

New York Governor David Paterson will be honored by The Glaucoma Foundation as the 2008 recipient of the Kitty Carlisle Hart Award of Merit for Lifetime Achievement. The award will be presented to Governor Paterson at TGF’s Black and White Ball on December 3.

Paterson, who is legally blind, was diagnosed with acute glaucoma in his left eye on May 20th, after admitting himself to Mount Sinai Medical Center in New York City, complaining of what his office called “migraine-like symptoms.” Acute angle closure glaucoma is an emergency situation in which the passageway that normally allowed fluids to drain freely from the eye suddenly becomes completely blocked. The condition is extremely painful and is a medical emergency. The governor underwent a surgical procedure called laser iridotomy the same day to relieve pressure in that eye.

Governor Paterson’s attack was in his left eye, in which he has been legally blind since infancy, the result of an ear infection that spread to his optic nerve. On May 23rd, Governor Paterson underwent a second laser iridotomy, this time on his right eye, which has very limited vision.
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Yes, I support The Glaucoma Foundation’s work in pursuit of new treatments and cures for glaucoma. Enclosed is my tax-deductible gift of:

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Research Grants

Spring 2008

TGF has approved the funding of five new innovative research projects that focus on better understanding several types of glaucoma.

Tom Glaser, MD, PhD
Associate Professor, Internal Medicine
University of Michigan Medical School, Ann Arbor

ATOH7 (Math5) Mutations in Optic Nerve Aplasia

Retinal ganglion cell (RGC) neurons and their axons in the optic nerve are the targets of glaucoma disease pathology. This project studies ATOH7, a major gene discovered by the project team that controls the first step in the formation of RGCs from embryonic retinal stem cells. The project explores how mutations, identified within or near ATOH7, cause congenital absence of the optic nerve in two families. In one, they will compare the molecular properties of normal and mutant ATOH7 protein products. In the other, they will find the exact DNA change that causes this disease by high-resolution genomic analysis. Complementary studies will test whether halving the ATOH7 gene dosage affects the number of optic nerve axons. The results should help to guide future studies on RGC regeneration and optic nerve disease.

Vincent Raymond, MD, PhD
Professor, Departments of Ophthalmology and Anatomy-Physiology
Université Laval Hospital Research Center, Quebec City, Canada

Characterization of Modifiers for Open-Angle Glaucoma by Candidate Gene Screening and Genome Wide Linkage Study Neuroprotection

Genetic factors play a major role in the etiology of glaucoma. Fourteen chromosomal regions encode genes for primary open-angle glaucoma (POAG), the most common form of glaucoma, but only three of these genes have been identified: myocilin, optineurin and WDR36. The surprising occurrence of older individuals with healthy vision, despite the fact that they are carriers of myocilin mutations, raises the possibility that “good” genes, named protective modifier genes, maintain healthy vision by counteracting the effects of “bad” genes. The investigators recently found evidence for at least one of these modifier genes in the world’s largest known glaucoma family. The goal of this study is to discover these modifier genes. Their identification should offer novel and powerful approaches for discovering drugs to treat and perhaps prevent glaucoma.

Michal Schwartz, PhD
Professor of Neuroimmunology, Department of Neurobiology
Weizmann Institute of Science, Rehovot, Israel

Searching for a Molecular Mechanism to Awaken Dormant Retinal Stem Cells: A Therapeutic Approach to Glaucoma

While treatments are available to lower pressure in the eye, and thereby prevent continued damage from glaucoma, there is currently no cure for glaucoma nor any therapy capable of inducing cell renewal in the damaged tissue. Stem cells, which can differentiate to form numerous cell types, might be used to replace nerve cells in the retina that have been lost to glaucoma. Stem cells exist in the human eye but are dormant. Dr. Schwartz will explore the reasons why ocular stem cells are unable to divide...
Research Grants continued

and form new nerve cells, and to use this information as a basis for therapy aimed at awakening these stem cells in order to circumvent the need for donor stem cells.

David W. Sretavan, MD, PhD
Professor of Ophthalmology,
University of California San Francisco

Micro & Nanotechnology-Based Bioplatforms for High-Throughput Analysis of Axon-Glial Interactions in Glaucomatous Neuropathy

Better understanding of the causes of damage to the axons of retinal ganglion cells should lead to improved treatment of glaucoma. This project will develop a new type of highly versatile microplatform for glaucoma research that incorporates advances in micro and nanotechnology to provide researchers with unprecedented control over key experimental parameters. With this bioplatform, researchers will be able to conduct high-throughput experimentation simultaneously on a hundred axons, providing the amount of data that currently might require several dozen rounds of experimentation. This project will fabricate and test this new generation of micro/nano research bioplatforms with the ultimate aim of using these devices to analyze cellular communication between retinal axons and glial cells.

Xianjun Zhu, PhD
Research Scientist,
The Jackson Laboratory, Bar Harbor, ME

Characterizing Microglial Activation in a Mouse Model of Glaucoma

Mice provide valuable models for molecular and mechanistic studies of glaucoma pathogenesis and for the rational development of neuroprotective therapy. DBA/2J mice provide an inherited glaucoma model that accurately reproduces many hallmarks of human glaucoma. Microglia are cells that appear to play an important role in glaucoma. However, their role is not clearly defined. This project aims at determining how the expression of various microglial genes change during DBA/2J glaucoma and to assess the relationship of these changes to glaucomatous damage. The researchers will also assess the role of a microglial enzyme in DBA/2J glaucoma. This will be one of the first experiments to functionally test the role of a specific microglial molecule in glaucoma.

2008 Young Clinician Scientist Grant

In addition to the five researchers receiving grants under TGF’s Grants-in-Aid program, Pradeep Y. Ramulu, MD, PhD, has been named this year’s recipient of The Glaucoma Foundation supported Young Clinician Scientist Grant, a one-year grant awarded by the American Glaucoma Society with TGF funds. Dr. Ramulu is Assistant Professor of Ophthalmology at the Wilmer Eye Institute, John Hopkins University, in Baltimore.

He is investigating “Reading Impairment in Subjects with Bilateral Glaucoma.” As Dr. Ramulu explains, “The impact of glaucoma on task performance has mainly been defined through questionnaire-based research. Here, we propose to evaluate whether reading is impaired through direct measures of reading performance. The outcomes of this work will help answer whether glaucoma impairs reading ability, and if so, what type/amount of field loss is required for impairment, and under what conditions impairment first manifests.”
TGF Appoints New Scientific Advisory Board Member

John W. Grunden, Pharm.D., Senior Director/Global Medical Team Leader, Ophthalmology, within the Pfizer Global Medical Organization in New York City, has joined TGF’s Scientific Advisory Board. At Pfizer, he is responsible for U.S. and global glaucoma medical activities, including the conduct of clinical trials, investigator-initiated research grants, strategic planning, and interactions with global regulatory agencies. Prior to his appointment at Pfizer in 2003, Dr. Grunden worked in global medical affairs at Pharmacia, where he supported the ophthalmology franchise. He has also held numerous academic appointments.

He received his Doctor of Pharmacy degree from the University of Utah. Dr. Grunden completed a specialized residency in drug information with emphasis on study design and literature evaluation from University Hospital and Clinics in Salt Lake City. There he received the Upjohn Pharmacy Research Award, the Pfizer Pharmaceuticals Excellence in Pharmacy Award, and the Facts and Comparisons Award for Drug Information.

In addition to shaping TGF’s scientific message to the public, members of the Scientific Advisory Board often serve on the committee that reviews research applications and makes recommendations to The Foundation’s Board for funding approval.