What Is Secondary Glaucoma?
How Medications, Diseases, and Trauma Can Affect Your Eyes

While primary open-angle glaucoma has no secondary cause that can be identified, all types of secondary glaucoma are the result of specific medical conditions in the eye or the body. Either one or both eyes can be affected. Secondary glaucoma can also be divided into open-angle and closed-angle types.

Secondary open-angle glaucomas include: steroid-induced, pigmentary, pseudoxfoliation, and glaucoma associated with inflammation or eye trauma. These conditions may be caused by either the use of steroids (which may be necessary for treatment of another condition), material deposits from the iris or other parts of the eye into the eye’s drainage system, injury to the eye, or inflammation from other conditions.

Secondary angle-closure glaucomas occur when the eye’s angle (the angle between the iris, which makes up the colored part of your eye, and the cornea, which is the clear window front part of your eye) is narrow or closed by an identifiable cause such as:

- abnormal blood vessel growth (neovascular glaucoma)
- drug-induced secondary angle-closure glaucoma
- lens-induced secondary angle-closure glaucoma
- abnormal endothelial cells (iridocorneal endothelial syndromes, or ICE), or
- uveitic glaucoma

These and other rarer forms of secondary angle-closure glaucomas may occur for a variety of reasons, including in patients with diabetic retinopathy. While secondary glaucomas are often treated similarly to primary open-angle glaucoma (with eye drops, laser, or surgery), the underlying cause of the secondary glaucoma may also require treatment.
President’s Corner

Whether you have received a glaucoma diagnosis yourself or are providing support to a friend or loved one, I hope you’ll find the articles in this issue of National Glaucoma Research Report informative and reassuring. It’s your generous support that drives this groundbreaking research and gives all of us hope for a future without glaucoma. For that I’m very grateful.

Researchers around the globe are working tirelessly to find better ways to diagnose, treat, and eventually stop glaucoma. But we can all do our part by being vigilant about our eye health. Remember to protect your eyes outside by wearing sunglasses that block 99 to 100 percent of both UVA and UVB rays. And be sure to have regularly scheduled comprehensive, dilated eye exams as directed by your doctor.

In addition, I hope you’ll also consider helping researchers in the fight against glaucoma by participating in a clinical trial. Trials are taking place across the country and you can learn more by visiting brightfocus.org/clinical-trials.

Thank you again for your support!

Stacy Pagos Haller
President

SPOTLIGHT ON …
Ethan Rossi, PhD

Dr. Ethan Rossi’s interest in vision science was sparked as an undergraduate when he took his first course that covered the senses and how we interpret them. In the years since, he has devoted his efforts to developing and refining advanced optical technologies to the study of human diseases. He’s hopeful that these new tools will play a key role in vision restoration and early detection to prevent vision loss from occurring at all.

Dr. Rossi’s team recently devised a way to see a type of nerve cell in the eye that is nearly transparent and that has proven very difficult to see with existing imaging. Thanks to support from a National Glaucoma Research grant, his team has been able to continue improving an imaging tool and is developing a new one that can look at these cells for the first time in people with glaucoma. This will allow doctors to see the earliest changes to these cells, track how they change over time, and monitor their response to treatments. By detecting these first changes, a long window of opportunity for treatments may be created and could prevent vision loss for countless patients in the future.

Dr. Ethan Rossi

Research conducted today could prevent vision loss from glaucoma for future generations.
Volunteers Supporting Stanford Clinical Trial to Save Sight

Volunteers in a Stanford University clinical trial, supported by National Glaucoma Research, a BrightFocus Foundation program, are helping to evaluate a new device designed to enhance vision lost to glaucoma. Directed by Jeffrey Goldberg, MD, PhD, chair of ophthalmology and director of Stanford’s Byers Eye Institute, the project follows volunteers for two years and studies how a tiny capsule implanted in the eye affects a patient’s sight by releasing proteins to help stimulate optic nerve growth.

According to Goldberg, “Clinical trials are critical to advance science and develop new vision therapies. Decades of careful research and exciting breakthroughs in the laboratories have led to a number of excellent drug candidates that have the potential to protect or restore vision.”

To receive a free copy of “Clinical Trials: Your Questions Answered,” from National Glaucoma Research and learn how you can participate in clinical research, call 855-345-6647 or visit brightfocus.org/GlaucomaTrials.

This is the latest in a series of articles promoting awareness of clinical trials that is supported in part by an educational sponsorship from Biogen. BrightFocus is solely responsible for the content of this article.

To learn more about clinical trials in your area, please visit brightfocus.org/clinical-trials.

Laser Procedures for Glaucoma

Eye pressure is the major risk factor in the development of optic nerve damage from glaucoma and is the only factor that doctors can currently treat. Laser procedures are used primarily to reduce the intraocular pressure to a safe level that will prevent or at least slow the eye nerve damage. Either medications or laser surgery can be used as “first-line” treatment.

Surgical techniques include delicate laser or microscopic incisional methods. Generally, laser methods are tried before incisional surgery, although sometimes laser surgery is not appropriate for the condition or is not likely to bring the eye pressure low enough.

Microscopic incisional methods include trabeculectomy with mitomycin C or 5-flourouracil application, glaucoma drainage device (or tube) implantation, cyclophotocoagulation, and ExPRESS microshunt implantation. In addition, there are newer, minimally invasive glaucoma surgeries such as the Trabectome, iStent, Cypass, or Xen implant that are combined with cataract surgery. These procedures are likely safer than traditional surgeries, but often do not lower the eye pressure enough for moderate to advanced glaucoma.

Selective laser trabeculoplasty (SLT) is a recent advance and uses a laser that does not burn, but rather vaporizes the pigment that may be affecting the cells in the drainage system. Since there are no burns, this laser technique can be repeated if necessary. This in-office procedure does not require hospitalization and has a 60-70 percent success rate in lowering the eye pressure by 20 percent. For many patients, this is an ideal procedure as it can either eliminate the need for eye drops or reduce the number of eye drops. But, it is important to remember that the laser procedure is not a “cure.” A discussion with your ophthalmologist will help you decide which procedure is best for you.

Laser Procedures for Glaucoma

Eye pressure is the major risk factor in the development of optic nerve damage from glaucoma and is the only factor that doctors can currently treat. Laser procedures are used primarily to reduce the intraocular pressure to a safe level that will prevent or at least slow the eye nerve damage. Either medications or laser surgery can be used as “first-line” treatment.

Surgical techniques include delicate laser or microscopic incisional methods. Generally, laser methods are tried before incisional surgery, although sometimes laser surgery is not appropriate for the condition or is not likely to bring the eye pressure low enough.

Microscopic incisional methods include trabeculectomy with mitomycin C or 5-flourouracil application, glaucoma drainage device (or tube) implantation, cyclophotocoagulation, and ExPRESS microshunt implantation. In addition, there are newer, minimally invasive glaucoma surgeries such as the Trabectome, iStent, Cypass, or Xen implant that are combined with cataract surgery. These procedures are likely safer than traditional surgeries, but often do not lower the eye pressure enough for moderate to advanced glaucoma.

Selective laser trabeculoplasty (SLT) is a recent advance and uses a laser that does not burn, but rather vaporizes the pigment that may be affecting the cells in the drainage system. Since there are no burns, this laser technique can be repeated if necessary. This in-office procedure does not require hospitalization and has a 60-70 percent success rate in lowering the eye pressure by 20 percent. For many patients, this is an ideal procedure as it can either eliminate the need for eye drops or reduce the number of eye drops. But, it is important to remember that the laser procedure is not a “cure.” A discussion with your ophthalmologist will help you decide which procedure is best for you.

Volunteers Supporting Stanford Clinical Trial to Save Sight

Volunteers in a Stanford University clinical trial, supported by National Glaucoma Research, a BrightFocus Foundation program, are helping to evaluate a new device designed to enhance vision lost to glaucoma. Directed by Jeffrey Goldberg, MD, PhD, chair of ophthalmology and director of Stanford’s Byers Eye Institute, the project follows volunteers for two years and studies how a tiny capsule implanted in the eye affects a patient’s sight by releasing proteins to help stimulate optic nerve growth.

According to Goldberg, “Clinical trials are critical to advance science and develop new vision therapies. Decades of careful research and exciting breakthroughs in the laboratories have led to a number of excellent drug candidates that have the potential to protect or restore vision.”

To receive a free copy of “Clinical Trials: Your Questions Answered,” from National Glaucoma Research and learn how you can participate in clinical research, call 855-345-6647 or visit brightfocus.org/GlaucomaTrials.

This is the latest in a series of articles promoting awareness of clinical trials that is supported in part by an educational sponsorship from Biogen. BrightFocus is solely responsible for the content of this article.

To learn more about clinical trials in your area, please visit brightfocus.org/clinical-trials.
Spicy Marinated Broccoli Salad

Prepare ahead in just 15 minutes and enjoy this salad with visual appeal, eye-healthy ingredients, and sweet and spicy tang. This quick and easy side completes a meal - deliciously!

Ingredients

- 1 cup fresh broccoli florets, cut into bite-sized pieces
- ½ medium carrot, grated
- ¼ cup chopped red onion
- ¼ cup diced roasted red bell pepper, rinsed and drained if bottled
- 2 tablespoons plain rice vinegar
- 1 tablespoon water
- ⅛ tablespoon olive oil (extra-virgin preferred)
- 1 teaspoon honey
- 1 small garlic clove, minced
- ½ teaspoon crushed red pepper flakes
- ½ teaspoon dried basil, crumbled
- 1 teaspoon shredded or grated Parmesan cheese

Directions

1. In a medium bowl, stir together the broccoli, carrot, onion, and bell pepper.
2. In a small bowl, whisk together the remaining ingredients except the Parmesan. Pour over the broccoli mixture. Stir gently to coat. Cover and refrigerate for 1 to 2 hours, stirring occasionally. Before serving, sprinkle with the Parmesan.

Serves 2.

Thank a Researcher

Researchers funded by your generous donations to National Glaucoma Research would love to hear from you! To send a message to thank them for their hard work, please visit brightfocus.org/researcherTY.

You can also receive updates and other important information from National Glaucoma Research by following us on Facebook.

Thank you for supporting National Glaucoma Research!
Include these foods on your grocery list to be sure you’re getting the vitamins and nutrients especially important for eye health:

<table>
<thead>
<tr>
<th>Produce:</th>
<th>Dairy:</th>
<th>Meat/Seafood:</th>
<th>Pantry:</th>
</tr>
</thead>
<tbody>
<tr>
<td>beans</td>
<td>eggs</td>
<td>liver</td>
<td>fortified cereals</td>
</tr>
<tr>
<td>bell peppers</td>
<td>milk</td>
<td>poultry</td>
<td>nuts &amp; nut oils</td>
</tr>
<tr>
<td>broccoli</td>
<td></td>
<td>red meat</td>
<td>sardines</td>
</tr>
<tr>
<td>Brussels sprouts</td>
<td></td>
<td>oysters</td>
<td>sardines</td>
</tr>
<tr>
<td>cantaloupe</td>
<td></td>
<td>wild salmon</td>
<td>whole grains</td>
</tr>
<tr>
<td>carrots</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>citrus fruits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>collard greens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>corn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>green beans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>leafy greens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mangoes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>okra</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>potatoes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>spinach</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>squash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>strawberries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tomatoes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For more eye-healthy tips, visit brightfocus.org/NGR.
Strong risk factors for open-angle glaucoma include:

- High eye pressure
- Family history of glaucoma
- Age 40 and older for African Americans
- Age 60 and older for the general population, especially Mexican Americans
- Thin cornea
- Suspicious optic nerve appearance with increased cupping (size of cup, the space at the center of optic nerve, is larger than normal)

Learn more about glaucoma at brightfocus.org/NGR.