How Does Sleep Affect Glaucoma?

Sleep is an essential part of everyday life. Though generally a time for healing, there are changes to the body’s physiology and positioning that can have a negative effect on glaucoma and eye pressure.

Intraocular Pressure During Sleep
Eye pressure is affected by the rate of aqueous fluid production and drainage. Although aqueous fluid production decreases during sleep, intraocular pressure actually increases due to blocking of the drainage system when lying flat. Overall, eye pressure increases 10-20% when both effects are taken into account.

Blood Flow to the Optic Nerve During Sleep
Blood pressure generally decreases during sleep and stays low throughout the night. This long duration of relative hypotension has been linked to worsening of glaucoma. However, lower night-time blood pressure in some hypertensive patients may decrease certain cardiovascular risks. In patients whose glaucoma is worsening despite what appears to be good eye pressure control, either the patient or the ophthalmologist should have a discussion with the primary care doctor or internist to see if decreasing nighttime blood pressure medicines could be safely undertaken.

Sleep Apnea
Another process that can occur during sleep and could negatively affect glaucoma is sleep apnea. Some individuals, especially those who are overweight or who snore heavily, may be prone to episodes of partial or complete cessation of breathing that happen during sleep. The patient may be totally unaware of these episodes, but the sleeping partner may notice the choking or gasping sounds. During these periods of reduced or absent breathing, there is a reduction in the oxygen going to the optic nerve causing further damage in glaucoma patients. Also, these nighttime episodes may be accompanied by daytime fatigue and sleepiness. Patients with sleep apnea have a greater likelihood of having glaucoma and, although not common, patients with glaucoma are more likely than the general population to have sleep apnea. Because sleep apnea can cause worsening of glaucoma, it is particularly important to recognize its presence and to appropriately treat it.

In any of the above conditions, close collaboration between the eye doctor and the primary care doctor can be both a vision saver and a life saver.

Finally, too little or too much sleep has been linked to worsening visual field defects in glaucoma patients and a higher rate of glaucoma. The ideal amount of sleep is different for each individual but varies from five to nine hours. In addition, adequate sleep has also been shown to benefit patients with conditions such as Alzheimer’s disease, heart disease, kidney disease, high blood pressure, diabetes, stroke, and obesity—conditions which may also be present in glaucoma patients.

Kathryn E. Bollinger, MD, is a glaucoma specialist and Associate Professor of Ophthalmology within the Medical College of Georgia at Augusta University. Her research focuses on development of novel neuroprotective treatments for glaucoma, and she serves as a Patient Education Ambassador for the Glaucoma Research Foundation.

Arash Davanian, DO is currently completing his fellowship in glaucoma at Vanderbilt University Medical Center. He completed his ophthalmology residency at Medical College of Georgia at Augusta University. His research involves studying the structural effects of sleep apnea on optic nerve and retinal vasculature.
Focus on Dr. Anna La Torre’s Laboratory at UC Davis

Dr. La Torre’s laboratory focuses on generating retinal ganglion cells from stem cells to enhance axonal growth and cell survival and ultimately, to use these cells as donor cells for cell replacement therapies.

Dr. La Torre is a principal investigator in the Catalyst for a Cure (CFC) Vision Restoration Initiative, along with her colleagues Xin Duan, PhD (University of California, San Francisco); Yang Hu, MD, PhD (Stanford University); and Derek Welsbie, MD, PhD (University of California, San Diego).

“I became a scientist because I’m a very curious person, and I always wanted to know how things work, how cells work,”

“The goal of the Catalyst for a Cure team is to bring together our expertise to try to find ways to restore vision in patients that have lost vision from glaucoma,” said Dr. La Torre. “Restoring vision is a really challenging goal. We are trying to find ways to protect the nerve cells that are still there and trying to rewire the axons of the retinal ganglion cells.” This approach called neuroprotection is a therapeutic strategy to prevent the neurons affected by glaucoma from dying.

In collaboration with the other CFC researchers, Dr. La Torre’s laboratory is also working to develop and test technologies to transplant retinal ganglion cells for cell replacement therapies. Although much research is still needed before this approach can be translated from the laboratory to the clinic, “the final goal is to be able to collect the cells that we make in the lab, transplant them in the eye of a patient, and find ways to correctly rewire the lost connections to the brain,” Dr. La Torre said.

Anna La Torre grew up in Campdevanol, a small village close to the Pyrenees in Catalonia (in Spain). She enrolled in the University of Barcelona to study biology, and began her scientific career driven by curiosity. Specifically, how organisms build themselves from a single cell. “I became a scientist because I’m a very curious person, and I always wanted to know how things work, how cells work,” Anna told us. “But also, during my postdoc, I decided I really wanted to make a difference for human health and to do research that’s meaningful and will improve people’s lives.”

Anna La Torre, PhD is an Associate Professor in the Department of Cell Biology and Human Anatomy at the School of Medicine, University of California, Davis
Eye injury and glaucoma

By Kathryn Freidl, MD and Rajesh Shetty, MD

Q A

Kathryn B. Freidl, MD, is a board-certified ophthalmologist at Florida Eye Specialists, specializing in cataract and glaucoma surgery. She completed medical and surgical fellowship in glaucoma at the Wills Eye Institute in Philadelphia.

Rajesh K. Shetty, MD, is a board-certified, double fellowship-trained ophthalmologist specializing in cataract and glaucoma surgeries. He is currently the CEO and Managing Partner of Florida Eye Specialists and the surgery center.

Q How can an eye injury cause glaucoma?
A Each year more than 2.5 million eye injuries occur in the United States. Eye injuries can lead to several eye problems including glaucoma which is usually caused by a blunt force trauma to the eye. The natural drain (trabecular meshwork) of the eye sits at the base of the iris and circles around the inside of the eye for 360 degrees. When a blunt force compresses the eye, the shearing forces can cause the trabecular meshwork to tear or bleed. Tearing and bleeding results in scarring of the trabecular meshwork, reducing its ability to drain fluid. This may lead to elevated eye pressure which can damage the nerve in the back of the eye (glaucoma).

Q How likely am I to develop glaucoma after an eye injury?
A Damage to the internal drainage system of the eye occurs in 75% of blunt eye injuries. The amount of damaged drain is predictive of the risk for glaucoma. When more than half of the drain is damaged, the risk is about 10%. This can develop many years after the initial damage. Therefore, it is crucial for someone who has sustained such an injury to have periodic eye exams for the rest of their life so that, if glaucoma develops, it can be detected and treated before significant vision loss occurs.

Q Can traumatic glaucoma be cured?
A Unfortunately, there is no cure for traumatic glaucoma; however, there are many effective treatments. Because there is no cure, prevention and early treatment interventions are exceedingly important.

Q How is it treated?
A The first-line treatment for traumatic glaucoma is eye drops placed in the eye on a regular basis. In cases where the eye pressure is high and not controlled by eye drops, surgery may be required to bring the pressure down to a safe level. The goal of treatment is to lower the pressure to prevent continued vision decline, but there is currently no way to restore vision that was already lost due to pressure damage.

Prevention is always better than treatment. So, whenever possible, where potential for injury is present, protect your eyes; that simple act could save your sight.
We are grateful for the generous and loyal support from all of our donors. Following is a listing of recent contributions and pledges at the $1,000 level and above; including members of The Catalyst Circle and institutional donors. Please note these are new contributions and pledges received between July 1, 2020 and October 31, 2020 and may not reflect a donor’s cumulative giving for the year.

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To learn more, please contact Nancy Graydon at 415-986-3162 ext. 231 or ngraydon@glaucoma.org. You can also visit www.glaucoma.org/donor-advised-funds to download a free guide or use the DAF Direct Link to make a grant today.
DONOR SPOTLIGHT: The Farrell Family

January is National Glaucoma Awareness Month, an important time to spread the word about this sight-stealing disease. This month, and throughout the year, we are indebted to our friends who create their own personal fundraising pages to engage their communities to spread the word and raise funds to speed the cure for glaucoma.

One of our fundraisers, Maureen Farrell, went a step further and entered the Philadelphia Marathon last fall to raise awareness of her daughter’s journey with glaucoma.

Fionna was just 10 when she was diagnosed, and for years Maureen made sure Fionna (“Fi”) got the drops she needed to maintain her eye pressure. But by senior year in high school, that treatment stopped working and Fionna’s condition worsened threatening loss of sight. Fi is always a straight A student, but in her senior year she was unable to take her AP English exam due to surgeries she would need. The day after her 18th birthday, she had laser surgery that, unfortunately, was not successful. And prior to her senior prom, she had another surgery that failed, which left her looking, as her Philadelphia mother described it, “like she’d been in a Rocky fight.” For mother and daughter, it was a struggle to stay positive. Finally, after Fionna’s graduation in 2019, surgeons implanted a shunt, which seemed to work and kept her eye pressure stabilized. But as a mother secretly does, Maureen worries about the future.

“I wanted to do something,” Maureen said. “As a mother, I needed to do something. But what could I do? Then I realized, I’m a runner. I can deal with this through running. Like training for a marathon, dealing with glaucoma requires an incredible amount of diligence. You can never waiver from training or for Fionna, waiver from her medications and doctor visits,” Maureen added.

Maureen has run more than 15 marathons and 150 half-marathons, so it made perfect sense to combine her devotion to her daughter’s care and passion for running. In addition, when Fionna’s doctor, Scott J. Fudemberg, MD, said Glaucoma Research Foundation was his favorite charity, Maureen donated all the proceeds to advance our research and education programs.

In the final tally, Maureen raised more than $6,000 through friends and family and continued her campaign even after the marathon was over. Maureen’s determination is an excellent example of how many special gifts can make a difference and bring us closer to a cure.

On January 29, Glaucoma Research Foundation will present the Farrell family with The President’s Award at the 2021 Virtual Annual Gala in recognition of their dedicated fundraising and advocacy efforts. To join this celebration, tickets are available at www.glaucoma.org/gala.

To learn more about how to create your own personal fundraising page, please visit www.glaucoma.org/involved or contact Morgan Velarde at morgan@glaucoma.org.
On Saturday, November 7th, Glaucoma Research Foundation (GRF) presented the second annual Glaucoma Patient Summit as a virtual online event. The virtual Patient Summit featured presentations and panel discussions highlighting advances in treatment options, updates on the latest glaucoma research advances, and practical information to help patients to understand and live with glaucoma.

Summit speakers included leading glaucoma specialists and researchers including Jeffrey Goldberg, MD, PhD, Michael L. Halkias, OD, Andrew Iwach, MD, Shan Lin, MD, Constance Okeke, MD, MSCE, Inder Paul Singh, MD, and Ruth Williams, MD, who also served as the event host. Glaucoma patients Richie Kahn and Linda Richardson provided the patient perspective and discussed the importance of education and being one’s own healthcare advocate. Andrea Epstein, the Chair of the Glaucoma Patient Summit Steering Committee, welcomed summit attendees to the virtual event, and Tom Brunner, GRF President and CEO, led a live “questions and answers” session. GRF event staff members also answered questions via chat throughout the 3-hour virtual event.

Sessions included “You are Diagnosed with Glaucoma, Now What? (A Patient’s Perspective),” “Understanding Glaucoma,” “Current and New Treatment Options,” “Living with Glaucoma — What Every Glaucoma Patient Should Know,” “Promising Research on the Horizon — The Path to a Cure,” and “How to Be Your Own Advocate.”

“It’s encouraging to me that so much research is focused on developing better treatments for glaucoma and on finding a cure and restoring lost vision. The Virtual Glaucoma Patient Summit was fabulous! I can’t think of any ways to improve it.”

Summit Attendee