Glaucoma Chats

TRANSCRIPT

New Frontiers in Glaucoma Research

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Featuring: Jimmy Liu, PhD & Diane Bovenkamp, PhD

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Please note: This Chat has been edited for clarity and brevity.

DR. DIANE BOVENKAMP: Hello and welcome. My name is Dr. Diane Bovenkamp and I'm the Vice President of Scientific Affairs at BrightFocus Foundation. I am so pleased to be your host for today's special Glaucoma Chat, called, "New Frontiers in Glaucoma Research." And it's special today because normally the person who is the interviewer is becoming the interviewee, and I'll introduce him later.

Glaucoma Chats are a monthly program—presented in partnership with the American Glaucoma Society and supported, in part, by sponsorship from Glaukos—designed to provide people living with glaucoma and the family and friends who support them with information straight from the experts. The information provided in this program is for educational purposes only and should not be considered medical advice. Always consult a qualified health care professional regarding any medical concerns or conditions. Please note that BrightFocus does not endorse or promote any specific brand or product.

BrightFocus Foundation's National Glaucoma Research Program is one of the world's leading nonprofit funders of glaucoma research and has supported more than $55 million in scientific grants exploring the root causes, prevention strategies, and treatments to end this sight-stealing disease.

Today, I will be talking with Dr. Jimmy Liu, Director of Vision Science Programs at BrightFocus Foundation, as we highlight each of the 16 newly awarded research grants to exceptional glaucoma scientists around the world—an investment of $2.3 million. And when I introduce him, you may recognize his voice because he's normally the moderator and the person doing the interviewing on this show. So, it's his turn to be interviewed. So, Jimmy, thanks for joining us today.

DR. JIMMY LIU: Thanks, Diane, for that warm introduction. It's a pleasure to speak with you today on all the exciting and innovative research that we are funding to end glaucoma. Before we start talking about the grants, Diane, would you like to update our audience on the state of research funding in America?

DR. DIANE BOVENKAMP: Absolutely. You may have heard in the news lately that there have been new policies introduced at NIH and other federal funding agencies that, for all intents and purposes, make it harder for scientists to receive and keep enough funding to support their research. And this will definitely affect the scientists in all of our programs, including National Glaucoma Research, because they also receive NIH funds. The good news is that BrightFocus is still here. We're not changing anything about how we support the scientific community to accelerate their innovations to better help the communities affected by glaucoma, and that means you. So, just a note, we need your help even more than ever now to help fund the best science recommended by the extremely talented experts on our Scientific Review Committee.

DR. JIMMY LIU: One hundred percent, Diane. Thanks so much for providing that information for our audience. And just to let everyone know on the call, BrightFocus—and just echoing Diane's comments—BrightFocus Foundation is 100 percent committed to funding research that will end Alzheimer's, macular degeneration and glaucoma.

DR. DIANE BOVENKAMP: To start off, could you provide our listeners with an overview of BrightFocus' grant application process and scientific vetting?

DR. JIMMY LIU: Absolutely. So, we have a rigorous scientific process in place to ensure that the most innovative science gets funded in a timely manner to move the field forward. Our Scientific Review Committee, which determines which grants get funded each year, is composed of world-class scientists and clinicians in glaucoma from across the world. These scientists volunteer a lot of their time to ensure that every dollar that is donated by everyone on this call goes to glaucoma research that will enhance our understanding of the disease, as well as create new preventions and innovative treatments for glaucoma. So, on behalf of BrightFocus and our Scientific Review Committee, we are immensely grateful for everyone on this call and across the world who donate to our organization to help fight this sight-stealing disease. And so, every year, starting in the summer, we put out a call for applications. One of the great things about our call for proposals is that it is driven by the ideas from across the scientific community. We define this as our 360-degree approach to fight glaucoma. This allows us to receive a broad range of scientific ideas that allows us to create a diverse portfolio of proposals, as well as researchers from across the world. And just to let everyone know, since 1973, which was the inception of our glaucoma program, we have funded over

523 grants across 16 countries. And so, overall, we leave no stone unturned when it comes to finding a cure for glaucoma.

This past fiscal year, we received a record number of applications—106 of them. And so, with consultation from our co-chairs of the National Glaucoma Research committee, Drs. John Morrison and Adriana Di Polo, I assigned each application two to three reviewers based on their expertise for that particular application. All proposals are checked against the pool of available reviewers for real or potential conflicts of interest prior to assignment of the proposal to individual reviewers. From there, each reviewer carefully assesses the science based on its impact on glaucoma, how innovative it is, how rigorous the experimental design is, and if the budget and scientific environment are appropriate. After multiple rounds of determining which proposals are the best and the brightest, our SRC deliberates in person and makes a final ranking and recommendation of applications for funding to the BrightFocus Board of Directors. Full critiques are given to applicants so that if they don't receive funds that year, they can improve and apply next year. This process has yielded 16 promising projects that will drive treatments and cures for glaucoma.

DR. DIANE BOVENKAMP: Great. And thanks for taking time at the beginning just to describe for everybody our rigorous process. And this is really to try and make sure that the dollars that you provide us are only going towards the best and the brightest who have the most innovative ideas that will accelerate us toward that cure. So, thank you. Thank you for leading that process, Jimmy.

So, as you may know, around 4 million U.S. adults have glaucoma, a leading cause of blindness in the U.S. caused by damage to the optic nerve, which is the nerve that connects your eyeball to the parts back into your brain so that you can actually process and see. Because there are often no early symptoms, as many as half of those affected may not even know they have it—that is insane—until irreversible vision loss has occurred. The good news is: Although there's no cure, early detection and treatment can help slow the disease's progression. So, the National Glaucoma Research grant recipients are investigating a wide range of scientific approaches, including novel treatments, early detection methods, and efforts to protect and regenerate retinal ganglion cells. And those are basically the cells that make up that optic nerve cable connecting the eye and brain that could preserve or restore vision. So, this is why we have this 360-degree-approach portfolio to try and bring in everything we can to battle this disease. So, Jimmy, could you tell us more about the 16 new NGR grants that just started on July 1?

DR. JIMMY LIU: Of course. So, I have separated the 16 grants into four 360-degree approach categories. The first 360-degree approach research area I will go over is Con-

trolling Eye Pressure in New Ways. And so, as many of you know on the call, elevated eye pressure is one of the biggest risk factors of glaucoma. Elevated eye pressure occurs when your eye's drainage system doesn't drain properly, causing the fluid in your eye to build up and impart pressure on the cells and tissue that are important for your vision—like, for example, what Diane said earlier, your optic nerve. This pressure causes these cells to die and can occur quite suddenly, which is why glaucoma is often called the sneak thief of sight.

We have two new projects this year to look at controlling eye pressure and glaucoma. Dr. Revathi Balasubramanian from Columbia University in New York's proposal is titled, "Maldevelopment of Schlemm's Canal in Children with Glaucoma." So, in the eye, the Schlemm's canal is a tissue that is critical for the regulation of eye pressure. Although information is known about the Schlemm's canal, the molecular mechanisms underlying the development of the Schlemm's canal are not fully understood. This study will figure out the role of a specific receptor in Schlemm's canal development. Really understanding the role of this receptor will provide us further detail on how pediatric and adult-onset glaucoma occurs.

The second project that we have is from Dr. Tyson Kim, and he's from the University of California, San Francisco, and his proposal is titled, "Novel Visualization of Aqueous Outflow: Uncovering Glaucoma Mechanisms and Therapeutic Targets." And so, Dr. Kim's study develops a new imaging method that visualizes and quantifies fluid drainage with microscopic precision in the living eye, which is really cool and really novel. And so, his research proposal will help uncover new insights into how eye pressure is regulated, which will open new opportunities for discovery and therapeutic innovation in glaucoma.

DR. DIANE BOVENKAMP: Wow, thanks, Jimmy. It's really exciting to hear how innovative and important these proposals are in controlling eye pressure in glaucoma and how early that glaucoma could start, like in your childhood, and you might not know it. So maybe to prevent it from even happening, that would be really cool.

The next 360-degree category that Jimmy has created here is called Protecting and Regenerating the Optic Nerve. I'm intrigued. Could you describe what this category means and discuss the eight grants that are under this category, please?

DR. JIMMY LIU: Yeah, of course, Diane. Research projects under this category of Protecting and Regenerating the Optic Nerve are focused on understanding how our body can naturally protect our optic nerve—in this case, the optic nerve is made up of cells called retinal ganglion cells—from degenerating in glaucoma. So, this is called

or termed "neuroprotection." And on the other hand, there's also glaucoma researchers working on techniques to regenerate the optic nerve or our retinal ganglion cells, which is really exciting because that could potentially restore or bring back vision for those who have lost it in glaucoma. And so, just like Diane said, we have a whopping eight awards in this category. So, eight out of the 16 awards are in protecting and regenerating the optic nerve, which is really exciting. And this really goes to show how this topic is really hot right now in the field of glaucoma.

DR. DIANE BOVENKAMP: That's great. The drugs that we have now can't get your vision back. So, if we can have something that will protect, we can start to take it early on with early detection, and then we can prevent the vision loss. That would be amazing. So, there's a lot of exciting research into this optic nerve degeneration and regeneration. So, this is giving me really a lot of hope that there is a cure on the horizon. So, thank you.

DR. JIMMY LIU: Yeah, absolutely. Same here. I'm also super excited, as well. Our first award in this category comes from Dr. Evan Cameron from the Cleveland Clinic. His proposal is titled, "Understanding Optic Nerve Head Astrocyte Contributions to Glaucoma." And so, glaucoma is a neurodegenerative disorder characterized by the loss of retinal ganglion cells, which are, again, the cells that make up your optic nerve, that is commonly associated with elevated eye pressure. Astrocytes are support cells in your eye that are directly implicated in retinal ganglion cell degeneration and death due to their unique position within the optic nerve, allowing them to sense changes in eye pressure and modulate immune responses to promote retinal ganglion cell survival. Dr. Cameron's project aims to define the signaling pathways in astrocytes that regulate immune cell–mediated neurodegeneration in glaucoma to guide the development of novel therapeutic strategies that can protect the degeneration of the optic nerve in glaucoma.

DR. DIANE BOVENKAMP: Yeah, I am going to be paying attention to this project to see what the astrocytes—the astronomical astrocytes—are doing in glaucoma for the RGC survival. So, one of the things is, you use the term "optic nerve head." Can you just quickly explain what that is, why eye doctors look at its health during eye exams, and why this could be a right target for treatment?

DR. JIMMY LIU: Yeah, of course. So, for our audience and our listeners here, think of the optic nerve head as the one exit door where all the wires carrying vision signals from your eye bundle together and leave for the brain. And so, in glaucoma, pressure inside the eye can squeeze and damage those wires right at this doorway, which can cause those wires to become faulty and stop functioning. That's also why this spot is

really important for doctors. By looking at the optic nerve head during an eye exam, they can spot early warning signs of damage often before you would ever even notice a change in your own vision. And so, researchers like Dr. Cameron are understanding the basic biology as to why cells in the optic nerve head die in glaucoma so we can develop treatments to protect and potentially regenerate those cells to preserve vision.

DR. DIANE BOVENKAMP: Awesome. Thank you.

DR. JIMMY LIU: Yeah. And so, for the second grant out of the eight in this category, Dr. Qi Cui is a clinician–scientist at the University of Pennsylvania, and her proposal is titled, "Exploring Glucagon-Like Peptide-1 Receptor Agonists for the Treatment of Glaucoma." So, many of you may not know that full term that I just said—glucagon-like peptide-1 receptor agonists—but the nickname or acronym for this is GLP-1s. And I think many of you on this call may have heard the use of GLP-1s in commercials to advertise as a medication for weight loss. These medications have also been shown to modulate the eye's immune system, which can promote retinal ganglion cell survival—again, those same cells that make up the optic nerve and degenerate in glaucoma. And so, this study really looks at how GLP-1s can help decrease our risk of glaucoma and how they can rescue retinal ganglion cells from dying. Dr. Cui's study in particular will enhance our understanding of narrow inflammatory processes in glaucoma and clarify those mechanisms behind GLP-1–induced retinal ganglion cell rescue.

DR. DIANE BOVENKAMP: I have to tell you, Jimmy, this project, it kind of blows my mind a little. And maybe some of the listeners on the call, it might be blowing their mind, too, because this is a glimpse into the excitement of how the scientific community can build an innovation on the shoulders of a past published discovery. Like, who knew that a "good side effect" of taking a drug for weight loss or diabetes could lead to protecting your eyes and delaying the prevention of vision loss from glaucoma? I mean, that's just the unexpected serendipity, I think.

DR. JIMMY LIU: One hundred percent. Yeah, it's really crazy how serendipitous science can be. And that really goes to show that, just like a lot of our researchers that we fund and for researchers across the world, it's really important to always go for and really be curious in your research because you never know where science is going to end up taking you in finding all these very interesting discoveries.

So, great. The next award up is Dr. Luca Della Santina, and he is a professor at the University of Houston and is looking at "Using AI to Detect the Loss of Connections Between Neural Cells in Glaucoma." Previous studies have shown that death of retinal ganglion cells in glaucoma is not evenly distributed, with neurons in some regions able

to survive longer than others. The cause of this difference or heterogeneity in retinal ganglion cell death in glaucoma is currently unknown. This study will create new artificial intelligence—or AI—tools to investigate the structure and function of retinal ganglion cells across multiple animal models. And completion of the study will open new avenues to understand and predict the mechanisms of how our eye cells can rewire themselves in glaucoma.

The fourth grant in this category is by Dr. Cátia Gomes from Indiana University, and she is working on a project titled, "Reducing Inflammation to Protect Vision in Glaucoma." As I talked about before with Dr. Cameron's work, immune cells in the eye, like astrocytes and also immune cells like microglia, play a role in optic nerve degeneration in glaucoma. And so, to investigate how these immune cells communicate and contribute to degeneration in glaucoma, Dr. Cátia Gomes is developing human stem cell–derived models combined with microfluidic devices to specifically study the cells that make up the optic nerve, those retinal ganglion cells, and the interplay with these immune cells. Successful completion of this study will establish a novel human-based model of glaucoma all in a dish that will provide critical insights into how immune cells like astrocytes and microglia interact and drive the loss of retinal ganglion cells, which, in turn, can help pave the way for targeted therapeutic interventions in glaucoma.

And then another inflammation-related grant that we have is by Dr. Monica Vetter from The University of Utah, who is studying "The Immune Landscape of the Human Optic Nerve Head." So, as I said before, the optic nerve is critical for vision, and in glaucoma, degeneration of the optic nerve head causes vision loss in the disease. And so, immune cells play an important role in this degeneration process. And interestingly, there are many different types of immune cells that respond differently to injury in glaucoma. This study will uncover the molecular signatures of these different types of immune cell populations using really cutting-edge biology techniques. And revealing the identity of each of these particular immune cell populations will really help figure out or elucidate how some immune cell populations may have either a protective or detrimental effect during glaucoma, and this can also help uncover new targets to protect the optic nerve head from glaucoma.

DR. DIANE BOVENKAMP: Wow. I mean, it never ceases to amaze me that sometimes seemingly unrelated things like inflammation that sometimes starts outside of the eye and sometimes outside of the brain ... these inflammation cells can ... some of them are resident within the eye and some of them move from the rest of your body into the eye or out of the eye. And then, unrelated, inflammation and then structural damage to eye tissues and vision loss can be connected. So, it really drives home that maybe glaucoma is a whole-body disease. And maybe we could treat glaucoma in a periphery, like

outside of the eye, making inflammation cells maybe be happier and preventing them from going berserk, either overdrive or underdrive, and doing damage to the eye. That's really interesting. So, why don't you tell us about the last three grants in this category, starting with a cool new model for glaucoma?

DR. JIMMY LIU: Certainly. So, the next project that I'll discuss about is from Dr. Josh Miyagishima, and he is working on a project titled, "Using Nature's Hibernation Strategies to Protect Vision in Glaucoma." And so, Josh is using ground squirrels, which are quite surprisingly a great model to study retinal ganglion cell neuroprotection due to the ground squirrel's ability to alter its metabolism and other biological processes during hibernation. And so, while in hibernation, these squirrels have this way to protect their retinal ganglion cells from degenerating while they're hibernating. And so, really studying this proposal on these ground squirrels can help uncover new natural protective strategies that can be harnessed for glaucoma therapies to directly preserve vision.

Next, we have Dr. Yvonne Ou, and she is a clinician–scientist at the University of California, San Francisco, and she is working on a project titled, "How Neural Activity Shapes Vision Recovery in Glaucoma." This project explores how light and neural activity help the retina protect itself from damage in glaucoma. By studying how these retinal cells maintain and rebuild their connections after injury—so, for example, when light shines on cells and it causes injury—she's going to help look at really understanding how those cells can rebuild themselves. And so, essentially her team is aiming to uncover the ways to preserve vision and stimulate repair processes that could really benefit people with glaucoma and other related neurodegenerative diseases.

And then lastly, the last person in our category of neuroprotection and regeneration of the retinal ganglion cells is Dr. Jeremy Sivak, who's a professor at the University Health Network in Toronto, Canada. His proposal is titled, "Spatial Responses to Elevated Pressure in the Human Optic Nerve Head." As we all know, glaucoma irreversibly damages retinal and optic nerve tissue, which is often associated with high eye pressure. Yet, how pressure affects the tissues in the human eyes is unclear, because interestingly, there's a lot of people who don't have increased eye pressure but have glaucoma. And this is called normal-tension glaucoma. And so, Dr. Sivak has developed a newly developed system where this project looks at the molecular changes in response to changes in eye pressure in human donor eyes, which is super cool. And so, this data will be compared to long-term changes present in glaucoma samples to uncover critical links between eye pressure and glaucoma.

DR. DIANE BOVENKAMP: Wow, that's really amazing. I mean, all three of those that

you talked about are great. And I did want to point out this last one, it is an international grant. So, Dr. Sivak is in Canada and you know, BrightFocus has funded in 28 countries for the last 53 years we've been in existence. And it kind of drives home that there's great ideas that can come from any country in the world, and BrightFocus will fund it, if they apply to us and our SRC thinks it's great. So, looking forward to following the progress on all eight of those projects. So, on to the next category. And for those of you keeping count, we now have five of the 16 grants left to discuss, I think. Anyways, five or six. We'll now talk about Understanding What Causes Glaucoma. So, could you describe what this category means and discuss the grants under this category?

DR. JIMMY LIU: Yes, of course, Diane. So, although the field knows a lot about factors like diet, lifestyle, eye pressure, and age in terms of increased risk of glaucoma, there is a lot that the field does not know about what causes glaucoma, such as the genetics of glaucoma. And so, Dr. Nazlee Zebardast is a clinician–scientist at Harvard University, and she's looking to use AI—or artificial intelligence—to discover genetic risk factors for glaucoma worsening. So, just like many other diseases, the progression of glaucoma and associated vision loss varies quite greatly from person to person, and yet physicians are unable to predict who is at a higher risk of rapid vision loss. And so, Dr. Zebardast's project is really trying to study the role of genetics in glaucoma progression using clinical data and AI. Discoveries in this project may allow for earlier detection of high-risk patients and help create more personalized treatments for patients with glaucoma, and lastly, potentially find new targets to slow or prevent vision loss from glaucoma.

DR. DIANE BOVENKAMP: Wow, that's great. I mean, you hear this AI ... it's really cool to see there's many different ways that you can use AI. And the way that we're funding it are really cool, beneficial ways for AI. And this one really is using the power of computation and speed and the ability to maybe put together things that are seemingly unrelated from past publications to look for, basically, a "needle in a haystack" of participants' massive amount of clinical and genetic data to uncover new ideas for more personalized treatments for glaucoma. So, really looking forward to this project. Okay. So, our last 360-degree category is Predicting Outcomes and Other Treatment Innovations. So, can you share what this category entails and briefly describe the remaining grants under this category?

DR. JIMMY LIU: Absolutely. So, this category of Predicting Outcomes and Other Treatment Innovations is reserved for awards that focus on discovering novel treatments, lifestyle interventions, and clinical care for patients living with glaucoma. And so, our first award in this category goes to Dr. Navid Amini, who is the professor at California State University, Los Angeles. His proposal is titled, "Foot-Based Monitoring and Feedback to Improve Mobility and Reduce Falls in Glaucoma." Unfortunately, nearly half of

glaucoma patients fall each year. What the study does is it's trying to develop smart insoles, or shoe inserts, with motion and pressure sensors to track how glaucoma patients lift their feet while walking and deliver real-time vibrations on the soles to correct unsafe walking patterns. And so, through continuous monitoring and personalized feedback, Dr. Amini's research group aims to reduce falls and improve mobility, confidence, and quality of life for those living with glaucoma.

DR. DIANE BOVENKAMP: Wow. So, if this clinical study ultimately produces a product that can go on the marketplace, it'll kind of be like we can put a Dr. Scholl's prescription insert in our shoes that not only can detect unstable conditions, but give little buzz, kind of like if you're wearing a smartwatch and you get a buzz, whenever you get a message, right, text or something. It'll maybe put a buzz on a different part of your foot so you can correct yourself, or maybe give a warning to sit down or hold a railing before we fall. So, that's just brilliant.

DR. JIMMY LIU: Yeah, exactly, Diane. This is such a cool award, and I feel like this is one of the really great treatment interventions that we have funded that really could see a lot of benefit for a lot of people on this call living with glaucoma. So, I think we are really looking forward to the progress of this award.

The next award that we have is Dr. Mark Christopher from the University of California, San Diego, and he is studying how to "Improve Glaucoma Care with Agentic Artificial Intelligence", or AI. Glaucoma, as we all know, is a disease that required clinicians to interrogate information across multiple ophthalmic testing platforms that are necessary to make treatment decisions about a patient. What this project aims to do is to develop advanced artificial intelligence tools that combine multiple ophthalmic testing platforms over time to understand glaucoma progression. So, things like optical coherence tomography, or OCT, and then visual field tests. Typically, those are kind of the tests that are typically done for patients with glaucoma. So, providing clear automated summaries for doctors, his artificial intelligence tool that his team is trying to develop will aim to improve diagnosis and staging of glaucoma, help guide treatment decisions, and reduce the documentation burden for physicians in glaucoma care.

DR. DIANE BOVENKAMP: Wow. And this is yet another AI project, and it's being used in a different way than the other two projects. So, just because this is a really new term, like in the last 6 months or so, can you explain what "agentic AI" means? Because it's a little different from regular, vanilla-flavored AI, right? Can you explain what agentic AI means?

DR. JIMMY LIU: Yeah, of course, Diane. Agentic AI refers to artificial intelligence that

not only analyzes data or answers a single question, but it can also actually carry out multistep tasks on its own. So, for example, analyzing the data, gathering the information from that data, and then making decisions about that data and what to do next and taking action on those decisions—all in an automated fashion. And so, kind of think of agentic as a term as kind of like an assistant for Dr. Christopher's project, where the AI helps independently pull together and analyze results from multiple different eye tests over time.

DR. DIANE BOVENKAMP: Perfect. Thank you.

DR. JIMMY LIU: Yeah, of course. The third project that we have in this category of predicting outcomes and other treatment innovations is from Dr. Stuart Gardiner from the Good Samaritan Foundation, which is located in Portland, Oregon. His proposal is titled, "Measuring the Effects of Visual Stimuli on Retinal Blood Vessels and Flow." Research has found that glaucoma may interfere with the body's ability to send extra blood to those areas that need it the most, like the optic nerve head, which needs a lot of oxygen and nutrients in order to survive. Improper blood flow can potentially cause those cells and other cells in the eye to malfunction and die. And so, the objective of Dr. Gardiner's study is to optimize and compare novel methods to quantify this blood flow into the eye in human subjects with glaucoma. Really, this technique, will subsequently be used in longitudinal studies—for example, clinical trials—to lead new insights into glaucoma disease processes, and potentially can be used as a new diagnostic tool for clinical care in glaucoma.

And then, we also have, in this category, Dr. Myoungsup Sim, who is a researcher at Duke University who is proposing a study to look at "Activating the Eye's Own Nitric Oxide to Fight Glaucoma." As we all know and we talked about before—it's its own 360-degree category—increasing eye pressure is a well-known risk factor for glaucoma. When pressure increases in your eye, our body actually produces a gas called nitric oxide to help kind of decrease that eye pressure. Essentially, our body releases nitric oxide naturally to help decrease that eye pressure. In this study, Dr. Sim is looking to develop safer, longer-lasting glaucoma treatments by really amplifying our body's ability to produce nitric oxide to help decrease eye pressure, which will eventually really help decrease eye pressure in patients with glaucoma. That's a really cool novel treatment paradigm that we are really excited about. And we actually funded Dr. Sim's research several years ago, and the Scientific Review Committee for National Glaucoma Research thought that his proposal was so good that in terms of funding the next generation of that, they wanted it to fund again. So, that was really awesome.

And then, lastly, we have our last grant, the 16th one, and that is from Drs. Audrey

Bernstein and Arunkumar Venkatesan, and these are both researchers at SUNY Upstate Medical University in Syracuse, New York. These two are looking at "Investigating the Role of Impaired Mitochondrial Dynamics in Exfoliation Glaucoma." If people don't know on the call, exfoliation glaucoma, also known as pseudoexfoliation glaucoma, is a more severe form of open-angle glaucoma that affects an estimated 25 percent of the 60 million cases of open angle glaucoma cases worldwide. And so, it is characterized by a clumpy, white, flaky substance that blocks fluid from draining from the eye, which eventually leads to vision loss. And so, in this study, Drs. Bernstein and Venkatesan will further characterize the mechanisms behind exfoliation glaucoma by creating a novel system that mimics the disease to test out various compounds and basically chemicals that might help clear out these defective mitochondria and reduce the production of these white flakes that help block and increase eye pressure.

DR. DIANE BOVENKAMP: Yeah, and I mean, this is really cool because there is no treatment for pseudoexfoliation glaucoma really to try and get at the root cause of it, right, to try and clear out the white gunk that is basically blocking the drainage. But when you say mitochondria, it's the mitochondria we have talked about in past calls, where it is basically the energy powerhouse of the cell. So, if this clumping and whatever is causing the pseudoexfoliation, it's causing the mitochondria to be defective, then the cells are not getting enough energy, and then that is where you can get the neurodegeneration. So, this is really another exciting new treatment for us to look out for.

DR. JIMMY LIU: Yeah, 100 percent, Diane. It is really exciting to see this.

DR. DIANE BOVENKAMP: Absolutely. So, wow, okay, that was 16. We went through 16 of these newly funded projects that started July 1, and I am so proud that we are funding these innovative scientists and science, and we totally look forward to following the progress of this research. Kudos to all of the scientists that we mentioned on this call, and kudos to their academic institutions for recognizing talent and supporting them to then be able to help to find prevention treatments for this disease. And then lastly, but not least, thanks to all our donors and listeners who are listening right now for your generous support of these game-changing projects.

So, one last public service statement we would like to make before we leave you today is that it is vital. As you can listen from what we are talking about, early detection is vital, and you can't get early detection unless you go to a doctor. So, please get regular appointments with your eye doctor to check for signs of glaucoma. Half of the people who have glaucoma … half of you listening right now could have glaucoma, or maybe all of you do, but half of the people in the world who have glaucoma don't know they have it. And so, years or sometimes decades of damage can be happening to your

retina without you even knowing. So, know your family history, and if anyone has had glaucoma, that makes you at risk. It doesn't mean that you'll get it, but it means you're at risk. And so, please go to your doctor, your health care professional for the eye, every year or as advised by your eye doctor. Sometimes it's every 6 months, sometimes it's every 2 years—whatever your eye doctor recommends. But at least consider going every year, especially after you reach the age of 40.

DR. JIMMY LIU: Exactly, Diane. Time lost is vision lost, and it's really important to go see your ophthalmologist to check your eyes.

DR. DIANE BOVENKAMP: Yeah, great. Wow. I'm sad to say that our time together on this call is drawing to a close, Jimmy. But before we leave, do you have any further thoughts on BrightFocus' funding in our National Glaucoma Research Program?

DR. JIMMY LIU: I just wanted to reiterate for the research that is funded, our researchers not only provide their proposals, but they also provide summaries of their research that are for scientists and also for a lay audience. And so, if you would like to go see more about each of these researchers that I mentioned on the call today, feel free to go to https://www.brightfocus.org and search for National Glaucoma Research Awards, and you'll be able to find all 16 of these awards on our website. And those pages have summaries of all these awards. And so, if you have any more questions about them, feel free to email us or call us at BrightFocus.

And then I think the other things that I would like to say before we close today … so, as Diane mentioned in the beginning, there have been many changes at the NIH and other science funding agencies that may cause a decrease in support for research into diseases like glaucoma, macular degeneration, and Alzheimer's. However, I would like to reassure everyone on this call that BrightFocus is 100 percent committed to funding the most innovative research in the world to find cures for glaucoma, macular degeneration, and Alzheimer's.

And then lastly, I just want to share how excited we are, along with our National Glaucoma Research Scientific Review Committee, about these 16 grants. I think every one of these awards exists because of your support and generosity. And we truly believe they'll make a real difference in the push for better treatments, interventions, and ultimately, a cure for glaucoma. And we're so grateful for that support. And it's really our privilege to put that support to work funding the best and brightest researchers in the field.

DR. DIANE BOVENKAMP: Agreed, Jimmy. Drop the mic. That's such great take-home message. I'd also like to mention that our website, https://www.brightfocus.org, has a

wealth of information about glaucoma. Our next Glaucoma Chat will be on Wednesday, August 12. Thanks again for joining Jimmy and me today to talk about our grants. And this concludes today's Glaucoma Chat.

Useful Resources and Key Terms

BrightFocus Foundation: (800) 437-2423 or visit us at www.BrightFocus.org. Available resources include—

- Glaucoma Chats Archive
- Research funded by National Glaucoma Research
- Overview of Glaucoma
- Treatments for Glaucoma
- Resources for Glaucoma

Helpful treatment options or resources mentioned during the Chat include—

- National Glaucoma Research Program
- 2026 National Glaucoma Research Grant Awards