Living with Geographic Atrophy: What Can I Do for My Vision?

Matthew Levine: Welcome to MedLive. Today's program is *Living with Geographic Atrophy: What Can I Do for My Vision*? My name is Matthew Levine. I'm the Grants, Advocacy and Partnerships Director at the American Macular Degeneration Foundation. And I'm joined today by Dr. Rishi Singh, staff physician at Cleveland Clinic Florida, and President of Cleveland Clinic Martin Health. We'll also be joined by Dr. Preeti Subramanian, Director of Scientific Programs, Vision Science at BrightFocus Foundation. And we'll also have Liz, who's a retiree living with advanced macular degeneration. She's going to speak about her own experiences with geographic atrophy. This program is presented by the American Macular Degeneration Foundation and MedLive and supported by an educational grant from Apellis Pharmaceuticals. Now we'd like to hear from you during the program, so please take a moment to ask any questions you have. Just type them into the box below at any time during the discussion. But keep in mind that the question should be general in nature. We really can't answer a question that's specific to your case, but we encourage you to bring those kinds of questions to your doctor.

Throughout today's program, we'll be asking you to take some polling questions and we encourage you to respond to these questions because it's going to help drive our discussion. And even if you're watching this video later on demand after the live broadcast, it's going to provide valuable insight into your experience. Once the program ends, you'll automatically be directed to a post-program evaluation form. We'd appreciate it if you could complete the evaluation form because it's going to help us measure the effectiveness of this educational program.

Now, we're going to be covering a lot of territory today, and some of it might be new to you. If you feel that a topic is passing by too quickly, it's difficult to absorb the information, don't worry, you're going to have several options: One, all of these presentation slides are available for download. *[00:02:00]* So just go to the event resources section of the player located under this video box and you can download them. You'll also be able to rewatch the program and we're going to send you an email when that's available. And finally, a transcript of the program is going to be made available maybe towards the end of the month, and you'll be able to find that in the event resources section. We'll send you an email about that.

Here are our financial disclosures. Okay. Now, in today's program, we're going to talk about geographic atrophy in section one. In section two, we'll talk about emerging treatments for geographic atrophy. And then finally, we're going to have a discussion about working with your doctor for the best possible outcomes. So the first section today is just getting to know what geographic atrophy is. And to help us start going, let's start with an audience poll, as I mentioned before. Here's the first poll: What best describes geographic atrophy in relation to macular degeneration? Is it a subclinical stage of AMD with changes in dark adaptation? That's choice A. B is an early stage of macular degeneration with no symptoms C. an intermediate stage of macular degeneration. D. A late stage of macular degeneration that includes vision loss or E. Maybe you're unsure. Just submit your polling answers below. And while we're sort of collecting them, let's meet Liz right away. Maybe, Liz, you could tell us a little bit about what stage of macular degeneration you're in and what your vision is like these days.

Liz: Well, thank you. Actually, I have got advanced macular degeneration. I've got it in both eyes and both forms.

[00:04:00] One eye is just GA, the other eye is GA and wet. But thanks to the anti-VEGF treatments that I've been getting, my eyesight in that eye is still pretty good, and it's what's helping me lead my life. All of this is thanks to a wakeup call, a heads up I had from my mother, cousin of my mother's, in my early forties, so I kept really close track of what was going on from my mid-fifties when I knew it might start. Read a lot. Asked a lot.

Matthew Levine: Thank you very much. All right. We're going to speak to Liz a lot more about her experience a little bit later on. But just so you know in the audience, that the correct answer: geographic atrophy is a late stage of macular degeneration that includes vision loss. In fact: Geographic atrophy is a late stage of the dry form of macular degeneration, and it's really important to know about it because it really affects a huge portion of our lives, if we develop it. It affects driving, reading, household activities, social activities, your ability to conduct your finances and even your emotional well-being. If you look at the slide that we have up here, the statistics are pretty significant. Geographic atrophy actually accounts for about 20% of all legal blindness caused by macular degeneration worldwide, and it's driven 70% by the genes that you inherit and 30% about by the aging process and other environmental stressors like smoking, poor nutrition. Nearly one in five patients with macular degeneration will progress to geographic atrophy within two years of their diagnosis. And about two in five patients with wet macular degeneration develop geographic atrophy. That's what we want you to understand. The progression of geographic atrophy is constant and it's irreversible at this time.

There are no treatments currently available, but the good news is that there are treatments to slow geographic atrophy, progression that are

in late stage clinical trials. So let's turn this over now to Dr. Singh to learn a little bit more.

Dr. Singh: *[00:06:19]* Thank you, Matthew. I see we have a lot of really intelligent viewers today. You guys got the question right from the pulse. I'm impressed already. Well, I'll talk about the stages of macular degeneration. First, we start off with dry macular degeneration. And this is one we've known about that's been very, very common, sometimes unseen in our population, because patients don't necessarily have vision symptoms at this stage. It's classified as either early or intermediate. And the hallmark of this is these yellowy deposits on the retina. They're called drusen. There are signs of cholesterol deposits in the retina. It doesn't mean you have high cholesterol. It just means you have a dysfunction in your retina where you're accumulating cholesterol within it. You can then progress to one of two stages: either the dry form or the non neovascular form of the disease, or the wet form and the neovascular form of the disease. The dry form is where you have patches and areas of atrophy, dead cells within the center of the vision, while in the neovascular form, you have blood vessels that form and those blood vessels leak and cause bleeding within the retina and cause distortion in the retina. And this is treatable at this given stage with injections of medications into the eyes that have been around for the past 15 years. These are the two stages that we typically see in patients within our population. And we'll focus our talk today on geographic atrophy because that's the topic at hand here. But this is really where you have a loss of the photoreceptors and loss of the retinal pigment epithelial cells. In the center of this picture here, you can see a yellowy spot: that's an area of thin retina where the area has become atrophic or has a loss of tissue there.

Dr. Singh: And it's important to remember, as I just showed you in the last slide, that while there's two forms or flavors of macular degeneration, you can have a little bit of each in each eye. *[00:08:02]* So it's not always that you have one flavor and one eye and one flavor in the other eye. You can have a little bit of both, unfortunately, in each eye, and therefore you need to be monitored for both as it progresses over time. There's a spectrum of vision changes associated with these conditions. Early on, the biggest complaint that patients will talk about is impaired night vision. It's actually, the term is loss of dark adaptation, but essentially it's the inability to see in dimly lit rooms and navigating them in the rooms, as it's the first complaint of many of the patients with these conditions. In addition, when the disease is latent stages, either the dry or the wet form, you can develop distortion, blurring or inability to see centrally. You may miss faces or food on your plate as an example of the vision impairment that you'd end up seeing within this condition.

Who is at risk for a geographic atrophy? There are a variety of different risk factors that have been established. First and foremost, genetics and family history play a large role in this condition. We know that older adults, Caucasian adults, who smoke are at the biggest risk also of developing this condition over time. Those with diabetes, obesity and poor nutrition, low intake of omega threes, low intake of green leafy vegetables and doses of fish. Those are all significant risk factors developing this over time. And certainly high blood pressure has been associated with this condition as well.

I'm going to turn it back to Matthew for another polling question.

Matthew Levine: All right. Thank you, Dr. Singh. Let's take another poll from the audience. How long after you or your loved one's

diagnosis with macular degeneration did you receive a diagnosis with geographic atrophy? Select your answer and click submit below.

Is it A. Less than a year B 1 to 2 years C. 3 to 5 years. D. Six years to ten years. E. More than ten years. F. I've got macular degeneration, but I do not have geographic atrophy or G. I don't or my loved one doesn't have macular degeneration or geographic atrophy. *[00:10:16]* Now as we are waiting for the answers to come in, we're going to see a little video clip of another patient who has geographic atrophy. Her name is Jill.

Jill (interview clip): The history on the geographic atrophy diagnosis is rather strange. Nobody in the medical field ever used the words geographic atrophy to me. And I had to call my doctor's office and ask. And the reply at the time was, well, of course you have geographic atrophy, you have wet and dry macular degeneration. Dry macular degeneration leads to geographic atrophy. So I had never been told by the multiple providers, of that diagnosis until I specifically questioned it.

Joe (interview clip): So just to clarify, this was Jill's third macular degeneration-- or third macular physician--that she had seen and was being treated for her wet and dry macular degeneration. And that was the physician's office that used the words geographic atrophy.

Jill (interview clip): I find it very interesting because when I questioned it further with the doctor directly, he was pretty honest with me and said, you know, we don't talk about it because there's nothing we can do about it. I got diagnosed with wet macular degeneration, the only diagnosis I had initially gotten in 2014. It probably was at least four, maybe five years before I even heard the words geographic atrophy.

Matthew Levine: *[00:12:00]* All right. I'm sure that's a little bit eye opening for some of you, because the difficulty in understanding your diagnosis sometimes becomes apparent when we start talking about geographic atrophy, and we're really about to hear about the importance of early detection from Dr. Singh. But I was hoping that as we get into this discussion, Dr. Singh will also be able to tell us about how early he starts his discussions with his patients on geographic atrophy.

Dr. Singh: Yeah. Great, Matthew. Happy to take that on. You just heard this wonderful story from the patient about what we see a lot in our patient populations, that sometimes eye specialists were ignoring this condition because truly there was no treatment. And the good news is that there are treatments that are coming around, which we're going to talk about later.

But first and foremost, early detection matters the most. It's important to get regular eye examinations, to get complete eye examinations with a dilated fundus examination. What does that mean? It means people put drops in your eyes and your pupils get wide and your vision gets blurry for a period of time, usually 3 to 4 hours. That's the best examination you can get for macular degeneration. You can monitor your vision at home through an Amsler grid or grid paper that they typically hand out at the doctor's office. This is a sensitive way of detecting if there's changes; wavy, blurry or distorted lines in your vision, that's a sign you might have advancing forms of macular degeneration. Certainly we talk about making lifestyle changes, making sure that that we reduce the risk of progression by stopping smoking or taking a diet full of green leafy vegetables or being on an eye vitamin that may help prevent the progression of the disease in the first place. However, the treatments for geographic atrophy are still in development, as I mentioned, and early detection is the most

significant event to preserving vision and prolong the quality of life in our patients.

Matthew Levine: *[00:14:05]* Thank you, Dr. Singh. So everyone knows, the majority of people in the audience answered that they have macular degeneration, but they don't have geographic atrophy, which might be a reason that they're tuning in today. All right. We're going to move on to the next section, which really talks about emerging treatments for geographic atrophy. And I'd like to bring on Dr. Preeti Subramaniam to talk about that.

Dr. Subramanian: Thank you, Matthew. So this slide lists some of the ongoing research in GA. GA is primarily driven by an immune response which is mediated by the complement system, and we'll talk about it later. So learning why our immune system contribute to AMD and understanding the mechanism that may lead to new and promising treatments. That is, new research for lifestyle intervention. One area of promising research is understanding how diet can influence the gut microbiome. So the microbiomes are the diverse bacteria that are normally found in the gut or the intestinal tract. And how these microbiomes influence the progression of the disease and particularly how they influence the immune system is an area of research currently. There are innovative approaches using artificial intelligence on retinal images and eye scans to predict the chances of AMD progression from intermediate to advanced form. And this can help identify high risk individuals who can then be recommended for more frequent screening and earlier treatment, which Dr. Singh mentioned is really key for GA. *[00:16:00]* And studies are underway to identify new genetic risk factors, so with increased knowledge it's going to lead to new GA treatments. And with that, I'll pass it back to you, Matthew.

Matthew Levine: Thank you very much. Before we really start to continue on and focus on some promising treatments that are imminent, hopefully--let's have another quick poll of the audience. Which part of the human immune system is a target for treatments now being tested in geographic atrophy? Is it A. Antibodies B. Complement. C. White blood cells. D.You're unsure. Just submit your answers below. And while they're coming in, maybe Dr. Subramanian could talk to us a little bit about the one term here that I think might be new to people. You probably heard about antibodies and white blood cells, but complement. You've already mentioned it once. Can you describe that a little bit more, Dr. Subramanian?

Dr. Subramanian: Yeah, you can think about the complement system as a first line of defense in our body and also in the eyes. It's always active and it's available to quickly respond to any kind of injury or insult. So any time it detects something as wrong, the complements would alert the immune system to respond. And then what happens in case of geographic atrophy, or GA, is that the complement system is in a hyperactive mode. So there's a lot more of it and too much of the complement is bad.

Matthew Levine: All right. Thank you very much. So the audience is a little unsure. Their answer has been D. The correct answer is B. complement, which we've just been talking about. And perhaps, Dr. Subramanian, you just continue on and talk about the role of complement in the progression of geographic atrophy and how it develops.

Dr. Subramanian: *[00:18:00]* Yes. So oxidative stress, as you see here, is a naturally occurring process with aging, and it's also accelerated by smoking and poor nutrition conditions. And under oxidative stress, what happens is that accumulation of drusen, which

are the yellow deposits that are at the back of the eye. And these drusen can eventually lead to cell death of the retinal pigment epithelium cells that are lost, and form the patchy area. So the loss of these RPE cells or retinal pigment epithelium cells activate the immune system, particularly the complement system, and the hyperactive complement system can cause inflammation and contribute to the disease progression and development too. So there is more and more evidence accumulating that the complements play a significant role in the development of the disease, and trying to inhibit the complement may actually play out to be a good strategy for treatment of GA. And with that, I will pass it on to Dr. Singh, who will talk more about that.

Dr. Singh: Thank you, Dr. Subramanian. That's a good setup for me to talk about some of the newer drugs that are in clinical trials, which really are changing the way we can attack this disease in many ways. And you talked about complement and this complement system being dysregulated, potentially as a source of geographic atrophy. And there's a drug called pegcetacoplan, which is now being investigated for the inhibition of complement through an eye injection or an intravitreal injection into people's eyes. This drug has shown a significant reduction in progression of geographic atrophy, almost 22% within the clinical trials. And this improvement was seen to 18 months. And we're soon to have two-year data at the end of this year, which I think will elucidate what the benefits may be of this condition.

[00:20:00] In addition, we have other drugs within clinical studies, again, looking at the complement system and really attacking it in many ways. This is avacincaptad pegol. This is a drug that is actually currently in clinical trials showing a very similar reduction in geographic atrophy growth, of 27 to 28% improvement seen across 12 months. Again, this is still an eye injection delivered within the office

under aseptic technique for a patient, and it's given every one or every other month in order to see a response to treatment.

And finally, just to be clear, there's a lot of different approaches going on right now to this treatment. And this is some of the schematic cartoon that shows you where those injections are being given, either into the vitreous cavity and the back of the eye under the retina, subretinal injections, or potentially suprachoroidal injections. This is a small space in the front of the eye which communicates to the back of the eye. This is a way of delivering drug in a very elegant fashion to a spot in the eye that might be benefited from this condition. So I'm going to turn it back over to Matthew for the question and answer portion.

Matthew Levine: Thanks, Dr. Singh. So as you can see, there's some pretty interesting and promising treatments that are already in clinical trials. And let's talk about clinical trials for a second. How would you rate your interest or willingness to participate in a clinical trial for geographic atrophy treatment? Again, just select your answer and click submit. And as we're waiting for the audience answers to come in, let's ask Liz how she might answer this question and why.

Liz: I was just saying that I have to be really careful because I live alone and I've got both conditions in both eyes. And so I have to think very carefully about what the effect might be while they're doing it, and particularly what might happen if there's any kind of negative effects afterwards. Because as I say, I am in my own, but I really, I really value that work. *[00:22:00]* And if I could get involved in one, I absolutely would.

Matthew Levine: All right. Thank you very much. Let's see what the audience answered: C. they’re somewhat interested and willing. So

we're going to get a little bit more information on that in one moment. Here's a slide that'll tell you where to go for more information. But before you get worried about trying to write all this information down, I just want to remind you that this deck is available for download. Again, it's at the bottom of the user interface and you can download it and then you'll be able to click on those links and go directly to these sources of information. So in case you want to learn a little bit more about participating in a clinical trial, we've already created a program that you could watch on demand, and that's the MedLive program. But there's also a website, clinicaltrials.gov, that lists all the clinical trials that are open or underway. Some people find that quite confusing. But BrightFocus, the organization that Dr. Subramanian works at, has their own version of an interface for people interested in clinical trials. And many people think that that's a much more elegant and clearer way to figure it out for themselves. So we encourage you, once again, download the slides, investigate this if you want to learn more about clinical trials.

All right. We're going to move on now and we're going to start talking about working with your eye doctor toward the best possible outcome. Maybe, Dr. Singh, you can start us off by talking about when and how often people should have their eyes checked in the first place.

Dr. Singh: Thank you. Happy to talk about that. Vision screening is something that we recommend for many of our patients, depending on your age, and at the age of 40, everyone should have at least one comprehensive eye examination. *[00:24:00]* Think of it as your midlife crisis eye examination for those who are who are in that age group.

And then from the age of 40 to 64, you should have eye exams starting every year or every two years, depending on whether you have a family history of a condition or whether you have some

predilection to having it when you had that examination, if they found something that'd be worth following in the subsequent years to follow. But for the vast majority of people, they need to, at the age of 65, have a comprehensive eye examination once a year. And that's really to eliminate the likelihood of the most common reasons for vision loss: diabetes, glaucoma, cataracts and also macular degeneration. Macular degeneration still ranks as the number one leading cause of blindness in the United States. And so therefore, finding it early, detecting it early, providing supplemental support, whether it be vitamins or whether it be other therapies, is of critical importance to preserve vision.

Matthew Levine: Right. I just wanted to point out, thank you, Dr. Singh, that patients who have a high risk of macular degeneration should follow up maybe more often than others at intervals that's determined by between them and their primary eye care specialist. Now, this point is not one that you're probably going to find as a standard recommendation from one of the medical practice associations. But it's something that we at the American Macular Degeneration Foundation have kind of put together based on what we understand about the progression of the disease and what doctors are telling us. Dr. Singh, is this kind of close to what you practice with your patients?

Dr. Singh: Absolutely. I think that this is where we really have to use the art of medicine. And this is sort of a way of putting together a lot of different recommendations from various societies together.

Matthew Levine: All right. Thank you. All right. We're going to move on. And Dr. Singh, I think you can continue to talk about testing and monitoring.

Dr. Singh: Yeah. So, you know, when we do testing in the office, we talked about some of the testing we did, but just to be clear, a dilated eye examination with eye drops to make sure pupils dilated for 3 to 4 hours is the best test you can have.

[00:26:00] Retinal imaging is a good alternative and certainly a good substitute sometimes for helping the eye examination along. Retinal photographs look at progression. As you can see on the far right side, those orangey pictures of the retina are helpful to follow. We have a newer test called an optical coherence tomography test or OCT. This is using, basically, light that's reflected back from the eye and using it to quantify structures within the eyeball itself. And you can see a gray and white picture right here where you see the patient who has an area of geographic atrophy present in this picture. But this gives you an ultra-structural, high resolution histological section almost of the retina, without actually doing any cutting or any tissue work. Basically just looking in the eye with this machine. And OCT angiography is an iteration on OCT which allows us to look at blood vessel and blood vessel flow in particular. Fluorescein angiography is sort of the gold standard where they take some vegetable dye and inject into your arms. The dye turns yellow and will certainly go into your eye and become fluorescent and then use a camera with an excitation and a barrier filter to look for a fluorescent light that emanates from your eye and that can help map all the blood vessels within your eye. And finally, dark adaptation testing. This is something that's not commonly done, but it's commonly done in those patients who might have a retinal degeneration where they do some dark adaptation testing to see how quickly you adapt to the dark period of time, to see if you might have some other retinal disorder which might require additional therapies and management. You can certainly self-monitor yourself, and I'll have Matthew take over this part of the slide.

Matthew Levine: Thanks. You know, when it comes to tracking changes in your vision, the patient also plays a part here. And it's another one of the key messages we want to get across to you as being involved in your own care. And this is one way you can. It's home monitoring as frequently as possible.

You're probably familiar with the Amsler grid. *[00:28:00]* You may have been handed it by a physician. You may have found one online. It's a grid that you use to test for changes in your vision. Now, just to give you this, it's a simple device, but just to give you a sense of how important it could be: We got a letter from someone in our community. This is someone who takes just one minute a day, every day to check his sight with this very simple device. And on two occasions, he noticed changes in his vision that had not been detected by the more elegant forms of vision monitoring that Dr. Singh just described, at his last medical appointment. But he found there was a change, he reported to his doctor, and on two occasions the doctor had him come in immediately for an additional anti-VEGF injection that saved his sight. This gentleman, who's a retired physician, has been doing this for eight years and he's 94 and still driving.

There's another device or tool. It's called the KeepSight Journal. It's something that is not widely known about it. But it takes elements of the Amsler grid and combines it with some game-playing. And it becomes a fun way for people to, becomes a fun way for people to monitor their vision. In fact, it turns out it's so much fun that it's 5 to 7 times more effective at keeping people engaged in monitoring their vision. So it's something that you might want to look at. You can get a copy of it free at macular.org. But a more sophisticated tool that is available is the Foresee Home. You can see it here on the right. It's a desktop mounted device and it involves you in tracking changes in your vision, but it reports changes directly to your doctor's office, at

which point they can alert you that there might be a change that you need to come in and see someone about right away. *[00:30:00]* This involves a relationship with your doctor, so you need to talk to your doctor about it, whether they offer it, and to see how you might get into the kind of relationship that would involve using this device.

Now, as much as we've been, as much as we've been emphasizing the patient or caregiver's role in managing macular degeneration, being active in your own care, you know, we don't want you to feel that you've got to do this alone. So, in fact, you can think of yourself as being the key player on a whole team that includes several specialists. And many of you probably have engaged some specialists already. Maybe you started out with an optometrist, moved on to an ophthalmologist, and from there to a retina specialist to really deal with your macular degeneration. But there are other eye care specialists that can really help improve the quality of your life. A low vision specialist can deal with lighting conditions and lots of other aspects of vision that affect your ability to get around. And an occupational therapist is someone who can find ways for you to adapt to living with low vision in your physical environment and doing everyday tasks. So if you want to find out more information about low vision specialists and occupational therapists, usually your local blind association or low vision association is a good resource for that.

Okay, let's have another vignette from Jill, along with her husband, to talk about the way that she communicates with her team.

Jill (interview clip): I'm very forward with the physicians when it comes to what I want. And I think that's something that a lot of patients are not, that I think they need to learn. It's very important to me to be able to communicate very openly with whatever doctor I was

seeing. *[00:32:00]* And I currently have that kind of communication with that kind of openness.

Joe (interview clip): I think sometimes people don't want to ask the question that they don't want to hear the answer to. And it's important to, I think and in Jill's, Jill's a perfect example of this. She does ask that question she doesn't want to hear the answer to with the follow up: Okay, so now what can we do about it?

Jill (interview clip): There's one part of my care team that I very commonly forget, and I think she has given me, other than my husband, she has given me the most support and grounded information. She's my low vision specialist. She has been one of the strongest support systems. Because she's open enough to say, "There's nothing that we can do this time. This is a part of your disease. So let's learn how to adjust to what's going on. And let's try this. Let's do that. Let's do the next thing." Then there's other times where she's like, "Wow, I think if we change your lens, we can get a little bit of perfection here. This looks better. This might help."

Matthew Levine: So as you can see, Jill is pretty forceful when it comes to expressing herself. And she also has her husband as an advocate. Now, not everyone has an advocate or is as comfortable as Jill is with that style of communication. So you really shouldn't feel that you have to be like Jill, but you should find a way that suits you when it comes to making sure that your needs and concerns are being heard. Maybe comes down to developing a relationship with someone who can become your advocate, especially when you go for treatments, because sometimes you have to recover from an anti-VEGF injection and you're not really prepared to ask the questions that you might have thought of. Maybe it's just writing down some questions and letting your doctor know in advance that you have this

list and you want to discuss it. *[00:34:04]* But there are any number of ways of establishing a good baseline for communications.

So, we're going to move on to sort of managing the disease and what you can do about that. And let's poll the audience one more time. What lifestyle choices can you make to slow the progression of macular degeneration to geographic atrophy? Is it: Avoiding nuts. B. Eating fewer green vegetables. C. Avoiding daily red meat. D. Meditating daily or E. You're kind of unsure. So while we are waiting for the audience to answer this, maybe we talk to Liz again about the healthy lifestyle choices that she's made.

Liz: Well, listening to that list, I have to say I try as hard as I can to do them all. And I was lucky enough to be able to start very early on, too, because of that warning I had from my mother's cousin. So I've always tried to follow a good diet. I like to walk. I'm not a good sports person by any means. I wear my sunglasses, I wear my hat, I take the AREDS supplements for my dry and anything I'm asked to do, I do, do. But once you get into the swing of it, it's not as difficult as you might think.

Matthew Levine: And I know, Liz, that one thing that you like to emphasize, at least in our conversations, is that people should start making these lifestyle changes earlier rather than later.

Liz: Absolutely. And I thought I was expressing that in a very roundabout way, not being too forceful, but it is absolutely critical. It gets you in the habit of doing it and it just becomes part of your life. *[00:36:02]* And also it's basically good for every other aspect of your life. The only thing I haven't done is smoke, but that's because I never liked the taste of it. But I know that is the number one problem for a lot of people getting over it. The good news is, it's never too late and

that's your message that really has to get across to for all of those things.

Matthew Levine: All right. Thank you. So the audience was answering C, which is the correct answer.

Let's really drill down now and sort of talk about healthy lifestyle choices. But before we start the conversation, I just want to be very clear about one thing when it comes to geographic atrophy: Research has clearly connected making lifestyle, healthy lifestyle choices to reducing the risk for developing macular degeneration in general and to slowing its progression. But we're still waiting for studies that really directly connect, making these kind of choices to reducing your risk from geographic atrophy. Still, it just makes sense that you can put yourself in a much better position to reduce your risk for geographic atrophy if you reduce your risk for developing macular degeneration. Now, again, I'm kind of sorry that we can't go into great detail on a lot of these, there's a lot of territory to cover. Again, you can find much more information if you do some exploration, you can go to macular.org, or some of the other resources that we're going to provide you with later in this presentation. And again, you can download the slides and get a hold of those resources. There are some really excellent ones. So let's start with some of the foods and supplements that you can choose to help reduce your risk for macular degeneration, geographic atrophy, hopefully.

So let's start with antioxidants. They're really abundant in colorful fruits and vegetables and dark leafy greens. And antioxidants prevent or slow the damage to cells that's caused by free radicals, which are kind of unstable waste substances that our bodies produce in reaction to environmental factors like the ones we've talked about before, smoking, pollution, and also as byproducts of our own body's

metabolism. *[00:38:15]* Guess what? The intense process that occurs in our retinas that converts light into nerve impulses that our brain then interprets as vision, makes our retinal tissue the area of highest metabolic activity in our bodies. So our retinas are kicking off a lot of stress factors. So if you think back to some of the risk factors for macular degeneration, like cigarette smoke and air pollution, ultraviolet light, these generate free radicals as well. And we really need antioxidants to neutralize these free radicals, or our bodies are going to enter into that oxidative stress state, which, if you recall, Dr. Subramanian told us, was right there at the top of the chain of events that leads to geographic atrophy. And there are two antioxidants in particular that we want to consume enough of protect our macula from the damaging light of the sun. That's lutein and zeaxanthin. And both of these are found really in dark, leafy vegetables and colorful vegetables.

The next two, eating more omega three fatty acids and eating limited amounts of red meat, are actually two sides of the same coin. And that is fats and inflammation, which is at the end of the pathway that Dr. Subramanian told us leads to geographic atrophy. So there are really no inherently good or bad, naturally occurring fats. They all serve a purpose and play a role in our bodies. So omega 3 fatty acids are found in cold water fatty fish like tuna, salmon, sardines and in some nuts, most abundantly in walnuts. They've been shown to play a protective role in the body by reducing damaging inflammation. Omega 6 fatty acids, on the other hand, which are found in red meat and many of the vegetable oils that are commonly used for baking or frying, they stimulate the inflammation response that our immune system relies on to protect us from outside attack or injury. *[00:40:08]* But eating too much omega 6 and too little omega 3 contributes to chronic illnesses, including macular degeneration, by overstimulating the inflammation response. In fact, studies suggest

that we want a ratio of maybe three or four to one omega 6 to omega 3 fatty acids. But the typical American diet has a ratio of something more like ten or fifty to one. So cutting down on fried foods and baked goods while eating more broiled or baked fish is probably a good way to balance your fat intake.

And when it comes to eating well for macular degeneration, studies have found that a heart healthy diet, like the Mediterranean diet, ticks off all the boxes. Colorful, fresh vegetables and fruits, fish, extra virgin olive oil and also limited carbohydrates. There are many ways for you to learn about recipes that can contribute to good eating habits. Macular Degeneration Foundation has got one, a cookbook called *Eat Right for Your Sight*.

And finally, let's talk a little bit about the supplements that have been referred to. There is a formula that was tested in a large study called the AREDS Formula, and it was shown to slow the progression of macular degeneration, if you already have intermediate macular degeneration, by about 25%. The study did not find, though, that the supplement prevents you from getting macular degeneration. Now you can find out more about the recommended amounts of these nutrients, and you can take them individually or you can take them all in one in this single supplement, usually you will find it on the label that contains the AREDS2 formula. But there is one element of the formula I just want to point out, which is zinc, something you probably need to track overall because too much zinc can lead to digestive and neurological problems. And the reason I'm mentioning it is because it's a common ingredient in some over-the-counter supplements that people are using to reduce the length of colds and other viral infections. *[00:42:00]* So if you're taking a supplement with zinc in two different places, you might want to find a supplement for your eyes that eliminates the zinc component.

There are some other really standard recommendations that you may have heard of already for reducing your risk for macular degeneration if you've been diagnosed with it. Avoiding or stopping smoking, that is the single biggest risk factor that you can change. Making exercise routine. I think it's recommended maybe 2 to 3 times a week for about half an hour, enough to break a small sweat. Maintaining healthy weight and blood pressure, also very important. Protecting your eyes from the sun, from the ultraviolet A and B light-- sunglasses that clearly say or have been tested to prove that they do block that range of light and also wearing a large-brimmed hat. One thing that you should really be aware of is that the benefits from doing these lifestyle changes are cumulative. So much better to do two, three or four than just one.

So geographic atrophy and macular degeneration are also associated with other conditions, they're called, usually referred to as comorbidities: heart disease, obesity, kidney disease, cognitive decline, depression, even dry eye. There are other conditions. It might seem obvious that there's a connection between heart disease and macular degeneration because the drusen that are associated with macular degeneration and the plaque that's associated with heart disease are similar. In fact, people with macular degeneration also have been found to have angina pectoris, coronary heart disease, congestive heart failure, myocardial infarction. They also have chronic kidney disease.

[00:44:00] And something I just learned and I'm a type one diabetic, that the presence of diabetes predicts incident geographic atrophy and that patients with diabetic retinopathy are at greater risk of getting macular degeneration later. I was unaware of that. It's a cause of concern for me personally, but I think it really needs to be more widely known. People with macular degeneration are also at increased risk for

Alzheimer's disease, especially if they also have liver disease. And then also there's a connection to depression. Many people with macular degeneration experience depression really within the first few months of diagnosis. And, you know, these are all medical conditions that are listed here, and they involve other specialties. But you should talk to your general practitioner or your eye care doctor about how these conditions might affect your macular degeneration and really how you can best manage them and what to do about the interrelationship there.

So it's pretty apparent by now that geographic atrophy affects more than just your vision. And I'd like to talk to Liz a little bit now about whole patient care. What does that really mean?

Liz: Well, to me for sure it means the eye doctor who is taking care of our eyes remembers that those eyes live in the same body the day before they got the disease. We haven't changed at all. We're the same person we always have been. And having a diagnosis of, particularly advanced macular, whether or not, you knew it might be in the cards as I did, or in the case of Jill, I was just looking at the vignette on her too, it just came out of the blue. It is a devastating diagnosis. *[00:46:00]* And so initially when we're hearing it, actually we're not hearing anything other than you've got that. And so really important to get some material that we can take away and read and kind of muse on. I know with my own doctor, and we have a long-term relationship and work really well, when he mentioned to me that, yeah, now in my case it was the wet AMD, the first one. He said, "Would you like your injection today or next week?" And he could just see the fear streaming out of my eyes. So totally unexpected to both of us. And he patted me on the shoulder a little bit, he said, "Material this week. I'll give you the shot next week."

And so just remembering that all the way along and also the need for support. Oh, my gosh. You know, there is the traditional ones and they were the ones I always used to rely on, which was friends and family. But I've found since the COVID particularly, support is actually out there all over the place, not on a regular basis, but all of those little connections that you have with people you know, the person you start, stop to talk to or the person who gives you the coffee sees you can't see very well and at lunch time brings you your dish. You know, that's also really important. And also, I think it gives us all a boost. So I would say, as I'm learning: never miss an opportunity. You never know what is going to come at the end of it. In fact, that's how I met the fellow who today is enabling me to use a computer and to do all the research I'm doing. Without him, I wouldn't have been able to do any of it. So it's really marvelous. And also: peer support. Now, I haven't needed too much of that yet because I still see as well as I do because my condition was detected early and I'm being very good about everything I'm asked to do. *[00:48:04]* But when I do meet up with them, it's really helpful to talk to other people who have the same eye condition, not just an eye disease, but the same one. Because we all tend to be an older group and we've had very different life experiences and we're living very different lives too now. So just being able to trade stories and pick up tips here and there the other way, you know, what do you do about this? Well, actually, I found this works really well for me. Just that kind of camaraderie that the pandemic is awful, as it has been in so many areas, has exposed us to that area, which particularly people who don't live in big centers, have the opportunity to connect with people all over the place. And in fact, I'm thinking of joining a peer group in the UK because I now know I can get on them just as well. And they have some amazing answers there too. So it's all part of a piece where all the person with the same kind of needs that we have before we were diagnosed, and after, and some of them even more so. But there's lots of opportunity out there.

Matthew Levine: Thanks, Liz. I think I'm really getting a strong sense from you of your openness and willingness to take advantage of all these kind of resources that you just mentioned.

Let's talk a little bit about maintaining safety and independence. Now, there's a lot of information out there, both good and bad, but there's some fundamental things that you should really be aware of. We just touched on developing a kind of support network, as Liz said, including family and friends, maybe even work colleagues. But there are also ways to modify your home for low vision safety. And I know that Liz has some concerns that people should be aware of, about fall risks related to the changes in your eyes, especially contrast sensitivity and depth perception. *[00:50:05]* So, Liz, maybe you can speak about that very quickly. I want to move on to some other things. I know you have a lot to say about other things as well.

Liz: Okay. Yes, those are the things-- we're never told about any of the things, the incendiary things, you might say, that happen when you get AMD. And I learned that by accident, for example, why when I was walking in dappled light along a sidewalk, I didn't see the step, little step in front of me. Instead, I stubbed my toe on it and fell over it. Well, that's because my contrast sensitivity is not what it once was, which means you can't see subtle differences in something of the same color. Same thing happens when I'm trying to work with white paper on white paper on my desk, and if the pieces of paper get separated a little bit, suddenly I'm writing on the wrong piece of paper. So that is a biggie, and depth perception is another one. It can be very dangerous trying to go in a subway because we not only we can't see the steps, but also we don't necessarily know where the height is because we've lost that ability too. And that was the big one with driving. That was one of the things that made me decide, you know, I don't move fast enough to be able to do all those earlier judgments, that losing the

depth perception and seeing how far that oncoming car actually is, that made me decide that I would be better on my feet, on public transportation in a cab, a friend's car. But definitely for me anyway, I'm lucky I live in the city because I want to be safe and keep others safe.

Matthew Levine: Okay. Thank you. You've touched on this issue of transportation and there are going to be resources available to people watching this program: If you don't live in a dense city environment, there are other services that maybe you can take advantage of, get you to shopping or to doctor appointments, but we'll have to access those separately or contact us if you want that specific information. But one more topic, I think, Liz, that you would like to comment on is about technology. And maybe we can sort of segue from using technology or getting comfortable with technology and then how to find the reliable resources that are out there.

Liz: Yeah. Thanks, Matthew. You know, AMD is a disease for older people and particularly people of my generation, we have not had the same background in technology. Some of us have learned it through jobs or kids or something like that, but for some people it's a big unknown. So I would say the first thing people need to do is to get comfortable with using it, know what to expect when things happen. A friend of mine has a great phrase, “Expect the unexpected.” And it can be so easy to hit a wrong key and oh, what's happened and how do I get back from that? So just developing a comfort level and then once you've got that, it is amazing what's available on the Internet. And that's where I've done all of my research. But I do know that a lot of it, most of it, in fact, is not designed for people with vision loss from the very beginning. The, what they call, the URLs or the stories of the screens you pick up, the colors may not suit your eyes. So how do you cope with something like that, especially when you have to change

from one to the other? Or what is chat when you're asked to chat or YouTube, where people speak very quickly, but our brains aren't processing as quickly and even as we go back, we don't have the background, computer skills or knowledge of the subject, in my case, my eyes, to be able to really use it well. So I'm a big advocate for all kinds of different kinds of communication.

Matthew Levine: All right. So when you go on the Internet, where do you find the most reliable information there?

Liz: Oh, wow. Good question, because it can be pretty tricky when you enter a very simple search. You think it's simple, but you need to understand and -- thank you for asking this question--it all has to do with the search engine and how they decide which sites they're going to show you first. And that depends on which get the most hits. Well, if your subject is not one of the ones that gets the most hits, the best information for you may not be right at the top. But knowing all of that, if you can get to feel comfortable with certain websites, you know they're going to give you good information. That is really helpful. And I know the organizations attached to macular degeneration is one, foundations are another. They've been very helpful for me. Some of the health magazines, the good ones, where, you know, who's written a subject, whether or not a doctor has reviewed it can be very helpful and in very simple, straightforward language for people who have no background. It's a long time since we were in school, you know, and we may not have even studied the eye at that point. So doctors and people who are helping us, everyone, we're starting from a pretty blank slate.

Matthew Levine: Okay. Thank you. So let's just see if we can get to some of the resources that Liz was mentioning as being valuable. Obviously, we at the American Macular Degeneration Foundation have

a website that's got a lot of good stuff on it. Also, Dr. Subramanian's Foundation, BrightFocus, has got some excellent stuff there. *[00:56:03]* And there's something I want to draw your attention to: AMD Central is actually a website that combines the best information from BrightFocus, from AMDF, along with some other leading nonprofits. We all got together and contributed good information that you can rely on, to this website called AMD Central. So it's worth checking out. Also in general, the National Eye Institute. While you might find highly technical stuff, you'll also find some highly useful stuff, and Vision Aware, a really good website answers a lot of your questions. So I'm sorry that we can't really get further into this at this point because we're kind of running out of time. I want to just move ahead and we'll have time now to ask the panelists some of the questions that have come in from the audience.

So the first question is something that I alluded to before about a genetic risk profile for geographic atrophy. How do you find out if you've got the profile that says you might be more likely to have geographic atrophy? Remember, it's driven 70% by genetics. Maybe, Dr. Singh, you can take a swing at that.

Dr. Singh: Happy to. Genetic testing is something that has not been recommended typically by the American Academy of Ophthalmology. And the reason is, is because genetic testing doesn't determine either progression 100% of the time or doesn't determine response to disease treatment. So at this point in time, really, it's based upon clinical examination from a staging perspective. So you want to have an examination with an eye doctor, they'll take a look at you, evaluate you, and determine if you need to have, be on, vitamins or other things. And that will be the true benefit of having that examination. The genetic tests themselves are very expensive and probably very

nice, but they don't tell you truly if you're going to progress to the disease or not.

Matthew Levine: *[00:58:00]* Dr. Subramanian, maybe you can talk about this next question. Do probiotics assist the microbiome in geographic atrophy?

Dr. Subramanian: So, probiotics provide overall anti-inflammatory effect, but the role of probiotics for GA is still being evaluated by research. So overall, it does-- probiotics could have health benefits, but specifically for GA, it's something we need to find out in the future.

Matthew Levine: Okay. Thank you. Dr. Singh. I think the interest was piqued in the audience about the clinical trials for those two complement inhibitory treatments that you discussed. They want to know how far away we are from actually having these treatments.

Dr. Singh: They're not too far away at all, actually. They're in their last phases of clinical trials. They should be out by hopefully middle of next year in its first form. They're about to submit to the FDA currently, so we're going to hear a lot more of the information from these studies that are going to be ongoing and certainly in the fall with some pivotal data from both of these trials.

Matthew Levine: Okay. Thank you. Well, you know, it's a very informative conversation we had today. I think it's become clear that geographic atrophy is a significant development within macular degeneration. And people want to learn more. In fact, another question just popped in. Are there side effects from the new geographic atrophy treatments? And also, I think I would add on to that. Are they independent or combined with the current anti-VEGF treatments for Wet?

Dr. Singh: Those are really great questions, Matthew. But I think in in the essence of this program, I think it really remains upon the consultation with the physician about those two aspects. And we'll have more of the discussion with a 1 to 1 patient scenario, determine those answers.

Matthew Levine: *[01:00:00]* Okay. Thank you very much. And I think we're coming to the end of our time here. So, thank you again, Dr. Singh, Dr. Subramanian and Liz for joining us today and providing us with a really informative conversation. Thank you to the audience for joining us. The American Macular Degeneration Foundation is pleased to partner on this program. And just a reminder that support was provided by Apellis Pharmaceutical company.

Remember, when the program ends, you're going to be directed to a post program evaluation form, and we'd appreciate it if you complete it. And as a reminder, check out the event resources section of the player below because you'll be able to download all the presentation slides and check back at the end of May for a transcript. The program will also be available on demand. My name is Matthew Levine. Thank you so much for joining us.