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Chats

Influence of Diet, Genes, and Lifestyle on AMD

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Transcript of Teleconference with Dr. Sheldon Rowan, an assistant professor of ophthalmology at Tufts University School of Medicine in Boston, MA.

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

MS. DIANA CAMPBELL: Hello, and welcome to this month's BrightFocus Chat. I'd like to quickly introduce myself. My name is Diana Campbell, and I've been with BrightFocus for about 13 years, working with people like yourselves who are impacted by macular degeneration, along with external partners to make sure you have the news and information that you need. The topic of today's Chat is the "Influence of Diet, Genes, and Lifestyle on AMD," or macular degeneration. We're going to spend about a half an hour learning about some of the latest research updates about the role of our diet and other habits or behaviors we have that may impact our eyes. For context, for people who are new today, BrightFocus funds some of the top scientists in the world who are working to find better treatments and, ultimately, cures for macular degeneration, glaucoma, and Alzheimer's disease, and we do events—like today's Chat—to get the latest news from science as quickly as possible to families that are impacted by these diseases. We also have a lot of information on our

website, which is www.BrightFocus.org. Today's guest is Dr. Sheldon Rowan. He's an Assistant Professor of Ophthalmology at Tufts University School of Medicine in Boston, Massachusetts, and is a scientist on the Nutrition and Vision Research Team at the Jean Mayer USDA Human Nutrition Research Center on Aging, located at Tufts. Dr. Rowan is also a previous grantee of BrightFocus Foundation. If you're interested in receiving our 2021 Macular Degeneration Research Yearbook, you can leave a message at the end of the Chat. So, with all of that said, Dr. Rowan, welcome back and thank you for speaking with us today. I wonder if you could just tell us a little bit about yourself before we get into the discussion.

DR. SHELDON ROWAN: Sure. I've been doing research in this area around nutrition and macular degeneration for about 10 years now. I've actually been doing vision science for probably over 25 years. It's something I started in graduate school and have just been really passionate about. And one of the exciting things about coming to work at a nutrition research center is the ability to take what we've learned about basic science, especially in disease processes, and relate it to nutrition, which impacts so much of our health. And so, it connects with our mission about healthy aging, and I think, you know, thinking about healthy vision aging is just absolutely essential. I'm really excited to be doing this Chat.

MS. DIANA CAMPBELL: That's great, and I completely agree with you, and for people like myself who aren't researchers or scientists, this research is easier to understand, and it's so wonderful to be able to share with our audience. So with that, you've been involved in studies that contrasted the typical Western diet to those in other parts of the world and found that the Western diet might not be the best for eye health. What are the most beneficial foods for healthy vision?

DR. SHELDON ROWAN: We have learned a lot over the years about what we should be eating to help our vision, and it's kind of what our mom always told us to eat. So fruits and vegetables are probably the most important things, and when you think about which kinds of fruits and vegetables, especially ones that have color in them—that contain carotenoids. So, we're talking about beyond just carrots—anything with

red color, with orange color, like peppers, tomatoes, those kinds of fruits and vegetables. Within vegetables, leafy, green vegetables obviously are great, but things that are ... broccoli, cauliflower, Brussels sprout kind of family has been shown to be great for healthy vision. And then, the other foods you throw in there is fish, which is especially beneficial for macular degeneration—I think we'll talk about it as we go on, has some additional protective effects. So, those are what I would consider to be the healthiest foods for maintaining healthy vision.

MS. DIANA CAMPBELL: That's great, and I think that guiding principle you shared about color makes it a lot easier for us to implement rather than memorizing a list of what's good for you, and instead just looking at your plate and making sure that there's plenty of color on it. So, there are also foods to avoid, right? Your own research was some of the first to make a direct connection between a high glycemic diet that's typical in the West and changes in the microbiome that lead to increased risk of macular degeneration, or AMD. You showed this in animal models. What are high glycemic foods?

DR. SHELDON ROWAN: The way that we determine if a food is high glycemic is it's about the carbohydrates that are within the food and how quickly those carbohydrates get broken down into sugar during the digestive process. So, when we think about a high glycemic index food, typically, we think about something that contains a lot of simple sugars—the best example being a sugar-sweetened beverage. But there're other foods that could also be really high glycemic that have no added sugar to them. So, for example, starchy foods that have very simple starches that get broken down, especially ones that have been processed, tend to be very high glycemic foods. The best example I like to think about for this is corn flakes. When you look at the nutrition information for corn flakes, there's no sugar in it, but the way that our body treats that particular kind of processed corn starch, it almost instantly gets converted into glucose, and it's how quickly that glucose goes into the bloodstream that determines what our responses are to the different kind of food.

MS. DIANA CAMPBELL: Right. That makes sense. And we mentioned the microbiome. What exactly is the microbiome, and what is it about the

microbiome that helps mediate the potential damage done by these high glycemic foods?

DR. SHELDON ROWAN: The microbiome ... I think it's a phrase that most people have heard a lot about. It's the collection of all the microorganisms in our community. When we talk about the microbiome in humans, we're often talking about bacteria, but it's important to keep in mind that there are other organisms that live inside us, and we also consider viruses as part of our microbiome. And then, within the body, we have a lot of different microbiomes as well. So, the one that my research focuses on—and a lot of people are most interested in—is the gut microbiome because that's our largest and most significant, but almost all of our organ systems contain their own microbiomes. So, for example, the skin has a very well-defined microbiome. The eye has a microbiome on the surface. The nasopharyngeal cavities have a microbiome. But again, as I mentioned, the one that we think about most in response to diet because of its proximity to the food coming in is the gut microbiome. And the gut microbiome is the one that's sensing different changes in the glycemic properties of our foods. So, for example, one of the things that a high glycemic diet can do is it could lead to a short-term hyperglycemia—so an increase in your blood sugar—and that actually changes the properties of the gut as well. It could change the permeability, allowing bacteria inside the gut to temporarily escape, and those can go on and signal to inflammatory processes. There're other bacteria living inside our gut that can specifically utilize some of these different carbohydrate sources.

The way that those microbiota—the microbiota being the different organisms like bacteria—utilize those carbohydrates can lead to them producing compounds that can go and signal to the eye and other parts of the body.

MS. DIANA CAMPBELL: You just got to my next question, and that was: Does it signal or communicate messages to the eye? And what would those messages be?

DR. SHELDON ROWAN: So, we think about a lot of different kinds of communication pathways, but the short answer is there are a lot of

different signaling pathways. We don't know all of them yet, and that's one of the focuses of my research. So, one of them is, like I mentioned, signaling an inflammatory and a kind of modulation of the immune system. So, one of our most important pieces of the immune system is within the gut itself around the colon, and the microbiota in there and the way that our food is processed can change inflammatory cells in the gut that could signal to other parts of the body. So, you can certainly get a signal going from the gut to other parts of the body that signal inflammatory processes that we know are part of what happens in macular degeneration. But there are other kinds of signals that go from the gut to other parts of the body, and some of those are small molecules. Even certain hormones have been known to be released through gut microbiota. In fact, even neurotransmitters can be produced in the gut and go on and signal to other parts of the body. So, we think it's a combination of all of these above that is how the communication path works between the gut and the eye.

MS. DIANA CAMPBELL: Wow, that's really great information, and what really stood out to me was the inflammatory process. We've talked a lot on these Chats about the role of inflammation and the complement factor for example and, especially, in dry AMD, but it's interesting to hear how it all pieces together. It's very, very interesting. So, in this communication with the eye and given that we're talking about macular degeneration, is the retina itself especially vulnerable to age and other damage?

DR. SHELDON ROWAN: Yeah, the retina, just because of where it's situated in our body, does have unique vulnerabilities. So, we think about the environment, especially, being an impact on the eye, so light damage, for example, because the eye is directly exposed to the light, but we think of that as being a unique vulnerability within the eye. But there's also aspects about how the phototransduction works—how we actually convert that light into a neural signal that makes the eye susceptible for damage. So, for example, our photoreceptors—the actual cells in the retina that are picking up the light—have really high amounts of DHA. This is an essential omega-3 fatty acid, but it has such a high concentration, ... —there's such a high metabolic activity —that it's actually prone to getting damaged itself, which can signal inflammatory pathways. The other thing

about the eye, like other parts of the brain, is that it doesn't really have a natural regenerative process, so when the eye does get damaged, there isn't an easy way for it to repair itself. So, unlike other organisms ... other organs, it does have more susceptibility to environmental damage.

MS. DIANA CAMPBELL: That's a great incentive for all of us, to take into account some of the things you're mentioning today. Really quickly, I have a couple of basic questions from the audience, primarily one just verifying whether the information that we're talking about today is applicable to wet AMD, dry AMD, or both.

DR. SHELDON ROWAN: I think it's applicable to both. Certainly, from the experimental side, some of my research has linked changes in the gut microbiome in our diets to a dry AMD model, but there are other papers that have specifically looked in the context of wet AMD, and I think it's a fact that they have so many common processes, like we mentioned inflammation. So, I think it applies to both forms of disease.

MS. DIANA CAMPBELL: Well, and truth be told, it's ... they're good guidelines, in general, for our general heart health and other types of health; it isn't necessarily specifically about the eye. Thanks for clarifying that. Okay, so moving on, are there simple dietary changes we can make other than incorporating the colors and fish? Maybe swapping out certain foods, such as switching from refined sugars and starches to a healthier mix of whole grains and reduced sugar? And are there immediate benefits when people start changing their diet?

DR. SHELDON ROWAN: Yeah, that's a great question. I think the idea of simple swaps is probably one of the best concepts that the glycemic index has given people because most people don't want to make a wholesale change to their whole diet, but they want to make small changes that can kind of add up over time. And so, the one you mentioned is great: the idea of having a whole-grain food rather than the refined, so whole-grain bread instead of white bread. And there's a lot of ways to make those kinds of swaps. You could think of having steel-cut oats instead of instant oats; it actually tastes better anyway. Basmati rice has a much lower glycemic index than regular white rice. But something that I've

learned recently from doing experiments on myself, I got to have a glucose monitor hooked up to me for a 2-week period of time, and I used myself as a guinea pig to test out how I can change the glycemic properties of the foods I eat. Just the way that we combine foods together can really reduce the glycemic index of a meal. So, if you have ...

MS. DIANA CAMPBELL: Interesting.

DR. SHELDON ROWAN: Say you're going to have a bagel and, that's just what you're going to have. If you eat that bagel together with another food—like, a bag of almonds, it really effectively lowers the glycemic response of the whole foods because we eat our foods in combinations, so combining the right foods together can improve that. The other thing that I found that was quite surprising was exercise can also really slow the rate at which the glucose gets released into the blood. So, I did an experiment where I had a bagel and then went for a quick 15-minute walk, and my blood sugar went significantly lower doing that little bit of exercise afterwards than when I just had it and then was sedentary for the same period of time.

MS. DIANA CAMPBELL: Wow, that's really ... that's awesome you did the experiment on yourself, and you have all this first-hand knowledge of not necessarily giving up the bagel but adding the almonds to balance out the net effect. I think people typically think of just removing things completely, and oftentimes, those are things we can get sad about removing. So, small suggestions like this are also really interesting, I think, and important. We've talked a lot about carbs. Is a high-fat diet also harmful for macular degeneration?

DR. SHELDON ROWAN: Yeah. From both experimental studies and what we see from epidemiology studies, a high-fat diet does seem to contribute to eye disease. And the way that people eat their foods together, we talk about a dietary pattern. A lot of times people eat, like, a high glycemic food together with a high-fat food, so think about burger and fries—those kinds of things together.

MS. DIANA CAMPBELL: Sure, sure.

DR. SHELDON ROWAN: And those can synergize sometimes to cause damage to the eye using more than one pathway, potentially. So, the nature of the fat seems to have a big role in its risk to your eye health. So, animal-derived fats and especially trans fats, which we've luckily more or less phased out of our diets, seem to have the worst effect, whereas there are other fat sources like, again I mentioned fish. Fish is ... especially things like salmon and tuna can be fatty, but those fats are really healthy for the eye. So, it's best not to think about high fat versus low fat but to think about the quality of the fats and kinds of what their sources are and how they've been processed.

MS. DIANA CAMPBELL: Gotcha. There's also a question about the high glycemic foods, and perhaps even the high-fat diet, also contributing to things like diabetes and heart disease. Is there any connection between other chronic diseases like the ones I mentioned and AMD?

DR. SHELDON ROWAN: Yeah, that's a great question. There are really good connections between a high glycemic diet and risk for diabetes and cardiovascular disease, but the connections between those diseases and AMD get a little more murky, and I think that's an interesting question. So, we know, for example, obesity could be a big risk factor for cardiovascular disease, diabetes, and it's also a risk factor for macular degeneration. But when we've tried to tease out, "Are people that have cardiovascular disease more at risk for macular degeneration?" the answers may be a little less clear.

MS. DIANA CAMPBELL: Right.

DR. SHELDON ROWAN: Diabetes probably, but may be a little less clear. And we think that there are actually some good explanations for that. So, sometimes some of the risk factors for cardiovascular disease could actually help protect you against macular degeneration; we see these kinds of paradoxes. So, I wouldn't necessarily say that one always leads to the other, but sometimes the baseline fundamentals behind them are similar in the disease risk.

MS. DIANA CAMPBELL: Sure. And like I mentioned before, healthy eating benefits many different systems. So, a question aside from the natural ways we're taking in nutrients, we always get a lot of questions about AREDS and how do AREDS supplements figure into all of this. Do the dietary changes we've discussed provide some benefits in early to intermediate macular degeneration that go above and beyond the potential benefit of taking AREDS? So, are they kind of like an add-on to the AREDS, or does AREDS replace the need to do the dietary changes?

DR. SHELDON ROWAN: Yeah, this is so good to talk about because I do think there is a lot of confusion about this. What we've seen is that the benefits of the diet seem to be in addition to the benefits associated with the AREDS supplements, so certainly, people that are taking the AREDS supplements still get additional benefits from eating a healthier dietary pattern. And there are some great studies done using the AREDS studies, which were run by the National Eye Institute, that kind of showed that people that eat a more Mediterranean-style diet are still protected, even ones that are taking AREDS. And then, the other thing I think that's worth keeping in mind is that the components of AREDS, even though those are naturally found in foods, are present at much higher levels in the AREDS supplements than we could ever get from our diet alone. So, even though they're natural products, we almost take them in a medicinal kind of way, and at the same time, some of the foods and nutrients that we ... some of the nutrients that we get from our food can't be taken in supplement form. So, for example, I've mentioned fish a couple of times, and we know that fish is a great source of DHA and EPA, which we know are really important in the retina, but the AREDS trial actually tried doing a study with adding in DHA and EPA alone, and that didn't seem to have any additional protective effect, whereas fish intake does. So, I would say it's best to think of AREDS and our nutrition as separate entities that can work together but probably not replace each other.

MS. DIANA CAMPBELL: I think that's great information. As I mentioned, we always get questions about AREDS, the different components of it, and how it helps, so I think that's really important. I remember when you and I were talking before this call, you said vitamins do not equal nutrition, and I wrote that down; I loved it. Yeah, I have had people with other

conditions just say, “Oh well, I take this vitamin, so I don’t need to worry about that,” like calcium, for example, and it’s like no-no, you still have to do the dietary changes necessary. So, I think clarifying that is wonderful. Okay, so aside from dietary changes and supplements, like AREDS, what are some other lifestyle modifications that can benefit people with AMD? I know we talked briefly about exercise, but are there any other lifestyle modifications to make?

DR. SHELDON ROWAN: Yeah, I would say the two most important things we can do in our environment—outside of what we’re eating—is to not smoke. And, you know, smoking, I think, is a little less prevalent now than it used to be, but it’s a huge risk factor for macular degeneration, and our environment plays a role in that—both our exposure to smoke and our kind of environment that could encourage it—so not smoking. And exercise is actually, like, a perfect example of another lifestyle change that we can make. We now have, actually, some good data that exercise can help reduce the risk for early macular degeneration, so that’s interesting. It’s a little different than some of the dietary effects that have been studied more in the context of AMD progression. I think there’s an excellent opportunity for exercise and diet to be used together—again, like our parents always told us and our doctors told us. But we now have some solid data behind that.

MS. DIANA CAMPBELL: Yeah, that’s great. I’m looking at the questions from the listeners, and this goes right in with the topic we’re talking about. Are sunglasses important for protection of AMD? I know we briefly discussed light in one of the other questions.

DR. SHELDON ROWAN: Yeah. I think sunglasses can be an important part of that. I think you can also get protection from regular glasses as long as they have significant UV protection.

MS. DIANA CAMPBELL: Oh, good.

DR. SHELDON ROWAN: Yeah. I made sure when I got my eyeglasses done that they had strong UVA and UVB protection. We don’t know a lot about if sunglass use on its own can help prevent that, but I think the idea of

considering the environment as a potential source of damage gets you in a mindset to make other smart choices. So, sure, I think sunglasses are great.

MS. DIANA CAMPBELL: Wonderful. You know, we've talked a lot about different lifestyle modifications and changes. Is there a set somewhere of easy lifestyle guidelines that would be easy for people to follow—those who have AMD and also those who are at risk of developing it? Or is it forums like this that serve to communicate this information?

DR. SHELDON ROWAN: I think we have a good sense of what the key lifestyle changes are, so again, like the smoking, exercise, healthy diet. Something to keep in mind is that it's sometimes hard to get this information from your ophthalmologist, and I think this may have to do with just how people specialize in different areas. So, surprisingly enough, our primary care physicians probably know a little bit more about lifestyle changes that could be healthy, but it's good to know that there is strong scientific data supporting all of those components in reducing risk for macular degeneration. And I should mention that there's new research out there that shows that this kind of combination of the three things—so not smoking, healthy diet, and exercise—can reduce the risk for macular degeneration, even among people that are at very high genetic risk for developing macular degeneration. So, no one should feel like that there's no point to them doing these things. I mean, hopefully, people always understand that it's worth taking steps to improve our health, especially as we're getting older, but there's no inevitability of macular degeneration—you can always do something.

MS. DIANA CAMPBELL: Absolutely, and it's nice for people to feel empowered to feel a little bit of control over something that's, in many cases, taking over their life and all decisions they make, so I like that a lot. This is all just such great information. A couple of final notes before we conclude—next month, on June 29, we will have a fantastic discussion about "Living Your Best Life with Low Vision," featuring Ranjoo Prasad, who is a specialist in low vision rehabilitation. With all of that and to close out today, Dr. Rowan, this has been a really great conversation and very

informative for me and I'm sure for others as well. I think you've given our audience some clear, actionable steps we can all consider to potentially impact our eye health and maybe make us feel like we have a little bit more control of what's going on with our bodies. Before we conclude, are there any final remarks you'd like to share with the audience?

DR. SHELDON ROWAN: No. I think you brought up a really good point that BrightFocus is an incredible resource for the whole community, and I think you guys make such an effort to reach out to scientists and to make sure that we translate our findings into public and actions that people can take. So, I'm grateful, and I hope that people utilize BrightFocus as a source for knowledge and learning.

MS. DIANA CAMPBELL: Thank you so much for mentioning that, and we appreciate it. And really, on behalf of BrightFocus and the audience, we very much appreciate you educating us today on the influence of diet and lifestyle on our vision.

Thank you. This concludes today's BrightFocus Chat, and we will return on June 29. Thank you so much

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Other resources mentioned during the Chat include—

[2021 Macular Degeneration Research Yearbook](#)