GUY EAKIN: Hello, everyone, welcome to our monthly BrightFocus Chat, presented by the BrightFocus Foundation. My name is Guy Eakin; I’m the Vice President for Scientific Affairs at BrightFocus, and today I’d like to welcome our speaker, Dr. Neal Adams, who is an ophthalmologist in Maryland, not far from the BrightFocus headquarters. In addition, he is editor-in-chief of the journal Eye Report and the author of the book Nutrition for the Eye, which was released last November.

Of course, September is Health Aging Month, and we chose today’s topic of “Healthy Living with Low Vision” and today’s guest, Dr. Adams, with that Healthy Aging Month in mind.

Dr. Adams, welcome to the Chat. We host these calls monthly, and we generally start with a quick overview of macular degeneration, but can you give us a little bit about yourself and your practice? Then we’ll go into what macular degeneration is and a little bit about nutrition and the eye.

NEAL ADAMS: Guy, thank you very much for having me, and thanks to you and BrightFocus. It’s quite a delight to be with you and to be able to speak to everyone who is with us on the call today.

I am a retina specialist in the metropolitan DC area on the Maryland side, and I am very interested in nutrition for the eye. I just came out with a book entitled Healthy Vision, which you can get at book stores around the country. It’s geared towards patients and just the general public.
Recently, there’s been a flurry of research on nutrition and the eye, and patients and the American public in general are really savvy, and they want to know what all this research says.

As a society, we’re becoming much more health conscious, and so I spent quite a bit of time trying to figure out what all this research does say and what does it say for our patients? I’m in private practice. I spent many years at Hopkins and then eventually made it out to my own practice where I treat patients with macular degeneration and a variety of other retinal conditions, and our goal is always to help out patients and equip patients with the best knowledge so that they can help themselves out as well.

**GUY EAKIN:** That idea of looking into the research and providing the evidence basis for the recommendations that we have around nutrition is really what we’re all about here today. Maybe we can start with a relatively basic overview about what macular degeneration is and then we will get into that idea of nutrition and what that means for eye health.

**NEAL ADAMS:** Absolutely. Let me start one step back with vision and how vision is really our most important sense. And I don’t say that because I’m an ophthalmologist, but biologically one-third of all of our brain function serves vision, so that’s why we say vision is our most important sense.

How does the eye work? You can think of the eye as a tennis ball. It is hollow just like a tennis ball. There’s a clear window in the front of the eye, and light goes in through this clear window, goes in through the pupil, and gets focused to the back wall of the eye. The wallpaper that lines the inside of this tennis ball, that is the retina. It is what sees light, creates pictures, and sends the pictures to the brain. It is very similar to the old fashioned cameras where you put the film in and wind up the film. That film in the camera is the retina. The retina is what sees the light, creates pictures, and sends the pictures to the brain, so it happens to be the most active part of our whole body.
Metabolically, it is the most active tissue in our whole body. More active than anywhere in the brain, more active than your heart or your lungs. Because it is so active, the retina produces a lot of debris every day and the back wall of the eye sweeps up all that debris every day. It’s the job of the back wall of the eye to sweep up all of that debris every day that the retina produces, but sometimes, over time, our body may get tired. Particularly as we age, we may get tired and we may not sweep up that debris quickly enough. When that debris starts to accumulate, that is the beginning of what we call macular degeneration.

Macular degeneration is a condition in which debris starts to accumulate behind the retina. When this debris starts to accumulate to any substantive quantity, we can notice it when you look inside the eye as an ophthalmologist, and as a retina specialist when I look inside the eye, I can see some of that debris as it starts to accumulate. Then we tell the patient, “Well, you have the early stages of macular degeneration.” And when you have a little bit of debris, it probably does not interfere with vision, but when this debris starts to accumulate even more, it may start to interfere with vision, making vision either blurred or creating some gray areas or even some blind spots in one’s vision in the center as it progresses.

This debris, when all you have is all this debris, we call that dry macular degeneration because the debris is dry. When the debris becomes brittle and starts to crack and blood vessels start to break through the cracks and those blood vessels start to bleed and leak with fluid, that can devastate one’s vision, and that’s called wet macular degeneration because those blood vessels can grow like weeds and they can bleed and leak fluid. That’s wet macular degeneration.

Not many people with macular degeneration have the wet type. Most people have the dry type, but wet can be particularly devastating to patients. This debris—just for our listeners—this debris is called drusen. Our term for this debris is just a fancy word that comes from the Greek word for “rocks.” Back in the old days—way before many of us were born—doctors used to look in the back of the eyes and they’d see this debris and it’d look like rocks, and so they called it drusen, and that name
stuck. So when we see this debris in the back of the eye, we call it drusen. That’s the fancy word for it. You and I can still call it debris because that’s what it is. It’s debris.

**GUY EAKIN:** What do we know in terms of, if we are what we eat, what makes up drusen? And are we adding to the drusen through our nutrition, or is that something unrelated to one another?

**NEAL ADAMS:** In a way, it’s unrelated. Some of the drusen might have lipids and cholesterol and the bad kind of fats, but most of the composition of the drusen is proteinaceous waste and other byproducts of cells functioning.

One factor that results in excess drusen is excess oxidation. People ask me, “What is oxidation?” We’ve all heard of antioxidants, and antioxidants are nutrients that prevent oxidation. Oxidation is this process where chemical compounds inside cells lose electrons, which lead to toxic changes in proteins and lipids, and even DNA, that ultimately lead to injury to the cell that leads to this debris. A lot of this debris that we’re talking about is the product of oxidation and antioxidants prevent this oxidation.

One question people always ask me is, “What does oxidation have to do with oxygen?” and “Where do we get all this oxidation from, and why do we need all these antioxidants?” Well, oxygen is a very curious molecule. As all of us know, life depends on oxygen. We have to have oxygen, but too much oxygen can be harmful, and oxygen byproducts form these toxic chemicals that result in oxidation.

All around us there are many sources of oxygen byproducts. From ultraviolet radiation from the sun, from exposure to chemicals in the air, pollutants such as car exhaust, cigarette smoking, trash incinerators, forest fires, pesticides—you name it. There are oxygen byproducts in medicines that we take. Even just in foods, just by the nature of cooking or processing foods, they have oxidants. Our body has to try to fight these oxidants, and that’s where antioxidation comes in. The body contains high levels of antioxidants, and the eye—and specifically the
retina—has one of the highest levels of antioxidant activity of anywhere because of this enormous task of creating vision that the retina has to do; because it is the most metabolically active part of the whole body, it has to get rid of all these oxidants—get rid of all these chemicals that damage the proteins, the lipids, the DNA—and this damage is what results in macular degeneration.

GUY EAKIN: Well here at BrightFocus, as this week is part of Healthy Aging Month, we’re having healthy recipes contests. So for the aspiring chefs out there, is there a list that you might give, or some examples of eye healthy ingredients or maybe even spices, that you’d recommend adding to a shopping list or to your pantry?

NEAL ADAMS: Absolutely. I talk a lot about spices in my book, Healthy Vision, and there’s a whole appendix that has a bunch of spices and foods and wonderful things to eat. I’ll tell you about some spices, and I’ll tell you about a sample meal that I would suggest for you.

Spices such as mint, basil, saffron, curry, ginger, garlic, cinnamon—they are wonderful. I’ll tell you a little bit about all of them. Mint, for example, is really important for the eye because it helps some signaling molecules in the eye, and those signaling molecules can protect the eye. Curry—there are some studies in the medical literature that show that curry and curry powder, which contains this chemical curcumanoid—it is a very strong antioxidant and can protect the retina.

These spices that I talk about, in fact everything we’re going to talk about, is all from evidence-based medicine. What I talk about is from clinical trials, from the medical literature, from what we call evidence-based medicine. So, curry is wonderful. Saffron contains carotenoids, which are very powerful antioxidants that can help prevent some of this oxidation that occurs in the retina. Ginger is wonderful. Garlic has a very strong antioxidant called quercetin. Cinnamon has so many bioflavonoids. In fact, cinnamon probably has more bioflavonoids per serving than almost anything else. A bioflavonoid, by the way, for those who are listening—bioflavonoids are forms of antioxidants, and initially they were called Vitamin P: P for “protection.” It all comes down to that
saying, “An apple a day keeps the doctor away,” and there is a lot of truth to that because apples are packed with bioflavonoids—and bioflavonoids and ring-shaped nutrients that come from plant sources act as very powerful antioxidants. They also have some other actions—including anticancer, anti-infection, anti-inflammation, antiallergic, anticlotting—but we’re most interested in their antioxidant capability.

Cinnamon is probably one of the most highly packed antioxidant sources. A couple of other wonderful sources of these bioflavonoids are teas and coffee and, believe it or not, chocolate. Some of our listeners might be saying, “Oh, wonderful! I’m going to go out and get myself some chocolate now.” But when I say chocolate, I mean pure cocoa powder and not the chocolate that’s mixed with sugar and butter and all the other ingredients; but pure cocoa powder is just packed with bioflavonoids and is a wonderful source of antioxidants.

GUY EAKIN: Considering all these wonderful ingredients, you had brought up early on the idea that preparation may be a consideration. Is there a rule of thumb for getting the most benefit of the antioxidant properties of these ingredients? You know, how you prepare your food?

NEAL ADAMS: The real easy rule of thumb is mix it up. Cook some and eat others raw. When you go into the details, some fruits and vegetables are better cooked. For example, tomatoes, when you cook them, they release some of their nutrients, including the lycopene—which gives tomatoes their red color—and lycopene is just a wonderful antioxidant. Some of them, when you cook them, their nutrients levels decrease. To go through each one is going to be very difficult; in my book, I do go through which to cook and which not to cook, but the rule of thumb is mix it up. Don’t always cook them all, don’t always eat them all fresh. Mix it up, but keep in mind to not overcook them. Don’t boil them to death, so to speak, and deep frying is not a good way to eat your fruits or vegetables anyway because of all the oil you’re adding with the deep frying. The process of frying increases oxidants in the food. You want your foods maybe gently cooked, or a lot of these fruits and vegetables not cooked, but you certainly don’t want them overcooked or processed.
GUY EAKIN: Let’s switch gears a bit and ask about some of the frequently asked questions we have. We know that the only existing intervention that we have for dry macular degeneration is the AREDS vitamin formulations, and we often have a lot of questions that are sent in by our listeners about AREDS.

First of all, for new listeners, what is AREDS and how do they work with—you know many of our listeners are already taking other vitamins—how do they work with the other vitamins? How do we look at that as part of an overall pharmacy of supplements or nutrition we might be taking into our bodies?

NEAL ADAMS: Absolutely. I want to mention one thing, Guy, before we talk about the AREDS. You mentioned that it’s pretty much the only intervention that we have, and I want to take a step back: I’m going to politely disagree with that and say that it’s not the only intervention that we have. One very strong intervention in macular degeneration is looking at risk factors that a patient might have, such as high cholesterol, high blood pressure, other types of heart disease, diabetes, smoking status, or inflammatory status. There are a lot of ways we can intervene to decrease the risk of progression of macular degeneration, and really the theme is keeping yourself healthy.

It goes back to this whole concept of vision as our most important sense—the eyes are the most demanding organs, and the retina is the most metabolically active part of your whole body—so if you keep your whole body in as tip-top shape as possible, starting with your cardiovascular, going to your inflammatory health, all the way around, then that is a very important intervention in macular degeneration.

I sit down with my patients and we look at these risk factors and how we can intervene, and then we look at nutrition. Nutrition is an important risk factor in macular degeneration, and poor nutrition does increase the risk of macular degeneration, and good nutrition does decrease the risk of progression of macular degeneration, and the AREDS study helped define for us the importance and the scope of good nutrition in preventing the progression for macular degeneration.
AREDS stands for the Age-Related Eye Disease Study, and it was sponsored by the NIH—the National Institutes of Health—and it is just a wonderful study that taught us a lot about how nutrition really plays a role in the health of the retina in macular degeneration. But taking a pill may not be right for everyone, and it is certainly easy to say there’s one size fits all, but nutrition for the eye is really a complex solution.

Before I talk about the AREDS specifically, I want to talk about two nutrients which are in the AREDS formulation. One is vitamin E and the other is zinc. These two nutrients are in particularly high concentration in the AREDS formulation, and I want to talk about how sometimes too much of a nutrient may be just as harmful as too little of a nutrient.

Let’s take vitamin E, for example. It is a very powerful antioxidant that, at the appropriate doses, it can protect the retina, and it may protect against macular degeneration, may protect against cataracts, and may block blood vessel disease. It works really well within membranes in the cell, and it’s just a powerful nutrient. However, high doses of vitamin E, they can cause diarrhea, bloating, fatigue, but that’s okay—that’s not that big of a deal in the long run. The real issue is that vitamin E can increase the risk of bleeding in the eye, and that’s because of the way vitamin E interacts with vitamin K, and some of the consequences include strokes, for example, some of the bleeding consequences.

Vitamin E in high doses can also block antioxidants, can block the effects of vitamin A and vitamin C, so when you take too much vitamin E, you lose out of the effects of vitamin A and vitamin C.

In our average diet around here, we get in about 10–15 units of vitamin E per day. That’s the average diet, and perhaps the ideal amount is about 100–200 units per day. Over 200 units, you run the risk of bleeding complications, and you block the effects of vitamin A and vitamin C. Let’s put that on hold for just a moment. We’ll talk about zinc, and then we’ll come to back to the AREDS formulation.
Zinc. It’s the second most abundant trace metal in the human body. It’s very important. The highest concentration of zinc in the whole body is in the eye, particularly in the retina and the macula. That’s the highest concentration of zinc in the body. Zinc is absolutely necessary for the action of over 100 enzymes, and these enzymes are so important for chemical reactions in the retina, zinc is just absolutely necessary for over 100 enzymes. Studies have shown that people with macular degeneration have lower levels of zinc in their blood, and as we age, the levels of zinc can decrease. Zinc is so important for the macula, but zinc in high amounts—it’s a metal, it’s an oxidant. Guy, I said—it’s an oxidant. Not an antioxidant, and we want antioxidants. We don’t want oxidants. We want antioxidants.

Zinc has to be balanced. We have to have enough zinc to activate all those enzymes and help all those enzymes work, but not too much zinc such that it’s acting like an oxidant. So, AREDS is wonderful for some patients and not for others. Studies have shown in patients with macular degeneration, AREDS does decrease the risk of progression, but it’s not for everyone. The biggest concern with the AREDS are these high doses, specifically of the vitamin E and the zinc. These high doses may block activity of other antioxidants and may also cause oxidative damage, and that’s something that we don’t want.

The other issue with the AREDS is that it’s missing so many other nutrients, and that’s where the AREDS2 came in. Some of the listeners may know about AREDS2, which is the new formulation of AREDS—a newer study that put nutrients such as lutein and zeaxanthin into the original formula—lutein and zeaxanthin and very powerful antioxidants. The AREDS2 has that lutein and zeaxanthin, so that’s wonderful, but even the AREDS2 is missing so many other important nutrients. Good health requires multiple nutrients in an appropriate balance, and you may not always get that from pills. Pills—again, taking a pill may not be the right solution for everyone. Oftentimes whole, natural foods have a wide variety and a balance of nutrients that we haven’t been able to mimic in a pill form. No one has been able to mimic all the nutrients in an apple into a pill form, and so as wonderful as the AREDS formulation is, take it with a grain of salt. It may not be right for everyone.
Some of the nutrients in the AREDS are very high and may be more harmful than beneficial, and the AREDS may be missing some nutrients that patients might need. The best way to do it is fruits, vegetables, and whole, natural foods. That is absolutely the best way to get in all your nutrients and protect yourself from a nutritional point of view, but really the ultimate way is to look at all the risk factors and protect yourself from nutrition through all the risk factors for macular degeneration.

**GUY EAKIN:** You bring up the idea of other risk factors. We’re beginning to have some questions coming in. One of our first is Elizabeth from Massachusetts, who is asking about other lifestyle factors. Do we know anything about exercise? She mentioned playing tennis, hiking, or even the role of the sun, so just being outdoors. What do we know about these other lifestyle factors that might help with macular degeneration?

**NEAL ADAMS:** Absolutely. Again, nutrition is one piece of the puzzle, and in my book, *Healthy Vision*, I do talk about exercise. I talk about sunglasses and sunlight exposure. There are so many pieces of the puzzle. Let’s talk about exercise and let’s talk about sunglasses.

Number one, exercise. There are so many health benefits of exercise. Increasing your blood flow is one of the top health benefits, and a research study that came out last year showed that being physically active over 20 years—so over a 20-year period, if you’re active over that whole 20-year period—you decrease your risk of having poor vision by a whopping 60 percent. Being physically active for 20 years can decrease your risk of poor vision by 60 percent. That is tremendous. Exercise is really all about keeping your health in tip-top shape, and combing it with nutrition is just a simple and powerful tool to healthy vision.

The same thing can be said about sunglasses. The science isn’t quite there regarding sunglasses as it is with exercise, and part of that is the surface of the eye contains powerful ultraviolet blocking capabilities. So it isn’t as much about the ultraviolet light from the sunglasses, but it’s about the heat energy. Specifically, it’s about the high-energy blue light that gets to the retina. We all know that heat energy from the sun burns.
You may recall when you were a kid, Guy, holding up a magnifying glass to the sun and burning a hole in a leaf. I think we all did that, and the eye acts just like that magnifying glass. The eye focuses light all the way back to the retina. It’s just like a magnifying glass, so it makes sense to limit sun exposure and limit heat energy from the sun with sunglasses. There’s no definitive science to back up this practical recommendation, but there is reasonable scientific evidence to suggest that this is the best way to do it.

Two of the studies we always look at are actually from here in Maryland from the Chesapeake Bay, where the watermen spend their day, day in and day out, on the bay crabbing and getting all those crabs, and they’re on the bay with the sunlight hitting them from above and reflecting off the bay. Well, they do have an increased risk of various eye conditions, and compared with those who aren’t, that sunlight exposure has been shown to be associated with risk of progression of macular degeneration and cataracts. If we can decrease the high energy blue light, then that decreases the risk of macular degeneration, decreases the risk of cataract, and really helps us out. Again, combined with nutrition, it’s a very simple and powerful tool to healthy vision, and you have to keep in mind that you have to combine this nutrition because there are nutrients that act like sunglasses in our eyes. We call them nature’s sunglasses.

Lutein and zeaxanthin—you may have heard of them. There are nutrients that are found in vegetables that give them their yellow and orange color. Vegetables like squash, sweet potatoes, peppers, corns. The highest concentration and of lutein and zeaxanthin in our bodies is in the back of the eye where they form a layer that actually acts like sunglasses. A layer right in the retina that protects the retina from the damaging effects of the sun, that protects the retina from the high energy blue light, that protects the eyes from conditions like macular degeneration.

What’s the message here? Exercise; if you’re out in the sun for any long period of time, wear sunglasses; and eat your fruits and vegetables. Particularly the orange and yellow colored ones, but really all the different kinds of fruits and vegetables are all wonderful.
GUY EAKIN: Let’s move on to one of the other questions. Don from New Jersey is referring back to your statements about AREDS2 and takes it as if he were to walk into the doctor’s office and ask the question of whether AREDS2 is right for him. Perhaps you could help him—how would he prepare the doctor to answer that statement? What would he need to take along with him to help the doctor make that call on whether or not AREDS was right for him?

NEAL ADAMS: I don’t think you really need to take anything with you so much as initiate the process of finding out what risk factors you have, what is your diet like, and then what is your retina like? What stage of macular degeneration do you have?

Keep in mind that macular degeneration—we kind of lump it all as one condition—but there are a lot of us who believe macular degeneration is not one disorder, but it is probably several hundred conditions that result in this occurrence in the eye that we call macular degeneration. Really, it’s all about what kind of macular degeneration you have, and what does it look like, and where are we in that whole process? It is really individualized, and you can’t come up with a set of criteria before you’ve seen the physician. You’ve got to go in with the physician and speak with the physician about what you have and what’s going on.

There’s a lot of research being done of these various types of macular degeneration and the genetics behind macular degeneration. What we know today is different than what we knew a year ago, and it’s different than what we’re going to know in a year. As long as this research keeps going the way it’s going, there’s a lot that we’re learning about macular degeneration every year. That all plays a role in how we approach treating and preventing the condition. Get involved with your doctor. Spend time talking to your doctor. Stay up on the information that’s out there in the public.

GUY EAKIN: So, get involved with your doctor. Spend time talking to your doctor. Stay up on the information that’s out there in the public. You’ve mentioned your book, and we have BrightFocus resources as well through our website and through our call-in. One of the things we
haven’t talked about: you talked about chocolate earlier on and coffee and teas, and the one that comes up all the time and Ms. Young from Washington is asking about resveratrol, so red wine. What do we know about red wine and macular degeneration?

**NEAL ADAMS:** Let me back up just a moment. Resveratrol is a very powerful antioxidant that’s found in the skin of red grapes, and so really the discussion isn’t so much about the wine as it about these red grapes. And some people think, “Just go to the grapes. Eat the grapes. That’s the best way to get it in,” because you get some oxidation with the alcohol content in the wine, so you may want to avoid that part and just focus on the antioxidant itself.

This all goes back to what’s called the French paradox. You may have heard of the French paradox. The French paradox is a finding that in some regions of France where there is a very high consumption of cheese and high-fat foods, that instead of finding very high heart disease rates, these areas have lower heart disease rates than other places around the world. It’s a paradox that people in these regions that consume these high-fat foods have lower heart disease, and that’s because they consume a lot of powerful antioxidants from grapes and berry-derived drinks and really kind of a lifestyle that’s beyond just the resveratrol. It is one bioflavonoid, and these grapes and berries contains bioflavonoids, and we talked about bioflavonoids. They’re a large groups of nutrients that are not required for any of our cells to function, so you don’t really need them, but if you don’t have them, you are going to miss them.

Right now, there are about 5,000 or so bioflavonoids that we’ve identified in the scientific community. They are very powerful antioxidants and we sure do need them.

**GUY EAKIN:** Thank you so much. Obviously the research behind these things is very difficult. We all eat a variety of food. We have a variety of behaviors. The clinical trials are quite complicated, and we’ll be looking at some of those questions on clinical trials in our next Chat next month,
where we’ll be focusing on exactly that question of understanding clinical trials.

We are running out of time today, so I’d like to thank our speaker for coming in and educating us about nutrition and about how our foods that we’re consuming and the other activities that we’re taking part in affect our eye health.

I do want to thank Dr. Adams again for taking the time to talk with us today and thank everyone who joined the call and asked questions.

In addition to this transcript, we post a recording of this call on our website, and you can also listen to and download the past Chats that we’ve had through iTunes or SoundCloud, or call 1-800-437-2423 to order a print transcript.

I mentioned that our October 2015 Chat will be on Understanding Clinical Trials, so we encourage you to register and submit questions in advance, and we’ll send you a reminder email before that Chat.

You can register for the October 2015 Chat, request some of the free information the BrightFocus Foundation provides like the “Healthy Living, Healthy Eyes” and “Protect Your Sight Against AMD,” or copies of recipes submitted during this month’s healthy recipe contest by calling 1-800-437-2423, or you can always find these resources on our website at brightfocus.org.

Thank you, Dr. Adams, for sharing your expertise today. You’ve covered so much of the areas of nutrition and lifestyle that promote healthy eye aging.

Thanks to everyone on the call today. If you’d like to leave a comment after the call today, stay on the line. Thank you from all of us at the BrightFocus Foundation. Have a great day!
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Useful Resources and Key Terms:
If you have difficulty locating any of the resources listed below, please call our Donor Services department at 1-800-437-2423.

- BrightFocus Foundation, 1-800-437-2423, or visit us at brightfocus.org.
- Antioxidant-rich spices and foods: mint, basil, saffron, curry, ginger, garlic, cinnamon, apples, tea, coffee, pure cocoa powder, red grapes
- AREDS and AREDS2 vitamins (www.brightfocus.org/macular/news/are-you-getting-what-you-need-your-areds-supplements)
- Nutrition for the Eye, by Dr. Neal Adams