114 – The Benefits of Antioxidants and the ORAC Test

Interview and transcript topic: Antioxidants and ORAC	Transcript: Interview with Jim NIchols	HEALTH QUEST PODCAST

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Steve Lankford: Welcome back to Health Quest. My guest this morning is Jim Nichols. Jim is with Brunswick Laboratories. Brunswick Laboratories is the company that invented, that developed the ORAC test, the antioxidant test and oversees the testing of many different products.

We thought we'd go right to the source to learn more about this intriguing test and how you might be able to use it as we go forward looking at different products for their antioxidant properties.

It's in that capacity that I've invited Jim to be our guest today. Jim good morning and welcome.

Jim Nichols: Hi Steve. Good morning. We're happy to be here.

Steve Lankford: Well I do appreciate your time. I know you are busy people.

Before we get into our topic, tell our listeners a little bit about your background and how you became associated with Brunswick Laboratories and then tell us a little bit about that company.

Jim Nichols: Well, first off I'm an old guy. This is sort of a second, third career for me passion wise. I happened to meet a friend, actually at church one day, and we were talking about fitness and wellness, and it turns out that gentleman was Dr. Ron Prior. At that time he was with USDA stationed in Tufts and Ron invited me to go to a meeting with him where he was talking about antioxidants.

His complaint to me was that they had developed an assay that could quantify the antioxidant capacity of fruits and vegetables et cetera but it was not available for industry. That was some intellectual curiosity for me. I had a small company. I actually moved some equipment aside and built a wall and started a laboratory and bought some equipment and we, under his instruction we hired some people and we started doing ORAC.

That was back in 1999. From that point forward we've invested a lot of money and time and energy into understanding antioxidants and the measurement thereof.

Steve Lankford: You did this in conjunction with the USDA. Is that correct?

Jim Nichols: Yes, the USDA actually was a prime mover in this because their role in food and nutrition. They were studying the various constituents of food and antioxidants being one of them, so this was a focus. I think one of the first papers ever published by Dr. Prior and group focused on antioxidants in blueberries.

Steve Lankford: We hear the term antioxidants. We know we should get them. There seem to be antioxidants all over the place when we talk about certain foods. Give us a primer on why antioxidants are important to human health, and then we'll get into the discussion of how the foods meet those needs.

Jim Nichols: Sure. If you have a piece of metal or an old tin can in your yard, and all of a sudden it's rusty that means oxidation is taking place. That oxidation can become very damaging and that very situation can exist in our bodies and it creates something called oxidative stress. I'm going to read you just a sentence that's published by the oxidative stress and aging research group just to position it. It says "Oxidative stress is the harmful condition that occurs when there is an excess of free radicals, a decrease in antioxidant levels, or both and that free radicals are culprits of many diseases".

So that really sets the stage for free radicals being the bad guys and the antioxidants being the good guys.

Steve Lankford: What is it that these free radicals do that cause so much damage?

Jim Nichols: Well, the free radicals are really what, they have what we call unpaired electrons and they are looking for some place to attach and neutralize that unpaired condition, and in so doing they may match up in places that aren't healthy or good for the human body. There are several different free radicals that are predominant in the body and that's been part of our focus in determining what compounds, and what antioxidant compounds, can match up and neutralize those particular free radicals.

Steve Lankford: Do we know where these free radicals come from? Is there a source or are they just a part of all energy and metabolism?

Jim Nichols: Yeah. Well, they are. They're a significant part of our breathing and energy and metabolism and the bad air that we breathe, and even when we exercise. There are a whole host of those that occur because of oxidation, and not all are bad. The body has some mechanisms for overcoming them and primarily through the food that we eat.

Steve Lankford: What we're talking about is really something on the atomic level. We're talking about atoms and electrons that are related to those atoms. Do I have it right so far?

Jim Nichols: You have it right so far.

Steve Lankford: Okay, and when these are out of balance or they're missing, is it an electron that they're missing?

Jim Nichols: That's correct.

Steve Lankford: That then this atomic particle is then classified as the free radical? But so we've got an unbalanced atom, and that, because atoms seek balance, it wants to grab an electron from somewhere else and that somewhere else is going to be an atom that's within, that make up the cells of our body.

Jim Nichols: That's correct.

Steve Lankford: Okay, so we're really down to the very nitty gritty of where damage occurs. If you have that damage, does that mean you're damaging cell walls, DNA, and so on? Is that what we're talking about then?

Jim Nichols: Yes. We subscribe to the research philosophy that oxidative stress, which is what you and I have just been discussing, is a precursor to DNA damage. In other words it affects the DNA in some way because it's linked up with other radicals to combine and neutralize. But the DNA damage then becomes a precursor to disease. If you chase it down the pathway, if you don't do something about the oxidative stress, then oxidative stress leads to the DNA damage and DNA damage leads to diseases of many kinds.

Now again, just read, because this is available public information from Wikipedia, it says "In humans, oxidative stress is involved in many diseases such as atherosclerosis, Parkinson's disease, heart failure, myocardial infarction, Alzheimer's disease, chronic fatigue" and it goes on and on and on. We're onto a topic here that is, if proper first aid is taken in the beginning, then it can prevent a lot of the diseases.

Steve Lankford: Now, our bodies have a certain capacity to neutralize free radicals, but do I understand that because of, say lifestyle choices, and or dietary choices, we may increase our load of these free radicals and that, conversely, we can consume antioxidants in higher abundance and therefore help neutralize the damage that those potentially could do?

Jim Nichols: Yes Steve. We, in our lifestyle in the Western society, we ask our bodies to be chemical factories. They aren't necessarily designed to do that. With all the things that we put into the body and with the air that we breathe, and it's more difficult in some locations than the other. We ask it do things that maybe it's not equipped to do, and therefore we need to make some alterations to what we eat and consume and how we protect it against the free radicals.

Steve Lankford: What we've learned is that antioxidants are the keys to reducing the free radicals in the body.

Jim Nichols: That's right.

Steve Lankford: Okay so this gets us to where we now want to figure out how to measure how much antioxidants there are in different foods. Is there anything we missed as part of our laying a

foundation that we should make sure our listeners hear before we then go into the test suite we're talking about?

Jim Nichols: Yes. Sure. Well there's just one concept and that is, if you can think of antioxidants as being protectors. If you go out into your yard where you may have a tree and you look at the bark on the tree, that bark is actually full of antioxidants and it protects the tree from damage and insects and a lot of other things.

If you take an apple and cut it in half and lay it on the table in front of you. One half of that apple, if you squeeze lemon juice on that apple, and let it stay there for about an hour, in an hour the half you squeezed lemon juice on is still pure white. The half that did not have the antioxidant protection is now dark and rust colored. Antioxidants are protectors. I think it's just important to understand that particular concept.

Steve Lankford: It's a dramatic illustration that we're all familiar with because you can see there, in the matter of an hour, a difference and that difference is due to the antioxidant power that's found in the lemon juice.

Jim Nichols: That's correct. You see it all the time when you go to the market to buy fruit and you see bananas that have been bruised and how quickly that they change color due to the oxidation. Those are just so visible to us, but the same happens in the body. It's just not in a situation where you can see it. Some reactions take longer than others.

Steve Lankford: Let's then look at the ORAC test. Describe for us what is ORAC?

Jim Nichols: Whenever we test a product or a compound or a functional food or whatever for a customer, we send them a certificate of analysis. On that particular port, here's the definition. It says "The ORAC analysis provides a measure of the scavenging capacity of antioxidants against the peroxyl radical, which is one of the most common reactive oxygen species found in the body. ORAC hydro reflects the water soluble antioxidant capacity. ORAC lypo is a lipid soluble antioxidant capacity." That was the beginning of the ORAC measurement against the peroxyl radical, which is one of the major free radicals found in the body.

Now just for your listeners, there are other free radicals. There are many, many, many. Because of the researchers, epidemiologists and nutritionists, we have focused on five, what we call reactive oxygen nitrogen species, or free radicals. Your listeners will see these sometimes in advertisements. They are the hydroxl, peroxyl, peroxinitrate, singlet oxygen, and super oxide anion.

To the average person on the street, those don't really mean a lot, but for those who are studying disease and disease pathways they become important because they are predominant in the body.

Steve Lankford: What you have then is the capacity to look at the different foods for their antioxidant quantity, or capacity? Are those two different things?

Jim Nichols: They often get used synonymously but we use the term "quenching capacity" which is the antioxidant capacity. It's a number relative to its strength of power to quench, or absorb, or neutralize the bad guys, the free radicals.

Steve Lankford: Now you mentioned these five different types of free radicals. Does it suggest that different types of antioxidants may exert a power more on one type of free radical and another food might provide an antioxidant that's particularly good for something else or are all antioxidants good on all free radicals?

Jim Nichols: It's the first part. That's a very astute deduction on your part because different foods have different capacities against different free radicals. Some of these free radicals are more common, say for the skin. Some are more common for other parts of the body. We do a lot of work with the cosmetic companies and there's something called singlet oxygen, which is part of that whole skin surface process. Because peroxyl is the most dominant of free radical, that's the one the USDA elected in the beginning to focus on, all the early ORAC values and most of the ORAC values you see in the marketplace are based on the peroxyl radical.

Steve Lankford: Is the ORAC value a value that's given for a certain quantity of food so that somebody can say "Oh it's four ounces, or it's half a cup." Do we have to do a little more calculating to break that down?

Jim Nichols: Well, consumers need to be very aware to read the fine print and to read the labels closely because we report the results back to our customers. If it's a solid we report it back to them in units per gram. If it's a liquid we report it back to them in units per milliliter. From there companies translate that into a per serving basis, or they may even say per one hundred grams.

They may alter that. Not in a negative way, but in order to enhance the concept of the product. It's very important consumers read very carefully what unit of measure is being used to define the ORAC value for that particular product.

Steve Lankford: Well, let me give you an example. I recently came across one of your reports exactly as you described it. I won't name companies or anything like that, but it reported ten thousand ORACs per ten gram serving. Of course, they were touting that they thought that was a very good level. Can you give any context to a dosage and serving like that?

Jim Nichols: Steve, that's probably in the next ten years of research. The misconception about ORAC and the other means of measuring the antioxidant capacity is that it only measures the input side of the equation. What needs to be done now is for clinical trials or other means of measuring the outcome to determine "Okay so I eat that every day for one hundred days. What good is it going to do for me?"

Not much work has been done in that area. It gets caught up in the emotionalism of how high is high as far as ORAC value is concerned.

Steve Lankford: Did the USDA, or did Brunswick Laboratories, did they evaluate say the average American diet or say the five fruits and vegetables that we're supposed to get? Do we have any idea or is it fair to look at how many ORACs we should get from our diet? Are we there yet?

Jim Nichols: We aren't there yet. We actually hired some intern students to backtrack from a college cafeteria plan. Not that the students actually ate that, but what was planned by the dietitians. We were trying to establish in our own mind, because we get asked all the time. Dr. Prior did some initial work and at one time they published a paper talking about five thousand ORAC units per day.

But again, that was only talking about the peroxyl radical. It's gotten a lot more sophisticated than that now because we have the capacity to measure against all five radicals. That's not known yet. I think it's really a mathematical opportunity to look at what's prescribed. Whether it's five per day or what a good diet should be and come up with what is deemed to be a total number per day.

Steve Lankford: There's been a lot of analysis done of different food that the USDA has a list of the ORAC values of any of the foods that have been studied. Are you familiar with that list?

Jim Nichols: Yes. We cooperated with the USDA in developing a USDA database.

Steve Lankford: I haven't looked very carefully at that yet but I did notice that what I did see was looking at like hundred gram units of measure for a food and then determining the amount of ORAC from there. Is that then something that a consumer could look at and say "Oh, if I eat a hundred grams of cherries, which is maybe three and a half ounces, I'm going to get a lot, or this amount of antioxidants"?

Jim Nichols: Yes, that's correct. I think the database is based on a hundred gram serving which is a pretty accurate number for most of those. You could compile your own eating regimen based on the foods and fruits and vegetables contained in that USDA database.

Steve Lankford: Give us some examples of what are some of the best foods that are high in antioxidants based on the ORAC scales. What should we be looking for if we want to make sure we are consuming some of the richest foods?

Jim Nichols: Again, Dr. Prior and I, going back ten years now, we both agree that a cocktail of all of the various fruits and vegetables is going to, end to end, be the best. We can't define that, or haven't. It's just not been on our scheme of things because of the nature of our businesses, but eventually we need to define what that cross section or cocktail should be of all the fruits and vegetables but we find because all the super fruits and all the vegetables, we see values that are very, very high.

Also for your listeners, they should be aware that if you're thinking about or looking at an extract versus a whole food. An extract already has the moisture taken out of it so it's concentrated. In a per unit measure, per gram, it's going to be much higher than if you had a per gram of a fresh apple.

Steve Lankford: So if you had dried cherries, and they actually extracted it down to a powder, your amount of antioxidants per gram of material is going to be quite more concentrated?

Jim Nichols: That's correct, yes. Again the need to look at unit of measure and perhaps, somehow, how prepared.

Steve Lankford: Well this is a very intriguing topic because there's so much science that goes on and we're really just at the beginning stages. It's only been since 1999 that we've started looking and measuring these things. There's a lot of scientific work yet to do to determine what's the most significant takeaways from all of this new information.

Jim Nichols: That is for sure. I know that if you went out on the street there where you are and asked ten people if blueberries are good for them, I think all ten would say yes. They don't know why, but they do know that what they've heard is that they are nutritious and good for them and that goes back to Dr. Prior's paper in 1995.

Yet there's still so much research that needs to be done but in our country there's not enough funding for all the research these institutions need to be doing. We do some but we are really just an analytical laboratory trying to provide tools for them.

Steve Lankford: Well I guess if I had to walk away with one message, it would be that if you eat a variety of fruits and vegetables and get good quality food in your diet, you're going to get a lot of these important antioxidants and that's what you should focus on.

Jim Nichols: I couldn't say it any better. I'm sure because your listeners are dedicated to nutrition and wellness, and I think wellness is a word we need to build into our psyche.

Steve Lankford: Jim, I'd like to thank you so much for being my guest today.

Jim Nichols: Well thank you and good luck to you. Consumers let's all work towards being well. Thank you so much.

Steve Lankford: You too.

Jim Nichols: Okay.

Steve Lankford: Take care.

Jim Nichols: Bye bye.

Steve Lankford: Bye bye.