A Special Interview with Bob Capelli
By Dr. Mercola

DM: Dr. Joseph Mercola
BC: Bob Capelli

Introduction:

DM: Welcome everyone. This is Dr. Mercola. Today, I am here with Bob Capelli who is the Vice President of Cyanotech which is the largest grower of astaxanthin in the world. You might be wondering what astaxanthin is. It is a derivative of a marine algae. It’s a very potent antioxidant.

Bob actually is one of the co-authors of some literature that was written about astaxanthin which is a very powerful piece. After I read that I was so intrigued with it and I’ll tell you why in a moment. I was so intrigued that when Dr. Oz called me last year and asked me what’s the latest and greatest in supplements, I said, “I just read this book about astaxanthin and I’m very excited about it.”

So he and I met in the show and we shared it and interestingly, the entire national supply of astaxanthin ran out within a few days. It was the power of the presentation that Dr. Oz has.

One of the reasons I was interested is because in case you don’t realize already but astaxanthin, as you’ll elaborate in great detail about, is what actually makes salmon orange or pink. That makes the pink flamingos into pink because typically flamingos are born white and they only develop that pink color after eating this pigment from this algae.

Welcome on our program and thank you for joining us. I’m wondering if you can share with our viewers how you became interested in this and sort of discuss your journey in this whole process because I’m sure it’s a fascinating story.

BC: I hope so. I have been about 20 years in the natural products industry. I started in distribution of many different products. This is back when I lived in the East Coast in New Jersey. After about 10 years working in that job, I tried astaxanthin and I found remarkable results. It was incredible.

DM: So you personally tried it?

BC: Absolutely. This is about 10-12 years ago.

DM: How did you hear about it?
BC: It had just come out. It was a new product. It was the strongest antioxidant. I want to see for myself exactly what it was all about. I play basketball. I have been playing basketball for years usually about twice a week at night time. Back when I was in my late 30s when I was working in New Jersey, I would play basketball and the morning after, I would be so stiff, not here by my knees mostly, stiff and sore.

My wife used to make fun of me. She said, you walk like Frankenstein in the morning because I was just stiff like a monster. I started taking this astaxanthin and within about a month, I would spring out of bed the morning after basketball and I felt like a 20 year old again. It was really incredible results for me.

DM: Quite dramatic.

BC: Yeah.

DM: That's excellent. You had some personal experience with it that showed that it worked. What was the next step in your involvement with it?

BC: The next step was I sought out the job that I'm apparently working out for the largest producer in the world of astaxanthin and it's been great ever since then. I have gotten very into the ingredient. What I have also found...

DM: So for the last 12 years you have just been pretty much exclusively focusing with astaxanthin.

BC: We actually have two products. We have astaxanthin and we have spirulina as well. We're like a two-trick pony pretty much.

DM: It is because they are both from marine based organisms and the growing process or the farming process is very similar.

BC: Exactly. They are both from microalgae and two very different species of microalgae. The spirulina is a blue-green algae. It has a blue pigment in it as well as the green chlorophyll. Astaxanthin is a green algae. What we do which is very, very interesting is – we're in Hawaii and there is intense sunlight there.

The astaxanthin grows in a few different stages. In the first few stages it's always covered. It’s either indoors or it's outside but it’s covered. The last stage, the final stage we call it the reddening stage. It goes from green to red in a period of just about one week.

DM: How long does it take to grow before that stage?

BC: It takes about four weeks or so before it goes to the final stage. There is really three or four distinct stages before that.
**DM:** And you can continually harvest throughout the entire year or (indiscernible 4:22) because there is essentially virtually regular daily sunshine in Hawaii?

**BC:** Hawaii is the ideal place to grow astaxanthin or any microalgae. It’s the perfect location. We’re not in Honolulu. We’re on a remote island.

**DM:** Which island are you on?

**BC:** We’re on the big island, the Kona side. It’s just awesome sunlight and there is no pollution and the water is perfect as a growing source. What we do, we create stress to these algae and we do it two ways. In the final stage, we put it out into the sun and the sun is so intense that the algae has to develop a defense mechanism to survive.

The second thing we do is we stop feeding it – and when we stop feeding it and we put it out in the sun, in a period of just about a week, the green algae goes to this intense red color because it has hyperaccumulated astaxanthin. What it’s doing, it’s almost as it is in a survival mechanism. It’s creating almost like a force field to shield it from the sun and the lack of food.

This algae can live for over 40 years with no food, no water and either intense heat, intense sun or even intense cold. As soon as it’s put back in favorable conditions, the algae turns to green and starts swimming around again. It’s perfectly healthy.

**DM:** That is fascinating.

**BC:** So you can imagine if it’s helping the algae to that extent for 40 years protecting it, what it’s doing when we ingest it in our bodies?

**DM:** It seems to me the obvious analogy here would be that the algae that are producing this astaxanthin are very similar to the way our own skin cells produce melanin in response to our normal exposure to the sun. Maybe it doesn’t increase as rapidly but it essentially serves the same purpose to protect us against excess of ultraviolet radiation.

Since there are such similar responses from the organisms, can you share with us your experience or the literature that you reviewed with respect to using astaxanthin as a supplement orally and maybe topically in helping protect against sunburn?

**BC:** That was one of the early phase that our company sponsored was to test in humans – there had been actually some rodent studies before that with hairless mice. You put them under heat lamps. By the way, our company does not sponsor any animal research but these were mostly done in Japan.

They showed that by ingesting astaxanthin, the mice could stay under UV radiation longer without having any sort of sunburn or deleterious effects, damage to the skin.
We did a test in humans, willing subjects, we found them just two weeks with only 4 mg a day that there was statistically significant increase in the amount time the subjects could stay in the sun without getting burned. So it absolutely is working as an internal sunscreen.

**DM:** Obviously there is a lot of variables that are present primarily through the color of your skin and the time of year and the intensity of the sunshine and such. But for the most part, it will not eliminate sunburn in most everyone but it will radically reduce your risk of developing severe sunburn and consequently and perhaps more importantly, the risk or the damage that sunburn incurs because no one should be getting sunburn. There is no expert who would disagree with this. That's something that is universally accepted. We need to avoid getting sunburned because that causes not only photoaging but it can cause skin cancers. Perhaps even other damage we are yet unaware. So we want to avoid that. One of the ways to do it is to do cautious prudent sun exposure but then clearly for at least a two week time 4 mg of astaxanthin.

Are there any benefits for taking a higher dose for protection or is it sort of peaked out at 4 mg?

**BC:** That's a good question. Many people take a lot more than 4 mg usually anywhere from 4 to as much as 12 mg per day. We found the research depending on what you’re taking astaxanthin for varies quite a bit. For UV protection and for actually to improve the skin’s appearance – it actually works believe it or not as an internal beauty supplement as well because it can actually reduce fine wrinkles around the eyes. It can improve skin moisture and skin elasticity. So that’s about a 4 mg dose. But for other things like for say joint problems, for athletes, up to 12 mg is usually indicated.

**DM:** Interesting. We’ll talk about some of those other applications but just addressing the beauty treatment which sounds bizarre. Actually, I recall reviewing a study published earlier this year which pretty much definitively approved that. I’m not sure if it was beta carotene or some type of carotenoids that people were taking.

The study looked at that that objectively examined a whole group of people who had taken this carotenoid and who hadn’t. The people who had were subjectively evaluated as being far more attractive than the group that hadn’t just because in the color. It’s a subtle color and you wouldn’t necessarily recognize it consciously but subconsciously, it just appears to make you more attractive. That was the conclusion of the study. I thought it was fascinating. I think astaxanthin does it even better because it really gives you this pinkish color whereas an orange tint that beta carotene might.

Have you ever seen anyone taking massively high doses? I haven’t noticed yet but I have seen a number of people who have taken large amounts of carrot juice and they have this almost a sickly brown orange color to them. It doesn’t look healthy. That’s sort of the extreme.

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I don’t know if you ever seen anyone taking large amounts of astaxanthin and have a pinkish color?

BC: We actually have one guy who works at our company who takes a lot. He takes about 40 mg a day which is well above what is really necessary. He’s an athlete. He feels it really helps him. The only thing that I have noticed in this guy is that not his skin in general but the palms of his hand have become just a little bit more reddish, let’s say. Other than that really no difference in the skin.

DM: It’s interesting the 40 mg. Let’s talk about some of the other benefits. One of the areas that intrigued me when reading the literature you compiled was the benefits in sports. There were a lot of elite or competitive athletes who were using it and anecdotally had been very impressed with the results in their ability to workout harder and perform better in their competition. I’m wondering if you can address that.

BC: There is actually a lot of endurance athletes that are taking astaxanthin. A lot of them are just raving about it. They love the stuff. There was a study about – this is going back probably almost 10 years ago in Sweden of young men that were training. They had been doing deep knee bends as many as they could do until exhaustion. Obviously the control group taking placebo; they put the experimental group taking astaxanthin. That was also a 4 mg dose. After six months, the young men working out taking placebo could do approximately 22% on average more deep knee bends. The ones taking the astaxanthin could do 62% more. They were getting stronger, three times faster than those taking placebo.

Absolutely for strength and endurance, it works wonders, recovery from exercise. Athletes generate a lot of oxidation, a lot of free radicals floating around their bodies from doing these intense workouts. Because it’s such an incredibly strong antioxidant, it’s helping to combat those free radicals. So it’s working on three different ways to help athletes.

DM: Excellent. It’s very exciting because exercise is really one of the crucial components that we recommend and obviously most people realize is necessary if you’re going to be ultimately healthy. It is in my personal view certainly more powerful than most drugs with respect to the benefits and side effects except for these injuries and overuse syndromes which can happen. Astaxanthin would be useful to protect against that.

As an antioxidant it seems to have some very powerful anti-inflammatory benefits. So as a result of that it seems to be useful for a number of other diseases that are associated with inflammation. One of those would be of course arthritis. I’m wondering if you could talk to us about that and kind of the doses that people use. If you notice if there is a difference in specific joint injuries from sports or injuries or accidents or osteoarthritis or rheumatoid arthritis and other types of arthritic conditions?
BC: That’s a good question. We’ve done a few different studies in that area. All of the studies we’ve done point to the same final conclusion that the astaxanthin is not going to cure these problems. It’s not curative. But it will absolutely help with having people feel better and definitely increased mobility and also to reduce pain.

For example, rheumatoid arthritis is much harder to treat than osteoarthritis. We’ve done a study on that. Believe it or not, about halfway through the study when the results started kicking in – by the way, astaxanthin takes usually at least two and up to six weeks to really start kicking in. It doesn’t work overnight. So don’t expect to take a pill and an hour later...

DM: It’s not like an aspirin or an Advil that you take.

BC: No. Not at all. Again, most of these other anti-inflammatories have some serious side effects.

DM: Of course, like death.

BC: Astaxanthin is safe, natural, no side effects, no contraindications. But it’s going to take a little while. People, about halfway through the study, were asking – the people in the treatment group taking astaxanthin not the placebo were asking the researcher what is this? A lot of them with rheumatoid arthritis had tried many different things and had not gotten results. With astaxanthin they were getting very good results. It just took about a month or so to kick in.

We’ve done studies on people with carpal tunnel syndrome, again, very good results. People with tennis elbow, actually made their grip strength 93% stronger in eight weeks. Obviously if you have tennis elbow, it’s one of the bad side effects is your grip strength gets very weak. These were all different studies on people that had certain conditions.

We did another study on a group of people that were just again athletes to test about joint soreness after heavy exercise. This was people that had no afflictions but also the same thing; the placebo group after doing heavy exercise, had serious joint problems, joint pain. People taking astaxanthin much, much reduced almost to a point of no joint pain after doing heavy exercise. It will work whether you have an issue or whether you are perfectly healthy as well.

DM: That’s great. So some pretty profoundly impressive results. I like the fact that you mentioned that it really isn’t a magic pill. That it clearly relieves symptoms. It doesn’t work as quickly but it relieves symptoms and in many cases far more effectively than the far more expensive and potentially toxic and dangerous prescription anti-inflammatories and over-the-counter ones certainly which can be equally as dangerous.

But it’s not a magic pill. If one uses it for these conditions and one clearly needs to look at the foundational causes which in many cases is going to be the diet, eating too much sugars and grains that are increasing insulin levels and increasing inflammatory
prostaglandins. And modulating the fats to make sure you’re having good fats and enough essential animal-based omega-3s and then also looking at biomechanical stressors like in tennis elbow.

You got to look at weak muscles or tight muscles and do range of motion exercises and strengthening exercises to address those so that you get collectively (indiscernible 16:12). It’s part of a comprehensive program. It really looks like a magic bullet but I just want to warn people that they really need to address the foundational causes and in many cases that’s going to be required to visit with a healthcare professional who is knowledgeable about natural solutions and not the traditional conventional doctor who is just going to see you for a few minutes and write a prescription for you. Clearly, you could do better than that.

You can do a lot better than that just by reading on the internet. But clearly what you don’t have by reading on the internet is the knowledge of someone who has really carefully studied this and is aware of all of the potential complications and variables that might be factors that you’re not aware of. This is a caution for everyone.

**BC:** These are good points you’re bringing up. One other thing I would like to bring up with this is that for really one reason we believe not everyone gets really good benefits from astaxanthin. Most people do. About 85% of people in studies and also in surveys get fantastic results for several different things. There is about 15% of the population. The reason why we think of this is because many people have a very poor ability to absorb carotenoids of which astaxanthin is a carotenoid. People absorb anywhere as low as 5% of the carotenoids in their diet or in supplements up to over 90%.

Say, if your body absorbs 90% you’re going to get a great benefit even at like 2 to 4 mg a day. If I’m only a 5% absorber, I might take 12 mg a day and get almost no benefit. It’s not a magic pill. It works for about 85% of the people. It works usually in about a month or so. It starts really kicking in but then you’re going to get many benefits. We talked about joint pain. We talked about skin and there are many others as well after that.

**DM:** We definitely want to hit those but certainly address the point you just mentioned with respect to the fact that it’s not going to work for everyone. If you claimed that or anyone claimed that any pill works for a hundred percent of people I would be beyond skeptical. In my 30 years of practice, I have seen probably thousands of different therapies not only supplements but a whole variety of different modalities. There is no modality that I am aware of that works a hundred percent for everyone all the time.

So clearly this is the case with astaxanthin but the tips that you brought up that I think everyone needs to be aware of is that astaxanthin is a fat soluble supplement. So if you don’t take it with fat, it’s not going to work too well. So you’ve got to take it, you know, kind of think this through definitely take it with a meal but understand which meal you have the most fat. For most people it would probably be dinner.
If you’re having a tablespoon or two tablespoons of butter or four eggs – those are the meals you want to take it with because those fat soluble supplements will sort of dissolve the astaxanthin and allow it to be absorbed into the intestine into your bloodstream where it’s going to do the action. That’s a very good point. Thank you for bringing it up.

One of the other ones that I can remember out the top of my head that astaxanthin seems to be useful for is the most common cause of blindness at least in the United States and most western countries would be age related macular degeneration or ARMD. It takes the vision from more people than any other cause of disease.

Apparently this seems to be a particularly useful therapy in the prevention of this type of blindness but I’m not sure about what the studies show for the treatment of it. I’m wondering if you can comment on that.

BC: There has been quite a bit of research on astaxanthin for eye health in general. One of the areas you brought up for sure is one of them, for age related macular degeneration.

DM: The other point was cataracts too. If you could include that in your answer.

[----- 20:00 -----]

BC: Definitely age related macular degeneration and cataracts. There are some interesting properties in terms of many people nowadays that are working on computers all day long are getting very tired eyes. They call it…I’m blanking what they call the medical name for that. Astaxanthin absolutely has been shown in nine different human clinical studies to be able to prevent tired eyes and also to be able to help cure once you have tired eyes. It’s helping to maintain the motor function of the eyes at the highest level just like it is your other muscles.

DM: My guess is these tired eyes – I’m not familiar with the medical term for that – is actually one of, at least my understanding, is one of the primary reasons why as people age they tend to develop what is called presbyopia or they lose the ability to focus in close. They can’t read really well and they have to move the book further out and that requires them to wear these reading glasses. That’s typically due to tired eyes. So I imagine it maybe beneficial for that too (presbyopia).

BC: There are no studies in that area. Actually, I remember the word. It’s called visual accommodation as your eyes get tired from overuse. I would imagine that also it would be very good for that. Also visual acuity in terms of ability to see fine detail. Also, another thing of the eyes would be just protecting the eyes from sun damage just like it protects our skin from UV damage. It’s also protecting the eyes from sun damage. It’s really for eye health. It hasn’t been known for as long a period of time as some other products but all the research points to astaxanthin being really the champion of the supplements for eye health.
DM: Because the traditional one would be lutein.

BC: Absolutely which is great too.

DM: Which is still good but it appears from all the evidence that this is far superior to lutein – if you only had to use one. I’m not saying you can’t. It’s an either or situation but certainly that would be the case.

Many people don’t know that before I went to medical school I was actually involved in recovering eyes for transplant. Actually the nuclei of the eyes from the cadavers and in many cases would remove the lens and they would transplant that lens. I have definitely seen up close lenses.

For those who haven’t had the opportunity to do that, the lens is like the crystal – when we had regular mechanical watches, there was a lens cap on that. It’s somewhat similar to that. It’s an ellipsoid though but it’s very clear. It’s crystal clear ideally at least in the newborn. But as we age, we are exposed to ultraviolet radiation and the older you get, the darker it becomes. It becomes this yellowish amber type of color to the point where it becomes so densely amber that it actually obstructs the rays from coming in and you can’t get enough light going past that lens to the back of your eye.

The reason the lens is there of course is to help focus, it accommodates. Those muscles are surrounded. It helps focus the light so that you can see sharply. When that focusing ability becomes impaired then you can’t see that well. Many times cataracts aren’t as big an issue which is why I didn’t think of it initially because now we have a pretty good surgical technique that removes the lens and puts in an artificial lens which works pretty well as surgeries go. It’s relatively innocuous but still it wouldn’t better not to have that surgery.

I think the cataract surgery may be the biggest line item budget in the healthcare system I think. It is so frequently done. It’s a phenomenally common – almost everyone seems to get it as they age because it is progressive. It’s sort of a tangent.

The reason I mentioned this is – I haven’t studied this but I suspect you have is that the reason it prevents these cataracts is the similar benefit of protecting against sunburn. It actually blocks the ultraviolet radiation which is why the marine algae are producing it to begin with when they are exposed to all this sun. It’s basically transferring that protective benefit to the lens. Is that the mechanism?

BC: I don’t know that that’s been proven but that absolutely seems like that would be it.

DM: Okay, great. So are there any therapeutic applications for astaxanthin that you like to discuss or review with us?
BC: Sure. For example, just like it can help protect the eyes and anti-inflammatory. It’s very strong natural antioxidant protection to the eyes. It also is the same with the brain. There was very little research on the brain until pretty recently. In just the last two years, there has been 10 different studies demonstrating the asset and have some very, very good effects for the brain. Two of these were really gold standard human clinical trials all showing sort of the same things. That it can prevent dementia as we age.

One actually animal study again over in Japan showed that it could potentially actually make the rodents smarter. That was not really demonstrated in humans yet but that’s kind of an interesting thing not just for people as they age but for anybody that just wants to have their brain functioning at maximum capacity.

DM: Now, how many people would want that?

BC: I know I need it.

DM: It’s interesting too because Alzheimer’s is literally an epidemic. I mean the projections are that one in three of us will lose our brain as we age which is really a sad commentary. Of course we want to live older and enjoy life as long as we can but we want to enjoy it with the full functioning capacity of our brain. What is good to be 90 years old if you can’t remember your children or your spouse?

BC: It’s true. So the brain health. Another area also is immunity. There have been several very nice studies on how astaxanthin can help increase immunity. There is a great study at Washington State University in humans that really demonstrated this very, very effectively. There has been other things, you know, looking at potentials for cancer, tumor reduction and things like that. We don’t talk about those very much because there have not been human studies in that area. These have been all pre-clinical animal trials.

Basically, what I try to summarize with is that astaxanthin, if you kind of look at all of the negative things, the maladies associated with aging, anybody 40 and older, I mean, anyone I know I tell them really take this product because it’s helping in so many different ways. It’s helping your eyes and your brain. It’s helping the heart for sure, the whole cardiovascular system – over 40 different studies in that area. I mean fantastic research. It’s helping your immunity. It’s helping your skin. I mean, right down the line helping with joint pain. It’s really again not the magic bullet but in terms of what we have out there...

DM: It’s part of the puzzle. You mentioned cardiovascular disease which tends to be one of the leading causes of death. How about the other two major ones which would be cancer and diabetes? Have you seen any literature connecting and studies that have looked at astaxanthins potential benefits there?
**BC:** Believe it or not in both of those areas there are studies but they are only animal trials so far and there has been no human clinical research so far in either diabetes or cancer but there are promising (indiscernible 27:21)

**DM:** Part of this is because it’s only been available for about 10 years or so.

**BC:** That’s exactly true.

**DM:** It hasn’t been out on the market that while and most people may not appreciate the fact that the process that research goes through initially it’s thought of it as something that should be studied and then it’s done in animal trials first and then it progresses to clinical trials. That whole process, each stage, could take many years to do that especially as new indications are outlined. From a theoretical perspective it seems it could play a very important role in these diseases.

**BC:** Absolutely. Again, most of all these things are tied back into its incredible antioxidant potential and also its anti-inflammatory activity.

**DM:** So if we could give our viewers some sense of perspective because that’s always useful. You said it’s a powerful antioxidant but powerful is the word. Can you provide some more objective parameters on how it can compare to some of the more traditional antioxidants that people would be familiar with like vitamin E or vitamin C?

**BC:** There has been so many different tests where they take astaxanthin and put it head to head against other well known antioxidants and in every test – there is different ways to measure by the way. There are several different ways to measure antioxidant strength. Every one of them, astaxanthin consistently comes out way above the others.

Vitamin E, comparing singlet oxygen quenching, it was 550 times stronger. CoQ10 – 800 times stronger. Vitamin C, in one of the studies – again, this was singlet oxygen quenching – it was 6000 times stronger. Compared to some other antioxidants like let’s say lutein it might be only 10 times stronger but overall whatever you’re comparing it with, it’s consistently well above all the competitors.

**DM:** It brings me to another point too because I don’t want to give it the appearance of this miracle new antioxidant, you take this and you don’t need anything else. It’s definitely natural. It’s in nature. If you eat salmon – we’ll talk about non-farm raised salmon, wild salmon, you’re getting astaxanthin. So it is part of the food supply normally. It’s not typically – we’ll talk about typically ways that you get it.

The point I want to address now is the fact that it’s not like you just need astaxanthin and nothing else. Even though it’s stronger, there are other potential applications of these other antioxidants. So we need the whole ball of wax would be my guess and especially to things like vitamin C which are water soluble.
I'm wondering if you can address astaxanthin's role in the broader picture of antioxidants and then discuss the fact that even though it is fat soluble it appears to have some water soluble antioxidant benefits too.

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There are a lot of questions in there but (indiscernible 30:02)

BC: Good questions though. Astaxanthin is pretty unique in the sense that it can protect the entire cell. The astaxanthin molecule, it’s in the same family as beta carotene and other carotenoids like lutein and lycopene but it’s very, very different – the shape of the molecule and the ends of the molecule.

One end of the astaxanthin molecule could actually be protecting the water soluble part of the cell and it spans the cell membrane and the other end can be protecting the fat soluble part of the cell. So it can protect the entire cell. First of all, it gets throughout the entire body. It gets in the skin, the muscles, the brain, the eyes, the heart. So it’s getting everywhere and it’s protecting all the cells, the whole part of the cells. So it’s really unique in how it works.

Another thing that’s really interesting to note is that many very good antioxidants under certain conditions can change and have the opposite effect and become prooxidants. It can actually cause additional oxidation in the body.

DM: The reverse effect.

BC: Exactly. It can start doing damage. Astaxanthin has been shown in a few different studies never ever to be able to become prooxidant. It’s never going to hurt you. It’s only going to help you.

DM: But how would you place its role compared to vitamin E and vitamin C if people are taking those? Would you encourage them to continue to – obviously, you need it from food sources but the question really becomes supplemental sources because there is a lot of good literature and evidence to suggest that vitamin C has some benefits especially taken on a regular amount. I’m wondering if you could sort of provide perspective at least from your view.

BC: Sure absolutely. I believe that, first of all like you said, you have to eat a very healthy well balanced diet. I believe you should be eating nine fruits and vegetables a day.

DM: I like nine vegetables and fruits. More of the power is in the vegetables than the fruits.

BC: Yeah. That’s true. How many people do that? Very few. That’s number one. Number two; look at our life nowadays compared to say our great grandparents. We’re
living in a world where there is so much air pollution. The water, in a lot of cases isn’t very pure. The foods are full of preservatives. We have increased sun exposure because the ozone layer is thinner. We have much more stress than any of our ancestors had.

I mean all of these things I just mentioned are causing additional oxidation in the body. So even if you eat a really good diet, taking some good antioxidants in supplement form on top of that, it is really important nowadays because of all the extra oxidation happening. I take a couple of extra antioxidants myself in addition to astaxanthin. I believe in taking at least three or four good antioxidants on a daily basis.

**DM:** So a wide spectrum. It’s a form of insurance. Again, to reemphasize what you have just stated is that we’re not recommending that this is a magic pill. It’s going to solve all your healthcare problems by any mean, shape or form. The most important approach you can take is to take control of your diet and making sure you are eliminating processed foods and sugars. And having plenty of the healthiest food that you can possibly have because that’s going to provide the basis of the raw materials your body needs.

But for these applications we’re talking about especially if you have these injuries or these conditions that may benefit from them which most people seem to have then it is a good idea. Just in the case of cataracts. Just about virtually just the fact that you go outside, you’re at risk for that even if you wear UV protecting glasses.

I would like to address the issue that some people are somewhat skeptical because supposed it’s not part of the diet. Actually, even before I do that because that argument is brought up frequently for krill. Krill as many people know is my favorite recommendation for animal based omega-3 fats which are really essential and really difficult to get because of the industrial influences that have really contaminated most of the oceans in the world with pollutants such as mercury and PCBs and dioxins.

So they get bioaccumulated in the fish or most marine animals and as a result the ideal form of these animal based omega-3 fats are not typically available to us because they are contaminated. So one needs to find a source. Some people use fish oil and I like the krill for a variety of reasons. But one of the primary ones is that the krill actually live in environments where these marine algae that grow that produce astaxanthin are taken.

So there is an intrinsic amount of natural based astaxanthin with krill which is relatively small. Not in a therapeutic dose that would produce many of the benefits for taking it. At least if you take the normal dose of krill but it’s there in a way to protect the oil, the very fragile and highly perishable omega-3 fats which when they are exposed to oxygen, pressure, and light will be oxidized and damaged and your body won’t be able to use it.
I have looked at some of these studies. It almost guarantees that you’re not going to be oxidizing omega-3 fats whereas it is just not the case with fish oils because there are so many areas and there is no protection. They don’t have astaxanthin there so it’s not protected. The moment it hits the light or air or oxygen, you’ve got damaged fat. Anyway, that’s a little bit of a tangent.

Getting back to the food sources, we had mentioned earlier that if you are eating wild salmon you’re going to get a therapeutic dose and maybe you can talk about the amounts you get in wild salmon. Can you mention any other typical food sources that people would encounter in their diet that they might be getting some astaxanthin just from eating that food?

**BC:** Pretty much anything that is red in color that comes out of the sea has astaxanthin in it. So you’re looking at shrimp, lobster, crab, of course salmon has the highest concentrations. In salmon it tends to concentrate mostly in the muscles and so the theory is that – I don’t know if this is proven but the theory is that that what gives the salmon this incredible endurance to swim upstream for weeks to spawn.

It’s in trout as well. Several different species have it in there but again not in big doses. Salmon, if you eat like a wild salmon, the species that has the highest amount is called sakai. This is common up around Alaska. If you eat about, I think it’s about half to three-quarters of a pound you’re going to get the same amount of astaxanthin that you get in one 4 mg capsule. So you got to eat quite a bit of salmon to really…

**DM:** Typically, it’s a little bit too much salmon for most people to be eating in one day. Typically 3 or 4 ounces maybe twice a day but even so you’re still going to fall a little bit short of what we consider a commonly used therapeutic benefit. At least the minimum dose is 4 mg. As you said earlier, you can go up to 12. Some people use more but that’s getting to ranges that we don’t necessarily think are useful or necessary.

You emphasized wild and of course the vast majority – I don’t know the numbers but it might be even 90% of the salmon that people would consume either at the grocery store or in a restaurant. Certainly almost all restaurants it would not be wild salmon, they would be farm raised salmon. If you’re going to choose salmon – I believe ideally raised salmon is a healthier choice than meat in most cases, at least in my view. That’s the conclusion I’m reaching.

So if you’re going to have it at a restaurant, you’re going to want to ask whether it’s farm raised or wild because they look pretty similar. To the naked eye it might be difficult to distinguish between the two. Is there any astaxanthin in these farm raised salmon?

**BC:** In the farm raised salmon actually there is a lot of astaxanthin but it’s synthetic astaxanthin.

**DM:** Are there any dangers with synthetic astaxanthin?
BC: Synthetic astaxanthin so far is allowed to be fed to fish. It’s not been allowed anywhere in the world yet in any country that I’m familiar with; certainly not in the United States or Europe or Japan to be given directly as a supplement to humans. There is not enough really safety (indiscernible 38:13) on direct ingestion by humans. When you eat the farm raised salmon, you’re actually getting synthetic astaxanthin.

Synthetic astaxanthin is produced from petrochemicals, from oil. It’s made in the laboratory in a very elaborate process that turns it from oil into astaxanthin. Frankly, it’s a pretty amazing feat that they have figured out how to do this but…

DM: The miracle of modern chemistry.

BC: Yeah. That’s it. It’s chemistry. It’s not natural and it has a very different shape. The molecule actually is shaped differently.

DM: Are the isomers the same? Isomers can’t be chemically could be the identical molecule but an isomer would be a mere image of that. And then there is other variations of that with respect to – so you could have the same actual atoms but the orientation could be shifted or even the positioning. Has that been looked at?

BC: That’s exactly what it is. If you look at the chemical formula for both natural and synthetic astaxanthin it’s the same – I don’t have it memorized but it’s you know, carbon and hydrogen and oxygen and nitrogen but again the same formula doesn’t mean that it looks the same…

DM: Or works the same.

BC: Exactly. The very important difference is that the natural astaxanthin is sterified which means that either on one end or both ends of the molecule there is a fatty acid molecule attached. Again, this is not proven. We don’t know why but that’s the theory of why it works so much better because in animal tests that have been done, synthetic versus natural astaxanthin, there has been a remarkable difference in all sorts of things like immunity, disease resistance, growth rates, strength, all things like that.

[----- 40:00 -----]

And also in a laboratory test on antioxidant strength, the natural astaxanthin from algae believe it or not was 20 times stronger in free radical elimination than synthetic astaxanthin from petrochemicals. It’s really like comparing apples to oranges. They have the same name astaxanthin but again, one is very different from the other. They don’t even look the same under a microscope.

DM: This is yet another reason to avoid farm raised fish specifically farm raised salmon. It really should not be on your diet. You should avoid it like the plague because you’re going to get synthetic astaxanthin which has not been proven to have the same benefits we all just discussed and potentially has yet unknown toxicities.
It's just one of the reasons why it’s not been approved for human consumption but you're getting it indirectly through the fish if you have farm raised salmon. So stay away from it. There is a number of other very good compelling reasons to avoid farm raised fish. They're on my site. On the top of each page, it has a box that you can type that in and you'll find a load of articles that discuss that in greater detail.

With respect to supplemental astaxanthin that people can purchase, are there any supplemental astaxanthin products in the stores that are synthetic versus natural?

**BC**: So far, again, they are not approved. To tell you the truth, I think they are going to be trying to get them approved in the very near future because thanks a lot to your talking about it, astaxanthin has become a very – it's become a phenomenon. Many people are using it now. The usage of astaxanthin is probably got up ten-fold in just the last few months.

**DM**: Let’s talk about it because earlier this year I was on Dr. Oz’s show. We played that interview a few times. That has increased awareness of the value of this product and people are not ignorant. All they have to do is go online and research it themselves and read the studies and find out that this is true. We're not pulling the wool over their eyes. This is really authentic, real deal, valuable resource for health.

I'm wondering if you could – I don’t have to access to this data but you're in the industry. Can you tell us what happened – I think I mentioned earlier that I thought that the astaxanthin was sold out but what has happened to the increase in the demand for this product since it was on in the beginning of 2011?

**BC**: Fortunately for us that have been producing it for awhile, the publicity that you generated on Dr. Oz has been fantastic. It’s gone from a supplement that even people working in a health food store barely – if you walked into a health food store back last year and asked them, do you have some astaxanthin? Probably only one out of ten would even know they had it on their shelves if they had it on their shelves. Now, pretty much I think you can find it in most health food stores across the country and lots more people are taking it.

The word of mouth is becoming even bigger almost in the publicity because people take it. That’s the nice thing about the supplement that most people feel the difference. Within a month or so you start saying hey, I’m in the sun. I’m not getting burned. Hey, the fine wrinkles on my eyes are diminishing. Hey, I'm not getting colds and flu. My immunity has built up. Hey, I got a better workout. My knee pain is not as bad. They feel it and they tell their friends and relatives. It’s snowballing.

**DM**: You can fool many people initially but to fool them persistently is very difficult to do. There is no attempt to fool anyone here. It's just really describing the benefits that are very clear. We can promote anything we wanted to. Life is too short to be not telling the truth and being honest and just sharing what we learned as we go along this
journey in life to find the best resources and tools to really take control of our health. Astaxanthin appears to be one of them.

It’s clearly not my ultimate supplement. My ultimate supplement is vitamin D. They’re not either or, you do both. I do not particularly care for vitamin D as a supplement but I care for getting it the same way that algae produce the astaxanthin is when they are exposed to sun shine. I think there are just so many benefits when we get vitamin D, we raise our levels of vitamin D through the sun.

Ideally, you would never swallow a drop of vitamin D at all. You just get it from the sun exposure or a safe tanning bed and avoid it. Those two, I think they are essential. They are a part of my daily regimen. I’m making sure I get the sun exposure on a regular basis and take astaxanthin along with some good probiotics and fermented foods. It doesn’t take a lot.

They are a really a good comprehensive way to really provide this protective umbrella against all the contemporary industrial intrusions that we have as a result of technology and all these exposures which really didn’t exist a hundred years ago. So we do need I believe we need a little extra protection if we’re going to achieve higher levels of health.

How has your company been able to keep up with this demand? What has happened? Has it doubled, tripled, ten times?

BC: It’s got up more than double. Fortunately, we have like a very nice big inventory before this hit and so that’s kind of gotten (indiscernible 45:25)

DM: You’re the world’s largest producer of astaxanthin?

BC: We are yes. Now, for the first time, we’re up against our – we have no inventories. Every bit we produce is going out the door. We are looking at ways in the future to make sure that we can take care of everybody’s needs for astaxanthin.

DM: Are there any other hints or pearls of wisdom or any exciting new research on the horizon that you might want to share with us?

BC: We don’t really talk about the research that we do ourselves until it’s published. We don’t want to jinx things. We don’t want to let the cat out of the bag.

One thing that you talked about before is always take it with food and with some fat in the food. That’s one of they keys. Some people like to take their supplements in between meals. With some of them it’s not an issue, with this one it’s a major issue. You’re not going to get the benefits. You’re not going to see the results that you would if you take it with your meal of the day like you said earlier that you get the highest amount of fat in. It’s going to help your body absorb it. That’s really the ticket.
Again, don’t expect it to work overnight. It’s safe. It’s natural but you’re not going to see results for at least two usually up to four to six weeks.

DM: Great. I really thank you for taking the time to come from Hawaii to join us and share with us your wisdom on this phenomenal new product that I think really most everyone watching this should seriously consider adding to their regimen. At least explore it for themselves. They might be part of the 15% of the population that doesn’t benefit especially if you’re not taking it with the fat like you mentioned. In my case I take it with avocados and egg yolks in the morning or if I don’t, I have a snack where I have two tablespoons of butter, you know, lots of fat to easily digest it and absorb it. You’ve got to have that component.

I think it’s really something that everyone should seriously consider if they are really seeking to achieve those optimum benefits to protect themselves in the long run. It really is a form of insurance. I think we definitely need health insurance to protect against accidents and catastrophes, it’s almost foolish to invest against that continuously and not make investments for the inevitable reality of so many diseases that tend to progress as we age. It’s sort of an inevitability unless we pass away prematurely from some accident which is we why we have health insurance or wear seatbelts and have safety airbags. Again, thank you for coming from Hawaii. Thank you for all the research you have done for writing that document that really sensitized me to the great potential that astaxanthin had. For all the benefit it provides for me and my family and for all the work that you will be continuing to do.

BC: My pleasure.