An Interview with Dr. William Harris about Omega-3
By Dr. Mercola

DM: Dr. Joseph Mercola
DH: Dr. William Harris

Introduction:

DM: Welcome everyone. This is Dr. Mercola. Today, I'm here with Dr. William Harris who is a research professor at the Sanford School of Medicine in South Dakota. He is an expert in the analysis and determination of omega-3s in your body. We all know the benefits of those. I'm sure we'll review them here shortly.

Dr. Harris is a prolific researcher and very well published in some of the major peer-reviewed scientific journals. He really is an established authority in this field. He really has helped identify ways that we can determine if we're getting enough of this valuable nutrient.

Thank you for joining us today Dr. Harris.

DH: Thank you for having me.

DM: Why don't you expand on what your specific areas of research are and how you got into this whole science of determining omega-3 levels in people?

DH: The story goes back to my post doctoral. I got a PhD in nutrition from the University of Minnesota back in the 70s. I did a post-doctoral fellowship with Dr. Bill Connor in Portland, Oregon.

One of the first assignments that Dr. Connor gave as a new PhD was figure out what salmon oil does to blood cholesterol level in people because we really didn’t know. Back in those days we knew that vegetables oils were good for you. They lower your cholesterol. We knew that animal fats raised your cholesterol and that was bad. We didn’t know what fish oils did. They were kind of somewhere in the middle. They were liquid but they were from animals.

I did some of my original studies there and we found that the omega-3 fatty acids in fish oil lowered triglyceride levels in the blood. We thought we were looking for cholesterol effect but really we saw a triglyceride effect. It’s a different blood lipid.

From that point, we started to learn about the Eskimo studies that had been done by Dyeberg and Bang in Greenland and how the high omega-3 diet of the Eskimo was apparently what protected them from heart attacks despite having a really – what we have considered a lousy diet in those days. That got people interested in beyond the
effects of omega-3, beyond just blood cholesterol, and blood triglyceride levels. It just snowballed since then.

I would say that omega-3 story have now five grants from the NIH to study omega-3 fatty acids. About, coming on 10 years ago, came up with the idea that blood levels of omega-3 fatty acids might be actually useful for people to measure and sort of like a risk factor. Sort of like we measure cholesterol levels in people now like I was talking about or we measure blood pressure, or we measure blood sugar.

The doctor always does that so that he can estimate if people are at risk for particularly cardiovascular disease. High cholesterol levels mean high risk for heart disease. So when you have a high cholesterol the doctor wants you to do something about it; change your diet, take a drug or whatever.

The omega-3 level in the blood is also something that you can measure. It also gives you information about your risk for heart disease and probably other things. So we proposed back in 2004 now that the omega-3 level – we call the omega-3 index which is measured in red blood cells which is an easy to get at type blood sample.

We measure the omega-3 level in red blood cells as a reflection of the omega-3 levels in all the tissues. We then use that to help people figure out if their omega-3 levels are too low. We really haven’t seen too high so that’s not apparently a problem. That’s kind of how it quickly evolved into actually using omega-3 levels not just a marker of how much fish you eat but as an actual risk factor.

**DM:** Excellent. Prior to your research and development of this assay, there really wasn’t a commercial test that one could use to quantify this, is that correct?

**DH:** Yeah, that’s basically the situation. And there wasn’t much research that would allow you to say a certain level was associated with a certain kind of risk, a certain amount of risk. That’s what we’ve been trying to develop.

**DM:** The red blood cell as a marker for the omega-3 fat level is somewhat comparable to a test that we use for diabetes which is hemoglobin A1c or glycosylated hemoglobin which also uses red blood cells and is able to allow us to give a good summary of what a diabetes control is for the past three months because the typical red blood cell lasts for about three months.

Similarly, your assay shows an average of what the consumption has been for the last three months. So it’s not easily influenced by a large fish meal the night before the test.

**DH:** That’s correct. That’s a great example, a great analogy for physicians to understand.
DM: It's a useful tool. I'm wondering what your research has shown so far because I suspect you have compiled a large data set. What have you found from doing this over the last 10 years?

DH: We started our studies – actually, we’re able to piggy back on some studies that were done by others in the late 1990s, early 2000s…

DM: You’ve been doing this test for about 10 years and collected a large amount of information from the people you surveyed. I’m wondering if you could let us know how many people you’ve sampled so far and some of the highlights of the information that you have uncovered from this analysis.

DH: We’ve done two major studies. We’re in the midst of two major studies. One is what’s called the Framingham study which is a large group of individuals in the Boston area who have been tracked for their health and risk factors for many, many years. So about 3000 samples there. We’ve done about 7000 samples from a research point of view in a group called the Women’s Health Initiative which is obviously a much large trial that has looked at.

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In that study, we’re looking at the relationship between the omega-3 index and the development of what they call cognitive decline or loss of mental function as women age. Again, these studies are in process. We’re still doing the analysis.

Before that we’ve done some studies with a few thousand people and published them, looking at people who are admitted to the hospital with a heart attack for example. We would get blood samples from people when they got admitted to the hospital. We measured the omega-3 level and we compared that omega-3 level to other people who are in every other way just like those folks who were admitted to the hospital except they weren’t having a heart attack.

This is what we call a case control study – the cases of the people who are having a heart attack. The controls are people who are not. We looked at the difference in omega-3 levels and found that those people who have heart attacks are much more likely to have a low level. A low level meaning under 4%. I guess I maybe should explain how these numbers work.

We express the omega-3 index, the amount of omega-3 in the red cell as a percent. It’s a percent of all the fatty acids in the membrane. The omega-3s typically run from say 2% to 10%. That’s the scale. We think a level under 4% puts you at high risk as somewhere between 4% and 8% roughly is at intermediate risk and then over 8% is really the low risk area, the target value that we aim for.

So we looked in this group of individuals who are having heart attacks from not and found that those people who were having the heart attacks are much more likely to have
an omega-3 index in that under four target and very unlikely to have an omega-3 level up in that eight range where we think it’s good. That’s one of the first studies we looked at.

Another study was we looked at the relationship between the omega-3 level and what they call cellular aging. We all know what aging is because we just look at the calendar and we get older. That’s what we call chronological aging (time based aging). Each individual ages at a different rate because we don’t all live the same number of years and some people age faster than others.

There is a test that is a little controversial but it’s being used more and more. It’s called telomere – measuring the length of telomeres which is a section of the DNA that’s in each and every cell in every body. If we look over time over a five year span of time we can measure the loss of telomeres in the DNA. The more telomeres that’s lost, the faster the cell is aging, is the general way of looking at it. We have the marker then of aging, cellular aging.

We looked in this study at the omega-3 level in the blood of these people and they compared that omega-3 level with how fast their cells aged over five years. We found that those people have the lowest level of omega-3, the under 4%. Their cells aged much faster than the people who had omega-3 levels up in the 8%. So it seemed to be a marker of aging actually.

DM: Sure. That’s a really interesting observation and we’ve discussed that on our site before. I think the telomeres appear, from experts I have interviewed, to be probably the most accurate biological clock that we have. The theory is that once you reach a certain limit maybe about 5000 base pairs I believe you just don’t stay around any longer, you’re just dead.

I wasn’t aware that the omega-3s were associated with the decrease in the shortening of telomeres because really the central area of telomere research right now is to see if you can activate telomerase to actually increase the telomeres and essentially reverse aging.

DH: That’s true. There may be a relationship with omega-3s in activating telomerase.

DM: It sounds like the initial research is very promising. If one is interested in delaying aging, it would seem a very good strategy from that perspective in addition to the details you have found uncovered with respect to the leading cause of death which is heart disease.

DH: Interestingly, in the same study that we looked at the rate of aging in the cells, we have actually measured – we did as we call body counts. We measured how many people died and found that those people who had the higher omega-3 levels died at a slower rate or are less likely to die within the study period than the people who had low
omega-3s. So that fits with the idea that the rate of telomere changing actually correlates with the rate of death. It’s just an important factor.

DM: That’s exciting. Of course the number one cause of death for most people is heart disease but following close behind and in some groups even higher would be cancer. Have you looked at the influence of omega-3s in cancer?

DH: We have not. You’re absolutely right. That’s a great area of potential research. It’s been difficult – many people have looked at omega-3 in human cancer studies and have not found nearly a strong or clear signal as we have seen in heart disease with reducing risk for cancers. There maybe a few specific cancers that are more related to having a little omega-3 but it’s not been a slam dunk at all in the cancer area.

DM: The other question I was a bit surprised to hear is that there didn’t seem from your research to be an upper limit of adverse effects. That’s somewhat unusual in nutrition and obviously you have a PhD in that but typically of course it’s easy to over do any specific nutrient. I’m surprised that an over consumption of these omega-3 animal fats wouldn’t have some complications. I’m wondering how specifically you have analyzed that and what your comments are on that.

DH: It’s a great question. It is a puzzle that I have puzzled about myself – why have we not seen an upper limit or toxicity level. Part of that may be fish oil is not at all that tasty and a lot of people just don’t want to eat very much of it. In America we don’t see high levels of omega-3 like you see in Greenland Eskimos or like you see in Japan for example.

Japan is a great example because of course it’s a completely different culture to attribute any one feature of their lifestyle or lifespan to omega-3 is a little presumptuous but I do it anyway. Because the Japanese live on average four years longer than we do. They have omega-3 levels that are twice as high as ours for their whole life not just when they decide to take fish oil because fish is just a big part of their diet.

The Japanese don’t seem to have any adverse effect to having omega-3 levels that are double ours. They just benefit. The fact that they have very little heart disease and again, live longer, live four years longer on average in spite of the fact that they smoke more than we do. In spite of the fact that they have more hypertension or high blood pressure is more common among the Japanese because a lot of salt in their diet. In spite of those two problems, they still live longer. They still have less coronary disease than we do. I think that’s an omega-3 related effect. It raises the question you have raised, is there a too high and we just haven’t seen it yet.

DM: I’m curious as to what levels are you finding in the Japanese. You mentioned the 8% being an important threshold. Are they typically higher than 8%?

DH: On average about 9-1/2 to 10.
DM: Okay, interesting.

DH: That’s average. So half of them are higher than that.

DM: Wow! What’s the highest you have seen?

DH: The highest we have seen is about 20.

DM: Wow, one-fifth. Interesting.

DH: Yeah one-fifth, right.

DM: It would seem to me just looking at the whole picture that if one was to have increased levels as a result of eating a whole food like fish as appears most of the Japanese do and they’re not getting these elevated levels from swallowing fish oil tablets that there may in fact not be much harm or toxicity but I think that it’s a significant leap to suggest that swallowing some supplement like a concentrated or highly processed fish oil is going to provide the same benefits because there is so much potential for damage to the fats and oxidation.

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I’m wondering what your thoughts are on that and if you have looked at that or tried to tease that apart in some way.

DH: I certainly agree with the point of view that the best way to get omega-3 fatty acids is the natural way which is in fish because fish by and large are very nutritious foods, the kind of protein they have. Fish is the best way to get it. There are issues with fish, as I’m sure you’re aware, mercury in a few species, some PCBs in a few species but I think the balance in favor of eating fish for the omega-3 far outweighs the risk. To assume that all the benefit of fish is just the omega-3 fatty acids is a little presumptuous also. There has got to be benefits there, trace minerals that you find in fish etc.

You’re absolutely right, some capsules can be prepared improperly. I think by and large there is so much scrutiny these days – there is so much interest in omega-3 products that there is pretty tight scrutiny of most supplements. I try not to alarm people too much about the supplements that they’re taking are going to hurt them in any way. I think, on balance, just about every supplement is going to be beneficial. There are certainly a spectrum of quality out there.

DM: That hasn’t been our experience. Actually, it’s quite the contrary because even though there are regulations from the government to abide by the actual enforcement and the monitoring of these regulations are really somewhat limited. It’s quite rare where a company is ever audited. The studies that I have looked at that address the nutritional profiling of what’s in the capsule versus what’s stated on the label, there is a significant disparity.
I think some due diligence is required on the purchaser especially if one is going to make a commitment to consume this for years or decades as typically one would for omega-3 fat. I think it’s important to really do their homework and ask the questions and do the research because you only have to do it once. Once you have established that the company preparing this is really doing a good job and you’re convinced of that then it’s not something you have to do on a regular basis. Most people don’t take that many supplements so I think it is worth the extra effort to do and not just assume that someone is monitoring this because there is a good chance that they’re not.

DH: Certainly if it’s the government that’s going to be monitoring it perhaps you’re right.

DM: Yeah, that’s the case. I mean there are independent companies like Consumer Labs. That is another resource that people can use to do this and they can then find this. I think they regularly look at fish oils.

I think probably one of the points that I wanted to go over is – I mean you have alluded to the cardiovascular benefits and sort of implied this protection for mental benefits also. I’m wondering if you could just review your understanding of the benefits of omega-3 generally and what the research is suggesting or even some of the newer research is finding.

DH: I delude to the cognitive sort of above the neck, sorted by above the neck and below the neck. The cardiovascular stuff is below the neck and there is a lot of research there. Before we leave cardiovascular, say that there have been some studies recently actually in 2010 there were three or four studies published that did not find – they did not find any harm but these were not able to find or report a benefit in cardiovascular disease. There is reasons for all of that failing. Some of them could be that the omega-3s don’t say have a benefit like atrial fibrillation. A big study was done in that condition and the omega-3s didn't affect it, well, maybe they don’t. That's the truth.

But there were other studies that were done that were either designed improperly, didn't go long enough, didn’t have enough people, didn’t find an effect. Some of your listeners maybe some of the more savvy ones certainly are maybe aware of those new studies. I would not let those really be a concern because the overwhelming picture in my view is still is that the omega-3s have cardiovascular benefit.

Back to your question more generally, I think we’re very interested in the idea that a long term high omega-3 level may actually forestall the development of dementia. We don’t know this yet if this is the case or not but there are several catalyzing hits in the literature. Populations typically that eat more fish all around the world have lower depression scores and lower rates of dementia which is a good thing.

What I doubt is the case is that you’re able to start taking omega-3 when you hit 60 or 65 and expect that that’s going to change the trajectory of your mental functioning. It’s just a little bit too late. I don’t know when too early is. I don’t think there is too early.
think you’re going to start probably minus 9 months in your mother’s womb if you had anything to do with that. So a lifetime of a high omega-3 I think is really what we’re aiming for.

Our studies right now, we’re looking at the question of whether the omega-3 index is measuring in the red blood cell is a predictor of risk. So people who have low omega-3, are they more likely to develop dementia? If they are maybe we can find other ways – if changing their omega-3 intake at that state of life isn’t going to help because the deed is done and the omega-3 level being low is just a marker that they’re going to be at higher risk. Then maybe other treatments can be instituted to try to prevent it or they can begin doing crossword puzzles more actively or something.

That is I think a big area of research. Cancer, you’ve already mentioned and there is certainly research going on there. The other is sort of joint health, arthritis, inflammation. That’s an active area of health where the omega-3 seems to be anti-inflammatory in a very general global way which seems to be good for us.

DM: Great thank you. I think we all tend to learn from the people who oppose our views. I think one of the more popular ones who really has been debunking the omega-3 benefits is Brian Peskin. I suspect you’ve heard of him. Is that correct?

DH: I’ve heard of him.

DM: Let me just summarize what his view is and then give your comment on it if you can. First of all, he has no formal biological training. I think he’s trained as an electrical engineer. He is able to review the literature and he is prolific at doing that and finding studies that support his position which is essentially that the benefits of omega-3 are vastly overrated.

It’s his premise that the omega-6 are actually more beneficial but not the traditional omega-6 that nearly everyone is consuming. It’s these polyunsaturated fats that are typically processed and highly damaged and oxidized and distorted in a way that actually causes a lot of damage. He is a big proponent of using essentially omega-6 oils that are raw and organic and highly unprocessed as providing the benefit.

His contention is that actually over consumption of omega-3s maybe significantly damaging because of course one of the components that they have is these unsaturated fats which are predisposed to oxidation unless you have some really good antioxidant structure in place. I’m wondering if you’ve read his work and reviewed his arguments because he does present a fairly well and logical counter argument to the benefits of omega-3s.

DH: Frankly, I have not read his work so I’m not going to be able to point-by-point address it to the point of the omega-3s are susceptible to oxidation that’s true but that’s also true with the omega-6 fatty acids. I’m not sure if you get a win on that. I don’t disagree that the omega-6 fatty acids are important. I think everybody agrees they’re
important. The question in my view is we need to get more omega-3 in the diet and not so much worry about the omega-6 side of it. That’s another discussion.

I mentioned these negative studies that came out. I know a person could. If they were of a mind, they could try to make a case that omega-3s are overblown. Fair enough, I think we have to have open unbiased discussion. I don’t want to have blinders on myself to where the science is taking us but most of the science is taking us in the right direction. I don’t agree with him that we are – I certainly don’t agree that an increase omega-3 intake is going to have adverse health consequences. I don’t see the evidence for that. Again, maybe I need to look at his work.

**DM:** Yeah, it would be good. He doesn’t write in an orally scientific way but even if he did that’s not issue for you because you’re a scientist so you’re familiar with that jargon. It’s a quick read and it would be interesting to see what you views are on it. I (indiscernible 31:04) I can forward you some of his material.

**DH:** You can send me a link or something like that.

**DM:** He is probably one of the most vocal opponents of using omega-3 at least from the responses we see to our site. I think there is probably some truth to what he’s saying or some elements because he has some good arguments. I think it’s very clear that’s he is in direct opposition to the vast majority of the scientific research that has been published which is really strongly in support of the use of omega-3s.

It just makes sense too from what you’ve seen in the other studies with respect to the Japanese but again much of it maybe as a result of the source of omega-3 that’s being consumed. I think we’re both in agreement using it from seafood that is not contaminated already with heavy metals or chemicals like dioxins or PCBs is certainly going to be the preferred the source. That is the challenge of course is that the oceans are so contaminated now that it’s a very difficult challenge to find uncontaminated seafood.

**DH:** Right and there is no way of knowing of course what you’re eating…

**DM:** You can assay it and there are companies that do sell salmon for instance from relatively uncontaminated waters in wilderness areas in Alaska. You can actually measure for these mercury levels. That’s a simple objective laboratory test.

**DH:** Sure. Obviously the consumer can’t. One has to trust the source.

**DM:** No the consumer can. It’s not an easy thing but maybe a step above doing an omega-3 index. These labs are easily available. You can send in a sample. It might cost 100 or 200 dollars but if you’re willing to make that type of commitment for doing something in the long term and you’re really careful about what you’re putting in your
body with the belief and understanding that it’s going to have a significant influence on your ultimate health outcome and your progression to these diseases. I think it’s certainly worth the investment.

There is a lot of people who are really committed to a high level of health. Ultimately, you know, we’re all our own physician and we have to take responsibility. The more that we relegate or delegate that responsibility to someone else and trust their recommendation, the more likely that we could right the problems.

**DH:** Well, yeah, a point taken.

**DM:** I think we all have that. I certainly run into mistakes myself or errors in my thinking and belief because I was relying on some other people who I respected as having the information but when you do the independent analysis, you come up with a different conclusion.

I tell people that read our site too the same point is that we seek to provide information that’s truthful and accurate but ultimately you have to listen to your body and do your own research and see what works for you.

**DH:** Yeah good point.

**DM:** I’m a firm believer in omega-3s personally. I was just presenting Brian’s position because it is the most prominent counter position. I take a significant amount myself.

I don’t know if you studied the use of krill as a source. Perhaps we can talk about the differences of not just krill but the different types of omega-3 fats. There are a number of people who choose for a variety of reasons to exclude animal products from their diet. They rely on plant based omega-3s. Of course that is a different fat. It’s ALA. It’s 2 to 4 carbons less than the EPA and a DHA. The body has to metabolize that. It can make it and it can convert it.

I’m wondering what you’re finding or if you’ve looked at people who are choosing to use plant-based sources of omega-3 fat and exclude the animal based ones. If they are receiving similar benefits and that they are able to achieve as high omega-3 indexes in your assay.

**DH:** No, they can’t. As you mentioned, the longer chain EPA and DHA omega-3s can be made from the short chain alpha linolenic ALA but it’s with great inefficiency. It’s very difficult to raise…EPA will go up a little bit. Maybe if you really increase the ALA intake, you might get a half a percent increase in EPA but you won’t get any increase actually you might get a decrease in DHA.

**DM:** Interesting.

**DH:** So that there is no effect on the omega-3 index to the sum of the two.
**DM:** It's interesting, prior to asking the question I hadn’t realize that your assay would be really one of the best tools to address that question because there are many people in that community who strongly believe and support and recommend that approach. Actually, from my understanding very little objective scientific validation of that.

Your assay is really probably one of the best tools to know if in fact one can achieve that. I didn’t realize it until you mentioned it but you’ve looked at this specifically and you have found that that is not the case.

**DH:** Right. We’ve looked and seen that people who really go out of their way to increase their ALA intake do not a get a bump in the omega-3 index.

**DM:** That’s good.

**DH:** There are new products on the market not widely available but they are encapsulated oils that are from plants either from microalgae or from yeast that provide DHA or EPA. There are more coming. Those are options for vegetarians but they are not easy to get at this point.

**DM:** Even with respect to their availability the other issue is and the one that I have more serious concern with is the fact that we believe that most of the benefit is from EPA and DHA but as you eluded to earlier that in fish there are other nutrients, micronutrients and other fats. When you get fish oil or fish, it’s not DHA and EPA there is loads of other fat in there, certainly not the majority.

I think we maybe assuming too much here and believing the benefits from these two fats when in fact it’s the combination and the ratios of the whole food that’s providing the benefit and not just the EPA and DHA. When one seeks to apply that in an isolated form like they can do from these extracts and these vegan sources that you may not get the benefits or probably not get the benefits that you’re going to get from the whole food.

**DH:** That could be. I think there are some studies that have looked at the effects on heart disease for example of just pure EPA. A large Japanese study looked at giving what was essentially 98% pure EPA almost like a drug. They observed benefit over five years. There was less cardiovascular disease in this group of people. It doesn’t mean that to your point that having the full complex of omega-3 and other non-omega-3 oils in fish would not have done better than EPA did. But EPA alone was able to actually have.

**DM:** That’s good to know. Have you looked at people who have taken these supplements exclusively, essentially just EPA by itself and not the DHA? Have you found that they have been able to actually increase the DHA in their cell membranes?

**DH:** No, if you take EPA, you don’t increase your cell membrane DHA.
DM: Interesting.

DH: If you take DHA you will increase DHA levels. It’s still somewhat of an enigma. If you take DHA you get a little bit of a bump in EPA levels which people have referred to as retroconversion because it’s a bigger molecule.

DM: Yeah, it doesn’t make sense biochemically. It should go the other way.

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DH: It’s very difficult. You would think giving EPA which is in the synthetic chain toward DHA would give you a rise in DHA but it does not happen. Time and time again, it does not happen. We don’t know why.

DM: I never knew that. That’s very interesting.

DH: You get what you take.

DM: That’s good to know. Have you looked at the other forms of omega-3s? Essentially there are two primary ones which is fish oil and then krill which of course has the benefit of being attached to a phospholipid so the absorption component could be better. And then one that’s not going to measure the membrane is the oxidative state so it has astaxanthin which is a really potent inhibitor of oxidation so virtually all of the omega-3 fats that are absorbed are going to be unoxidized which may not be the case with the fish oil.

DH: I’m aware that obviously krill oil is certainly a new player on the scene. It has a lot of promise. We’re just needing more data…

DM: So you haven’t looked at it specifically?

DH: I haven’t studied it. We’ve done some analysis for some of the krill oil companies as they’re developing, doing their pre-clinical animal research. We’re measuring omega-3 levels in rats for example that are given krill oil versus fish oil. We’ve done some human work with them as well but these are not published studies yet.

DM: Anything that you have found or can comment on?

DH: What I can say is what is published from I think reliable sources is that on a gram per gram omega-3 basis, if you want to look at the absorption or the increase of the omega-3 index per milligram of omega-3 fat…

DM: Perfect, that’s exactly the question.

DH: That’s the way you look at it. You actually get more omega-3 from eating krill. And it goes up – I think that part of the challenge is the product itself per pill there is just not as
much omega-3. So maybe (indiscernible 42:12) at the end of the day. We have a lot to learn about krill and the whole phospholipid delivery system. There may very well be a benefit to that we’re not yet aware of.

**DM:** Have you been able to determine what type of increase percentages? Is it twice as much, three times as much, 25% as much?

**DH:** More like 25 to 50 percent more on a per milligram of omega-3 basis.

**DM:** Okay. That's good to know.

**DH:** At least what I’ve seen.

**DM:** Are there any other comments you would like to make about this?

**DH:** If you don’t mind getting off the omega-3 a little bit but (indiscernible 43:05) on the red blood cell because the other advantage of getting a red blood cell fatty acid test is that we can also measure the trans fatty acids in the blood. Of course trans fats are the ones that are produced from industrial treatment of vegetable oils to make margarines and shortenings. They’re pervasive in baked goods and fried foods.

The trans fats are the bad fats and just about everybody agrees with that. We can measure that level in the red cell as well. Although there is not nearly as much data that will allow to us say – like we have for the omega-3 index; 8% is good, 4% is bad. We’re not quite there with the trans (fats) yet but we are developing those metrics.

We can say if a doctor has a patient or an individual wants to know themselves they do omega-3 trans tests on the red cell. It’s in the same profile as we do the omega-3 test. They get their trans level and then they change their diet. The doctors say, you got to go on a better healthy diet. You got to get rid of all the donuts and the pastries and the pizzas and the French fries etc. All of which contain trans fats.

If the patient or the individual follows that advice actually does reduce their intake, we’ll see it. We’ll see it in the red cell, trans level, a little drop. So it's a good indicator of following a healthier overall diet. Otherwise, I go to my doctor and say, Doc, I’m changing my diet. I’m eating better and the doc says, let’s find out.

**DM:** Yeah absolutely. So this trans omega-3 is part of the normal omega-3 index that is performed or is it a separate assay?

**DH:** It’s the same assay. I misspelled it. It’s not actually trans omega-3 it’s just trans fats.

**DM:** Because you talk about these processed foods, it's mostly omega-6s than are omega-3s…
DH: Omega-9s or omega-6s are the ones that are the trans – they have that trans configuration. It's just the way a double bond in a molecule split. It's not an omega-3 question. It’s a completely independent question. We’ve actually looked in the Framingham study. We measured the trans fat levels in the late 1990s and then we measured again around 2006 about seven years later.

That was during a time when the American food industry was trying to remove trans fats from the diet as much as they could. We found a 23% drop in the trans level in Framingham. Not all those people are trying to eat any better. It’s just the background diet, the background level of trans in the American diet is going down. It's not nearly as low as it should be but it is going down and we are able to track that with red blood cell trans fat levels.

DM: Again, I’m sorry, I still don’t understand. Is this assay performed as part of the regular omega-3 index?

DH: Yes.

DM: So you get that and you’ve actually been doing that since the beginning?

DH: Yes. It’s just another piece of information that comes out of the fatty acid profile.

DM: Yeah, you're right. That may in fact be even more beneficial. Have you analyzed the data to see what maybe an optimal range and any correlations with people with heart disease?

DH: Not as much as we'd like to. We’ll be able to do that as we move further into the Framingham study and the women’s health study. We'll be able to say, it looks like this level of trans is really bad. We'll be able to see that in these studies as we go forward.

DM: We’ve been referring to this assay that you developed and you’re really the pioneer in this. It’s not a typical assay that one can obtain though from their primary physician. I mean, it’s possible but how commonly available is this and if someone is interested in getting this test what would they do?

DH: The best way I think at this point to get the test – there is a whole world of direct to consumer testing and then there is a through your physician as part of a health workup. Through your physician, there is a laboratory that I now associated with called Health Diagnostic Laboratory. That’s in Richmond, Virginia. It’s abbreviated HDL which is nice because that’s the good lipoprotein. HDL is good.

At HDL, they’re beginning to offer this test to clinicians as part of the panel that they’re giving. They have brought my test into this lab. They’re scaling it up much bigger than what I have been doing in my research lab. So HDL is a place that physicians can order the test for their patients in that context. There can be some level of insurance reimbursements.
DM: How widely adopted is this assay?

DH: Hardly.

DM: Hardly anyone is using, is that correct?

DH: Yeah. We’re working with HDL, we’ve done probably 6000 or 7000 assays for them in the last four or five months. That’s a lot of numbers but as a percent of the number of blood tests that are being done in America, it’s nothing. We’ve love to see it become part of every test, you know, every heart disease risk evaluation panel.

DM: Sure, it sounds great. Alright, any other comments?

DH: I think that’s it.

DM: Great. Thank you so much.

DH: Very nice talking to you.