

A Special Interview with Dr. Rudi Moerck

Omega-3: Fish Oil versus Krill Oil

By Dr. Mercola

DM: Dr. Joseph Mercola, DO

RM: Dr. Rudi Moerck

DM: Welcome everyone this is Dr. Mercola. I'm here today with Dr. Rudi Moerck. We're really excited to have him because he is really an industry expert in a very important area, which is omega-3 fats. He's got lifelong of experience. He has had specific training. He is in academics. He is working with the National Institutes of Health.

Actually, an insider with the drug industry, and has actually been responsible for the formulation of many different drugs. He's taken his expertise and has been able to apply it to what his true passion is.

He is born and raised in Germany but most of his training is in the United States. His passion is health and getting people healthy. Actually, he's got an extraordinary personal history. I'm sure we'll get into how he applies his knowledge to his own personal choices of foods. You're going to learn a lot just from that information.

Why don't you highlight some of your specific academic credentials and industry affiliations so our listeners know that you really and truly are a highly qualified industry expert that can really share some useful insights about this really important topic?

RM: Thank you Joe. My undergraduate work was in biology with concentration on botany and of course, associated with that is a keen interest in plant extracts and plant products and medicinals made from plants.

In graduate school, I obtained a degree in Physical and Organic Chemistry. While at Ohio State University, I also taught premedical organic chemistry. I also taught at Ohio Wesleyan University. With that background, I then went into the industry, mainly the pharmaceutical industry. Spent 25 years in that industry, and developed a lot of drugs. I was associated with the development of 17 drugs from discovery all the way through manufacturing.

I've always had a passion for both pharmaceuticals and natural products and herbal products because of my family history and my background, those things have always played a very important role.

I applied them to myself. In some cases, traditional drugs are very important. In other cases, herbal products are complimentary with drugs. On a standalone basis, are also very important.

DM: I find it particularly interesting in the fact that certain drugs can be useful at times especially as a tool to help us make a transition to a natural lifestyle. I mean, you can fault the drug industry for a lot of problems and really contributions to major challenges in the health as we know it today.

But one thing you cannot fault them for is that they are really experts and pioneers in developing these processes and the quality assurance levels that really have come up with some extraordinary chemicals that really have a significant influence on biology.

It's just wonderful to have someone with this expertise to supply it and put on his good 'white hat' to really do good rather than necessarily generate profits for an industry that is really more concerned about their bottom line than the health of the people that they're serving. We're just delighted to have you here.

One of the things we want to really focus on today is omega-3.

One of the primary reasons we wanted to have you here is to really help our viewers understand really some of the keys from the animal based omega-3 fats which is really for the most people is down to two primary ones. That would be fish oil and krill oil.

There are some plant-based omega-3s that have DHA and EPA but for the most part from the algae. Those aren't commonly used.

There is a lot of confusion about fish oil.

First let me preface in saying that fish oil is really what started this whole market and really most all of the research and even to this day, I wouldn't say it's fair to estimate that over 99% of the studies, the documentation of the benefits of animal-based omega-3 fats, DHA and EPA, are based on fish.

RM: Yes.

DM: That's great and that actually is one of the, I guess, the criticisms that many people have about using krill oil is that it's not well studied.

I'd like you to explore the science with respect to allowing us to make a reasonable jump with a high degree of certainty that the difference between a DHA and EPA from fish is going to be pretty similar to, if not identical to the benefits if that source is from krill.

RM: As far as the fish oils we've seen out there, it's a very wide gamut of quality and stability and rancidity. I would say 50% of them are rancid.

DM: Fifty percent of them. Rancid to the level where they're unacceptable to be used by humans and more than likely, taking them will actually cause more damage than good?

RM: If you put that strict thing on it, I would say 25% are shelf life, you know, I have seen --

DM: They are already expired when you buy it, one out of four?

RM: I think that there is some mislabeling going on that the expiration date put on there is arbitrary and that the actual shelf life is less. I would bet my reputation on that that is the case. That there is fish oil that is mislabeled as far as expiration date. We have tested these and we have found a very wide range of rancidity even in the same brand.

DM: It's maybe an artifact of the processing of the oils and the manufacturing process.

RM: Or where it's stored. If you take a fish oil and you put in a warehouse in Dallas, Texas for four months --

DM: It can be a different other story than Maine in the winter.

RM: Right. Big difference. You know, the ones that have a high turnover are going to have less rancidity and then it depends on how they are stored in stores and what kind of bottles they're in. Also, a lot of fish oil is not in PET ([polyethylene terephthalate](#)) bottles or not in glass bottles.

Glass, I don't recommend because of environmental reasons. It takes eight times more energy to ship a glass bottle. That was in the *Carnivore's Dilemma* book. It takes eight times more energy to ship a glass bottle than it takes to ship a plastic bottle.

DM: And there is a breakage issue too.

RM: A breakage issue and safety issue, everything else. One thing great about glass is oxygen doesn't go through it. PET is almost as good as glass as far as oxygen barrier and of course is a lot lighter. I believe very strongly that you do have some excellent fish oil being made, it's very expensive. If you're going to buy that, you should buy it from a distributor that will ship it to you directly. You don't want to buy it off the grocery shelf. You don't know how long it's been there.

DM: I like you to expand on all these principles, the principles that a typical consumer can use to identify high quality fish oil because they're not going to have a rancid method they can use to check it. Basically, you never want to buy a high volume, large containers, small --

RM: Clear containers, avoid.

DM: Like the plague, because the sunlight is going to let the UV through and it will oxidize it.

RM: Fluorescent lights is as bad as sunlight.

DM: That will oxidize the oils.

RM: That's right because it's got a lot of UV in it.

DM: Are there any other guidelines?

RM: If you were going to buy tomato plants, when you want to have them shipped, go to the nursery and get it. While you can't go to the harbor and get a fish and squeeze the oil out of it, if you were to buy it in a store, you would either have it shipped to you or you would have it sitting in a glass drawer. I mean, if it was a tomato plant, you would have it shipped to you overnight. The same thing with fish oil supplements.

If you're going to use them, small bottles and have it shipped to you overnight and with a company that's got a high turnover and then when you get it, put it in a refrigerator.

DM: But the big caution I think that really casts concern on the whole industry because the bulk, well over 90% maybe 95% more of the people who are convinced of the data, they believe that animal-based omega-3s DHA and EPA are useful and are taking them as a supplement to protect themselves to prevent disease are using fish oils.

But a huge percentage at least 25% from your experience and another 25% are close to that level are damaged products. You really want to avoid them. It's a crapshoot. I mean, it's a toss of the coin as to which one you're going to get is good or bad.

RM: I talked to really fairly well known physician a little while back. I talked to him about the issue of metals and even refined fish oils, you have PCBs, you have some metals. I asked him, what's the cost to benefit ratio of this? He goes, all things being equal, if you couldn't get anything that was better, take fish oil and take the metals in and contaminants in because net in net, you're healthier than if you didn't take any. If there is no other alternative.

But of course, you and I know there is an alternative and that's krill oil. Krill oil comes out of the Antarctic. It is the most abundant biomass available to mankind in the world. Five hundred million tons is available and only less than 2% of it is harvested.

DM: Probably one of the strongest concerns or criticisms of krill oil is this myth that I believe got started from the fish oil industry because it's competition, is that if you are purchasing krill, you are evil because you are stealing food from the whale when nothing could be further from the truth.

It's the exact opposite because if you're consuming fish oil -- there is not enough fish oil left. We never really discussed it but why don't you discuss the sustainability of fish versus krill.

RM: Fish is not sustainable.

DM: Absolutely unsustainable.

RM: It's not sustainable. Ninety percent of the fish that were in the ocean in 1953 are now gone. There are some areas that have been totally closed to fishing. Most of the fish today is farm raised but even farm raised fish consumes fish because...

DM: You have to feed them.

RM: Right. Ninety percent of the fish that's fished today goes into feeding fish. Only 10% is sold as oil for human consumption. The rest of it is ground up as fish meal and fed to farm raised fish.

Krill meal is much better for fish farming because it has low metal content. Remember, if you take fish and you feed them to fish, the metals in the fish...

DM: Increase.

RM: Right. So krill meal has a much...

DM: Krill meal is what is left over after you extract the oil. It's a waste product but it's very beneficial for this fish farming industry.

RM: But the sales have not kept up with the sale of krill. The prices therefore have gone down. However, it is superior. There is data that the fish grow faster and happier and you don't have to add synthetic dyes to make red salmon because krill already has the astaxanthin in it, the carotenoid. Krill meal can be used to feed fish. It is being used but it's fairly non-profitable.

DM: Let me give you a little disclaimer because some people viewing this might believe that, well, why should I believe him, he makes krill. You don't make krill. Your expertise is in really staying healthy and running a company that is applying technology you learned from the pharmaceutical industry to create the highest quality natural supplements. You could care less if fish oil is better. You would do it in a heartbeat.

RM: Nothing else that has come along in the last 10 years and nothing that I know of in the entire nutraceutical business is as good for human health as krill oil.

DM: It's a very powerful statement. You reached this conclusion. I'm just highlighting this. Actually, you were opposed to it because it was absolutely against your total philosophy but after taking six months to carefully review the data, this is the conclusion you reach.

RM: Yes.

DM: We couldn't jump into the end. Why don't you lead us through your journey and why you reached that conclusion.

RM: From public information, the so-called Hamburg study that was done. Now that doesn't mean they were studying hamburgers, they happen to study overweight people in the city of Hamburg, Germany.

They gave them krill oil up to 2 gm a day in raw healthy subjects. They showed a dramatic reduction in fatty liver. It's a common disease from people that drink too much beer, drink too much alcohol, eat too much fatty food in Hamburg, Germany.

DM: Or have too much fructose.

RM: Right. Fructose is another fact. Believe me, in Hamburg, Germany, it's eating too much veal, eating too much pork sausage and drinking beer. There was a dramatic decrease in fatty liver which is -- I don't know of too many things that would do that even in the pharmaceutical range. In fact, I don't know of anything that does it.

We also saw very clear evidence from several sources of a reduction in cholesterol. We saw clear evidence in the dramatic reduction of triglycerides.

DM: Far more potent than you would see with the use of fish oils.

RM: Right. Also, far more potent than you would expect from the level of EPA and DHA that's contained in krill. That's also one of the keys that we need to talk about a little bit later. I'm very skeptical. I'm a scientist. I don't have religion about health food. I'm a scientist. You got to show me. I've got to see the data. I saw a lot of data. I've reviewed hundreds of papers.

The most interesting thing is, I have, genetically, very high cholesterol. 273 is my average. I won't take statins for a lot of reasons because I read all those studies too. I won't take statins. So I try to control it with diet. I try to control it with exercise. The typical things you do. I also took fish oil for many years which did not lower my cholesterol. Slightly lowered my triglycerides.

Even though I'm not overweight. I bicycle 20 miles a day. I get a lot of exercise. Lately, I've been doing a lot of gymnasium work, exercise like that. I have a very good diet. Low saturated fat diet, high in vegetables. I don't eat any omega-6s. My triglycerides have never ever in my life been below 300, typically 500.

DM: Fasting?

RM: Fasting. Sometimes as high as 1500 and so did my mother.

DM: It probably is genetic, a hyperlipidemia of some sort.

RM: Right. So I took krill oil supplements for 20 days, 600 mg a day, 2 x 300 mg. And then I switched to 300 mg.

My triglycerides went from 350 to 124. My cholesterol went from 274 to 185. My HDLs went up 20%. I actually feel a lot better when I exercise. There are no apparent side effects that I have seen.

Not like with statins with muscle aches, sports recovery and that sort of thing. I feel perfectly fine. I feel very good as a matter of fact.

DM: Well, it's a food.

RM: My health has actually improved.

DM: Something simple and basic and relatively simple.

RM: Krill oil contains something else that we haven't talked about yet. That's astaxanthin. It contains EPA and DHA phospholipid and that's important to say phospholipid. It also contains small amounts of astaxanthin. As time has gone on, the amount of astaxanthin in krill oil has decreased somewhat to fairly low levels.

DM: This is naturally harvested krill oil or the one that is sold commercially or both?

RM: Originally, the concentration of astaxanthin, which is very important for heart health, it is a very important antioxidant. If it were not in krill oil, it would be relatively unstable.

DM: So it really provides a bulk of the benefit to krill in keeping it safe from oxidative damages.

RM: Krill oil that contains astaxanthin, natural astaxanthin in krill, no added astaxanthin is incredibly stable.

DM: Resistant to damage.

RM: It is incredibly stable.

DM: You've documented this repeatedly because you've got the lab test.

RM: I thought the (indiscernible 18:21) machine was broken. I mean, it went 190 hours at like 100 degrees with bubbling oxygen through it, no change.

DM: And you did not touch it. If it were fish oil, how long would fish oil go?

RM: An hour.

DM: It's assuming you had a good fish oil because a good percentage of it, maybe even the majority, is damaged.

RM: Right.

DM: So 200 times more resistant to oxidative damage.

RM: As long as the astaxanthin is there. Now, over time, because of market demand and because of becoming more efficient at manufacturing krill oil, the amount of astaxanthin in krill oil has decreased. Originally, when the first clinical trials were done, it was about 1.5 mg per gram of oil. Today, it's about 0.2 mg.

DM: So it's down significantly.

RM: Yeah, but that's still a good enough level to completely stop the decomposition in a (indiscernible 19:18) scenario. If it goes down below one-tenth then the krill oil goes bad real fast. So one of the things my company has done is that we've taken the krill oil and we've added back in some astaxanthin made from algae.

DM: Which is where they get it from anyway.

RM: Which is where they get it from anyway. Great observation. That product we think, you know, we feel better about the clinical trials because a lot of the clinical trials were done at that level.

DM: The original research.

RM: The original research. We've done that. And also, we've discussed with some of our clients the possibility of adding a lot more astaxanthin up to 2 to 4 mg a day type of dose which we think is a good dose of astaxanthin.

DM: It's sort of a tangent here, but an important one. If you're convinced from these arguments that krill oil is a better choice for you than fish oil, as a source of omega-3, then ultimately you're faced with the decision as to which krill oil to purchase.

One of the variables that you use, one I would strongly, and I think we both agree, is to read the label and see how much astaxanthin is in there. Really, the higher the better.

Well, you don't want to go too high but essentially up to 2 mg per gram of krill oil would be a good dose. The lower the worse. If you get 0.2 or 0.1 as you're saying, you can almost be guaranteed that that's going to be oxidized at some point.

RM: Right, it will start oxidizing. You know, I know that you're working with krill oil and that your team is very conscious of the issues.

DM: We've been very convinced like you of the value of astaxanthin.

Because interestingly, and this is what I learned when we visited your company, is that it's probably the single most effective supplement that we know of to prevent two diseases that are reversible, which is cataracts -- which seems to be universal as you age -- and the most common cause of blindness, which is age related macular degeneration.

And then another nice benefit is cosmetic but nevertheless may contribute to premature disease is you don't get sunburned. You don't get sunburned. If you have enough astaxanthin, you're like immune to getting sunburned, which is just shocking but it's true. It doesn't happen in one dose, it takes awhile to build up a level.

RM: Twenty days.

DM: Twenty days, three weeks, but you take enough, and, end of the sunburn.

Fish Oil

RM: First of all, fish oils are very high in EPA and DHA and typically made from menhaden, sardines, herring; things that are generally not eaten in the normal consumption. Let's start off by saying that EPA and DHA are good for you.

DM: I think we pretty established that.

RM: We've established that.

DM: That's something so well documented. Most all nutritional claims are denied by the FDA but one of the few ones that are is the claim of EPA and DHA for the benefit of cardiovascular disease. I mean, that's so accepted even the FDA agrees to that one.

RM: Right. There are probably more benefits than that that are still not allowed but they will be coming in the next few years as more research is done. If we go out there and visit a fish oil factory, basically, you know where it is before you get there because these factories, they stink of high heaven. You go there and there are very large processing vats where they extract fish oil.

This is done several ways. One is by just simply squeezing the fish, in some cases with cod liver oil to actually remove the livers from the cod and then remove the oil from those by classical mechanical techniques.

In some cases, to get the last few ounces of oil out of the fish, they use solvents or they use fish oil as a solvent by taking fish oil that's already been processed using it as an extraction method to get more fish oil out.

Every time a fish oil is subjected to contact with oxygen it starts going rancid. It starts oxidizing.

The other factor that has to be considered right upfront and that is the metal content of the fish. The further down the food chain and the shorter that lifespan of the fish, the less metal it's going to have in it. So for instance a salmon is going to have less metal in it than a grandfather tuna. Tuna has a lot of more mercury and other heavy metals in them because they're older fish. They accumulate these things in their body. Accumulation of these in our own bodies causes all kinds of things like autoimmune diseases.

DM: Like mercury. Your contention is that one of the concerns and it's not really widely recognized that many of these fish oils is there is going to be relatively large amounts of metals in there. Not necessarily heavy metals, toxins like mercury which is typically screened for in higher quality brands at least. But these other ones are probably not identified.

RM: First of all, when you're buying an omega-3 source you shouldn't be buying metals. So all the reputable fish oil companies, the big boys in the industry, have gone to the point of refining the fish oil and removing as many of the metals as they can. When you buy fish oils, always pay the highest possible price. Usually a price in this case is a good indicator of quality. A very cheap fish oil is not okay.

DM: Be careful. Avoid like the plague.

RM: Right. Don't ever buy it in the clear plastic bottle and giant bottles like you see at some of these mall type stores, don't ever do that because the light goes right through there. Its UV damaged. It's rancid. Also, if you have a big bottle of it, you better keep it in a refrigerator because it's going to go rancid.

DM: One of the other elements that might be present in fish oil, I was surprised when you told me it would be some saturated fat, actually in surprisingly large concentrations. Can you comment on that and explain how that wound up in there?

What's going on with the saturated fat in fish oil?

RM: That's a very good question. A few years ago, there was a big controversy in England where people were buying fish oil and then reselling it by adding or as they say in the illegal area, they were cutting it with a cheaper oil. Fish oil is a relatively inexpensive oil anyway but then people were adding -- what I call, where I come from we call it pig fat, you know it more as lard -- to fish oil.

It's important to understand that most fish oil already has some saturated fat, 20% to 35% is a saturated fat naturally occurring in the fish. Through processing, you really can't separate it out.

There is some processing you could use like freezing or something like winterizing, they call it.

DM: This is one of the reasons when we put fish oil in the refrigerator it turns more towards a solid.

RM: Right, and some of the fatty acids that are in there also will solidify at that temperature if there are triglycerides for instance.

Fish oil definitely contains saturated fat and there have been cases, and these are published cases that were well known, of people adding lard to fish oil in order to extend it and to get a better price for their oils. So that's something to look out for.

Now if you look at the label of fish oil, you can usually tell if it's got any added fats to it by looking at the ratio of total weight and EPA/DHA. But most people aren't sophisticated enough. They're not chemists. They can't really tell. So if you buy, you got to buy it from somebody that's reputable. That is not mass market type of product.

Omega-3

RM: Omega-3 is almost a generic term for a broad range of fatty acids. There are three main ones that everybody has to pay attention to. That is ALA (Alpha Linolenic Acid), EPA and DHA.

All three of them are very important but the most important one is ALA. ALA is the only omega-3 fatty acid that is absolutely required, essential, and mandatory for life.

DM: This is typically plant based omega-3 fatty acid.

RM: Yes.

DM: It's not very commonly found, or found in low levels, in animals.

RM: It's found in low levels in animals. If animals eat plants, like grass-fed beef, your beef will have some ALA in it. But typically, we are talking about flaxseed, chia seed. We're talking about almost all grains have some ALA in them.

Seeds that spoil fast are usually higher in omega-3 because the omega-3s are highly reactive materials and oxidize very easily. The best source of omega-3 ALA is plants.

DM: I'm wondering if you can highlight some of the benefits that people receive from consuming high quality sources of these plant and animal based omega-3s.

RM: ALA is the only absolutely essential fatty acid. It is converted in small quantities to EPA and DHA in your body. I think the best way to look at it is that it's on demand. So

that if you have a diet that's good in ALA -- I'm saying for men, it's a minimum of 1.6 gm day. For women it's 1.2 gm a day. If you eat those things, your brain, your membranes are going to have EPA and DHA even if you have no consumption of fish. There is a warning about ALA and that is: don't go over 5 gm a day.

DM: 5000 mg.

RM: Right. Buy your ALA from a reputable supplier that uses a good peroxidation blocking system that has good expiration dates, has good packaging so that oxygen doesn't go through the package etcetera. I think the biggest problem areas of this are those giant bottles of oils, be it fish oil or ALA or flaxseed oil, that sit on the shelf with UV light. They're clear bottles usually. It's not only oxygen folks, it's also ultraviolet.

DM: It's pressure but for the most part, isn't an issue.

RM: Sometimes those bottles are not PET. They must be PET which keeps the oxygen from going through the plastic.

DM: So if it says, PET most likely it's a safe container. But if you pour a bad product into a good container, it's going to be irrelevant. It's damaged before it gets in there.

RM: Right. I think flax oil is the most problematical even though pure virgin flax oil that's right off the press or the extractor is probably excellent.

The problem is that the truck rolls out of the flax oil plant and is it going to Sherwin Williams to make paint or is it going to go to your local nutraceutical supplier?

That's an issue for us and that's why my company decided to go with chia oil because nobody makes chia oil for paint. This also is a problem with fish oil where fish oil that's not meant for human consumption winds up in capsules on somebody's store. That happens with flax oil too.

DM: Would it be safe to say that in your experience, and you've studied this very carefully, that it's probably unwise for most people to consider using flax oil as a supplement?

RM: I would avoid it. I avoid flax oil for that reason.

DM: So for the average consumer, there is really no reason to use flaxseed oil. But if they do want the benefits of flax for whatever reason, they can actually buy fresh organic, that's important, flaxseeds and grind it fresh because the moment you grind it, it's still pretty good. It has to be consumed within what? An hour or two hours before it starts to oxidize.

RM: Certainly less than a day.

DM: Here is another interesting thing that really is shocking, a lot of things are shocking but it really was. I just mentioned that the best way to do it is to grind it fresh. But, you know, we're consumers, we like convenience. So what many of the manufacturers do is grind it for you.

So you can easily find pre-ground flaxseed or hemp or chia or whatever. We can almost guarantee you that this is like a hundred percent, every one of those products, every one, not just some, all of them are oxidized because you have to consume within a day and there is no way to protect it.

So the bottom line is if you have any of this in your home, throw it away. It's damaged. It's going to hurt you. Tell your friends and family. Never buy it. You can process it yourself but don't let someone process it for you.

RM: You're better off buying the whole seeds and grinding them yourself. I recommend actually chia seed over flaxseed because it's more digestible.

DM: With chia seeds, they're really tiny for those who haven't seen them. My understanding is that you actually don't need to grind those. In fact you can't it's very difficult to do that without some industrial process. Is it true that once you consume chia seeds your body will digest most of them and they don't come out your stool undigested?

RM: It's a good general thing but there are some areas of caution as with all foods. Carrots are good for you but you don't want to eat half a carrot and swallow it. Chia seeds are much more digestible. In fact, if you eat them, they start spreading in your body almost right away.

DM: Sprouts are good.

RM: That's right. They sprout immediately. If you sprinkle them on a wet towel within a half a day, they'll be sprouted. Of course your body has a higher temperature than a wet towel. So they'll start sprouting right away. It's almost like a spring loaded -- as soon as they get wet, they do this.

Flaxseed cannot be digested. They must be ground. They have a substance called lignin on the surface that keeps you from digesting it. That's kind of God's way of spreading seeds. Animals would eat them --

DM: Which actually is a fiber and has been shown in some instances to actually protect against certain cancers like breast cancer and prostate cancer.

RM: Yeah, there has been some work on that. But chia seeds, you pretty much digest them right away. A word of caution though is that I would say they are 70 to 80% digestible. The rest of them are going to go through.

DM: It's my understanding too that it has a higher protein concentration and a better balance of water soluble and soluble fibers.

RM: First of all it has about 34% content of omega-3s. It has a very high ratio of --

DM: These are primarily ALA?

RM: It is ALA. It also has some omega-6 in it but the ratio is very unusual. It's about 3.3 to 1.

DM: So 3.3 of the omega-3 to omega-6.

RM: Omega-3 to omega-6. Whereas as an ideal diet has more 6 than 3, 4 to 1 however this will help you...

DM: Correct it.

RM: Right. It's kind of a corrective measure. Chia has a lot more protein than flax. It's about 35% protein and it has a fiber that absorbs a lot of water. In fact, it's 19 times its weight in water. So it has a lot of benefit. It has a lot of magnesium, calcium, and other essential minerals. It generally is not farmed with a lot of fertilizers and things like that. So it's very clean, very low metal content, very, very good food. I eat chia every single day.

DM: How much do you use?

RM: I use a product that is partially extracted so there is not as much oil in it. You got to remember if you eat two tablespoons of chia seeds, congratulations you've just overdosed on omega-3.

DM: Really, two tablespoons? Not much to do it.

RM: Two tablespoons.

DM: What you mentioned earlier is you want to restrict your total daily dose of ALA to less than 5 gm or 5000 mg per day.

RM: Right.

DM: And then a lot of people are interested in hemp.

RM: Hemp is a good source of omega-3. Again, hemp oil in capsules is available. Also, I think it is available in bottles too. That too has to be protected. That has to be refrigerated. I generally refrigerate everything. I have a little basket in my refrigerator. Even my vitamins, I keep them cold because it's well known that vitamins decompose over time.

DM: But you still believe that chia is better than hemp?

RM: Yes I do. There is one that is emerging now perilla.

DM: That maybe better than chia.

RM: It is better.

DM: It is better than chia.

RM: Yes, it's an ancient Asian seed that's used for spice in Japan and Korea especially in Korea, Vietnam. The leaves are used. When I saw the numbers, it has an incredibly...

DM: What impressed you about it?

RM: It's a 5 to 1 ratio.

DM: Instead of 3.3 it's 5 to1.

RM: Yeah, and there is no other plant on earth that has that. I just really feel bad that I haven't found this before.

DM: Because this is one of your passions.

RM: Right, this is my passion to find the world's best source of omega-3. You want the highest possible ratio of omega-3 to omega-6 to swing all those other things, you know, the ratio.

DM: Just to review and emphasize the fact that the traditional American diet has been about 20 to 1 and ideally, there is some disagreement here but at least it should be 3 or 4 to 1 at the worst, and some people even 1 to 1 ratio.

RM: 4 to 1 is a real good number to shoot for because that's what ancient man ate when people were gatherers where they would eat a lot of plants and berries and things like that. It's well documented that it was 4 to 1. Of course we live longer than they do today.