Therapeutic Nutrition and Supplements in Practice
Transcript – Class 3 part 3

0:00
When we use the term essential when we're talking about certain nutrients, we're referring to something that needs to be consumed in our diet; we cannot make it in the body. There are certain things we can make in the body and certain things we have to get from our diet. And this is true for two fats known as the essential fatty acids. We can make every other fat we need in our body from these two fats, but we cannot make these two fats. So they must come from our food.

0:32
The first one is alpha linolenic acid, which is an Omega-3. And the second is linoleic acid, which is an Omega-6. And what we've found that has happened over the years is that we've gotten a huge imbalance of these two. So how much Omega-3 do we actually eat? This is a key fatty acid to keep inflammation in check. So is Omega-6, but they have to be in balance. Now, this is a picture here of my breakfast this morning, I wanted to show you how out of balance I am (just kidding). No, this isn't my breakfast. And I really don't know who would be able to consume this unless they, maybe, dislocated their job. But since the 1850s, Omega-6 consumption has doubled because there's a lot of consumption of these meats and cheeses and things like that, while, which compounds the problem, Omega-3 consumption has decreased by 1/6. So, as Omega-6's have increased, Omega-3's have also decreased. We need a ratio of about 3:1 of Omega-6 to Omega-3 for optimal body balance. Again, that's Omega-6 to Omega-3 in a 3:1 ratio. But the Omega-6's, instead of being just up here in Omega-3 here, it not only has gone up Omega-3 have come down substantially. And that has put the ratio to about 40 to 50:1 for many people on what we might call the standard American diet.

2:05
Now over the past 40 years or so, another problem that has compounded the issue with fats, and that is fat phobia. We were told at some point, I believe it was sometime in the 1970s when the American Heart Association started to vilify fat, where we just became fat phobic. We started to get all of our foods without fat. Where did the fat go? We had non-fat this and low fat that and no-oil this, and we just started taking it out of all of our foods. And then the health has suffered greatly because of this fat phobia. Fat phobia has stripped our body of essential nutrients that we need for optimal health. So we need to bring fat back in; we need to bring the good fats back in; we need to bring lots of fats back in.

3:02
Now, what are the causes of fatty acid deficiency? First of all refinement causes fatty acid deficiency. Refinement is a process of taking good fats, good oils, and modifying them so that they can become shelf stable. When it comes to fats, for the average processed oil, there are about 18 steps involved in actually making

an oil that shelf stable, like vegetable oil. Degumming, deodorizing, etc. There are 18 steps, I don't know them all, there are so many processes that happen to actually make that oil. So the refinement destroys any good fats that might be in that food - it causes a deficiency. In addition, we have something called 'frankenfats" that have been invented; trans fatty acids, those fats that really never were supposed to exist on this planet, or in our body, a lot of fats get created by hydrogenating them or heating them at very high temperatures, which are sometimes done together to create these shelf stable fats.

4:17
What happens in the body is that there's a competition, a metabolic competition for receptor sites and for locations in and around the cell. Right? Remember, our cell membrane is a bilayer, meaning two layers of lipids, lipid bilayer, there are two layers of fats, and those fats are made up of whatever we consume. So if I consume a lot of these frankenfats, these trans fatty acids, then those are going to take the place of all of the good fats. What's unfortunate is that in a lot of places around the world where people are going further and further away from their indigenous diet, there's no transition diet between their indigenous diet and eating foods from a grocery store. So what they do is they just eat a lot of these processed foods in places where they can't really get good whole foods, because they're not farming them anymore. The only other choice is processed foods, and they're getting a lot of destroyed, terrible, pro-inflammatory, oxidized fats in those products, and their health is just going downhill. Rates of diabetes have exploded in these cultures, heart disease, and all this could go on and on - afflictions of the standard American diet.

5:43
So let's first start with the Omega-3. There are three Omega-3, we're going to talk about; alpha-linolenic acid, and this is the essential fat, so we can actually make the other Omega-3's from this. We're going to hone in a little bit on eicosapentaenoic acid, EPA and docosahexaenoic acid, DHA. So we're going to start talking about each one of these individually, starting with ALA or alpha-linolenic acid. Firstly, it's important to understand that ALA can actually convert into EPA and DHA. And for this, I want you to refer to page 49 in your notebook. On page 49, you can see a wonderful chart showing the cascade of Omega-6 and Omega-3 fatty acid metabolism. So right now we're talking about, if you want to look at the right side of that page, we're talking about alpha-linolenic acid, ALA, or sometimes it's written LNA. And that can move down this pathway and eventually be converted to EPA and/or DHA. And these two fats are fairly important; we'll talk about them in more detail in a moment. Now, the rate in order to do this is pretty slow. The body regulates this pretty closely. So if you think about 40 grams of flax oil, about 1 gram of that oil will be converted into EPA and DHA, so it's about 1/40 of the amount of ALA that you consume that will eventually be converted into the DHA and EPA. That doesn't necessarily mean it's really terrible. And we should always be consuming EPA and DHA, it just means the conversion is slow. So it's something we want to

consider in maybe someone who needs higher levels of EPA and DHA, and might be only consuming the form ALA in a vegetarian source. Now this conversion rate is also slowed further, when there's a deficiency in zinc, magnesium, B3, B6 or vitamin C, so you can start to see some connections in all the nutrients we previously talked about, and how they might affect other areas of metabolism in the body.

8:16
So that's ALA. We're going to move on to EPA, and EPA is the most prevalent fatty acid deficiency on the planet. Low RBC is indicative of deficiency, so you can actually get your red blood cells tested to see what level of EPA you have in your body. And it's a precursor to PG3. So if you look back on page 49, in your notebook, on the left hand side of the column, you see the Omega-6 fatty acid pathway; we're going to focus on that in a moment in a lot more detail. But still looking at the Omega-3 acid pathway on the right, EPA can be converted into something called PG3, sometimes written PGE3 as it is in your chart, and PGE3 is a prostaglandin. And this prostaglandin is a real potent anti-inflammatory chemical in the body and helps to regulate the inflammatory process and bring inflammation down. So EPA only really has one choice. It could only be anti-inflammatory; it could also get converted into LTB5, which helps to bring down inflammation as well. A really good food source of this is fish. It's present in high amounts in fish, and sardines tend to be a really fantastic source of this fatty acid. You can see on your chart there on the right side, EPA and DHA can both be consumed in fish. What's cool is that EPA and DHA that's in the fish, well, that fish already did all the work for you. It consumed the seaweed, the algae or other fish, and stored or converted those fats into the EPA and DHA and then you can just consume those straight up, and your body doesn't have to do that conversion, which might not be happening in an optimal level.

10:27
We also find that when we do make these PG3 molecules that are anti-inflammatory, they also have an antagonistic effect to arachidonic acid. And you can see on the other side of the chart, arachidonic acid moves into a couple chemicals that are pro-inflammatory. So EPA doesn't just in and of itself have an anti-inflammatory effect, but it also has an antagonistic effect on the pro-inflammatory pathway, sort of a double whammy for that anti-inflammatory pathway in terms of the way it works; it's magic.

11:07
Now moving on to DHA, DHA is critical for the central nervous system. It has been highly associated with mood disorders and mental disorders. Our brain is about 60% fat. Now, that fat is about 13% DHA; it's by far the most abundant Omega-3 fatty acid in our nervous system and in our brain tissue. And it's really important for nervous system development, memory, brain development, and low levels have been associated with things like ADD, ADHD, memory loss, poor long term memory, and dementia. So it's a really critical nutrient to help

maintain the levels of fatty acids in our nervous system. DHA is also really great at increasing something called brain derived neurotrophic factor. And BDNF actually stimulates the production of our neurons; it stimulates the growth of our nervous system, so a very important brain chemical there. BDNF also gets increased by caloric restriction and also meditation and even exercise. So it's very important to do all those for proper brain health. What's also interesting is that the levels of DHA in the breast milk correlate with the mother's intake. So the mother probably wants to consume a nice amount of DHA while she is pregnant, or while she's breastfeeding, so that the baby can then benefit from those high levels of DHA. DHA is really great for growing nervous systems to give them the best chance that they can at really having a strong and effective brain and nervous system.

13:07
Now, as you can see here on page 49, DHA isn't as involved in the inflammatory process, it's more involved in the structural process. Now what is the average person consuming in terms of EPA and DHA; these very important critical fats? The average is about 120 milligrams per day, may or may not be a lot, we'll see right now. We require about 3 grams per day for optimal health of these fats. There's no RDA for these fats, there's no Recommended Dietary Allowance, so people have no guidelines. What holistic practitioners and the medical community or the alternative medical may suggest that people get at least 500 milligrams per day of these combined, I would recommend maybe even a bit higher. Because if we don't consume these really good fats, we lose our mind. Literally, there's a cute comic here, "I forgot to make a backup copy of my brain so everything I learned last semester was lost." While good fatty acids, the essential fatty acids, Omega-3, Omega-6 and EPA and DHA, especially DHA are critical for building a nervous system that could function and remember things and really work at a high level.

14:30
Okay, let's look at the other side of the chart. The Omega-6's, we're going to hone in on linoleic acid, gamma linolenic acid, and arachidonic acid. First one is the linoleic acid and it's the most abundant polyunsaturated fatty acid in the body. In fact, we've got tons of that Omega-6 right in our skin. It is the precursor to PG1 and PG2, and it can actually inhibit intestinal microbial growth; it's actually got some antimicrobial activity. But going back to the PG1 and PG2, let's look at the chart on page 49. As you can see, linoleic acid comes from corn, safflower, sunflower oils, it works its way down to gamma linolenic acid and then it could take off on two paths. It can either go to PG1, which is an anti-inflammatory pathway, or the PG2 pathway, which is pro-inflammatory. So it's got a bit of this Jekyll and Hyde personality, the Omega-6 linoleic acid, where it can go pro-inflammatory or anti-inflammatory, really, depending on the balance of the body, what's going on in the body, what types of foods we're consuming, and what's actually going on the Omega-3 fatty acid pathway. What you'll notice is that at the top there, alpha linolenic acid moving to stearidonic acid and linoleic

acid moving to GLA or, or gamma linoleic acid, use the same enzyme Delta-6 desaturase. So there's some competition for this enzyme. So what's the implication of that? We need to be in balance with all these fats in the right ratio. It's not just a matter of bombarding one pathway or another. Now as you can see there at the bottom, factors that impair Delta-6 desaturase are magnesium, zinc, and B6 deficiency, so we need those nutrients to properly have Delta-6 desaturase working. Alcohol inhibits trans fatty acids, and high cholesterol levels. Also, sugar, adrenaline and non-steroidal anti-inflammatories can inhibit that pathway. Now looking back on the linoleic acid pathway, this Jekyll and Hyde pathway, we see that DGLA is in there, and DGLA is actually pretty high in mother's breast milk.

17:12
Now moving on to GLA. So some sources of GLA are borage, blackcurrant, and evening primrose oils. You can also see that on page 49, that these are some sources. Now in evening primrose oil, that contains about 9% GLA. Black current oil contains about 17% GLA and borage oil contains about 22% GLA. So borage really packs a big punch of GLA. However, what I've come to learn is that evening primrose oil, the GLA on the glycerol, you know the fats happen is three fats, is a lot easier to break off and liberate from those fats to be used in the body. So, therapeutically, I like to use evening primrose oil quite a bit to get that GLA and to make it bioavailable. Now GLA is actually more anti-inflammatory than linoleic acid. You can see that it skips the Delta-6 desaturase pathway, it could still go pro-inflammatory, but it's a lot more prone to be anti-inflammatory. So we want to make sure that if we're doing high levels of the Omega-3s, we also want to do some of the Omega-6s like GLA because if we only do Omega-3s, if we only do high dose fish oils, we can actually shut off some of the anti-inflammatory effects of the Omega-6 pathways. So it's really important to have a balanced fatty acid complex and for supplementing that.

19:03
Now looking down at arachidonic acid, that's where we're going to go next with this discussion. Arachidonic acid can be very pro-inflammatory. It's the precursor to the pro-inflammatory PG2 pathway. As you can see there on the chart, arachidonic acid as an Omega-6 does not have a Jekyll and Hyde personality. It really only goes to pro-inflammatory, if our pro-inflammatory pathways are fired up and primed and ready to go. So you can see by action of cyclooxygenase and lipoxygenase, they move down to PG2 and LTB4, which are both pro-inflammatory cytokines. Now arachidonic acid typically is very high in animal foods, and even higher in animal foods that have not been raised ethically, like conventional meats. So for example, in organic cow that was grass-fed is going to have a much different fatty acid profile than a animal that basically ate all grains, like a conventional steak; it's going to have a lot more of the arachidonic acid fats, because that's what it consumed. Whereas the grass-fed, grass is a great source of Omega-3s, is going to have a lot more of the

Omega-3 and therefore have a completely different metabolic effect in the body when it comes to inflammation.

20:38
Now, a few things of interest here is if you look at page 49, again, you can see those two enzymes cyclooxygenase and lipoxygenase. These are two enzymes that are often targeted with drugs. So acetaminophen, ibuprofen, aspirin; these non-steroidal anti-inflammatories (NSAIDs) actually work by inhibiting the effect of cyclooxygenase, also known as COX. And that's how they work, because these pro-inflammatory chemicals cause the sensation of pain, and that's why people use these as painkillers. But what's interesting is EPA and DHA will actually have an antagonistic effect on the COX enzyme. So will ginger and turmeric, which are two wonderful botanicals; very easy to get and very mild in their strength, but they have a really fantastic anti-inflammatory effect by way of this COX enzyme. The other enzyme, known as LOX for short term, can be inhibited by sulfasalazine, which is a popular anti-inflammatory, often used with inflammatory bowel disease. Some nutraceuticals that block lipoxygenase, or LOX, are quercetin, vitamin E, EPA, turmeric, boswellia or boswellic acid, also known as frankincense, and onions, and garlic. We're going to talk about a lot of these in a lot more detail. We've already talked about vitamin E, we're going to get into quercetin in a lot more detail later on and even talk a little bit more about onion and garlic and their relationship to cardiovascular disease. And this would be one of the mechanisms why they're such powerful therapeutic foods.

22:34
Some uses for these EFAs; one use is cardiovascular disease. These fats like the Omega-3 fatty acids, specifically EPA and DHA, have a tremendous ability to bring down inflammation; not just inflammation that we might feel, but sometimes what we call this silent inflammation. Silent inflammation, like inflammation with cardiovascular disease, we can't feel it. Usually when we get inflamed, we get cut or bruised; it gets red, it gets painful, we can feel that. But some inflammations are smoldering fires in the body, we can't actually feel it. But while we look at certain levels in the blood that indicate inflammation, like C reactive protein, we can see levels are elevated. So we definitely want to make sure that the fatty acid balance of an individual with cardiovascular disease is within the optimal range, or else there's going to be some big problems.

23:39
We can also use fatty acids for allergic inflammatory conditions. Remember to sway that inflammatory cascade to more of an anti-inflammatory situation. These fats have been used in autoimmune diseases extensively, because inflammation is a key factor in the perpetuation of autoimmune disease. They've been used in cancer, depression as well, because depression; remember, our brain is the material; it's the foundation for where we have our thoughts. So for example, your software, your programs on your computer are only as good as your computer. If you have a really bad computer, you can't really use that

advanced software. And that's the same with our nervous system. We need a good healthy nervous system with a lot of good Omega-3s, and some Omega-6s inn order to have good healthy thoughts and to prevent things like depression. We'll look at this in a bit more detail. So it's really good at putting out the fire and we're going to look at some research on this.

24:47
So this is some epidemiological evidence on the consumption of fish, obviously fish being very high in these good fats. If you look at page 49, you can see the sources in brackets of these different fats, and you can see that fish has some alpha linolenic acid, but it also has really high levels of EPA and DHA. So what does the evidence tell us? Well, first bullet point here is there's an inverse relationship between consumption of fish oil, and risk of heart disease. And we've seen this in Greenland Inuit and the Japanese. Two populations that consume huge amounts of fish. And that's huge amounts of Omega-3 fatty acids; they have much lower rates of cardiovascular disease. In a number of cohort studies (11), where they looked at 117,000 subjects, pretty hefty amount, they found that fish consumption at 40 to 60 grams per day is associated with markedly reduced coronary heart disease mortality in high-risk populations. So that's pretty substantial, right? Cardiovascular disease is one of the top killers here in North America and westernized countries. So this could have a huge impact on our disease level in this area.

26:14
Some more proven health benefits of Omega-3 and cardiovascular disease; fish and fish oil are proven to be profoundly effective in all major types of cardiovascular disease; benefits are shown in high and low risk populations. The summary of the evidence shows that the benefit happens in a dosage of around 0.5 to 1.8 grams of EPA and DHA per day. So remember, the general recommendations about 500 milligrams? Well, that's really the lower limit to really decrease risk in these cohorts. The American Heart Association reported in 2000, that the average US intake EPA and DHA is 0.1 to 0.2 grams per day. So they're falling substantially short to meet the levels that they need to really have that cardiovascular disease preventing affect. Some of the effects that it has on the cardiovascular system are, first, it improves prostaglandin metabolism. So as you saw on page 49, there are two anti-inflammatory prostaglandins PG1, which is produced from the Omega-6, PG3, which is produced from the Omega-3. And then there's one pro-inflammatory prostaglandin, PG2, which is produced by the Omega-6. Omega-3s lower fibrinogen levels. Fibrinogen can actually increase clotting in the blood. It turns into fibrin and fibrin in stock tries to patch things up. So we don't want super high levels of that, of course, we want some so that we don't bleed out. But we don't want super high levels that cause extra clumping or extra clotting to happen.

28:02
It also decreases platelet aggregation, so it makes the blood a bit thinner. And oftentimes, people with cardiovascular disease with really thick blood eventually go on blood thinners. We can do that naturally, with fish oils, because it helps to thin the blood and decreased platelets stickiness. So platelets are kind of like these disks. They're meant for clotting. But they are these disks that float around and when they clump together, they create these large stacks and then we're more prone to clotting, more prone to platelet aggregation and coming together. We don't want that to happen. We want to have nice liquid, thin blood so that we can avoid getting a clot, but also have really good perfusion to all of our tissues; really good blood flow to all of our tissues. Because remember, the blood is what brings nutrients to cells and takes toxins away.

28:59
Okay, moving on to something called the polypill versus the polymeal. And this is really applicable to our discussion here about cardiovascular disease. Why? Because a number of cardiologists got together one day and they said, "well, you know, when our patients have a cardiac event or have cardiovascular disease, we put them on this cocktail of drugs. Why can't we figure out a cocktail of drugs to maybe use this prevention? Make a polypill; make one pill with a little bit of all these drugs in there. Maybe it'll decrease the risk of cardiovascular disease." And in fact, they got together and they did figure out a pill, and it decreased risk of cardiovascular events by about 75% and they made something called the polypill. What was the poly pill made of? It was made of a diuretic, a beta blocker, ACE inhibitor, statins, aspirin and folic acid, they had to throw something natural in there at the bottom, which I love. So, diuretics, what do they do? They take extra fluids out of your bloodstream and make you lose them through your kidneys in your urine. Therefore blood pressure can go down because there is not as much vascular resistance happening. Beta-blockers; they block a beta-receptor in the heart that increases blood pressure in response to epinephrine, norepinephrine. When do we release epinephrine, norepinephrine? When we're stressed, when the adrenals get stimulated. What does it do again? It brings down blood pressure, which is also known as hypertension. Do you think meditation and relaxation helped bring down blood pressure? I'll leave that as an open-ended question.

31:05
Number three is ACE inhibitors. ACE inhibitors block something called angiotensin-converting enzyme. Angiotensin converting enzyme has multiple effects, including the activity of the sympathetic nervous system, the reabsorption of electrolytes, which will increase blood pressure, because it causes the arterioles to constrict. It increases antidiuretic hormone and increases aldosterone, all which increase blood pressure. So ACE inhibitors inhibit this enzyme from doing all of those things. Statins, of course, lower cholesterol. We've also got aspirin, which works as a blood thinner. And then folic acid,

which helps to bring down homocysteine levels. So they were trying to attack the whole cardiovascular issue from multiple angles.

31:55
All right, moving into food. Food is healing, food is medicine, and medicine is like food. Another group of practitioners came along and they thought, well, if you could do that with a pill, maybe you could do that with food. Because we know a lot of foods have very similar activities than certain drugs. And just as an aside, a little tip here, a little clinical pearl, when there's an interaction between a drug and a food or a supplement, it's usually because they do the same thing. Isn't that interesting? So the contraindication could be a treatment, if used in the right way. So they decided to figure out a standard meal that someone can eat to get very similar benefits of the polypill, like a 75% decreased risk of cardiovascular event. And what did they come up with? Their first food on their list was almonds, and they specify the exact amount of each just to be scientific. Second was fish. Third was garlic. Fourth were fruits and vegetables. Fifth was dark chocolate and sixth was red wine. Now, how hard of a sell is a fish dinner with some vegetables and garlic on the fish and a little dark chocolate and red wine to finish off the meal. I mean, like how hard of a sell is that? So they put this meal together, they got the same results as the poly pill. They called it the polymeal. Now, the foods here on this list, we can gather that they have multiple similar effects than some of the drugs on the left hand column. Fish has a wonderful anti-inflammatory effect and blood thinning effect because of the omega fatty acids, just like we saw in the aspirin. Garlic has a blood pressure lowering effect, similar to that of beta-blockers, even fruits and vegetables have all these wonderful phytonutrients, which help keep the body and the blood pressure level. Remember we talked about potassium in great detail and the need for drugs versus the need for just eating more fruits and vegetables, which are loaded and packed with potassium. Dark chocolate has some amazing polyphenols, which help support the cardiovascular system. We're going to talk about dark chocolate later on. And red wine of course has resveratrol, which has a multi-factorial effect on genes, on inflammation, on so many different pathways to help the cardiovascular system. So for that individual who might have had a cardiovascular event or you training for cardiovascular disease, or just for general health, prescribe them the poly meal See what happens, see what progress you can make just by recommending specific foods in a specific dosage. I love this example because it really shows the power of using food for healing.

35:14
Moving on to allergies and inflammation. So it's very important to get a anti-inflammatory fatty acid balance in the body to prevent allergies and inflammation from happening. What we see is that there are numerous clinical studies that have demonstrated the therapeutic effect of a diet supplemented with essential fatty acids in the treatment of many chronic allergic and inflammatory diseases, including rheumatoid arthritis, asthma, eczema,

psoriasis, lupus and ulcerative colitis. We're going to look at rheumatoid arthritis right now in a bit more detail.

36:01
So what this chart is charted showing is about 18 randomized controlled trials summarized in one chart. They used about 3.8 grams of EPA DHA per day, about an average. Just to give you a bit of an idea, about 1.8 grams is about a teaspoon of a super EFA liquid, Genestra makes one called Super EFA Liquid; about 1.8 grams is about one teaspoon. So they're consuming about two to three teaspoons of your average high potency fish oil. The average duration was about 16 weeks. And what they found was the percentage of people that responded with the treatment was 60 to 80% higher than those that weren't treated at all. So a substantial improvement for those with rheumatoid arthritis, bringing down inflammation and morning stiffness. Morning stiffness is one of the things that people with rheumatoid arthritis experienced because the joints haven't been moving. Our joints have synovial fluid in them, and very poor blood supply. So in order for joints to remain healthy, and to get the nutrients they need, they're almost like little sponges. And they need to be compressed and opened on a regular basis. And to do that you have to move the joint, right? That's why exercise is so beneficial to our joints. Otherwise, the blood flow and the nutrients that that joint needs in a static joint is really minimal.

37:38
Okay, let's look at using fatty acids with Ulcerative Colitis and autoimmune disease where basically an individual's immune system is attacking their own colon. This is a summary of about nine randomized control trials. They used on average about 4.7 grams of combined EPA DHA per day. So, also to consider is that they're using 4.7 grams. Some studies are using a much higher dosage and some studies are using a lesser dosage. The average duration was about 35 weeks. So, again, to appreciate that some of these studies, they're probably on it for longer than 9 or 10 months. Some of them might have been a few months shorter, so this is the average. And what did they find? They found with those that took this dosage on average, had a reduction of two or more of the following in this list: ulceration, overall disease, drug use - drugs needed to decrease inflammation and control pain, relapse, and they had an increased rate of remission. So another person another important point to understand is that when using these fats, sometimes we need to do them long term. And for my clients with Ulcerative Colitis and Crohn's, I explained to them that to change the body, to really move from a pro-inflammatory state to an anti-inflammatory state takes some time, and they have to hang in there and stick with it. Because it does take some time to shift the fatty acids and all of our cells in the body. Essentially what we're doing is an oil change, right? And that doesn't happen overnight. Cells need to turn over, red blood cells have about a 120 day lifespan. So we need to bring the new materials and to make the new cells.

39:35
Now we saw with a couple autoimmune diseases. What about cancer? Well, prostaglandins derived from the Omega-6 fatty acid tend to stimulate cancer cell growth, while those from Omega-3 fatty acids inhibit the growth of cancer. So we want to really control this balance of anti-inflammatory versus pro-inflammatory, although the statement here says Omega-6 stimulates cancer cell growth. If it's balanced out with Omega-3, it'll be more prone to move towards the anti-inflammatory prostaglandin 1. So not to worry, we could still consume Omega-6, they just have to be in balance. Recall that Omega-6 has to be imbalance with Omega-3 in about a 3:1 ratio, then we're in really great balance.

40:29
What about with mental health? Well, in this chart, we can see that annual fish consumption, as it goes up, rates of depression go down. You can see Japan's right at the bottom they consume the most fish and have the lowest rates of depression. What about other mental disorders? So, postpartum depression and Omega-3 and mother's milk. So obviously reflecting how much Omega-3 that mother is consuming? Again, Japan pretty low down as Omega-3 content of the milk increases, rates of postpartum depression go down. So with my clients that I know are going to be getting pregnant, who are pregnant, or are seeing me a little bit later in the postpartum stage, I want to make sure that they're loaded up on Omega-3 and Omega-6 in the correct ratio; making sure that they're getting a good dose of EPA and DHA. If that mother does not have good amounts of EPA and DHA, that fetus will take whatever she has, right, it has priority in the body. And then a lot of mothers deal with things like postpartum depression, because they've been stripped of all their good fats, and then we have to build up their nutrition over a period of time. We also find this correlation in something more serious, like bipolar disorder. Again, increased seafood consumption causes lower rates of bipolar disorder. And you can see the rates are really low in places like Taiwan, Korea, even Iceland.

42:08
Now, if we're going to be choosing good fats, we need to know a few key things about processing. Because, as Udo Erasmus clearly points out in his books, is that fats can heal, or fats can kill. And in fact, the same fat can do both. So, if you take a really, really good fat, and you heat it and destroy it and oxidize it, it can go from a fat that can heal you and give you amazing benefits, to fats that kill you.

42:45
So what actually destroys a fat? The first is heat. Heat is not a good thing for fat. The more stable a fat is, it's usually more saturated. So saturated fatty acids like that we find in coconut oil, palm oil, they're very stable in heat and with some of the these other things we're going to talk about. So we can use those for cooking at higher temperatures. But fats that have a lot of double bonds, like in the Omega-3s and Omega-6s, are a lot more prone to damage. Those double bonds, that's what the Omega-3 is referring to, the double bonds are highly prone to

heat. So if I take a flaxseed oil and I heat it, I'm going to destroy a lot of the fats. If I take a good flax oil, and I expose it to light, it's going to destroy a lot of those fats. And if I expose it to air, it's going to destroy a lot of those fats. So heat, light and air all destroy these fats. The double bonds that are in the long chain Omega-3s and Omega-6s attract the heat, light, and the air and can get oxidized or peroxidized very easily. So there are some precautions we want to take and some things we want to look for when shopping for these very unstable fats. Firstly, we want to make sure they're organic. Second, we want to make sure they're expeller pressed and using a lot lower temperatures. Third, we want to make sure they're in a dark glass bottle. Now you'll notice here on the picture here with this flax oil, it's in a dark brown bottle. That's because it wants to protect the oil from the light that could possibly destroy the fats. And oftentimes, you'll also find these in the fridge as well, to make sure that those fats aren't destroyed, when they're just waiting for you to come pick them up and consume them. We also noted that air was a factor and thus, obviously, we want them in a nice sealed container. You know sometimes with olive oils, we get, like, a nice jar and we keep it in the jar; it might be exposed to air, like, not have a lid that screws on. That's probably okay with an olive oil. But when we're talking about these oils with a lot more of the Omega-3s and Omega-6s, we want to be super careful that we don't expose them to huge amounts of air, heat or light. We also want to look at the manufacturer and the expiry date. This is one thing you never ever want to consume. If oil is expired and bad, it's going to cause huge amounts of inflammation in the body.

45:45
Now in terms of processing, I get a lot of questions about how they process fish oils; what are they actually using? Oftentimes, they're using fish for agriculture. So they take the fish, they squeeze out the oils, the fish are pressed. And those oils are used for these fish oils, which I'll talk about in a moment. And the mulch that's leftover is given to farms, which are probably not organic. They feed them to the animals for protein. And of course, those animals are going to be deficient in the good fats because we just took them out. Then they steam the oil to eliminate smells and toxins; they don't use really high temperatures for that. And then they filter these oils, called molecular distillation, through clay to remove all the impurities, because we know fish can concentrate the impurities like PCBs, heavy metals, persistent organic pollutants, etc. So we want to make sure that when we're getting official oils from a reputable company, it's been molecularly distilled, and all of the impurities have been taken out through some sort of processing. If we're unsure, we could call them and ask them how they get it. Now I also like oils that are derived from sardines and anchovies, because those are really small fish. Those are fish that we eat anyway. So I know that those toxins haven't been bio-accumulated and built up in that fish.

47:20
There are a couple forms that you'll find out there in terms of fish oils, one are called ethyl esters and the other are triglycerides. The triglycerides are a lot more

bioavailable for us, and those are the ones that you want to find when you're buying a product. Ethyl esters usually use alcohol to help detach the fats and put them in the fish oil, while the triglycerides are using enzymes like lipase to break those off. And it's a lot more pure that way; there's no alcohol, there's no damage to the oils. This is the relative bioavailability of the triglycerides versus the ethyl esters. You can see the triglycerides are the blue ones and there's a lot more bioavailability versus the ethyl esters there.

48:12
Now, those are all the essential fatty acids. One other sort of area that I wanted to cover were medium chain triglycerides and medium chain triglycerides are becoming a lot more popular. They're incredible for helping us to utilize energy. So as you can see here, the two reasons for using them. One is to bypass steps for long chain fatty acid uptake, and two, to use as a reliable energy source. Now, if you recall back to cellular respiration, we want to get proteins, fats, and carbs into the mitochondria; very important because that's what we burn in our mitochondria to make ATP, to get energy, the currency of energy. Now, long chain fatty acids are pretty big. They need a shuttle - the carnitine shuttle, which we'll talk about in a future class, to get it into the cell. But the medium and short chain triglycerides, specifically here, the medium chain, they can get right in to be burned as energy and they're a fantastic energy source for all of our organs, all of our glands, our whole body, and also for the brain. They're very easily burned as energy. Our body uses them as a primary fuel and doesn't really have a high propensity to actually store them away as fat. The body wants to store away longer chain fatty acids because they are harder to break down and using uses energy. So medium chain triglycerides are becoming a lot more popular for neurological diseases like dementia or Alzheimer's, Parkinson's disease, even things like epilepsy, ADHD, and ADD, to really help with energy production within the nervous system. They can also be really useful for athletes who need a reliable source of energy that's not going to fluctuate blood sugar too much and is going to be there all the time. Now, if you recall back, I mentioned what is the most important part of our body. The heart! The heart, loves to use MCT oils as well. So this could be really great for people with cardiovascular disease as well.