The Four Vital Hormones Most Adults Need for Optimal Health Span and Lifespan
A Special Interview With Georgi Dinkov
By Dr. Joseph Mercola

Dr. Joseph Mercola:

Welcome, everyone. Dr. Mercola helping to take control of your health. And today we're joined by one of my favorite guests, the one that so many of my friends so look forward to because he is, what I called him on the very first time I interviewed him, the "fire hydrant" or "the hydrant" because he's a constant flow of information. He has a magical memory that exceeds virtually anyone I've ever met. And he has common sense, which is a rare commodity, of course. And he puts it all together in such a beautiful way. He has, really, in many ways, taken Ray Peat's approach of the science to the next level, and [I] just so value his insights, so I'm really, really looking forward to this discussion. So, thank you and welcome, and thank you for joining us.

Georgi Dinkov:

Thank you. Thank you for inviting me again.

Dr. Joseph Mercola:

All right. So, so many things we can talk about. CO2 (carbon dioxide) is going to be one of them today. But before we start there, I wanted to delve into some of the hormones because they're useful. Now, I think if you're – my understanding [is], and you can give me feedback on this, that if you're optimally healthy, you don't need them. You don't need them because your body is supposed to make them. The problem is almost everyone needs them because very, very few people, including me, are optimally healthy. And I still take them. I take four of them.

And I am going to tell you the four I take in what I believe is the rank order of importance. Progesterone, number one, virtually everyone needs it. Every adult needs [and] benefits from this – not everyone, and they're not taken continuously, because if you're a menstruating woman, you've got to take [them during] a very specific time of your cycle. Otherwise, you'll mess up your cycle. Number two, thyroid hormone, typically T3, then DHEA (dehydroepiandrosterone), and then pregnenolone .

So, you can comment on those and what I just said, and then we'll talk about the specifics of each one, because I think it's important to understand this, because almost everyone who is in the journey to improve their health is going to benefit from these as a crutch to help them along the journey. It is not the magic bullet. None of these are magic bullets, and they tend not to work well if you aren't biologically optimized following the principles that we've been talking about.

Georgi Dinkov:

Yep. So, if you look at a healthy person, specifically people between, let's say, around the age of 12, which is what the actuarial tables tell you has the lowest mortality rate.

Dr. Joseph Mercola:

Oh, I did not know that. That's a nice pearl.

Georgi Dinkov:

Yeah. Between 11 and 12. That's basically when you're at your peak, right before puberty. And if you look at thyroid function and the production of hormones that happens at this age, basically you'll see that both genders produce about the same amounts of pregnenolone and progesterone. Not so much testosterone for males or estrogen for females because puberty hasn't started yet. So, it's really, basically [a] very similar hormonal profile. And if you look at the thyroid levels, you'll see that they're probably the highest they'll ever be throughout their lifetime. And that happens to be, actuarially, the point in life we have the lowest mortality.

It's not a coincidence. And then when puberty strikes, basically you have the adrenal activity. It's really what I think the puberty – the old name for that used to be "adrenarche," which kind of tells you that it's the adrenal activity that's driving this process. And really, once puberty hits, basically you start producing some of the gonadal hormones, which is mostly testosterone for males and more progesterone for females, depending on the cycle. And that's when reproductive age starts. And multiple studies have shown that the later puberty starts, the longer the lifespan of both sexes and the longer the health span, which is something that medicine has been trying to achieve for a very long time. And basically and conversely, the earlier the puberty starts the shorter lifespan and the sicker the individuals from both genders would be throughout their lifetime.

And if you look at the way the hormonal profile changes, let's say, after puberty starts and until the late 20s, these people are remarkably resilient to stress. In fact, stress often seems stimulating for them and this seems to change drastically after they hit 30 and especially after 35. It's really, basically, a very steep decline. And if you look at the way the hormonal profile changes, you'll see that whenever these young, healthy people are exposed to stress, there's a spike in cortisol release, but also closely following it is there's basically a spike of pregnenolone and DHEA release for males, and there's a pregnenolone progesterone and DHEA release for females.

That sort of delayed release of these secondary hormones seems to drop off a cliff after the age of about 35. In fact, they change the ranges for pregnenolone, progesterone and DHEA, and even testosterone. They change the range depending on what age group you fall into, but they don't change the range for cortisol. So, throughout your lifetime, unless you're critically ill, in which case cortisol drops, or you have Addison disease, which is full-on adrenal failure – President Kennedy actually had that, John F. Kennedy – basically, your cortisol levels do not decline. They're always there. And that's what really keeps you alive. Because if you have adrenal failure, unless you take cortisol shots, you will die from hypoglycemia or other-

Dr. Joseph Mercola:

That's Addison's disease.

Georgi Dinkov:

Yeah, exactly, Addison's disease. So, it's lethal. So, cortisol is there. It's really a life-saving hormone, and its primary purpose seems to be not so much inflammation – and we found more recently about some paradoxical effects that it's pro-inflammatory. But its primary purpose is to keep blood sugar from dropping too low, because your brain runs predominantly on glucose. So basically, after the age of 35, your cortisol stays the same. We know it's a catabolic hormone. It can shred your muscles, soft tissue, bone, you name it. There's no organ that is immune to the effects of cortisol. There is only one that is somewhat resilient, and it's the heart. And it turns out that the reason the heart is so resilient in both genders is because in males, the heart contains a very large amount of testosterone. And in females, [it] contains very large amounts of progesterone. Both of these happen to be glucocorticoid antagonists. So,

they're protecting this vital muscle, which is the last thing you want to lose, and that is the last thing you do lose, but all the other tissues can be shredded and they're considered basically non-essential.

So, after the age of 35, you have a stable supply of a catabolic hormone and then a rapidly declining supply of pregnenolone, progesterone and DHEA. All three of which, actually, have anti-glucocorticoid effects. I think the one that's been the most studied lately has been DHEA, dehydroepiandrosterone. And there is one that has been sold as "the better DHEA," they call it. It's not really, it's called the 7-keto-DHEA. And several companies did studies showing that they say, "Oh, DHEA is a known anti-glucocorticoid, promotes immune system activity, has anti-aging effects, helps prevent muscle loss, sarcopenia –" which happens with age, right? "But unlike regular DHEA, the 7-keto-DHEA does not metabolize into potentially dangerous steroids downstream." I think what they mean is too much androgens for males or estrogen for females.

Dr. Joseph Mercola:

Aromatase, aromatase.

Georgi Dinkov:

Yeah, exactly, it doesn't aromatize, but they're also worried about the androgens in males because as we know, every neurologist will tell you, "Oh, you don't want too high androgens. It's going to cause problems with your prostate." Right?

Dr. Joseph Mercola:

Yeah, no. That's just why you don't want to go out in the sun because it's going to kill you from skin cancer.

Georgi Dinkov:

Yeah, exactly.

Dr. Joseph Mercola:

Same nonsense. Same nonsense.

Georgi Dinkov:

Have you seen that study that came out two years ago saying that avoiding the sun is worse than smoking a pack of cigarettes a day?

Dr. Joseph Mercola:

Yeah, they're just so confused. It's just not even funny.

Georgi Dinkov:

Yeah. So basically, when we're healthy, we have the lowest chance of dying, we do have a robust production of cortisol. We have a robust production of T3-

Dr. Joseph Mercola:

Let me stop you there because you mentioned the concern of this aromatization and conversion to estrogen, which is really, really toxic. I believe estrogen and linoleic acid (LA) are the two primary causes of cancer. But the progesterone, if you're taking it, which is one of the reasons it's number one, is that it is

antiestrogenic. It actually blocks aromatase activity. So, you don't have to worry about the DHEA converting to estrogenic substances or prolactin because progesterone is going to block that.

Georgi Dinkov:

And even if there is conversion, progesterone is actually an antagonist at the actual estrogen receptors. So, it will-

Dr. Joseph Mercola:

Yeah, you can't get much better.

Georgi Dinkov:

Exactly, yeah, exactly. And then pregnenolone has some of those effects. It's a milder aromatase inhibitor, in other words weaker than progesterone, but it seems to be very good at preventing the uptake of estrogen into the cell, and it's very good at that. So, in other words, if estrogen is not able to get into the cell, presumably, you're not going to get any estrogenic effects, but still the best thing you can do is inhibit aromatase and block estrogen receptor, and for that, progesterone is king.

So, when we're young, basically, before puberty hits and before nature sends a signal of basically saying "reproduce and die," we have high production of T3, we have robust production of cortisol, but also [a] robust production of the anti-cortisol steroids. And after the age of 35, we seem to be basically, gradually – we have a gradual decline of thyroid function and we have a more or less rapid decline of the synthesis and release of the anti-cortisol hormones, some of which also happen to be antiestrogenic. And since every cell in the body expresses the enzyme aromatase, we're getting into a state of not only relative glucocorticoid excess, but also a state of relative estrogen excess.

Now, the state of glucocorticoid excess is not very well-known. It's easily measurable, though, by the ratio of cortisol to DHEA, or you can do cortisol [to] progesterone, or cortisol [to] pregnenolone, but cortisol to DHEA is like a – there's quite a few studies on that and demonstrate that the cortisol-to-DHEA ratio or the cortisol-to-DHEA sulfate ratio is the best predictor we have, not only for how long you're going to live, but of any disease that you're going to develop throughout your lifetime. We think of DHEA as an immune booster, so we say, "Okay, yeah, maybe if you have decent DHEA levels, you're not going to get COVID-19 or some other infectious disease."

But it turns out that the immune system is very important for a bunch of different diseases, including cancer. One of the best drugs recently on the market for cancer are actually immune boosters. The drug Opdivo, which was developed, I think, to treat secondary metastasis for melanoma, it's an immune booster. And recently, they found out that it works for many other cancers — metastatic breast cancer, metastatic lung cancer, secondary metastasis from liver cancer, especially in the bones.

So, it looks like [the] immune system is actually very important for not just infectious disease, but many other diseases, especially cancer, which is now said to become the No.1 killer in the developed countries – not the Western, but the developed countries. It's actually about to overtake heart disease. I think in some countries, it's already done it. So, the cortisol-to-DHEA ratio turns out to be the best predictor you have, and it just so happens to be the ratio of catabolic versus the major anti-catabolic hormone. And it's a unisex ratio too, because we produce about the same amounts of DHEA, both males and females, regardless of the age. If you look at the range with DHEA on the blood labs, on the tests, they're the same for males and females. There's also the – for males, you can have a more gender-specific ratio. You can have a cortisol to testosterone for males or cortisol-

Dr. Joseph Mercola:

What do you think is the optimal range for DHEA?

Georgi Dinkov:

So basically, I would look at the ratio actually, and I think that the ratio should not be over 0.3. In other words, [it] should be heavily in favor of DHEA. Cortisol to DHEA should be no higher than 0.3 and we-

Dr. Joseph Mercola:

And that would be the morning cortisol? [inaudible 00:11:41]-

Georgi Dinkov:

Yeah, exactly, when it's the highest.

Dr. Joseph Mercola:

First thing in the morning.

Georgi Dinkov:

Yeah, when it's the highest. And then if you want to check it – Some people have the inverted pattern, which by itself is not a good sign. A lot of people with depression and a bunch of different mood disorders have low cortisol in the morning but high in the afternoon when it should be the exact opposite.

And it just so happens that if you use DHEA as a supplement, several human studies demonstrated that taking more than 15 milligrams daily starts to increase biomarkers of estrogen, specifically estrone or estrone sulfate. Anything less than that, which happens to be a physiological dose, doesn't really cause that much of a problem, but I would still take it with progesterone because blood levels are not always indicative of tissue levels.

Dr. Joseph Mercola:

Yeah, yeah. So, the other concern is that it tends to increase prolactin too, because that's an indirect marker for estrogen.

Georgi Dinkov:

Yes. For estrogen and for serotonin as well. So, if you take DHEA and your estrogen levels don't change, but [your] prolactin jumps, you're taking too much.

Dr. Joseph Mercola:

Yeah, absolutely. So, in fact, I've concluded that it's not really wise for most people to check their estrogen levels. All they have to do is to measure prolactin, which is easier. It's just one thing. You don't have to measure three different estrogens and even then you're still not catching all the other ones.

Georgi Dinkov:

Exactly, exactly. Yep. And the only one that actually is kind of reliable is estrone sulfate –I know of no doctor that is capable of ordering – The labs have it, but I've asked my doctor and several others, they're saying, "Yeah, [it] used to be a biomarker for breast cancer back in the '70s." I said, "So what changed? It's still a biomarker. Nothing's changed physiologically since then." For some reason, they dropped it, and now the labs have it on their menu, but it's very difficult to order it. I don't think it has a code, which

the doctor can actually put into the system and say, “I want this test.” The doctor has to call in the lab, like [a] lab corporate request and say, “I want this specific test.” Otherwise, it's not capable of ordering. But yeah, you're right. So aside from that, since this test is almost not available, the second best thing you can do, or actually even better-

Dr. Joseph Mercola:

Prolactin, yeah.

Georgi Dinkov:

-is prolactin, because prolactin will also give you, basically, a surrogate measure of extracellular serotonin. And as we discussed previously, higher extracellular serotonin is not good. It's the exact opposite of what we've been told.

Dr. Joseph Mercola:

Yeah, it's interesting. We're going to talk about CO2 next, as I mentioned earlier. And if you have a really high prolactin, it's indicative of a microadenoma in the pituitary gland. And I know someone, a really astute natural medicine clinician, who had that and actually had surgery to remove it. And so, it's a – and I've only seen one of my – was it one? No, it was a different – It wasn't a prolactin, it was another – it was actually a tumor in the pituitary percussion [inaudible 00:169:05]. Yeah.

Georgi Dinkov:

Percussion. Yeah, I would say – prolactin, they give you a drug, but percussion is very difficult because they usually have to take it out.

Dr. Joseph Mercola:

Yeah, yeah, [crosstalk 00:16:12] a significant mass there, then you have, you know – then they remove it. But anyway, the reason I'm saying that is that one of the solutions to actually lower that would be carbon dioxide. Yeah.

Georgi Dinkov:

Exactly. Carbon dioxide or anything dopaminergic, which is what these drugs to lower prolactin are, they give you dopamine agonists, but a much easier way, and much more probably healthier way, would be to increase carbon dioxide production.

Dr. Joseph Mercola:

Is DHEA sulfate, or DHEA-S, as it's sometimes referred to, sufficient to measure? You don't need to measure both, do you?

Georgi Dinkov:

You don't need to measure both. So, the DHEA sulfate is the best biomarker of adrenal health So, the DHEA is the free version, which is basically what the cells use to convert it to those downstream steroids. But it's the DHEA sulfate levels that tell you how well the adrenal glands are working. You can have very low DHEA sulfate levels, but normal levels of DHEA, which basically the body increases the activity of the sulfatase enzymes to cleave off the sulfate group and create a free DHEA because it needs it. So, ideally you would measure both, but if you want to just measure your adrenal health, DHEA sulfate by itself is sufficient.

Dr. Joseph Mercola:

Good. I want to insert here a warning. A really important – It's almost a black box warning that you cannot take these drugs orally. You cannot take these drugs orally in a powder form. And you taught me this and I was not aware of it. They have to be dissolved in some long-chain fat. What the heck does that mean? Now, this is all of them, except for one of the four that I named, which is progesterone, which we'll talk about in a moment, because there's a derivative of that makes it better. But the thyroid [T3], the DHEA and pregnenolone, you cannot swallow orally because it can be metabolized in the liver. So, you want to encase it in fat, essentially forming a liposome. And it goes in, it's absorbed into the chylomicrons and it bypasses liver metabolism so that you'll get – That will work. And how do you do that? The simplest way is ghee.

Georgi Dinkov:

Ghee. Olive oil, if you don't have that.

Dr. Joseph Mercola:

Yeah, I'm not a big fan of olive oil because even good olive oils have 20% LA.

Georgi Dinkov:

Yep, that's true.

Dr. Joseph Mercola:

Yeah, so have you ever measured your LA intake?

Georgi Dinkov:

I've measured mean acid in blood, which is an indication for essential fatty acid deficiency. You can get a blood test and, basically, it can tell you how close you are. I'm always at the bottom 10% of the range.

Dr. Joseph Mercola:

That’s a commercially available test like [inaudible 00:21:39]?

Georgi Dinkov:

Yeah, yeah, mean test. Yeah, it's basically-

Dr. Joseph Mercola:

[inaudible 00:21:41] mean acid?

Georgi Dinkov:

Yeah, mean acid. It's the standard test for essential fatty acid deficiency.

Dr. Joseph Mercola:

Yeah, okay. And that – okay, that does get low. Okay. But otherwise, a marker that you can use to facilitate is to do an analysis of your diet with a nutrient [inaudible 00:21:59].

Georgi Dinkov:

Oh sure, yeah. Like Chronometer, I think, it’s like a-

Dr. Joseph Mercola:

Yeah. So, I've gotten mine down to 3 grams, 3 grams a day, which is pretty low. It's 1.3% of total calories.

Georgi Dinkov:

That's excellent.

Dr. Joseph Mercola:

So yeah, anything under 2% is considered ancestral levels, and the average person has 12% to 13%, and some are 20%.

Georgi Dinkov:

And I think studies show that anything over 4 or 5 grams is when you start getting to carcinogenic territory-

Dr. Joseph Mercola:

No, I think it's 4% or 5% of total-

Georgi Dinkov:

-So, you need to drop below that to be helpful.

Dr. Joseph Mercola:

It's close. I understand it's like 4% of total daily calories. So, it's dependent on how much food you're eating. So, depending with the numbers, it could be 4 or 5 grams. But normally, you don't want to have anything more than 5 grams. I would say that there's less than 99.9% of people who are doing that, which is sad because that's a big – actually that is the quality that Ray Peat had that convinced me that he was onto something, because I dismissed him for all that time until I understood linoleic acid. Then I realized he was the first guy explaining it and I should listen to him and I should have listened to him earlier.

Georgi Dinkov:

I just found a study showing that linoleic acid binds directly to the estrogen receptors and acts like a full estrogen, 100%. So, if you're eating linoleic acid, it's not just simply a substance that promotes the effects of estrogen, which is what Dr. Peat used to say. We now have evidence that it's a direct estrogen. Even if you produce none, eat enough linoleic acid and you'll be there.

Dr. Joseph Mercola:

You would appreciate this – most people wouldn't, but because you love molecular biology like I do – they actually have a similar mechanism of action. The concentration of calcium outside the cell, extracellular calcium, is 50,000 times higher than inside the cell. And I know this because I was studying EMFs (electromagnetic fields) and I actually wrote a book on it. And the mechanism of action of the EMFs and estrogen and linoleic acid are the same at the molecular level. With EMFs, they activate a voltage-gated calcium channel receptor in the cell and that causes the calcium to enter. But I don't think that linoleic acid and estrogen work on the calcium receptor. They might and you might know, but essentially, they allow the same thing. They increase the influx of calcium into the cell, intracellularly, and what this does is it increases superoxide and increases nitric oxide, which combine nearly

instantaneously in like a billionth of a second to form peroxyl nitrite, which lasts – Now, hydroxyl free radicals are dangerous, but it lasts a billionth of a second. Peroxyl nitrate is almost as damaging, but it lasts for 10 seconds, 10 billion times longer than hydroxyl. So, in many ways, it's far more dangerous than a hydroxyl radical. And that's what happens when you take linoleic acid or estrogen or EMFs.

Georgi Dinkov:

Exactly, or EMF. Or all these people taking arginine or citrulline as a supplement, which raises nitric oxide.

Dr. Joseph Mercola:

Yeah, a lot of people are. They're the unwise ones. So, are you aware of that mechanism? Actually, Ray discussed it. That's how I learned about it, that they had the same [mechanisms], in one of his papers that he wrote.

Georgi Dinkov:

I knew that there were cellular excitotoxicants, and anything that excites the cell and causes death from hyperexcitability has to do with calcium. Ultimately, all cellular death pathways lead to calcium overaccumulation and that's what really causes the cell death. And so, yeah, if both estrogen and linoleic acid are cellular excitotoxicants, then they have to increase intracellular calcium somehow.

Dr. Joseph Mercola:

Yeah, and that doesn't mean you stop drinking milk. That doesn't work that way. Milk can actually-

Georgi Dinkov:

No, no, no. In fact, it's the opposite. They call it the calcium paradox, right?

Dr. Joseph Mercola:

Yeah, yeah, yeah. But we don't want you drinking regular homogenized, pasteurized milk if you're allergic to it. That's not good. So, not everyone can tolerate it, you have to be careful. So, continue on and elaborate on the fatty acid, which I kind of diverted a little bit from. And this is a recent point that I just learned in the last few days, and I'm not sure if you're aware of it, but I mentioned that all those hormones, including thyroid hormone, most – I don't know if you understand, that actually needs to be integrated into liposome too to get maximum absorbability.

Georgi Dinkov:

Yeah, anything you ingest that does not form a chylomicron and does not go through the lymphatic system, which means most of the foods that you ingest are going to go through the portal vein system, end up in the liver, and then the liver decides what to do, how much to actually keep, how much to convert it to something else, and how much to excrete, which in the case of steroids means usually glucuronidation and sulfation. So, if you're taking basically any kind of a steroid, and it goes through the first pass metabolism, which is through the portal vein system, studies show that you're basically getting a bioavailability of less than 10%. In other words, 90% [of it] the liver will either sequester and either keep for itself or excrete. And the studies that have looked at urinary patterns after taking steroids show that most of it actually gets excreted, which means that steroids being lipids, if we want them to avoid the first pass metabolism, we need to take them with fatty acids, which are also known to avoid the first pass metabolism and absorb most of the lymphatic system.

And those are fatty acids with a chain length of 14, I think, is the borderline. Anything less than 14 goes mostly through the liver. Anything higher than 14, especially over 16, in other words, palmitic and stearic acid, are great for going through the lymphatic system because when you ingest them, they combine with bile acids and form something called chylomicrons. And those molecules basically diffuse through the lymphatic system, get into the lymphatic system, and then travel around. And then I think the endpoint is through a thoracic duct, then gets dumped into the systemic circulation, which is what you really want. It kind of mimics an injection of the steroid versus what you get with it by eating it, going through the liver. So, you want to avoid first pass metabolism. And-

Dr. Joseph Mercola:

But let me interrupt you for a minor tweak in that it's not just – you're absolutely correct. That means if it's under 14 carbons, it doesn't work well. That means it eliminates coconut oil. You do not want to use coconut oil to develop this because it usually tops out at 12. But that also means you don't want to use an unsaturated fat or polyunsaturated fat. So, mono or saturated fats are what you want to do, but you don't use fish oil to dissolve your hormones.

Georgi Dinkov:

Yep, or peanut oil, which unfortunately, that company that I sent you that's developing the testosterone drug – it's a testosterone ester, which is fine. It's a testosterone undecanoate, I think. But they're also mixing it with peanut oil, creating this emulsion and then putting it into gel caps, and then you ingest it with peanut oil. And by the way, because peanut oil is very high in linoleic acid, linoleic acid is known, actually, to block the activity of testosterone at the receptor level.

So, it's like ingesting an androgen and an anti-androgen in the same capsule, which kind of defeats the purpose not to mention its inflammatory effects. So, yes. So strictly, saturated fats, or worst case if it can get purified oleic acid, which is the main component of olive oil. There's another oil which I've recently become interested [in]. It's called moringa oil. [It] seems to have very low levels of PUFA (polyunsaturated fatty acids), like less than 1%.

Dr. Joseph Mercola:

Oh yeah. I used to [crosstalk 00:29:23] moringa.

Georgi Dinkov:

Less than 1% of PUFA, almost identical to olive oil, minus the PUFA. So, it's like the profile – if you look at the fatty acids, it's about 80%, I think, oleic acid, and the rest are saturated fats. So, you can probably try to use that.

Dr. Joseph Mercola:

Yeah, it's an important food product in the subtropics and tropics for sure.

Georgi Dinkov:

Yeah, I think India, they basically export a large amount of moringa oil and it's got a bunch of different phenolic compounds in it. So, it's similar to unfiltered olive oil in terms of its health effects, which unfiltered olive oil has. There's an interesting study that [says] taking 30 grams of unfiltered olive oil, real olive oil, can actually cure H. pylori infection better than antibiotics for about two weeks. So, moringa oil has some of the same phenolic. So, if you're interested in getting the better version of olive oil, you can try moringa, assuming it's not adulterated, which of course is not guaranteed these days. But yes, so long-

chain saturated, or worst case, monounsaturated fats, definitely not polyunsaturated fats in terms of storage-

Dr. Joseph Mercola:

Yeah, do not make that mistake. That's what's causing most of the health problems. So, let's pivot to progesterone, which is a special case, like the other three. You could get some absorption, but the better way to do it is the method that Peat actually got a patent on. I don't know when the patent was. He got his Ph.D. in estrogen in 1972, and I suspect it was late '70s or early '80s that he figured out the patent, but the patent for this has long expired, but it's essentially dissolving progesterone in vitamin E. And there's only one company – or there are two companies that do that, Progest E, which I don't like.

Georgi Dinkov:

Kenogen is the company that produces Progest E.

Dr. Joseph Mercola:

Yeah, I don't like that. I do not recommend that company at all. And I'll tell you why. And I confirmed that this is accurate. You can't measure the dose. The company is just – they made a terrible choice and it's too viscous. And when you try to squeeze one drop, you might be squeezing 10 or 15. It just comes out as a stream. It's not a drop. It's impossible to titrate that dose. So, don't use that. If you're using Progest E, finish what you have now and go get something either what I recommend – the two, which is from Health Natura, who has a lot of Ray Peat stuff, simply progesterone they have. Or you can do it yourself. You know how you can do it yourself? You can buy USP, which is 99.9% pure natural progesterone powder. It's not easy to find, but you can get it. And that's actually the least expensive because you can buy like a year's worth for $40 and you dissolve it in vitamin E.

Georgi Dinkov:

Vitamin E, yep.

Dr. Joseph Mercola:

So, why don't you expand on that? Because I'm sure you're going to have a lot of insights I skipped over.

Georgi Dinkov:

So, it's a lipophilic molecule of similar – I think it's got like 22 carbons or maybe more.

Dr. Joseph Mercola:

Vitamin E? I didn't realize it was that high.

Georgi Dinkov:

Yeah. Yeah. So, it's basically similar to these lipids that we're recommending, but the bond that the progesterone – the ionic bond that it forms with vitamin E is much stronger than the one it forms with regular fats. So, even when you take progesterone with the regular fats in the emulsion, chances are that basically, once you ingest it, even if it goes through the chylomicron system [and] gets dumped into the bloodstream, very quickly platelets and other cells are going to basically be able to cleave that bond and you're going to have free progesterone floating around. And for free progesterone in the blood, the half-life is about 45 minutes. So, you're going to get a, let's say, brief effect of progesterone and you want a longer-term effect. And it turns out that when you dissolve it in vitamin E, it stays dissolved in the

vitamin E that doesn't get extracted out of the vitamin E somehow. So, it stays in the vitamin E, which means that its half-life in the blood is the same as the half-life of vitamin E, which is 48 hours. So, when you take it-

Dr. Joseph Mercola:

Wow, I did not know that that's the reason why. So, 48 hours versus 45 minutes. Wow.

Georgi Dinkov:

Exactly. Ridiculous difference, which means you can take it only every couple of days, depending on the reason you're taking it. And the other good reason is that basically vitamin E, it's capable of binding to the red blood cells and then it gets carried throughout the tissues and distributed exactly where it's needed. Recent study found out that basically showed that when you dissolve a substance in vitamin E, [it] specifically targets the sites of inflammation with the highest inflammation. And this company found it by accident. They were doing experiments trying to deliver drugs into the brain, and specifically to the area of the brain that was damaged by a stroke. So, they were testing different chemicals, different solvents, and they have to cross the blood-brain barrier. And some of them did cross the blood-brain barrier, but they affected the entire brain.

So, they had to use a much higher concentration, which in pharmacology is usually not good. You want the lowest possible concentration exerting the strongest effect. And then they tried vitamin E. And then when they tried vitamin E, they managed to get that drug that was reversing the damage from the stroke specifically to that area, and were able to use a concentration about a hundred times lower than what they were able to use with the other solvents. And they opined – they haven't tested it yet that the same thing happens throughout the body as well. So ideally, when you take progesterone, you want it to go to the areas that need it the most, which usually means areas of high estrogen, which automatically means high inflammation, high nitric oxide or high serotonin. And it looks like dissolving vitamin E will specifically target those areas first. You will get to the others as well, but it will first take care of the problem where it's the most urgent.

Dr. Joseph Mercola:

So, the devil's in the details, but before I go into that, I want to – while I'm remembering – mention that we are actually developing the best progesterone delivery system in the world, because it's going to have not only vitamin E, but it's not going to be a dropper. It's going to be in a liposome, a liposomic capsule that you swallow, with vitamin E.

Georgi Dinkov:

Awesome. Awesome.

Dr. Joseph Mercola:

It's like the ultimate delivery system. So, hopefully, we'll have that out in three to six months. But vitamin E is a supplement that I believe almost every human needs to take, even babies. I mean, it's really hard – the primary – You say, “Well, let's get it from whole foods.” Well, that's a good idea. But guess where the highest concentrations of vitamin E is in foods? It's in seed oils or seeds or nuts. It's really hard to get vitamin E. You can get it in meat, but – the other benefit aside from just progesterone is that it's going to be antilipolytic and help you protect [against] oxidative damage from the linoleic acid that's in your tissues. It has to come out, and it's going to take seven years for it to come out completely, even once you

started a low linoleic acid diet. So, vitamin E is essential. Everyone needs vitamin E. But the devil's in the details, and you've got to take a specific type of vitamin E. So, why don't you discuss that?

Georgi Dinkov:

So, vitamin E, its effects in the first half of the 20th century were not known as an antioxidant. It was known as an anti-estrogenic chemical, as an anti-inflammatory chemical, and specifically is an anti-clotting factor that was protective against the clotting effects of estrogen. So, it was really known as [a] natural over-the-counter anti-estrogenic molecule that you can get. But then, around the 1950s is when the rate of living theory came out and that theory is based on the fact that if you have high metabolism you're going to have high reactive oxygen species, something which we've debunked. And actually, even the Wikipedia page says that if you have high metabolism, it actually lowers reactive oxygen species, but long story short, they did some experiments that showed that vitamin E is an effective antioxidant, so they said, "Oh well, you know maybe because it extends lifespan in animals and now we think that the rate of living here is what causes aging. Maybe that's how vitamin E works." And that's the idea that was pushed for the next 50 years.

So, vitamin E became known almost exclusively as an antioxidant. And then Big Pharma companies got involved and started producing synthetic versions of vitamin E, specifically the esters, such as tocopheryl acetate [and] tocopheryl palmitate. They also had racemic versions, the dextro (D) and the levo (L) kind. Only the dextro isomer of the tocopherol is active. So, if you go to any kind of a grocery store and buy the cheapest version of vitamin E possible, it doesn't have to be the cheapest, but if you reach for a random vitamin E product, chances are that it's going to have not only a racemic mix of D and L isomers, but also, it's going to be an ester. So, most often, the acetate. And multiple studies have demonstrated that acetate has only about 50% of the activity of the dextro version, I'm sorry, of the non-esterified. And then if you look at the D and L racemic mix, only half of that is active. So, half of half equals a quarter.

So, you're going to be getting only a quarter of the real vitamin E that actually your body needs. And in addition to that, there are several studies that have shown that the levo isomer is capable of displacing the dextro isomer from tissues. And you may get into a situation where you're taking a lot of vitamin E, but you're excreting the dextro one and you're getting accumulated the levo one, which is inactive and actually does not prevent from any of these damages that the PUFA does. So, you should not be taking anything that has the D [and] L in the name, and it should be listed on the label. And if you-

Dr. Joseph Mercola:

And you shouldn't have acetate, [inaudible 00:38:59].

Georgi Dinkov:

Yeah, you should not have acetate. So, it should be a non-esterified mix of the dextro isomers of the four isomers, which are alpha, beta, gamma and delta. And then, even those on the market, you can basically – You can get some good products, but basically, make sure that it doesn't does not smell like fish oil. Any smell like that or of rancidity demonstrates that there's some residual polyunsaturated fats there and you do not want to take that even though vitamin is supposed to protect from the negative side effects. So, you want mixed non-esterified D isomer tocopherol.

Dr. Joseph Mercola:

Yeah, and to illustrate that, because I'm actually creating a course, a master class, with a variety of – it's condensing the 40 years I've been studying this stuff into the most important topics. And I have a whole module on this, on the linoleic acid topic. And I forgot the specifics, but there's a really – I think it was a

large Japanese study that looked at the difference between whole food vitamin E that was from – it wasn't a supplement, it was quantitative someway, the level of vitamin E they were getting from the food, and they compared it to the synthetic versions and it was for women with lung cancer. It was a massive difference.

The synthetic vitamin E radically increased the lung cancers, radically increased them, where[as] the natural vitamin E reduced it. So, you are far, far, far better off not taking vitamin E that fits the characteristics that Georgie just described, than taking it at all. So, you got to take the right one. And then there's also a quantity issue that you didn't mention, but it's like 100 units, 100 milligrams. You don't need more. So, the last thing you want is dl-Alpha-tocopheryl acetate. That's the worst. It's like 400 units or a thousand units. Is it even better, right? No.

That stuff will kill you prematurely. So, you really want a high-quality one. There's a number of companies that make it. We happen to make one, too. And you don't have to buy ours. You can just look at our site and look at the product label and look at that and make sure, make sure that the brand you're using replicates that levels. Because we've got all the isomers – no, only the D isomer, the different species, alpha, beta, gamma [and] delta. And you want the tocotrienols in there too. And it's a smaller dose, smaller dose, not a hundred milligrams, like 50 milligrams, collectively.

Georgi Dinkov:

There's a study that actually demonstrated how much you needed, depending on your intake of linoleic acid. So, 2 milligrams per gram of linoleic acid is what your optimal intake should be. So, since a lot of people eat, let's say, 50 grams of linoleic acid a day, then they better be taking about 100 milligrams of the mixed tocopherols and tocotrienols.

Dr. Joseph Mercola:

I would argue that it’s probably more, because it also serves a very – I didn't realize it had a 40-hour half-life. So, it's its own time release capsule essentially. But it has a very powerful antilipolytic action, which is why it's so useful. In addition to preventing oxidation of these fats, it keeps it in the adipose tissue, the fat cells, and hopefully, being released so it goes to the liver and you can urinate it out.

Georgi Dinkov:

The fatty cells can metabolize themselves through something called the peroxisomes.

Dr. Joseph Mercola:

I did not know that. Please expand on that.

Georgi Dinkov:

Yeah. These organelles that are in the cell that are called the peroxisomes that are outside of the mitochondria, they can metabolize fats. And there are some drugs on the market – the interest is kind of waning recently because they didn’t pan out as – they were developed as a treatment for diabetes. And treatment for diabetes, to this day, the theory is that we want to suppress oxidation of glucose, we want to increase the oxidation of fats.

And they develop these drugs called the peroxisome activators. And they're like peroxisome alpha, beta, gamma and delta, just like the tocopherols. And then these peroxisome organelles can actually process fats extra-mitochondrially, without the involvement of the mitochondria. And I think that's the preferred way, in addition to the excretion through the liver, which is how you should be healthfully processing the

PUFA. Now, even the peroxisome metabolism of fats, even that is subject to the peroxidation. So, you still need the vitamin E-

Dr. Joseph Mercola:

Yeah, [inaudible 00:43:30] vitamin E to protect that. Sure.

Georgi Dinkov:

Yeah, exactly. So, the mitochondria is okay, it's protected because the fats are not oxidized there. Even in the peroxisomes, they can cause damage, especially to the cellular membrane, because it's also composed of lipids. So, you do need the vitamin E just for that, just for structural stability of the cell.

Dr. Joseph Mercola:

Yeah, so I did not realize that peroxisomal deactivation in the adipose cell. So, that's a powerful reason, because I said, "Well, I know it's antilipolytic and that's good." But I didn't understand that it's going to be metabolized in the fat cell, because I thought at some point it would come out and your body would take care of it more effectively, but if you can keep it in the fat cell as long as possible – And that's what vitamin E does, it keeps that damaging fatty acid in your fat cell, so that your fat cell can get rid of it and not leak out into your cells, embed into membranes in your body, primarily your inner mitochondrial membrane, and screw up your ability to produce cellular energy because [inaudible 00:44:26] machinery-

Georgi Dinkov:

The fat cells are probably the only type that actually is kind of doing okay by metabolizing fat. Anything else, especially [the] pancreas, liver, brain [and] gonadal cells, they're very vulnerable to [an] oversupply of fat. It can actually cause damage. A recent study came out showed that the damage, the kidney damage seen in Type 2 diabetes and even Type 1 diabetes, the damage to the beta cells of the pancreas is driven primarily by oversupply of fat and specifically polyunsaturated fats. So, you don't want the PUFA to come out, right? Let it stay there and those cells over time will help, together with the liver, to get rid of it. But even when it's sitting there stored, you don't want it peroxidized and that's really what the vitamin E will help to as well.

Dr. Joseph Mercola:

All right, so let's tie up these loose ends and go on. I want to go on to vitamin K2 and CoQ10 as quinones that will, I think, serve as a wonderful alternative to methylene blue, which I have some concerns I want to discuss with you, but let's finish up the hormones by just discussing the dose. So, let's start on the top [to] bottom. The most important one is progesterone. I'll tell you what I think and then you refine my views on it.

So, I think the dose – Actually, you know, an interesting dose that Dr. Michael Platt – I'm sure you're aware of, he's a physician, sort of a contemporary of [Dr.] John Lee, who's long since passed, and is a big proponent of progesterone. And his fix on it is for adrenaline excess. So, he primarily uses – he thinks we have an epidemic of adrenal excess. And I suspect to a certain extent he's correct. But he, like [Dr.] John Lee and like almost everyone else who is using bioidentical progesterone, just as an aside – we're not going to go into it now because we don't have time, we're going to discuss two more topics, but there is never, in my mind, never, never, never, never, never an excuse or a reason to use bioidentical estrogen. You do not want it. It's toxic, it's dangerous, it's going to cause problems, and I know a lot of people are going to be angry with me for saying it, but that's what you and I believe. So, I'm assuming you believe that, right? Never.

Georgi Dinkov:

Oh, not only that, I can send you – there was a – I don't know if you saw the debunking that a doctor did of the podcast you and I did on estrogen. You did not? I'll send you. There's a doctor who is, I think, a gynecologist [who] said, "Oh, these two. They poo-pooed all over estrogen and here are my counterarguments." And she said, "Yeah, the Women's Health Initiative studies demonstrated these terrible effects, but then we reanalyzed the data," which is a euphemism for, "We threw out the things we didn't like, and then we found these specific subgroups where if you change the dosage, estrogen will be OK." And I responded to that with a slew of other studies showing that – basically, her main point was that estrogen is not carcinogenic. And I said, "Really? Here is a list of 40 cancers. Every single one of them, multiple studies showing that estrogen can both cause it de novo and if it's already there, it promotes its growth." So, there's really no such thing as a non-endocrine cancer. All of them respond to hormones, and estrogen is a primary growth factor in all of them.

Dr. Joseph Mercola:

Yeah. And I'll put a link to our previous podcast where we did discuss that, where we went deep and had a lot more time to do it. So, no excuse for ever taking bioidentical estrogen, but you want bioidentical progesterone and that's not hard to do. You don't want the synthetic. And synthetic progesterone, sometimes it's referred to as progesterone, but more accurately it's called progestin. That is dangerous. That's bad. It's almost as bad as estrogen. So, you don't want that. But most of the people who are encouraging, recommending, advising people to take natural progesterone, I would say it's probably over 99% that people who use it, they use it transdermally and that is not what you want to do.

So, I'll let you talk – we actually talked about it. You want to use progesterone, but if you want to mention anything, the dangers of using it transdermally, we'll talk about it. But then I want to talk about the dose and then we'll go into the others. So, the dose I'm recommending – and a dose for a premenopausal woman, in other words, a woman who's still having her cycles, you have to be careful and only use it – not the entire month, and I forget the specific timing of it, but you can definitely [inaudible 00:48:51] up your cycle if you use it the wrong time. So, otherwise you can use it every day, and it's like 25 to 50 milligrams. I kind of like to err on the high side, like 50 milligrams, because there doesn't seem to be any downside. There's no toxicity.

Other hormones like testosterone – and notice, I did not recommend taking testosterone, especially for men. I do not recommend it at all. You don't need to do it and I think it's potentially dangerous. You just need to get those four we mentioned. But unlike testosterone supplementation that many men are on, it doesn't have negative feedback. So, you can take it to the wazoo and it will – in fact, I think it enhances progesterone production when you take it, if I'm not mistaken. So, you don't have to be concerned about that. There doesn't appear to be any toxicity. And the women who are pregnant, man, this goes through the roof. I don't know how many orders of magnitude higher it is during pregnancy than it is in non-pregnancy. But the point being is that the human body can tolerate very high levels of this without side effects.

Georgi Dinkov:

In the third trimester, women produce about 600 milligrams daily.

Dr. Joseph Mercola:

Okay, okay, so it's at least one order, closer to two orders of magnitude. Yeah, that's a lot.

Georgi Dinkov:

So, if you're using it transdermally, because the skin has a very high expression of something called the 5-alpha-reductase enzyme, a significant portion, if not the majority of the progesterone you're taking, will be converted irreversibly – it cannot go back to progesterone – into something called 5-alpha-dihydroprogesterone, and then that gets converted ultimately to something called allopregnanolone. Now, allopregnanolone has some very good effects. Recently it was approved by the FDA as a treatment for postpartum depression, as an infusion. And now the company-

Dr. Joseph Mercola:

[inaudible 00:50:30] good sleeping pill too.

Georgi Dinkov:

Good sleeping pill, too. Yeah. A very potent GABA agonist, [has] strong antiseizure effects because of that. And the company that I think is the same that's developing the testosterone oral version said, "Oh, maybe we can do allopregnanolone in our peanut butter formulation for oral use." And they are doing that actually right now to treat post-traumatic stress disorder in mostly the military veterans. It does seem to have that effect. But if you're using it transdermally, out of the progesterone, you're mostly getting the allopregnanolone.

If you're taking it orally with the proper oils, even better with vitamin E as the solvent, you'll be getting a significant portion non-metabolized. And then in a non-metabolized version, progesterone has some very potent pro-thyroid effect. It's a thermogenic steroid as well. It induces uncoupling. So, you'll be producing more heat, which is one of the effects of taking T3. Not as potent as T3, but you will raise your metabolic rate by about 10%. And milligram per milligram, it's more potent than caffeine. Caffeine can do about the same, but caffeine can cause jitters. A lot of people are intolerant to it, right? Some people think they're developing dependence on it. I don't think [they're] physically dependent, but [they] could be psychologically. So, with progesterone, you can achieve the same things, but without the jitters.

In fact, it may make you sleepy because progesterone itself is a GABA agonist and was used as one of the treatments for eclampsia and preeclampsia. Some of the symptoms include seizures of those conditions. So, that was a treatment back in the mid- to late-20th century before the synthetic progestins got involved. So, you do want it orally. You want it in the oils to avoid the liver. And in that case, then you're going to get the thermogenic effect, the pro-thyroid effect.

It will actually stimulate, it will increase the synthesis of some of the enzymes that are actually involved in producing one is progesterone. The key the side-chain cleavage, which increases conversion of cholesterol to pregnenolone, and then something called 3-beta-hydroxysteroid dehydrogenase, which converts pregnenolone to progesterone. So, by taking progesterone, you increase the machinery in your cells to create even more progesterone. And that positive feedback seems to be present also for pregnenolone and DHEA, but it's also unfortunately present for the not-so-good steroids, such as especially estrogen and cortisol. I've talked to many doctors, and if you talk to them about cortisol, they'll say, "No, cortisol has a strong negative feedback mechanism." That's why you never see this regulation of cortisol unless the person has Cushing's disease. That may be true centrally.

However, it turns out that peripherally, cortisol is a potent inducer of its own enzyme that produces cortisol, which is 11-beta-HSD1. So, by taking cortisol, you're becoming more cortisol-prone and the same thing happens with the good hormones. Taking more pregnenolone or more progesterone or DHEA within limits, you actually help your body produce even more of those. What else does it do? Progesterone in its unmetabolized form is the aromatase inhibitor, as we mentioned-

Dr. Joseph Mercola:

Yes. Yes.

Georgi Dinkov:

-and it's also the antagonist at both the estrogen receptors alpha and beta. And not many people know because the research on that seems to have stopped around the early ‘80s, that progesterone has the same affinity of cortisol for the glucocorticoid receptor, except that progesterone acts there as an antagonist.

Dr. Joseph Mercola:

It's different. It's a cortisol antagonist. That's like the cat's meow. And compare that to adrenaline too, because I mean –

Georgi Dinkov:

Oh, yes. So, basically the release of adrenaline is driven largely by two families of receptors, the alpha and the beta adrenal receptors. And I think one of the first drugs for blood pressure was a beta blocker, right? I think propranolol is the name.

Dr. Joseph Mercola:

Yeah, yeah, propranolol, [inaudible 00:54:19].

Georgi Dinkov:

So, that doctor that says that we have adrenaline excess, he's right, but it's not just adrenaline excess. We have an HPA (hypothalamic-pituitary-adrenal) overactivity syndrome like in the developed countries, which means both cortisol and adrenaline. So, we already know that progesterone can protect against the cortisol excess. Oh, by the way, progesterone also inhibits the enzyme 11-beta-HSD1, which synthesizes cortisol, while simultaneously increasing the activity of 11 beta-HSD2, which deactivates cortisol. So, it will block cortisol's effects if cortisol is already there, but it also reduces your ability to produce cortisol in excess. It does not put you into a cortisol deficiency such as Addison’s disease, which is what a lot of people will be concerned about.

Dr. Joseph Mercola:

Which almost everyone benefits from. That's why it's almost universally beneficial to everyone unless you're really engaged in unhealthy behaviors, then it could be problematic. There are complications that can result.

Georgi Dinkov:

Yeah, we're all in a state – After the age of 35, I think it's fair to say that we're all in a state of relative hypothyroidism and especially relative excess of glucocorticoids and adrenaline, and they go hand in hand. So, progesterone has been shown to increase the oxidation of adrenaline, which deactivates it. And also, I think it acts on the alpha-2 adrenal receptor as an agonist, which is the same mechanism of action of a drug called clonidine, and clonidine is used clinically to lower the release of adrenaline from the adrenal glands.

And there are human studies demonstrating that if you administer progesterone, even in its non-optimal form, such as just the powder without the long-chain fatty acids and definitely without the tocopherols,

even in that form, 100 to 200 milligrams orally, single-dose, is sufficient to drop cortisol and adrenaline by about 60%, 6-0. And as a side effect of that, the blood pressure also dropped in both sexes.

So, we know that progesterone has a very potent anti-stress effect by acting specifically on the sides of the stress system, which is the cortisol and the adrenaline one. And one of the explanations is that, I think, progesterone has shown some ability to activate directly the alpha receptors, which are negative feedback. In other words, if you activate the alpha adrenal receptor, you basically send in the signal that there's too much adrenaline, so the body will produce less adrenaline unless you have a very rare tumor, something called pheochromocytoma, which overproduces epinephrine, norepinephrine, adrenaline, noradrenaline and, I think, dopamine, but they're very rare. They're like 1 in 100,000.

Dr. Joseph Mercola:

Yeah, I've never seen one in my career. Most physicians haven't.

Georgi Dinkov:

Yeah, they're extremely rare neuroendocrine tumors. Unless you have that, progesterone is going to have an anti-adrenaline effect, especially if your adrenaline is in excess. So, it can be used as an over-the-counter blood pressure drug, if the doctor approves.

Dr. Joseph Mercola:

Yeah, well, it doesn't – It's like – We're going to talk about – I think we're going to switch to talk about CO2 next, which is clearly one of the best interventions for lowering blood pressure. Because it's the primary vasodilator in your body. So, let's skip now to thyroid, which is basically – there are two, well, there are three types of supplementation. One could be the desiccated thyroid, which has T1, T2, T3 and T4. T3 and T4 are the most common, though, and they're administered by prescription typically as Synthroid or Levothyroxine as T4, just T4. And that's not a good strategy. In fact, I forget Peat's position on this, but I believe he was primarily just recommending T3, which is what I use personally.

I just don't think for most people T4 is going to be needed, that you can do it with T3. But there's no danger to doing it. It may be optimal. It depends on the person. So, I definitely want your thoughts, and talk about the doses here, too. Again, I've never heard anyone, including you, discuss the need for taking thyroid in fat. I've heard it with the other hormones, but not thyroid. So, that was new for me, and I wanted to bring it to your attention. So, the dosages typically, I think – well, I'm pretty confirmed – If you take T3, interestingly, it's sold as a drug, a prescription drug, Cytomel it's called, but you can get other versions of it. And I think you can compound it in a lower dose, but I think its prescription is 25 micrograms, which is way too high a dose. You don't really want to go over 10 micrograms every three hours. It’s just not a good strategy, and you can tell us why, but you don't want to do that. So, you've got to be really, really careful about that. So, I think with that said, why don't you guide us further?

Georgi Dinkov:

So, the thyroid gland produces about 100 micrograms in a healthy person, 100 micrograms of T3 over a 24-hour period.

Dr. Joseph Mercola:

Oh, I didn't know it was that high. Okay.

Georgi Dinkov:

Yeah. But if you take anything more than 25 micrograms – or actually, even that is a very high dose – because it has such a potent thermogenic effect and in higher doses can be catabolic, the body has developed these mechanisms called the deiodinase enzymes, and they very quickly convert the excess T3 into something called T2 and even T1. And both of these are much weaker thyroid hormone receptor agonists than T3.

So, in other words, you're going to be wasting most of it. And interestingly, the same type of enzymes, T3 deactivating, are highly overexpressed in cancer cells, and cancer cells just happen to be very, very hypometabolic, as we've discussed previously. So, the thyroid gland produces the T3 to T4 in a ratio of about 1-to-4 in favor of T4, and then once this gets released in the circulation, T4 is actually a prohormone. It, by itself, does not have a very high activity directly at the thyroid receptors T3. So, it circulates and about 80% of it in the liver in a healthy person should get converted to T3. And the other 20% can get converted to T3 peripherally, or if the dosage of T4 is too high, the excess very quickly gets converted to something called reverse T3.

And it's a very dangerous state because reverse T3 acts as a thyroid hormone antagonist. So, if you're taking too much T4, which the dosage is different for everybody, depends on their state of health, their liver health. A lot of people have fatty liver disease, which means their liver health is not going to be optimal. And most doctors don't take these things into account. So, if they prescribe you, let's say, 100 or 200 micrograms T4 daily, you better be praying to the gods that you believe in that this will go to the liver and get properly converted, because if it doesn't and it gets converted to reverse T3, you'll end up in a more hypothyroid state than if you did not take the T4 at all. And that actually was known in, I think, towards the middle of the 20th century, which is when the T3 and T4 got isolated, and that's why the thyroid therapy was always a combination of the two hormones, never T4 by itself. That only became a thing in the mid-‘90s and to this day.

And then at that time, the cheapest way to get these was from natural thyroid glands, specifically bovine or porcine, sometimes even from sheep, depending on what the most popular animals in the area are. And it used to get freeze-dried, pulverized, and then you basically get a standardized grain that will have about 38 to 40 micrograms of T4 and about 8 to 10 micrograms of T3. And for most people, especially to the work of Dr. Broda Barnes, but for most people and other doctors who studied T2, up to three grains was considered what was basically likely to produce a healthy effect.

Anything more than three grains usually means you have some other problem that's either preventing the T3 from doing its work, you have impaired conversion of T4 into T3, which usually means liver disease, or you have another metabolic condition, such as diabetes or even cancer, which results in increased activation of your T3 and decreased conversion of the T4 into T3. So, if you take in thyroid, T4 is almost never a good option by itself unless the person is very young. But even then, if a person is hypothyroid, that by definition already means that the liver will be burdened because one of the primary functions of the liver is the detox mechanisms, and one of the primary things that the liver detoxifies are polyunsaturated fats and estrogens. But the detoxification mechanisms themselves depend on thyroid function, so hypothyroid means sluggish liver by definition. And in a person like that, if you give a hypothyroid person a T4 only, especially if the dose is higher, you’re asking for trouble.

Some of that will get converted to reverse the T3, and we've seen that on blood tests that the people have sent me, is that basically almost none of them improve on T4 only. Unfortunately, the doctors currently – the current protocol for treating hypothyroidism in most countries is thyroxine only, T4. And they only prescribe T3 for something called myxedema coma, which basically is a severe, very severe, almost lethal

side effect of severe hypothyroidism. And only then they will consider T3, and I think even then it's by infusion only. They don't give it orally.

You can still buy the products, but if you're going to be taking thyroid, I think either the natural desiccated, which usually has the T4 to T3 in a 4-to-1 ratio, which is kind of like the natural one that we produce as well. Or if you're going to be taking synthetic versions, then if you have to take T4, make sure that the dosage is not over 100 micrograms. That's very commonly prescribed. Because then it would mean you have to take 25 micrograms of T3 to kind of match the physiologic ratio, but that dosage of T3 is too high. It's going to cause problems. So, ideally, you're looking at something like the Sino Plus product, which [is] a tablet you can split into four, and I think you're getting about 30 micrograms of T4 and about 8 micrograms of T3.

Dr. Joseph Mercola:

Yeah, that's fair. You really want to be under 10 [micrograms] if you can. So again, I want to reiterate that these are not magic bullets. Please understand that, that you taking thyroid, even though you need it, is a wise strategy, but you still need to address the fundamental reasons why your hormones stopped working well. So that's what we discussed in our previous interviews, and it has a lot to do with your lifestyle, specifically the food that you're eating. So, we're not going to go into that here, but just know that. So, yes, go on the hormones, but at the same time, you want to address the foundational causes. So, having said that, let's progress to the next hormone in the trio, so it's progesterone, thyroid and then DHEA, which I think we talked about the doses, didn't we?

Georgi Dinkov:

Yeah. For DHEA, I think I mentioned that physiological dose. Basically, we're producing at most 50 milligrams daily. And if you take that, basically, it's probably good if you split it into several doses, smaller doses, just to avoid giving the estrogen enzymes [inaudible 01:05:24]-

Dr. Joseph Mercola:

And take it with butter.

Georgi Dinkov:

Take it with butter, and take it with progesterone.

Dr. Joseph Mercola:

Yeah, yeah, absolutely. Two things, actually, I put them together when I take it.

Georgi Dinkov:

Yeah, exactly. I do that too.

Dr. Joseph Mercola:

Actually, I have to qualify that, I take my progesterone all at once, especially since it's in the vitamin E, and I take it about an hour before I go to bed. And I apply it – you can swallow it, but I apply it on my gums.

Georgi Dinkov:

I mix the progesterone [and] DHEA together in vitamin E in a 3-to-1 ratio. To me, that seems to work the best.

Dr. Joseph Mercola:

It's good, but it's a mood issue because the half-life is 48 hours.

Georgi Dinkov:

Yes, exactly.

Dr. Joseph Mercola:

You've got it in your tissue. I mean, maybe the first day it's good to do that or [in] two days, but eventually you get high tissue levels of it.

Georgi Dinkov:

Yep. So, you mentioned 30 to 50 milligrams of progesterone, which by the way, happens to be the physiological dose that we produce when we're at the age of 11 and 12, both males and females.

Dr. Joseph Mercola:

Wow, I did not know that.

Georgi Dinkov:

Same thing for pregnenolone, 30 to 50 milligrams. If you look at the products on the market, a lot of them are selling 30 to 50 milligrams of the pregnenolone. And you wonder, "Why? Why is this consistency?" And nobody can explain why, but if you look at the literature, somebody who actually started doing this, selling them [a] long time ago, must have looked at the literature and said, "This is the physiological dose. This is what you need for full replenishment assuming you're producing nothing." So, yeah. So, I think that's a good dose but it's just as you said, for women in the luteal phase, when they already produce sufficient amount of progesterone, I think the progesterone dose should be lowered in that phase-

Dr. Joseph Mercola:

Or maybe stopped, or do you think it should be?

Georgi Dinkov:

Or maybe stopped completely, yeah.

Dr. Joseph Mercola:

Yeah, so the luteal phase is the first day of the cycle to like the fifth or 10th?

Georgi Dinkov:

Yeah, something like that, yes.

Dr. Joseph Mercola:

Okay.

Georgi Dinkov:

Well, I mean, varies in the length, depending on the specific person, but basically, I guess it's 10 days after ovulation-

Dr. Joseph Mercola:

Okay, so 10 days.

Georgi Dinkov:

Yeah, yeah, exactly.

Dr. Joseph Mercola:

So, one-third of the month you're not taking it, two-thirds you are. And then if you're not cycling at all, then you don't need it. You can take it continuously. So, that's good. Thanks for all your efforts, and I can't tell you how many people really appreciate what you're doing. So, thank you.

Georgi Dinkov:

Well, thanks for inviting me. Spreading the knowledge, that's what we're all about.

Dr. Joseph Mercola:

Yeah. You're really, really good at that.