Dr. Mercola: Statins. Are they really as bad as they think [you are 00:00:03] or are they even worse? Hi, this is Dr. Mercola helping you take control of your health, and today I am joined by Dr. Stephanie Seneff who is a professor of some sort at MIT. What is the specifics?

Dr. Stephanie S: Senior research scientist.

Dr. Mercola: Oh, senior research scientist, she's a senior research scientist at MIT, has a lot of background in computers and I think she has the distinction of being interviewed, maybe has the record number of people I've interviewed. Maybe Barbara Loe Fisher was more.

Dr. Stephanie S: I think so.

Dr. Mercola: But you're certainly up there, so this is good. And the reason we do that is because she's such a fountain of information. And today, as you know by the introduction, we're going to talk about statins. Specifically, we're going to be reviewing a book called the Dark Side of Statins, which has been published and out for a bit and was written by Dr. Graveline, who was a victim of statin side effects and actually died from complications from statins. So, he is not able to join us for the interview and we thought the perfect substitute would be Dr. Seneff because her husband, and I'll let her tell the story in a moment, was severely affected by statins and this was, my guess is, before she started really seriously exploring the benefits of natural medicine.

So, welcome, and thank you for joining us, Dr. Seneff, and I will let you take it from here because you are such an expert at telling the story.

Dr. Stephanie S: Okay, thank you very much for having me, and you're right, my husband actually did me a big favor in terms of getting me into this whole space. He really changed my career by getting sick, so it's not what you want your husband to do, but. He was diagnosed with heart disease 10 years ago and put on a high-dose statin, four times the normal dosage. The doctor said, "You have to take this for the rest of your life. If you don't, I will no longer be your doctor." And he started immediately suffering from all kinds of side effects, all the muscle pains and weakness. Even the road rage, behavioral changes.

I just knew this drug wasn't working and I started researching statins up one side and down the other. In fact, started doing it as part of my work at MIT, started analyzing statin side effects and finding all kinds of horrible things. He got off of them after a year. He slowly tapered it down and I'm happy to say he's statin free and doing great at this point, nine, 10 years later, still statin free. His doctors keep on reminding him and he keeps on telling them no politely.

Dr. Mercola: Yeah, he knows better.

Dr. Stephanie S: New doctor, he fired the one that would no longer be his doctor, but he's got a new doctor who is not exactly on board, but he's willing.

Dr. Mercola: So what was the justification they had for giving him a dose 400% the recommended dose?

Dr. Stephanie S: Four times? Yeah, I don't actually understand why they did that, because actually his cholesterol was not particularly high. So I think it's just because this particular doctor ... It turned out he was one of ... Victor found out later that there was information about Massachusetts and doctors getting funding to do ... Working with the pharmaceutical companies and his doctor was number one in Massachusetts, the most funded by, I think by Pfizer actually. And Lipitor was the product that he was taking, so I think it was totally-

Dr. Mercola: Yeah, I think collectively, this is one of the most commonly used medications and drugs in the world, statins as a class, but from a dollar perspective, I believe statins have sold over $10 billion.

Dr. Stephanie S: Yeah, I don't know the numbers, but I know it's obscenely big.

Dr. Mercola: Yeah and a big portion of those sales were Lipitor, but they've been on the market for a long time and this was sort of a ... I started practicing in 1985, I graduated med school in 1982 and did a residency, and when I started practicing, high cholesterol was not really a thing in the '80s. I was sort of conned into conventional medicine and brainwashed and believed that high cholesterol was a problem at the time and I would draw the person's blood, and I was the new kid on the block and I'd tell them, "Hey, you have high cholesterol," and they'd go back to their doctor and say, "No, I don't," and they were just using old reference ranges. It really didn't pick up until the late '80s, early '90s.[crosstalk 00:04:32]

Dr. Stephanie S: Yes. Once they thought they had a really good argument, they did some studies and they used this sort of relative risk with very rare risk, so when the population as a whole has an extremely low risk and then you can get a large percentage change, but it's actually a very small difference for the actual individual in terms of the likelihood of it reducing your absolute risk. They play that trick all the time.

Dr. Mercola: That's a good point. Why don't you expand on that because ... The difference between absolute and relative risk, because it's a really important sort of trick, a magic trick, that many of these companies use to confuse people into believing that the benefits of the medications are extraordinarily higher than they actually are.

Dr. Stephanie S: Right, so what they do is they do a study in which the absolute risk is very rare, let's say 2% of the population actually is expected to have whatever it is they're monitoring happen, like say a heart attack. Then they look over a period of time

and they find that the control group has the 2% with this occurring and the treatment group has let's say 1.5% instead of 2%. So that's a 0.5% decreased risk from your standpoint, but from their standpoint, that's 25% improved performance because it's 0.5 out of 2, 1/4 of the relative risk has been taken away. Therefore it's a 25% improvement, which sounds much better than 0.5%.

Dr. Mercola: Yeah, it's like 50 times better.

Dr. Stephanie S: Yes.

Dr. Mercola: And those numbers are actually quite conservative, because many times it's exploded beyond those numbers, so to just give outrageous, 100, 200%, 300%, when the actual reality is a very small actual decrease in the risk.

Dr. Stephanie S: Yes, and of course what I think is that you're decreasing your risk of heart attacks, but you're not necessarily decreasing your risk of heart disease, because you're driving yourself towards heart failure because of the damage that the statins do to muscles, and the heart is a muscle. So you're trading off heart attack for heart failure, and I think a heart attack is preferred over heart failure. These are two different diseases of the heart.

Dr. Mercola: Well, what you've just stated suggests that you believe that the statins actually decrease the risk of heart attack. Is that fair to say?

Dr. Stephanie S: I think they do decrease the risk of heart attack. They don't necessarily decrease the risk of the big heart attack. I think they actually do, like with the forest fires, if you're very careful to always put out the forest fires and then the trees get really dry and then finally you get ... Something just explodes and you get this giant forest fire that you never saw before because for many years you kept them away. It's sort of like that, that you keep away the small heart attacks that don't really matter and then the pressure sort of builds up and so you get one of these big heart attacks that's more likely to kill you. So they don't necessarily even improve heart disease risk, heart attack risk. How do I say this? Death from heart attack. They decrease the frequency of heart attacks.

Dr. Mercola: That's the ultimate barometer, is death from heart attack.

Dr. Stephanie S: Yes.

Dr. Mercola: Death. That's what we're looking for. Does it help decrease the death rate from heart disease? It doesn't for three primary reasons. One is that it lowers your cholesterol and I'll let you expand on this and I'll just give the summary, but it lowers your cholesterol. Cholesterol is an important precursor for many of our steroid hormones, actually most of them. And it also lowers co-enzyme Q10.

Dr. Stephanie S: Yes, that's crucial. And [inaudible 00:08:04] talked a lot about that in his book.

Dr. Mercola: Yes. What he didn't talk about and I don't think he knew of it, it actually lowers two other things, vitamin K2 and it also lowers ... It's the same darn enzyme ... See, almost all the statins inhibit this enzyme called HMG co-enzyme A reductase and that's the enzyme that your liver uses to make ketones. So if you're on a statin drug, you can't make ketones effectively. You'll never increase your ketone. You can go fast all you want, you're not going to be making them.

Dr. Stephanie S: That is remarkable. And he did not pick up on that I'm pretty sure, because I read the book carefully.

Dr. Mercola: No, he didn't mention it. I don't think he new of it. But he did mention the last one, which I wasn't aware of, and perhaps you can expand on everything I mentioned, I'm just throwing it out for you so you can take the discussion, and I don't even know how to pronounce it. It's dolichol.

Dr. Stephanie S: Yes, I was hoping you would bring that up because I was very fascinated by that part and I didn't know it either. I had come across it and actually from his red page I'd come across mentions of dolichol and it kind of went over my head and I didn't really pay attention, you know how it is. His book goes into the dolichol very, very nicely and it inspired me to even go back and look for some papers, because dolichol is very interesting.

Dr. Mercola: He believes it's just as important as Co-Q10. So why don't you enlighten us on your perspective on that because you've done the research. You're such a diligent researcher. You just go to the literature and digest it. It's just decades of-

Dr. Stephanie S: I love that part.

Dr. Mercola: I know and how many people ... You're so good. What I forgot in our introduction, too, you've written a book-

Dr. Stephanie S: Yes, I have.

Dr. Mercola: Was that your first book?

Dr. Stephanie S: It's my first book.

Dr. Mercola: And you were kind enough to ask me to write the foreword to it, which I did, and it was a very interesting book. Truthfully, it's a fiction book-

Dr. Stephanie S: Yes.

Dr. Mercola: But, it's really sort of autobiographical and the primary character in the book is you. It really sort of emulates your journey in this [inaudible 00:10:10] and it's a fascinating book. I forgot the name of it, though.

Dr. Stephanie S: Cindy and Erica's Obsession to Solve the Healthcare Crisis in America. And then there's a big thing, which diseases ... It's like autism and Alzheimer's and all these things. I went into statin drugs and vaccines and glyphosate, the weed killer, all of that. And I was discovering it in real time as I was putting it into the book, so it was very much of a personal ... It was even written in real time over the course of a year and a half.

Dr. Mercola: Yeah, you could tell that. It was really a fascinating read and I'm glad I got a chance to read it. But, anyway, that's a diversion. I just wanted to go back to that because I forgot to put it in the intro.

Dr. Stephanie S: So, the dolichol.

Dr. Mercola: The dolichol, the Co-Q10.

Dr. Stephanie S: I know, gosh. Of course, [crosstalk 00:10:58] we talked a lot about the mitochondria because the mitochondria are super, super important.

Dr. Mercola: Oh, absolutely. Dolichol is important in mitochondrial function, too.

Dr. Stephanie S: Absolutely. Dolichol does a lot of things. It's amazing, actually, how many things it does. And one of the things I really picked up on in reading this book was that it is responsible for the process of putting the sugar chains on top of proteins that are glycosylated proteins. This is super, super important because there's many really interesting proteins in the body that get these sugar chains added, sort of these so-called glycosaminoglycans, extracellular matrix, all that stuff that I always talk about and how important those things are to maintain the barrier function in the cell and to regulate the uptake of all the different nutrients. So the cell actually decorates itself with these ... It's puts these proteins into the membrane, attaches them into the membrane, like syndecans for example, and then it attaches all the sugar chains to those proteins to build this barrier around the cell that influences the water around the cell to make it into gel, so it's the sulfated proteoglycans that I talked so much about that are put together and assembled on top of these proteins by dolichol. It cannot happen without dolichol, which is truly amazing to me.

So it would mean, for example, that the muscle cells, which of course you have lots and lots of mitochondria, require lots of energy, and the muscle cells get hit really hard by statin drugs. If they can't maintain that extracellular compartment in a healthy state, they're not going to be able to easily take up nutrients, for example sugar. And we end up with type 2 diabetes and statins have been shown to cause type 2 diabetes, an increased risk, and whether that's happening in part because those extracellular matrix proteins are not being properly assembled. So it can't easily get the sugar in.

Dr. Mercola: Yeah, that's a very interesting observation, because the connection between statin use and diabetes is relatively recent, within the past few years. We didn't know that for the longest time.

Dr. Stephanie S: Yes, it's really come out now.

Dr. Mercola: The mechanism has always eluded us and it may be-

Dr. Stephanie S: Yes, this could be part of it I think.

Dr. Mercola: When you describe the process, it makes a lot of sense. [crosstalk 00:13:04] dolichol.

Dr. Stephanie S: It hasn't been said that that's why, but it might be why. Then, of course, dolichol also fixes DNA mistakes. This is super huge. It's really interesting that when DNA is assembled, lots and lots of mistakes are made and they're constantly repaired. There's this whole repair process that a mistake is made, whoops we made a mistake, do it again. Whoops, we made a mistake, do it again.

Dr. Mercola: It's not even so much the mistakes, it's that we're exposed to oxidative stressors. Some is good-

Dr. Stephanie S: That's right.

Dr. Mercola: But excessive oxidative stress, especially from EMF can radically damage DNA.

Dr. Stephanie S: Right. They get damaged by virtue ... You can't have biological reactions without having sort of mistaken biological reactions. It's sort of like it's hard to control, so only the good things happen and the bad things don't. So when the bad things happen, you have to either have a way to repair it or you just have to throw away the whole thing, completely break it apart and build it again. So with DNA, there's a very good mechanism to repair it on the fly as you're assembling it. Otherwise, you'd never be able to get it right, you know? And this mechanism depends on dolichol.

Dr. Mercola: And it's an extraordinarily effective mechanism. The amount of damage that is repaired every day ... I believe it goes around the ... If you take our DNA and put it end to end, all of our DNA in our cells, it would go around the earth like 40,000 times.

Dr. Stephanie S: It's unbelievable, isn't it? Biology just never ceases to amaze you. It's a mystical story all the time. There's so many parts about biology that are so fascinating.

Dr. Mercola: These repair mechanisms are almost going at the speed of light to repair all that damage.

Dr. Stephanie S: It's incredible, and the fact that it actually produces really well a very accurate copy of DNA in general. Of course, when it makes these mistakes, you end up with cancer, so that's really bad, and the mitochondria in particular, they have DNA, so they're separate from the nucleus and they have DNA inside them, mitochondrial DNA. That DNA is much more exposed because the mitochondria have to use all the superoxide to do what they're going to do to make AGP. Those, the DNA in the mitochondria, is very susceptible to damage and so it's a really big deal to make sure to protect it, and both the co-enzyme Q10, co-enzyme Q10 is a wonderful antioxidant that is in the mitochondria to help keep them from making those mistakes and then the dolichol is in there to help them repair the mistakes when they're made. So both of them are going to be deficient on a statin drug, which is really asking for trouble with respect to the muscles in particular, because they have lots and lots of mitochondria.

Dr. Mercola: Yeah, I think 85% of the DNA damage is in the mitochondria, because that's where the energy's produced, but interestingly, most of the DNA there is only for the mitochondrial proteins, which are relatively small number. Your biological DNA is really in the nucleus and, fortunately, there's nowhere near as much damage. But it's an interesting symbiosis that's developed between the mitochondria and our eukaryotic cells' cellular structures.

Dr. Stephanie S: Yes, it's really a curious system, isn't it?

Dr. Mercola: Yes, indeed. Well, why don't we discuss from your perspective the reason why it's not the wisest strategy around to start indiscriminately lowering cholesterol, because it's a vital nutrient that we need and it shouldn't be suppressed artificially.

Dr. Stephanie S: That's absolutely true. In fact, the first chapter of the book was written by Glyn Wainwright, who is a friend of mine and we're both members of THINCS, The International Network of Cholesterol Skeptics, which was found by Uffe Ravnskov. He's just amazing and he's been fighting this battle for decades. He's very persistent. So Glyn Wainwright wrote that first chapter and also the foreword of the book, and that first chapter's very nice and he talks all about this issue of how great cholesterol is. To think of cholesterol as public enemy number one is so strange, and I knew this also. When my husband was prescribed a statin, I knew cholesterol was vitally important to the body and I knew that there was high concentrations in the brain, 2% of the body's weight and 25% of the body's cholesterol in the brain. So you don't want to mess with losing cholesterol in the brain.

And, of course, statin side effects include a lot of cognitive issues and that was one of the things that really faced Duane Graveline, the author of the book. He suffered something called transient global amnesia after taking statins for about three months, and the doctors said, "No way the statin could be causing that, but why don't you-," but then he wanted to go off of it anyway and it went away. And then a year later, the doctor said, "Well, the statin didn't cause it, so you should go back on the statin because you still have high cholesterol." He

went back on it and then shortly thereafter, he had another episode of transient global amnesia. From that point on, he stopped taking the statin. Then he became obsessed and wrote books and he's written several books on statins. The first one was Lipitor, A Thief of Memory.

And I've read many of his books, at least three of them. This one is great and I'll show this one to you. I have it here, The Dark Side of Statins, his last book. A very sad last chapter by his wife recounting the last days of his life, which he died of ALS or an ALS-like condition, which he always suspected that the statins were contributory towards. He never came out and said, "Statins caused my ALS," but he felt like ... You got the sense that he felt like he wouldn't have had nearly as bad a problem with ALS without the statins.

Dr. Mercola: Yeah, well it seems like the mechanism there might be again related to the dolichols, because they're clearly are related to immune function.

Dr. Stephanie S: Yeah, I know. And, of course, the nerves have a tremendous dependence on cholesterol and dolichol also. Dolichol is really important in membranes, and it keeps membranes tight. That's another role that dolichol plays, so in the co-enzyme Q10, of course, the antioxidant effects, you start to get the oxidative damage in the nerves, the motor neurons, all bets are off. You see tremendous numbers of side effects related to muscle pain, muscle weakness, neuropathy, and you get a lot of evidence of aging. Things like hearing loss, hair loss, arthritis, diabetes. What he says, and I agree with this, in the book he says, "Statins make you grow older faster." And I think that's a very good way to describe them. They sort of give you all the things you get when you get older, faster. And since you never got old before, you don't know how fast you're supposed to get old, so you just think, "Well, I'm getting old. This is just the way it is." And it's not. It should be much, much slower, but you don't know that because you never experienced it. This is your first time. So everybody gets duped. Each person individually gets old fast and doesn't realize that's happening to them because of the statin.

Dr. Mercola: It's a very effective strategy if you want to grow old rapidly, take a statin.

Dr. Stephanie S: Yes, right.

Dr. Mercola: Take a statin, that's for sure. Let me see, okay.

Dr. Stephanie S: Oh, yeah, we should get into inflammation because that's something that he talked quite a bit about, statins and inflammation and sort of the studies that were done and also showing that cholesterol is not the reason why. Whatever they do in terms of reducing heart attack is not due to lowering cholesterol and that becomes clear from-

Dr. Mercola: It may be due to the anti-inflammatory components, at least the benefit.

Dr. Stephanie S: Yes.

Dr. Mercola: Why don't you talk about inflammation and enlighten us with the [crosstalk 00:20:59]

Dr. Stephanie S: Yeah, now one thing I will admit is that I have not been able to figure out how statins cause ... How they reduce inflammation. I have not been able to figure that out, and I'm not sure anybody has. He sort of talked about it and it didn't quite convince me, and I forget exactly even what he said. Well, he said it acts like NSAIDs. Like actually they had studies that showed that, so in terms of the evidence, it's there that it reduces the activity of certain inflammatory agents like C-reactive protein.

Dr. Mercola: Yeah, that is one of the best overall tests of total body inflammation would be C-reactive protein, or HS-CRP, high sensitivity C-reactive protein.

Dr. Stephanie S: Yes, that's right.

Dr. Mercola: Ideally, it should be below 0.7. Anything above 1 is potentially problematic, and the higher it is, the worse it is.

Dr. Stephanie S: Right, and it's an indicator of inflammation.

Dr. Mercola: I like to see it down at 0.2, 0.3.

Dr. Stephanie S: Yeah, that's great if you can get that.

Dr. Mercola: Yeah, and you can typically, at least the people ... You know, for myself, I've been able to achieve that and most people that I work with that are doing cyclical ketogenic diets-

Dr. Stephanie S: That's right.

Dr. Mercola: ... Get radically ... Ketones are a really potent histone deacetylase inhibitor, which radically decreases inflammation.

Dr. Stephanie S: That is super. That is really good, and of course I agree with that ketogenic diet. That is so important. It's really ... Many people are catching on to that.

Dr. Mercola: I want to extend my sincere and deep appreciation and let people know that you were one of the expert reviewers for Fat for Fuel and-

Dr. Stephanie S: Oh, thank you.

Dr. Mercola: And really helped make it much better.

Dr. Stephanie S: Great book.

Dr. Mercola: Yes.

Dr. Stephanie S: Yeah, so inflammation, so for example there was this study called ... Was it Ensure, I think? There was a study in which they added an additional cholesterol-lowering agent, which worked by disrupting cholesterol absorption through the gut on top of a statin drug, and they got great numbers in terms of much lower cholesterol levels, yeah, yeah, yeah, right? That's great. But then they got absolutely no evidence of any improvement in the heart issues. It's sort of like you got the cholesterol lowered, but it didn't do anything to improve the heart attack risk. So that's when it says maybe lowering the cholesterol is not what the statins ... It's not the part of what statins are doing that is causing them to reduce heart attack risk.

Then on the other side of the coin was the C-reactive protein. They got this Jupiter study, which was a very controversial study because they stopped it early and I've always wondered about that, why they did that, but the Jupiter study was C-reactive protein. They took people who actually did not have high cholesterol, but did have high C-reactive protein. Those were the people that were put into this study and they claimed to get terrific results. They had some ... I forget the numbers, but great improvement in the relative risk of heart attack and it got people on statins on the basis of C-reactive protein, to use that as the metric and say, "Okay, you're cholesterol is fine, but still take a statin because you've got this high C-reactive protein." That was sort of another reason to take a statin, but his feeling was that it was the anti-inflammatory aspect of the statins that was their only benefit, and he felt it was a benefit and he actually advocated even, he said, "I would even recommend that someone take a statin in a tiny dose, like say 2, what is it milligrams? 2 instead of 10 or 20. So normally you would have maybe 20, but just take 2.

Dr. Mercola: So 80% less or even 95% less.

Dr. Stephanie S: Just take a tiny bit of statin, that you could get 75% of the improvement in the anti-inflammatory effect with 1/10 the dosage, that kind of thing. Much, much lower dosage could get you 70% of what you would get with the higher dosage without lowering your cholesterol, which is what you don't want to do. He thought there might be justification in taking a statin for that purpose.

Dr. Mercola: I want to make it clear that this is not a strategy that I agree with in any way, shape, or form. It does help justify people who are taking it that they may achieve some benefit, but clearly there are so many other simple, less expensive, safe strategies to decrease inflammation and we talked about it earlier. There's a clinical ketogenic diet, but there's other things that you can do, too. This is not a tough nut to crack. It's pretty easy and certainly taking a statin isn't worth it when you consider that, at least traditional doses and maybe it would be less at the lower doses, that they admit 10% of people have side effects from statin, but the reality is it's probably closer to 30% or even higher and that's recognized side effects. That's not the damage that it's causing to

each and every person that's taking it from the very mechanisms we mentioned earlier.

Dr. Stephanie S: Well, I'm glad you said that because I totally agree with you. I would not recommend ... Personally, I don't think ... I would never take a statin under any circumstance. I just feel it's a poison and I'm done with it. It's just ... There's too much. Anything that's going to do what it does in terms of messing up the mevalonate pathway at its base and all the different things that come out of that pathway. Of course, it includes vitamin D and I think you maybe mentioned that, but vitamin D comes out of that pathway, too, because it comes from the cholesterol and [crosstalk 00:26:12].

Dr. Mercola: Right, the other hormones, right. It's for the critical hormones like progesterone, testosterone, aldosterone, cortisol, and vitamin D.

Dr. Stephanie S: Exactly. Vitamin D. Yes. It's amazing to think that you would want to reduce all of those things, you know? Why would you want to do that? It's just insane. Seems to me.

Dr. Mercola: Let's take a little side trail here because we have some time and you're an expert on this and we haven't talked about it for a while and maybe your views have changed since the last time we discussed it, but on vitamin D, you really had enlightened the world. Basically you and you alone pioneered this concept that it's not necessarily vitamin D, but it's vitamin D that's sulfated, which occurs typically and most traditionally when you expose your skin to sun. So why don't you ... Have your views changed on this and if they have [crosstalk 00:27:05]

Dr. Stephanie S: No, I still believe that. And in fact I believe cholesterol sulfate is probably more important than vitamin D sulfate, and I think vitamin D is more of a messenger. When you are exposed to sunlight and your skin produces vitamin D sulfate, it also produces much more cholesterol sulfate and that cholesterol sulfate gets shipped out into the blood. It goes into the membranes of the particles, so, for example, the LDL particles, the HDL particles. Cholesterol sulfate enters those membranes and makes them safe. It actually builds ... The sulfate is crucial because it builds this structured water, this [inaudible 00:27:39] structured water gel sort of like a Superman shield around that particle so that it can't be attached by sugar and oxidative damage. It keeps the inside contents safe and so you don't get oxidized fats and oxidized cholesterol. You don't damage those tissues. You don't damage the red blood cells.

The red blood cells also have cholesterol sulfate in their membranes. They make cholesterol sulfate and they put it in their membrane and it gives them that shield and also give them a negative charge, it makes everything repel each other so that things don't glom up together in the blood. So, cholesterol sulfate is super, super important. It's present in the blood at pretty high concentrations. DHEA sulfate is another similar ... DHEA sulfate is derived from cholesterol sulfate or from cholesterol.

Dr. Mercola: Oh, I did not know that.

Dr. Stephanie S: Yeah, cholesterol goes into like the adrenal glands and then it goes through this big complicated process and the DHEA comes out and then it gets sulfated again and sent out as DHEA sulfate. So DHEA sulfate is a sort of modified form of cholesterol sulfate. And all of the hormones, too, are also sulfated in transit. Estrone sulfate and progesterone sulfate and testosterone sulfate, and even other things besides the sterols, like the neurotransmitters, melatonin sulfate, serotonin sulfate. They're all sulfated in transit. And vitamin D sulfate.

Dr. Mercola: So this is the transportable form and not the biologically active form? The sulfates that [crosstalk 00:29:06].

Dr. Stephanie S: Exactly. When it's sulfated, all of these things have that property, very interesting. When they're sulfated, they're inactive and vitamin D as well. Vitamin D sulfate doesn't do anything ... 5% of the capacity of vitamin D to, for example, promote calcium uptake, and all the things that vitamin D does, vitamin D sulfate does not do. That's one reason why people dismiss it. They say, "Well, the stuff's useless. It doesn't do anything." But what it's doing is carrying sulfate and that's what I think is key.

Dr. Mercola: And because it's sulfated, it's water soluble because all the steroid hormones are fat soluble, so it makes it water soluble so it can be transported by the blood. Once it gets to the tissue where it needs to work, they take the sulfate out and, bang, it works.

Dr. Stephanie S: Yes, and the sulfate gets delivered, which is extremely important. It's a sulfate carrier. The sulfate gets delivered.

Dr. Mercola: Ah, a dual prong approach. Not only does it carry the biologically active precursor, but it also delivers sulfate.

Dr. Stephanie S: Yes, and this is something that very few people realize. I think it's crucial. I think all of these things are involved with sulfate transport and I think sulfate is actually very difficult to transport for the very reason that it will gel the blood. So sulfate has this property of forming structured water and the blood needs to flow, so you can't have lots of sulfate floating around in the blood, because it will mess it up. So, the blood keeps very ... It confines the sulfate levels to a very narrow margin in the blood. If there's too much free sulfate in the blood, it will flush it right out of the kidneys. It will throw it away.

Dr. Mercola: Okay. In your experience, though, and review of the literature, do you believe that most people just simply don't have enough sulfate? It's not that they have an excess they have to excrete, they just don't have enough to begin with.

Dr. Stephanie S: Yes, I think we have a massive sulfate deficiency problem in this country right now. I think many of the diseases that we face can be traced to sulfate

deficiency and I think that it's being caused in large part by glyphosate, the active ingredient in the herbicide, Roundup.

Dr. Mercola: Another area of your expertise.

Dr. Stephanie S: Yes.

Dr. Mercola: That is really one of ... Certainly statins are an issue. I forgot to mention this at the beginning, but I want to mention it now. Why is this important? One in four Americans, one in four Americans over the age of 40 are taking a statin drug.

Dr. Stephanie S: That's incredible. That's just incredible.

Dr. Mercola: That is ... And it may be even more. It might be going down to one in three.

Dr. Stephanie S: And children are taking them, too, children under 10 years old. It is so shocking. It is so shocking.

Dr. Mercola: Oh, gosh. I did not know that. I didn't even know they were allowed to be taken. Why am I surprised?

Dr. Stephanie S: It seems insane, absolutely insane. I can't believe ... That's the worst thing you could do to a child coming into puberty is to take away their cholesterol. It's unbelievable.

Dr. Mercola: It's criminal. It's absolutely criminal.

Dr. Stephanie S: It's absolutely criminal.

Dr. Mercola: They should have their license taken away. There's just no doubt in my mind. There's just no way that should be allowed.

Dr. Stephanie S: It's an insane world.

Dr. Mercola: But they won't be because it's a standard of care, so they can get away with it.

Dr. Stephanie S: In fact if they don't, they're going to say, "Well, you're not treating properly." They're going to be shoo'd out.

Dr. Mercola: [inaudible 00:32:12] but the other thing is the glyphosate and that's what your major ... Before we go into glyphosate, I want to touch on the sulfates again because you weren't a big fan of sulfate oral supplementation like MSM or-

Dr. Stephanie S: Actually I'm changing my mind, perhaps, on MSM.

Dr. Mercola: Okay.

Dr. Stephanie S: Because I'm getting a lot of people telling me that it's worked really great for them and so I'm thinking about it-

Dr. Mercola: Initially, you weren't, but that's okay.

Dr. Stephanie S: Well I didn't even understand how it worked, because I couldn't find literature that talked about what actually happened to the MSM. Like was the sulfur in it even bioavailable? It's a methylsulfonylmethane and was it even possible to get sulfate out of that, I wasn't sure. I couldn't find literature, I still can't find literature on exactly what happens to MSM. It's kind of interesting.

Dr. Mercola: It's a derivative of DMSO.

Dr. Stephanie S: Yes, right.

Dr. Mercola: They're really similar. Whatever works for DMSO is going to work for MSM.

Dr. Stephanie S: Right, I agree.

Dr. Mercola: I think Stanley Jacobs is the initial investigator that popularized it. [crosstalk 00:33:12]

Dr. Stephanie S: It has to be the case that it's accessible sulfur and it also has methyls, which is interesting, too, because methylation is another thing that's depleted by glyphosate. Glyphosate disrupts in the binding synthesis by gut microbes and by plants, so you get methionine deficiency. Methionine, of course, is the core of the sulfur-containing amino acids and it's going to be needed to make glutathione. Glutathione is a really important antioxidant in the liver. And then methionine provides those methyl groups for the methyl transfers, and so I think there's a methylation deficiency problem as well as a sulfate deficiency problem in the context of glyphosate.

Dr. Mercola: Some people are concerned about taking too much methionine, especially if you eat a lot of animal products. Do you have any concern about that?

Dr. Stephanie S: I don't know. I don't actually like the idea of taking free amino acids in general.

Dr. Mercola: Sure.

Dr. Stephanie S: I think taurine is really, really important, but taurine can actually cause seizures if you take free taurine, like in ... What's it called? Bull-

Dr. Mercola: Really?

Dr. Stephanie S: Yeah. It can cause seizures because your body is not used to having these amino acids available as free amino acids in the blood at too high a level. They can cause funny things to happen and-

Dr. Mercola: Sure, well that would make sense.

Dr. Stephanie S: I would hesitate.

Dr. Mercola: Well, let's go back to magnesium again, and your preferred one initially was Epsom salts or soaking in Epsom salts, and I've recently encountered, not a prescription, but sort of a formula for converting magnesium sulfate into a lotion that you can apply topically because-

Dr. Stephanie S: That sounds interesting.

Dr. Mercola: I don't know about [inaudible 00:34:48], but I just don't find the time or the ... Primarily the time to draw a bath and then sit in it. I've just got so many other things going on in practice. I would love to do that and I'm absolutely in favor of it, but it would seem a more efficient way would be to rub it on and I'm wondering if you have any-

Dr. Stephanie S: Yes, I think so. In fact, I remember talking to the father of an autistic child who said that they just made kind of a paste out the Epsom salt baths, I believe, and just put it on the child's arm and they felt that that was effective for absorbing it. Sulfate, it's interesting because there's a problem in the gut ... A lot of people at sulfur sensitivities and people were sending me email and saying, "You know, I can't take sulfur. It makes me sick." And for the longest time I was puzzled by that and I finally sort of realized that I think that's again because of glyphosate because it disrupts critical enzymes involved in detoxifying sulfite, both sulfite oxidase and sulfite reductase. There's an enzyme that takes sulfite and turns it into methionine actually, and that enzyme in E. Coli was shown to be suppressed by glyphosate. And then sulfite oxidase depends upon [melidronum 00:35:58] which is one of the minerals that would get chelated by glyphosate because it's a +2 cation. Glyphosate holds onto these minerals and makes them lose their bioavailability, so the sulfite oxidase and the sulfite reductase are both broken. Sulfite has to be cleared really fast because it's highly reactive. So it slows down the ability to clear the sulfite and that causes toxicity in the gut, I think because of the glyphosate.

So, again, people who have sulfur sensitivities I would love to find out if they could switch to an organic diet and fix the problem. I would predict that might be true.

Dr. Mercola: Yeah, and fortunately we also have a good test for glyphosate, a urine test that's not horribly expensive. It's available for under $100 and you can find out where you're at. A simple test, a urine test. No blood stick required. No spitting. Just pee on a stick, I think, or send a sample in of your urine and they'll tell you. I had mine done and it was tested below the level of detection-

Dr. Stephanie S: Excellent.

Dr. Mercola: ... Which is 40 parts per trillion. But it's something I would definitely recommend, because you've done such a great work in helping us understand the damage that glyphosate does. It's just such an atrocious compound put onto the earth at 5 billion pounds per year.

Dr. Stephanie S: It's unbelievable. It's just unbelievable.

Dr. Mercola: [crosstalk 00:37:15] We're going to look back and say, "How did we let them do this?"

Dr. Stephanie S: I know.

Dr. Mercola: It's caused so much damage. I didn't realize it bound to all the +2 cations. Would that include magnesium, too?

Dr. Stephanie S: Absolutely. It's been shown to deplete magnesium. It depletes a lot of the minerals in plants, so they become deficient in manganese, magnesium, zinc. These are really important micronutrients that your food is going to be deficient if your food's been exposed to glyphosate. And then, of course, your gut bacteria will also not be able to get access to those minerals if the glyphosate is in the gut and that will cause them to be sick and then it goes from there.

There was a study on cows and they found in particular manganese and cobalt, extremely low levels, way below the minimum expected value in cows exposed to glyphosate in the blood.

Dr. Mercola: But, fortunately, and I think really the end result of this is that we're educating the public, making them aware of it. Obviously we've been successful in California at least putting up a poison label on glyphosate.

Dr. Stephanie S: Oh, I know. I love California.

Dr. Mercola: [inaudible 00:38:24] concern [inaudible 00:38:25] progress. But the key point here is to educate people, inform them, let them know that they can take control of their health by choosing organic, but even better, because it could be raining glyphosate and it is raining glyphosate we've got so much in the environment, you can grow your own food or buy it from some local organic farmer at your farmer's market or even ... You can grow sprouts in your house. It's the key thing. If we can start growing our own food, taking back the production system, and we grew almost half of our crops in World War II with victory gardens.

Dr. Stephanie S: Victory gardens. Yeah, I know.

Dr. Mercola: Now it's less than 1%.

Dr. Stephanie S: We really need to do that. I totally support that. I think it's great that you're promoting that concept. I think it's really, really important.

Dr. Mercola: Yeah, it is key. It's part of the solution strategy that we get, because if we can convince enough people to do it, then there won't be a market for this and they can't do it. They'll still probably contaminate the feed for the animals, but it will ... You don't need to eat a lot of animal products. It's not much. Certainly a lot less than most people are eating now.

Dr. Stephanie S: And the animals, of course, are getting sick, too. There's actually a lot of stuff going on with the cows and the pigs. It's amazing. And they're discovering. Things are coming out both in America and in Europe. This guy, Ib Pedersen, he's a massive pig farmer. He has a huge number of pigs and he did studies. He saw deformed piglets and fertility problems and all kinds of issues with his pigs and he converted them to an organic diet and everything went away. It was amazing. They were getting Clostridium infections. They were getting botulism. They were having a lot of problems. They all went away when they converted to an organic diet for the pigs and same with the cows. I think we're learning, we should be learning from the animals because they're getting a much higher exposure than we are. But our exposure is going up every year, so we're catching up. We're getting sicker and sicker, too. In our population, it's just incredible how much healthcare is costing in America and we never seem to ask why is our healthcare so expensive. Maybe it's because we're sick. We don't seem to ask that question.

Dr. Mercola: No. Being sick is part of it, but I think the primary issue is that we've allowed corporations to [inaudible 00:40:45] benefit their bottom line dollar, so that's about half of it probably comes from there. But then the other is exposure to the two most pernicious toxins I believe that are out there, at least ... And one would be glyphosate and the other is EMF. They have a really powerful synergy that takes people out prematurely.

Dr. Stephanie S: Yes, I agree. I think glyphosate messes up your natural electrical system, which makes you much more susceptible to the EMF electrical noise.

Dr. Mercola: Yeah, which is .. Electrosmog is [crosstalk 00:41:15]

Dr. Stephanie S: It really sounds-

Dr. Mercola: We are highly polluted. [crosstalk 00:41:21] I want to give you a question. I don't think even you have a deep appreciation of the increase and the magnitude of exposure that we have. If you go back to 1917, right around World War II and now, 2017, as we're recording this right before 2018, 100 years essentially, what has the increase been in microwave radiation, 1 gigahertz from 1917? Did it go up 10 times, 100, 1,000, a million, a billion?

Dr. Stephanie S: Oh, my God. I don't know, but I imagine it's big, really big.

Dr. Mercola: It is big. You are correct, it is big, and the answer is it's not a billion, it's a billion billion.

Dr. Stephanie S: Oh, my God.

Dr. Mercola: It's went up 10 to the 18th, 10 to the 18th, 10 with 18 zeroes after it, or 1 with 18, but that's a lot.

Dr. Stephanie S: That is really a lot. Frightening isn't it? It's really interesting how we've become so dependent on this communication network we've created and to think of just taking that away and even though we didn't have it 100 years ago, and that was fine, we still seemed to live happy lives, but to cycle back to that. It's interesting to think about how hard that would be for us. I think it's almost harder than going back to organic food, don't you think?

Dr. Mercola: No, I think it's relatively easy because no one's suggesting that we abandon technology, and I'm not suggesting that, but it's just to avoid the wireless component of technology, which is relatively easy to do.

Dr. Stephanie S: Do it all wired.

Dr. Mercola: You do it all wired. It's just atrocious that they're putting children on statin drugs, which is just criminal, but it's equally criminal to put an entire classroom on tablets or iPads and expose them to that radiation. It's just insane once you understand the damage that's occurring. They're equally criminal activities from a health perspective, once you understand health at a foundational level.

Dr. Stephanie S: Yes, and it just takes such a long time to get people to realize what's happening with all of these things.

Dr. Mercola: Well, yeah, but you're taking a good stab at helping people understand. Thanks for all the good work.

Dr. Stephanie S: So are you.

Dr. Mercola: Are there any new insights you've acquired, and I'm sure there are since the last time we've talked about this because you're always reading. That's what I love about you. You're scouring the literature and absorbing this new information and, not only just reading and learning, but then synthesizing it, understanding it, and applying it into practical recommendations.

Dr. Stephanie S: Yes, well the glyphosate, I've really been obsessed, I've continued to be obsessed with glyphosate. It's such an interesting molecule and I'm figuring out all the different nuances of it's behavior. It's just incredible, everything that it does. I think that I'm much better understanding how it causes leaky gut. It causes the gut to leak. I believe it gets into proteins by mistake in place of glycine. There's a lot of evidence, a lot of circumstantial evidence that this is

happening. And then those proteins become much more allergenic than they would otherwise be. It gets into trypsin Anthony Samsel showed. He ordered porcine trypsin and porcine pepsin from a lab and he tested them. Both of them tested for high levels of glyphosate, so it's getting into the trypsin and messing up the trypsin's function to digest the proteins.

Dr. Mercola: Yeah, trypsin is a digestive enzyme.

Dr. Stephanie S: Yeah, so the proteins are not getting digested, the gut is opening up holes or leaks, the undigested proteins such as the gluten and the casein is getting out into the general circulation, and the immune cells are having a fit because of that and you get autoimmune disease. We have an epidemic in all kinds of different autoimmune diseases and allergies, food allergies. I think of all that traces back to glyphosate.

Dr. Mercola: Let's step back a bit and help people understand how is it getting into glycine? First of all, glycine is a really short, small, tiny amino acid. I think it's one of the most common amino acids.

Dr. Stephanie S: Yes, it's common and it's also the smallest amino acid. No side chains.

Dr. Mercola: Yeah, no side chains. What most people don't know ... Glyphosate, what does "gly" stand for? It stands for "glycine."

Dr. Stephanie S: It does.

Dr. Mercola: Glyphosate ... It's a step of understanding to recognize how this molecule can easily be substituted for normal glycine, so why don't you expand on that.

Dr. Stephanie S: It is a glycine molecule, it's a complete glycine molecule except that the nitrogen has this attachment to it, which is called this methylphosphonyl group. So it's got this thing stuck onto the nitrogen atom that makes it a modified glycine molecule, but it's still glycine. It's still the amino acid glycine, it just has something on the nitrogen. So I think that it still can go into the protein when the protein is being made and the DNA machinery says there's a code here for glycine and it's looking around for a glycine molecule and, "Oh, this one's a good glycine. Put it in." And it's not glycine, it's glycine on steroids. It's got this extra thing stuck on it.

Dr. Mercola: It's poison glycine.

Dr. Stephanie S: Exactly. And it can cause huge problems with that. Certain proteins have certain glycines that absolutely have to be glycine in order for them to work properly. A good example is myosin. Myosin in the muscles, it's muscle contraction. It's a really important protein in the muscles for contracting for movement. It has a glycine at position 699 in the amino acid sequence. If you change that glycine into alanine, which is to say you add one extra methyl group, it ruins the

protein. It only has 1% capacity to contract. It loses 99% of it's capacity to contract. Really amazing. So if you put glyphosate instead of glycine, you're going to have at least as bad an effect as you would with alanine, probably worse. It will cripple the protein and maybe that's how you get chronic fatigue syndrome.

Dr. Mercola: Yeah, for options for that. A lot of people don't appreciate it, but if you've taken biochemistry you have. Frequently as you mention it's just one amino acid substitution that can totally ruin an entire protein consisting of thousands of amino acids. You change one of them, it's ruined. You can't [crosstalk 00:47:33].

Dr. Stephanie S: Yeah, and it's just particular ones and people know which ones. That's what's so cool. I had a lot of fun rummaging through the research literature looking for essential glycines. You sort of find a protein, here's a glycine, here's a mutation, this is no longer a glycine, now it's an aspartate. All of a sudden this person has this horrible disease because of that one change.

In ALS for example, ALS ... I did a whole paper on ALS because there's a whole bunch of different mutations in certain proteins that are associated with the familial form of ALS, the inherited form, which is only 5% of the cases. But in those cases, you have a lot of examples of glycine mutations within certain proteins that are linked to ALS causing ALS. So it isn't hard to think that glycine's not mutated, but it's substituted by glyphosate. It has the same effect.

Dr. Mercola: I did not realize, so there's really basically two types or classes or ALS. One is a familial and the other is an acquired.

Dr. Stephanie S: Yes.

Dr. Mercola: I did not know that. That would make perfect sense for the glyphosate story.

Dr. Stephanie S: Yes.

Dr. Mercola: Having interviewed Steven Gundry who wrote the book The Plant Paradox, and I'm sure you've been exposed to that, his approach for virtually all autoimmune diseases of which ALS is a subtype of, is to remove lectins from the diet because they damage the gut lining as does glyphosate. And, of course, he recommends a GMO-free, glyphosate-free diet. But he's using some very sophisticated tests to document it objectively.

Dr. Stephanie S: Yes.

Dr. Mercola: But there could be ... So even with a lectin-free diet, if you're exposed to glyphosate, you're going to be ruined.

Dr. Stephanie S: I think so. And collagen has huge amounts of glycine in it and we have an epidemic in joint pain, back pain, knee pain, all these hip replacement therapies.

And, of course, opioid drug epidemic because of people being in agony, they're tasking painkillers and ending up dying from an overdose of opioid drugs. I suspect all of that is connected to glyphosate getting into critical proteins in the joints and messing up their ability to do their job properly.

Dr. Mercola: Yes, indeed.

Dr. Stephanie S: We got off topic.

Dr. Mercola: That's okay. That's all right because that's your area of expertise. Ultimately, it's an important topic with the cholesterol and the statins because-

Dr. Stephanie S: It is.

Dr. Mercola: And interestingly that was your segue into this arena, this whole arena. You would have never been studying glyphosate if it wasn't for statins.

Dr. Stephanie S: Absolutely.

Dr. Mercola: It's the tip of the iceberg. I suspect for most people, we're preaching to the choir. They understand the dangers of statins. It's their friends and relatives and neighbors and coworkers who just don't get it and are absolutely ... And why should they? One in four Americans, as I said it may be moving to one in three, over 40 are taking statins.

Dr. Stephanie S: It's amazing to me.

Dr. Mercola: It's an enormous number of people and there's just ... My guess, my conclusion is or summary maybe, it may be the more accurate term, is that virtually no one benefits from taking statins.

Dr. Stephanie S: I agree.

Dr. Mercola: And they shouldn't be given to anyone. Now Dr. Steven Sinatra who I just was with this last weekend, he's a cardiologist [inaudible 00:50:44] natural medicine, but he believes there's a certain subset of individuals who [inaudible 00:50:46] benefit. I don't know enough, but my concern is I think there's better and safer ways to address the risk factors. Reducing inflammation-

Dr. Stephanie S: I agree. Aspirin, for example, is an antiinflammatory. If you want to take an antiinflammatory, just take aspirin. It's a lot less destructive than a statin drug.

Dr. Mercola: Yeah, but there's so many other natural products that [crosstalk 00:51:07]

Dr. Stephanie S: No, I wouldn't take an aspirin, either.

Dr. Mercola: I wouldn't take aspirin, either. No way.

Dr. Stephanie S: But I did want to say I have on a [crosstalk 00:51:14]

Dr. Mercola: I do take white willow bark.

Dr. Stephanie S: There you go, yes, right.

Dr. Mercola: I take some of that every morning.

Dr. Stephanie S: I was going to maybe show this page because I think you're interested in what supplements you might take and he has a section, a chapter, on dietary supplements in this book, in Glyn's book, and I have here some of the things he recommends, which are interesting. Co-enzyme Q10 of course, taking it as a supplement.

Dr. Mercola: Yeah, there's a debate on that. Many people, and I'm one of them, believe that the ubiquinol version, the reduced version, is a little more effective, and that's the one I personally take.

Dr. Stephanie S: Yeah, okay, good. That's good information.

Dr. Mercola: Co-enzyme Q10 is the oxidized version.

Dr. Stephanie S: Right, it's very interesting.

Dr. Mercola: Which doesn't really work.

Dr. Stephanie S: It's the same thing with folic acid versus folate. It's interesting.

Dr. Mercola: I knew folate was the natural version, but folic acid is the oxidized folate?

Dr. Stephanie S: Absolutely. It's the same problem.

Dr. Mercola: I did not know that.

Dr. Stephanie S: It's interesting.

Dr. Mercola: I knew that was a synthetic version and I knew it wasn't natural, but I didn't know it was oxidized and reduced version.

Dr. Stephanie S: Right. Folic acid actually costs you a lot of antioxidant capacity in the liver to turn it into folate. It's not good stuff.

Dr. Mercola: Speaking of folate, I'm sure you like 5-methyltetrahydrofolate rather than folate itself, 5-MTHF.

Dr. Stephanie S: That's right. Both are methyls. Right, so folic acid, you have to get rid of the oxidation, so that's going to cost you antioxidant capacity and then you have to

methylate it, so that's going to cost you methylation capacity. Both of those you don't have because glyphosate has been destroying both of them. So, folic acid makes things worse in the context of glyphosate, I think. And it's in the wheat.

Dr. Mercola: Interestingly. That's in every prenatal vitamin, well not every, but most every commercial prenatal vitamin.

Dr. Stephanie S: Absolutely.

Dr. Mercola: Absolutes are rarely true, and that's certainly true here. So be careful out there if you're pregnant, don't take folic acid.

Dr. Stephanie S: Right, right. That's a big one. Then he says vitamin C, which I think you also like, right?

Dr. Mercola: I'm not a massive fan of vitamin C and I know this might distress some people, unless you're sick, and then I think the liposomal version, which you can take orally which is probably even better than intravenous, and I would take four every hour until you're better. I was just at an event last week and I gave a woman who ... Actually Annie Brandt who has the Best Answer for Cancer, she had an allergic reaction to something. Took it and literally within hours it was gone.

Dr. Stephanie S: That's amazing.

Dr. Mercola: It'll abort allergic reactions. It'll radically up-regulate your immune system and it's a very powerful, inexpensive, virtually no side effects. I love vitamin C. I just don't ... I'm not a big fan of taking it every day. I eat fruits, which are very high in vitamin C. I grow acerola cherries and I harvest them.

Dr. Stephanie S: It's nice to see that you're saying do it naturally, which is what I've always said, too, as you know. I like to get things through foods.

Dr. Mercola: I might eat 100 acerola cherries and each one has 80 mg, so I might be getting 8,000 mg of vitamin C from the cherries.

Dr. Stephanie S: But in the context of the whole food, which is very [crosstalk 00:54:09]

Dr. Mercola: In the context of whole food, yeah.

Dr. Stephanie S: Yes.

Dr. Mercola: Yeah, I think so.

Dr. Stephanie S: So then he says selenium. Selenium is another thing that gets messed up, selenoproteins, by the statin drugs, selenoproteins. So he says he takes selenium.

Dr. Mercola: I have a massive ... That is an absolutely critical, or vital, not critical, but vital mineral or nutrient that I think almost everyone needs to be on selenium, primarily for glutathione. But it has many other uses.

Dr. Stephanie S: Right, right. Lecithin. [crosstalk 00:54:35] How about lecithin? He says lecithin.

Dr. Mercola: I'm not a big fan of lecithin and I would suggest as a substitute for that just to eat one whole egg a day-

Dr. Stephanie S: There you go. I agree with that.

Dr. Mercola: Because lecithin is phosphatidylcholine and there's massive amounts in egg yolk and a whole egg. The egg yolk is better and I put a whole egg in my smoothie pretty much every day unless I'm working out and training, then I use two eggs. I get ... It's a magnificent, magnificent tool. You really need phosphatidylcholine. I am an absolute firm believer. You could take it supplementally. I think a liposomal form is better than just swallowing plain lecithin and you've got to be careful with lecithin because most of its from soy. A lot of it is from GMO soy.

Dr. Stephanie S: That's right.

Dr. Mercola: We use sunflower lecithin, organic sunflower lecithin.

Dr. Stephanie S: Important, because sunflowers can be contaminated, too. They can be sprayed right before harvest.

Dr. Mercola: Yeah, so it's a whole different deal. But I'm a big fan of phosphatidylcholine. I think it really helps. And you could even use it especially in detox in very large amounts to help penetrate your membranes. You need it for so many vital functions.

Dr. Stephanie S: Yes. And then he says omega-3, of course omega-3 fats, which you eat those fatty foods that have high omega-3s such as grass fed beef.

Dr. Mercola: It's not just fatty foods. It's ... Well, I'm not a big fan of grass fed beef for getting omega-3 fats. I think the better one would be seafood, healthy seafood.

Dr. Stephanie S: Yes.

Dr. Mercola: My two favorites are sardines, which is where I get most of them from, I do use wild caught shrimp, really tiny ones so they aren't grown up enough to get a lot of pesticides and dioxins.

Dr. Stephanie S: That's interesting. That's a good idea.

Dr. Mercola: And then I also use fish roe, salmon roe.

Dr. Stephanie S: Very good.

Dr. Mercola: I have a teaspoon of that every day. Just like glyphosate, which the urine test which we have on our site, you can [inaudible 00:56:26] 3 index, which we also have on our site, and it's a little blood stick and you can tell the percentage of omega-3 you have versus omega-6 and you can see your healthy ranges. That's a good test that if you're really interested in health that I would recommend anyone who is to get that test to see where you are, to see if, in fact, you're not deluding yourself.

Now if you can't have seafood for whatever reason, then I would highly recommend taking a healthy source, supplemental source. I'm a bigger fan of krill oil than fish oil, but you've got to take enough so you can change the omega-3 index.

Dr. Stephanie S: Wow, this is great. D-Ribose, I know you like ... I remember [crosstalk 00:57:04] ribose.

Dr. Mercola: Well, you changed my view on that. We had an email exchange-

Dr. Stephanie S: I know, yes.

Dr. Mercola: [crosstalk 00:57:09] glycating agent and then I talked to some other clinicians and I've radically lowered by dose, but I take about maybe a few thousand milligrams once a day, maybe like a half a teaspoon a day and I put that in my smoothie. It maybe glycating, but I think ... Ribose is an important nutrient that you need.

Dr. Stephanie S: It is. I know. It's interesting.

Dr. Mercola: It's part of DNA. But if you get too much, it's glycating.

Dr. Stephanie S: And statin drugs make it more necessary to take it because I think something in what the statins does messes up the D-Ribose processing.

Dr. Mercola: I did not know that.

Dr. Stephanie S: Magnesium, he says, and the alpha lipoic acid. Oh, magnesium?

Dr. Mercola: Let's skip back. Magnesium, most everyone listening to this is deficient and that's based on conventional standards, and you may not understand this, but the primary mechanism proposed by Martin Pall ... I don't know if you've seen any of his YouTube lectures, but they're magnificent. It basically describes the molecular pathology of how EMFs actually cause the reaction, ultimately resulting in-

Dr. Stephanie S: Nitric oxide, right?

Dr. Mercola: Well, nitric oxide, [inaudible 00:58:15] combining and then forming [inaudible 00:58:16] nitrate to form oxidative free radicals and hydroxyl free radicals. But the big issue is it's all mediated through these voltage gated calcium channels and, guess what? A calcium channel can be blocked by calcium channel blocker and a natural one is magnesium. So when you take high enough doses of magnesium, you are actually lowering your risk for developing damage from EMFs.

Dr. Stephanie S: That's actually really interesting, too, because calcification of the plaque is a big part of heart disease. Calcification is really a more serious problem than the cholesterol buildup and that calcification is going to be caused by the EMFs.

Dr. Mercola: And we go back to the statins. What do statins do? They impair the ability of vitamin K2 absorption or its effect to work. So if you're messing up vitamin K2, that's exactly what K2 does, it's calcification of the arteries. It's puts calcium in ... Prevents it from going into the arteries and puts it back into the bones.

Dr. Stephanie S: And, in fact, there's a paper I have that shows that calcification increases with statin drug exposure, so it's been seen.

Dr. Mercola: Exactly what you predicted, is it's blocking the K2 pathway.

Dr. Stephanie S: Right. Alpha lipoic acid, that's a good one because it's got sulfur.

Dr. Mercola: It is a good one. I'm a little concerned about that one because it probably is good ... You have to use it discriminately because it's an oral antioxidant and I'm becoming less enamored it as I grow older with oral antioxidants because I like ... And I'm not sure if you saw the literature on molecular hydrogen?

Dr. Stephanie S: Yes, you've gotten me into that. I'm still trying to figure that out.

Dr. Mercola: You will love it. Tyler Lebaron, he is really just very knowledgeable in this. But essentially it's a selective antioxidant inhibitor. Really the primary mechanism we think, it up-regulates NRF2 pathway, so it makes you make your own [inaudible 01:00:07] the ones that you need, so maybe it's better to get the sulfur and then have your body make them. Because your body can regulate on feedback. If you indiscriminately increase antioxidants, you may be shutting down important oxidant stressors-

Dr. Stephanie S: I'm glad to hear you say that.

Dr. Mercola: You need some free radicals. They're not all dangerous.

Dr. Stephanie S: You have to have them. That's the thing. You have to be able to do that and what you want to have is a good support system to tamper down the collateral damage, but you still want to be able to have that reaction actually take place. If you suppress the reaction-

Dr. Mercola: Which the molecular hydrogen does. It doesn't suppress most [inaudible 01:00:47], just the hydroxyl free [inaudible 01:00:48].

Dr. Stephanie S: And then it has one more pyrroloquinoline quinone, which I've never heard of, so I don't know if you know about that one.

Dr. Mercola: Oh, yeah, I've been taking it for two years or so.

Dr. Stephanie S: Oh, wow.

Dr. Mercola: It's more commonly called PQQ.

Dr. Stephanie S: Okay, PQQ.

Dr. Mercola: It's similar ... It's sort of a sister to Co-enzyme Q10. It functions in a similar type of mechanism. I'm a big fan of that. In fact, we sell a combination of that with berberine and I'm sure you've heard that many people use metformin, which is a relatively safe diabetic drug, for antiaging and they also use it to control ... Obviously it's an oral hypoglycemic, they use it to control diabetes. But interestingly, berberine works almost the same pathways, primarily AMPK, that metformin does and without the side effects.

Dr. Stephanie S: It's a natural.

Dr. Mercola: Like damaging B12. We have a berberine PQQ combination that I think is just magnificent.

Dr. Stephanie S: That sounds very interesting.

Dr. Mercola: Yeah, so just for health support because it improves mitochondrial function.

Dr. Stephanie S: Right. That's great. I'm glad I gave you that list. I'm interviewing you. We've reversed roles. But that was very interesting.

Dr. Mercola: It's good stuff that we ... Because supplements are important and I take a lot of supplements, there's no question, but my primary goal is to get it from food. Many of my supplements are almost ... They're food-based supplements. [crosstalk 01:02:12]

Dr. Stephanie S: Yes, you're looking more towards natural things.

Dr. Mercola: Acerola cherries, so it's things like that. I do take a fair amount, like PQQ would be one and ubiquinol, magnesium. I think it's important, but to be really careful and choose them wisely and not just to overboard and take everything.

Dr. Stephanie S: Yes, very good advice. Thank you.

Dr. Mercola: Any other insights you'd like to share with us, because you're just such an enormous wealth of information?

Dr. Stephanie S: Oh, gosh, I could go on and on forever, but I think-

Dr. Mercola: Some of the new stuff that you'd like to emphasize?

Dr. Stephanie S: Right. I'm having a lot of fun figuring out the mess-up in the gut with the glyphosate, I think is really what I'm working on right now. The whole thing of the imbalance in the gut microbes, overgrowth of things like Clostridium, and then the immune system getting messed up and not being able ... The immune system gets weakened by glyphosate. The neutrophils are unable to do their job and then the tryptophan gets squirreled away inside the macrophages as kynurenine and then it gets taken over to the brain and dumped off and causing all kinds of trouble in the brain. So there's this whole complicated thing that's going on between the brain and the gut, the gut/brain axis communication system, with the microbes being messed up by the glyphosate, the gut being leaky, and the leaky gut barrier introduces a leaky brain barrier. So the barriers are all leaky. The placental barrier is leaky, too, so the placenta gets in trouble during pregnancy. All this stuff that's happening because of glyphosate, it's such a cascade.

It's just truly amazing. It's so complicated and I'm struggling to try to organize it into individual papers that make sense because the space is vast. It goes on and one. But I think the tryptophan deficiency caused both by the shikimate pathway being broken, because shikimate pathway is what the bugs use to make the tryptophan, which is this essential amino acid ... Tryptophan is a precursor to serotonin and melatonin, so those are going to be deficient if tryptophan is deficient. Glyphosate prevents synthesis of tryptophan by the microbes and then it also forces the tryptophan into the macrophages. So they squirrel it away and it makes this deficiency problem even worse with respect to serotonin.

Dr. Mercola: How about the plants that we're eating, which I think ultimately is a source? Although Robert Lustig told me the highest source of tryptophan was egg whites.

Dr. Stephanie S: Oh, that's interesting.

Dr. Mercola: [inaudible 01:04:42] haven't looked it up, so that's when I started eating the whole egg again instead of just the yolks. I'm wondering when you spray glyphosate onto the crops [inaudible 01:04:58] shikimate pathway, [inaudible 01:05:01] is that correct?

Dr. Stephanie S: Yeah, it's going to deplete the shikimate ... It's going to mess up the shikimate pathway in the plant, which is going to deplete the supply of tryptophan in the food source. So you have a deficiency. Actually, Anthony and I talked about this

in our first paper that we wrote together on glyphosate, The First Pathways to Modern Disease, the first in the series. We've written six papers so far. And in the first one of the series, we talked about this tryptophan deficiency in the food and then tryptophan being unable to be produced by the microbes and tryptophan being taken up by the macrophages to fight the infection that's there because the microbes were disrupted. So you get into this situation where the tryptophan gets totally depleted and the liver doesn't get enough tryptophan, then it can't make enough NADa, because that depends on tryptophan. So have an [inaudible 01:05:43] deficiency.

Dr. Mercola: That is one of the most important signaling molecules in the body.

Dr. Stephanie S: Yeah, so that's a problem. Then you get also the serotonin and melatonin deficiency in the brain, which gives you the sleep disorder, and of course serotonin disorder gives you violent behavior, suicidal behavior, depression.

Dr. Mercola: And it's not just tryptophan, is it? The tryptophan is an aromatic amino acid. Doesn't disruption of the shikimate pathway decrease all the aromatic amino acids?

Dr. Stephanie S: Yes, tryptophan, tyrosine, and phenylalanine, all three. And then all their derivatives, which includes dopamine and melanin, the skin tanning agent, folic acid even comes out of that pathway, folate. So many things are disrupted by that pathway, which is why the plant dies. It really does kill the plant very effectively. It kills all plants except for the [crosstalk 01:06:35].

Dr. Mercola: Clearly that is a strong reason to avoid ever eating conventional food. Most of the time, you've got to realize any non-organic meat is going to be loaded with glyphosate, because that's what they're feeding them. They're feeding them non-organic food and it's loaded up. Clearly eating organically, especially any animal food, is important. But I'm wondering if you could comment on your experience, and I'm sure you've met Zach Bush before, he developed this product Restore with respect to its impact and its ability to actually repair some of the disruption of the tight junctions in the gut.

Dr. Stephanie S: Yeah, well it's interesting. It makes sense as a product, because it's got the minerals, so the minerals are getting depleted by the glyphosate, so it's a mineral supplement. It's also got the folic acid and the humic acid from the soil. He claims he gets this incredibly rich and healthy soil. It's really important where it comes from.

Dr. Mercola: Yeah, 50 million years old in South Asia, right?

Dr. Stephanie S: Yes. [crosstalk 01:07:36] And I think that's a crucial part. It's not just any soil, so it's always interesting with these products that it has to be really perfect, the best that you can find. And then it has also probiotics. It makes sense, because it's got all those things in it that I think are useful for helping to detox.

Dr. Mercola: As I understand it, it doesn't have probiotics. It's just this [tera lignite 01:07:55] is they have and essentially it radically decreases the need for probiotics and it improves-

Dr. Stephanie S: Maybe I'm talking about prebiotics.

Dr. Mercola: Yeah, I don't even think it's prebiotics. I think it just improves microbial communication.

Dr. Stephanie S: Oh, interesting.

Dr. Mercola: It allows a greater microbial diversity, is my understanding of it.

Dr. Stephanie S: You did an interview with him I think, didn't you?

Dr. Mercola: Oh, yeah. He's actually a good friend of mine. I'm going to be visiting his clinic.

Dr. Stephanie S: Yeah, he's invited me to visit. We should go at the same time.

Dr. Mercola: Yeah, I'm going to be there this week.

Dr. Stephanie S: Oh, okay.

Dr. Mercola: Yeah, I've been there before. He's just a great human being.

Dr. Stephanie S: Yes. And he tipped me off zonulin, too, and that's another piece of the puzzle, and he probably talked to you about zonulin.

Dr. Mercola: Yeah, absolutely.

Dr. Stephanie S: Zonulin gets induced by glyphosate because the glyphosate disrupts the protein digestion, so the gluten comes down and doesn't get digested and that triggers the release of zonulin. And what's worse than that is that zonulin is removed by trypsin, the digestive enzyme, which is broken by glyphosate also. So once the zonulin is produced, it's going to open up the gut barrier and then it's going to hang around because the trypsin's not working, so that the gut barrier's going to stay open much too long.

Dr. Mercola: Okay, well this is good. I think we've given people a earful in this last hour or so.

Dr. Stephanie S: I'm sure it's more than they can handle at this point.

Dr. Mercola: It has. So I think we'll probably get ready to close. I'll just remind people that the book that we were initially discussing was the book The Dark Side of Statins: Plus the Wonder of Cholesterol by Dr. Graveline. And Dr. Seneff's only book that she's written, I wrote the foreword to, is Cindy and Erica's Dilemma?

Dr. Stephanie S: Obsession.

Dr. Mercola: Obsession, that's what it was.

Dr. Stephanie S: To Solve America's Healthcare Crisis.

Dr. Mercola: Yeah, so it's a good book. It's been out for a while now and you can pick that up on Amazon if you're interested in an extremely intriguing autobiographical narrative of Dr. Seneff's journey into discovering the enlightening information she did about the healthcare crisis.

Dr. Stephanie S: Thank you.

Dr. Mercola: All right. Well, thanks for all you do. We really appreciate it and I'm looking forward to some even more great discoveries from you.

Dr. Stephanie S: Thank you. Thanks for talking. It was great.