Transcript of "Dr. Stephanie Seneff: Glyphosate Toxicity, Lower Cholesterol Naturally & Get Off Statins - #238"

Bulletproof Radio podcast #238

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Dave: Hi, everyone. It's Dave Asprey with Bulletproof Radio. Today's cool fact of the day is that a study of kids showed that babies born in spring and summer have a higher chance of having celiac disease. We're guessing, but we aren't sure, that this is because the children are first introduced to foods that contain gluten during the cold season when they're about 6 months old. There's a lot we don't know about celiac and about gluten intolerance and and gluten allergy and celiac and Crohn's and all these other things, but we're slowly unwrapping that.

Today's guest is a senior research scientist at the MIT Computer Science and Artificial Intelligence Labs. For 3 decades, she has been working where biology and computation come together. She only has 4 degrees from MIT, including a B.S. in biophysics and M.S. and E.E. degrees, electrical engineering, and a Ph.D. in electrical engineering and computer science.

I studied computer science and information systems. Today's guest can absolutely basically mop the floor with my studies and my experience as well, which is kind of cool. She's published 170 referenced articles, and I've actually featured her on the Bulletproof blog specifically in the post about mineral water and why I like to have mineral water in my life. In fact, today's guest is Dr. Stephanie Seneff, who is just a major researcher on human metabolism, and she uses computers to do it.

Stephanie, it's an honor to have you on Bulletproof Radio today.

Stephanie: Thank you. I'm so thrilled to be here.

Dave: In the last few years, your work has moved a little bit away from straight comp sci, electrical engineering kind of stuff and back towards biology. Why are you doing that?

Stephanie: It really was personal reason. Eight years ago, my husband very unexpectedly was diagnosed with heart disease and, very quickly, was stent-inserted, put on a high-dose statin drug. We were completely blindsided. I didn't know anything. I knew very little about heart disease at that time, but I did know that cholesterol is vitally important for the body and for the brain. I didn't like the idea that he was taking a high-dose statin, so I felt like I had to get involved with that and I started reading everything I could about heart disease, about statin drugs. I quickly came to the conclusion that he should not be taking that drug. I had to work with him for a year to finally get him off of it, of course, violently against his doctor's advice.

I am happy to report that he's been statin free now for eight years and he's doing fantastically well. That was the beginning of it. I got really, really interested because I started to realize that heart disease is not what they think it is, and then I got really excited because I felt like I was figuring something out that they were missing and, because they were missing that, they were treating incorrectly.

Dave: Normally, I would ask the kind of skeptic's question about the one that's about what business do you have as a computer science researcher doing biology, except that you have the degrees in that, too. Good on you. Thank you for addressing that concern. In all seriousness, I couldn't agree more on the thing you say about cholesterol. You said something, "Heart disease is something else." What is heart disease from your perspective as a researcher?

Stephanie: It's principally a cholesterol sulfate deficiency problem and, more generally, a sulfate deficiency problem.

Dave: Is this sulfur or sulfate? What's the difference?

Stephanie: Sulfate. Sulfur as well, but sulfate is the key problem. It derivatives from sulfur.

Dave: What's the difference between the 2 for people listening?

Stephanie: Yeah. Sulfur is the atom. It's actually the guy in the periodic table, very simple, just 1 sulfur atom. It's like oxygen. Sulfate is sulfur plus 4 oxygen molecules, 4 oxygen atoms, plus a negative charge, minus-2 charge. That's sulfate. It's very, very different.

Dave: If I take like MSM or some of those organic sulfur things, am I going to be getting sulfate?

Stephanie: Probably so, actually. I think MSM is going to be metabolized as sulfate probably by the red blood cells. Yes. Sulfur deficiency is a problem in our diet, but, worse than that, we have toxic chemicals that are messing up our body's ability to make the sulfate, to transport the sulfate and it's causing sulfate loss at the kidneys. We're basically running dry on sulfate. That's basically behind all the chronic diseases that the elderly are facing today in this society as well as kids with autism. I think that sulfate deficiency is a key part of all of those things, underlying.

Dave: You mentioned a cholesterol sulfate deficiency. We have people who have cholesterol and not enough sulfate. Could they have too much cholesterol and not enough sulfate? Is it a ratio thing or is it just that cholesterol isn't that relevant as long as there's enough sulfate for it?

Stephanie: That's an excellent question. People are aware. They're watching their cholesterol level like crazy these days. They think, "Oh, my God, my blood cholesterol is high. I've got to do something about that." It's a defensive mechanism the body is using. Because there's not enough sulfate, the body actually squirrels cholesterol away in the arteries leading to the heart. It doesn't make sense. Biology is smart. It doesn't make sense that biology would clog the arteries. If you're going to have to put some kind of junk somewhere, the worst place to put it is in the arteries leading to the most important organ in the body. It's the worst place, and, yet, that's where it's put, the arteries leading to the heart. That's because it's squirreling away that cholesterol to have it ready and waiting. As soon as a sulfate is available, boom, the cholesterol goes out and it gets delivered to the heart.

Dave: You said something really interesting, "It doesn't make sense." You and I both have spent a lot of time designing computer systems. Like any good engineers, we're inherently lazy, so we try to make systems that manage themselves so we don't have to do it, so we could drink more coffee. I think I have that right.

Stephanie: You do. That's perfect.

Dave: You start thinking about how do I make that just ... like if this, then that. If you were designing the human, you would say, okay, if you need to design a self-managing system that auto-regulates levels of things, what you just described is making sense. Totally, it does make sense at least from the perspective of a Ph.D. computer science person and someone who's designed high availability systems, but maybe for people driving in their car and listening to Bulletproof Radio, maybe they never thought about it before. When you think about it, okay, you want to design the body that has this inherent intelligence.

The cholesterol is going out for a reason, not because the body is too stupid and made too much cholesterol. Instead, it was lacking something or got a bad input from the environment. Then, what's sucking the sulfate out? Why are we peeing away our sulfate?

Stephanie: Yeah, and that's a much more complicated answer. Unfortunately, sulfate is really complicated. Part of it has to do with glyphosate, which I'm introducing now for the first time. That's been on my brain all of the time for past 3 years. Glyphosate is the active ingredient in the pervasive riverside Roundup. I think it has a direct link to high cholesterol. It's actually interesting that when you look at the hospital discharge data, the level of cholesterol in the blood is going up over time, in step with the rise in glyphosate usage on corn and soy crops. These are the GMO Roundup Ready crops that are resistant to glyphosate. The stuff is pour over the crop and soaked up by the crop and gets into the food supply.

We're all being chronically poisoned by glyphosate every day. Glyphosate is messing up the liver. It's messing up the liver specifically to interfere with its ability to make cholesterol sulfate. That's where the problem starts. The liver is forced to send the cholesterol out as these LDL particles because it cannot distribute the cholesterol as cholesterol sulfate.

Dave: Has there ever been anyone crazy enough to do a study where they get their cholesterol measures and then they go out and spray Roundup in their backyard the way they probably do already and then get their stuff measured a week later? It seems like you could do a short human exposure study, and then we would just be able to say, look, it's sort of like you stick your finger in your eye and it hurts every time you do it. Therefore, sticking your finger in your eye actually is bad for you, because, right now, I think we know the science, but there are naysayers. I think your theory makes a lot of sense, and I would bet on it.

Stephanie: Yeah, I think it'd make a great experiment. If anybody out there is daring enough to do it...

Dave: Yeah, anyone out there who like that suicidal? I don't recommend you do it, by the way. I know also we have these things called transsulfuration pathways where our bodies deals with sulfur and that there are genetic differences that can affect this, but you can choke them with glyphosate, so, even if you're not genetically weak there, you still can have this problem.

Let's say people are on the Bulletproof diet, and the Bulletproof diet is you only eat organic stuff, you only eat grass-fed meats so you don't get the glyphosate build up in these grain-fed industrial animals that are tortured before you eat them. It's a very clean diet and no sources of glyphosate would be consciously be in there. I tell people to filter their water. How do you minimize the things that make you weak? You're on that diet. How are you getting exposed to glyphosate?

Stephanie: It's in the rainwater, for example. There was a study done in, I think, Kentucky. They found something like over 90% of the rainwater samples contained measurable amounts of glyphosate in them. It's sort of pervasive in our environment. It's very hard to avoid if someone's spraying it in the field next door. Especially if you live in an agricultural area, you're really in trouble.

Even in organic food, I mean, people have tested the organic food and come up with glyphosate. It's in organic honey, for example. I mean, it's just everywhere. The organics, they're not using glyphosate, but there's glyphosate in the water that they're using. There's glyphosate in the air, in the rain, on the fields next door. They can't avoid it, so you're not going to be glyphosate free in this country pretty much, unless you're in some wilderness area and living off of local animals or something and it's very far, remote from any civilization. It's pretty hard to be glyphosate free in this country, I think.

Dave: I'm doing my best. I live on a 32-acre organic farm on an island.

Stephanie: You do the best, ever.

Dave: Fingers crossed. I'm working on it. There's certainly no glyphosate on this property and there never has been. Still, if-

Stephanie: I'm envious of you because I definitely am not ... I eat 100% organic at home. We buy organic spices, organic wine, organic beer. Everything is organic. We're compulsive, but we live next to a golf course, so, I mean, think about that.

Dave: Yeah. We see you have that green view.

Stephanie: Yeah.

Dave: I was thinking of how relevant it'd be to convert golf courses to grass-fed beef ranges, but then they spray so much crap on it that you wouldn't want to eat the cows that ate that grass.

Stephanie: You just have to wait a while and get some stuff going that would metabolize. That's a great research topic. I know people are working on it, how to rejuvenate the soil after it's been exposed for many years to this stuff, how do you repair it. That's a really neat research project. The government should be pouring money into that right now, I think.

Dave: The basic argument has been that glyphosate doesn't affect humans because it only affects bacterial pathways. We have a name for things like bacterial, but not humans. They're called antibiotics. We're spraying what's effectively an antibiotic on our soil. Good soil is a carefully evolved mixed of fungal organisms and bacterial organisms that are fighting to eat worm poop and stuff like that. Of course, there's all the insects. A lot of the soil behind these GMO crops has essentially been sterilized. It's just like Styrofoam almost that hold up some water and some stocks, but what's coming out of there isn't very nutritious anymore because we've removed these systems.

Glyphosate, when you spray it on these fungal organisms, it increases the amount of toxins they make dramatically, and those toxins also raise cholesterol, which is particularly interesting. These are mycotoxins. If feels like we're taking this stuff, we're putting it in our bodies because we're spraying it on our grains in order to make them dry more quickly so we can harvest them more quickly. We're doing all these things that are just shortsighted. We're putting antibiotics in the food, in our guts, which affects our gut biome. We're putting it in our soil, which affects the biome around us, and then we're causing the sulfate problem.

If you're sitting in your car and you're going, "Basically, we're screwed," so we have this big problem and, if tomorrow, we completely eliminated this stuff, which I would absolutely support doing, what would you do or would you recommend for someone who, obviously, if their life has been exposed to glyphosate, how do they turn out the sulfate, how do they turn their liver back on it? What are the things that researches have shown would work?

Stephanie: Right. Certainly, eating foods that contain that sulfur and especially eating foods that contain those, proteins that contain sulfur like cysteine and methionine. Those are really important, so eating seafood and eggs. Egg yolk is fantastic. Really eat as many eggs as you can. Of course, they're high in cholesterol, so a lot of people avoid them for that reason, which is really foolish because they have so many nutrients.

Dave: Don't tell anyone. As long as they keep selling egg white omelets, that means that we can have the yolks. If everyone wants the yolks, there might be an egg yolk shortage. You got to watch out.

Stephanie: Yeah, it would keep the prices down, because, actually, high quality eggs, they're a cheap thrill in my opinion. They're really quite economical. We eat a lot of eggs here. Getting sunlight exposure to the skin and not using sunscreen and not using sunglasses, so this is something people are really unaware of. People are obsessed with the idea of getting skin cancer. Actually, it's interesting because skin cancer rates, melanoma rates have gone up in step with the increased use of sunscreen over the past 20 years. It's a good match, a very strong correlation between sunscreen use and melanoma, which makes absolutely no sense because sunscreen is supposed to protect you from melanoma.

That also is a very interesting story related to glyphosate because glyphosate disrupts the skin's natural ability to protect yourself from the sun, which it does through these aromatic amino acids that are produced by the pathway that glyphosate disrupts in the gut. The gut microbes are providing these crucial aromatic amino acids, tryptophan and tyrosine, which are precursors to melanin, for example, in the skin. Also, tryptophan has all kinds of abilities to soak up that UV light and protect you from it. Tryptophan and tyrosine are going to be deficient because your microbes are reduced in your food that's exposed to glyphosate. Your microbes are unable to make it, so your body doesn't have enough tanning ability, for example, and, instead, the UV rays become toxic.

If you have the natural mechanism in place and healthy, then your body can utilize the sun's energy to make sulfate. That is the really amazing thing that we've discovered in our research. We've published several papers on that topic at this point. That is really, really interesting that the body can take the energy of the sun and oxidize sulfur with the oxygen coming out of the air. The sulfur can come out of the air, too, because that's hydrogen sulphide gas.

I think that it's possible that our body is actually building sulfate from hydrogen sulphide gas in the air, combining it with oxygen in the air to make sulfate in the skin, which is helping the liver to supply the body with sulfate. The cholesterol sulfate is made in huge amounts by the skin. The skin makes huge amounts of cholesterol sulfate. That's what's supplying cholesterol sulfate to the body, but that mechanism depends upon the sunlight exposure, plus, of course, having the sun and not having the glyphosate because that messes up the enzyme, which is a cytochrome P450 enzyme that makes the sulfate, and glyphosate disrupts the cytochrome P450 enzymes.

It's really kind of a perfect storm. The glyphosate is causing you to be much more sensitive to the sun, so skin cancer rates are going up, and so have this great marketing ability to sell all these sunscreens. The sunscreens actually contain aluminum, which also disrupts cyp enzymes, so you're actually making your own ability to protect yourself from the sun worse from chronic exposure to sunscreen.

Dave: Wow. That makes me think about a couple of things. My grandfather died actually of multiple things, but he had a big melanoma on his big toe. I have it on good authority he sunburned his big toe many, many times. How do you get a melanoma on the bottom of your big toe if it's caused by sunscreens? Just asking. He did work in cotton fields a lot where they might have sprayed a few things here and there. Right? I think there is evidence that getting sunburns that peel repeatedly can lead to melanoma, but it doesn't mean that sun causes cancer, right?

Stephanie: Right. No. In fact, one of the things that happens with the sunscreen is that you are fooled into thinking you're safe and you stay out too long. Whereas, if you didn't have the sunscreen, you'd be aware that you are burning, you'd get red, you'd say, "Oh, I've got to get out of the sun. I'm getting too much sun," and you would leave. Instead, the sunscreen is not really protecting you. It's just protecting your mechanism that would let you know you're in trouble, which is much worse because, then, you end up exposing yourself too much.

Dave: One of the things that drives nuts, my kids are in a Waldorf school, which is really kind of a hippie thing. They spend 2 hours a day, rain or shine, outdoors playing. The teachers have this like maniacal obsession with sunscreen. I'm like, yeah, I have a maniacal obsession with hats. Like, if they're hot, they'll put on a hat. if they get sunburned a few times, they'll figure it out. There's several parents who use special sunscreen, but they don't actually use sunscreens because they know this. When you have like people in positions of authority trying to force sunscreen as a safety measure on people, but it's actually harming them, it's like giving fat people Diet Coke. It helps them stay fat. It's the perfect product. Drink more of this if you're fat. It's evil, but it's happening and we just seem to get over that, where, if you're getting sunburned, just cover up.

Stephanie: Yes. Yes, and, of course, if you work on getting a tan in the spring, then you can handle the summer sun without burning. You need to kind of work on getting the sun, which is a natural protection from the sun, and then you are free to be out in the sun and not worry about it.

Dave: Now, every anti-aging guru that I know, which is a lot of them because I've done a lot of non-profit work in the space, like, "Keep the sun off of your face. It'll give you wrinkles." That's kind of true, isn't it?

Stephanie: I know. I don't think so. I think it's true in the context of a poisoning. Once you've got this glyphosate all over your blood and then you're getting exposure to the sun, then your skin can't handle the sun and it becomes toxic. If you don't have the glyphosate, and, of course, the

aluminum as well, which is being soaked up from the sunscreen, then your skin would actually be able to handle the sun without aging.

Dave: No kidding? That's interesting. Although, I have these photos of people I took in Tibet, the Tibetans. There's a little bit of cold wind up there, but I took some of the coolest photos ever. This was back when I discovered the idea behind Bulletproof Coffee, that yak butter tea. You see this incredibly wrinkled faces that just tell a story, but they weren't exactly like ... These guys got plenty of UV, but they weren't exactly the youngest people I've ever seen.

Stephanie: No. You may have a point. It maybe that you get the kind of characteristic. I can picture what you're talking about. My grandmother looked like that before she died, so I may end up like that, too. I would rather have my health really. If that's what it's going to take, I would rather keep my health.

Dave: I would rather feel amazing and look wise than look slightly less wrinkled and feel crappy any day.

Stephanie: Right. Exactly.

Dave: Now, one of the things, in fact it was your work specifically that inspired me to do this. I looked at sources of sulfate versus sulfur because I'm lazy. If I can give my body something that it doesn't have to process, then also my body is screwing it up because of some toxin or whatever, so I said, "Where can I get sulfate?" I looked at all the mineral waters out there. One of them, San Pellegrino, which is unfortunately owned by Nestle, which does some very questionable business practices, but San Pellegrino has huge amounts of sulfate in it compared to any other mineral water I could find.

Stephanie: Interesting.

Dave: It's about 1 gram per liter, if memory serves, per liter and a half, which is way more. It's about 450 milligrams in the average medium-sized

bottle. I'm like, "Yeah, if I'm going to drink some water, I might as well get some sulfate along with any sort of other dissolved minerals like calcium, magnesium and whatnot." I also have been a huge fan of massive egg yolks for detoxing even. There's recipes that, the Bulletproof "Get Some" ice cream. It's something that we used to restore fertility and to have healthier kids, even for my own kids, you're going to drink some mineral water with sulfate, you're going to eat egg yolks, maybe you'll supplement it with MSM, methylsulfonylmethane, which is kind of a common thing, and you're going to eat your broccoli.

I use collagen protein, which is also a high sulfur, less inflammatory protein source. I'm stacking my sulfur cards in my favor let's say. What else should I be doing to get more sulfur into my body or to get it more in a useful form that my body can use?

Stephanie: Yeah. It's interesting because I think that the sulfate transporters are a very interesting set of molecules. One of them actually is these aromatic amino acids. For example, serotonin is produced in huge amounts in the gut. Most of the serotonin that's produced in the body is produced in the gut. The gut microbes are involved, and they're going to make the tryptophan using this pathway the glyphosate disrupts. They make the tryptophan that's the precursor to the serotonin, and then the serotonin is shipped out as a sulfated form of serotonin. Vitamin D is also shipped around sulfated. Cholesterol, as I said, is producing cholesterol in the skin. It's shipped around sulfated.

What the sulfate does is that it makes these molecules water soluble so they can be just shipped out in the blood without having them package up inside LDL particles, for example. Furthermore, these molecules squirrel the sulfate in a safe way. The problem with the sulfate, which is really, really interesting to me, both what it does that's good is what it does that's bad, which is that it gels water. What you want is you want sulfate to be attached everywhere, lining all the capillaries and all the blood vessels of your body. They want to have sulfate sprinkled all around those capillaries. Those sulfates will make the water near the edge into jello. They make them gel, which will give you a very slick

boundary that the red blood cell can just kind of slide through with very little resistance.

Plus, you've got the negative charge, so this is going to be almost like a magnetic repulsion. It's just going to let that red blood cell fly through the capillary without resistance. That's going to make lower blood pressure, basically. When you think about it, the blood has an enormous task. It has to distribute all these nutrients in this water-based medium, which can become jello, but which can't jello because, if it does, the blood won't flow. You need to have the jello along the edges, so you attach the sulfate to the edges of the vessel so that it'll gel the water there, but still allow the water in the middle of the vessel to flow. That's a really tricky business, so, if you're transporting sulfate, if we've just got free sulfate in the blood, you got to make sure that blood's moving fast, or else you're going to end up with jello. That's going to be a no-flow situation, which could cause multiple organ failure and stuff like that.

The body is really facing a tough, tough problem with sulfate delivery. That's the critical thing, I think.

Dave: When you talk about jello there, I mean, collagen is where most of our jello in the body, because jello is actually made of collagen where it comes from, and collagen is in large part based on sulfur, but I don't believe it's actually sulfate that's in it. It's a sulfur containing molecule, but not a sulfate one, if memory serves.

Stephanie: Yeah, collagen actually has a lot of carbonates. Carbonates do a similar thing.

Dave: They do.

Stephanie: Carbonate and sulfate can both do that. In fact, they trade off, so think, when sulfate becomes deficient, carbonate has to pick up a bigger load to try to compensate for the lack of sulfate. The carbonate is all over the place in the jello. It also has these glycosaminoglycans. These sulfated

sugars are attached to it. The collagen itself is a protein, and then it has these sulfated sugars attached to it. In fact, those sulfated sugars are attached everywhere in the body. The body obsesses on them. It's constantly making them and it's constantly breaking them down. It's recycling them all the time.

Dave: The most famous sulfated sugar would be, what, glucosamine?

Stephanie: I would say heparan sulfate. Heparan sulfate is a really, really interesting molecule that I have studied extensively. Everywhere I look, looking at a disease, I end up with, "Oh, my God, it's heparan sulfate again," including autism. For example, autism has depletion of heparan sulfate in the cerebrospinal fluid in the ventricles. Heparan sulfate is needed there.

There's this really fascinating material. People don't understand these things very well. They're called fractones, which are in the cerebrospinal fluid at the edges of the ventricles in the brain. This is in the brain. Those things are the place where new neurons are born. New neurons come out of there as precursor cells and turn, develop into neurons. They can't do that if there's not enough heparan sulfate. It breaks that process.

Dave: There are several alternative therapies I've come across over the years where you use micro-doses of injectable heparan sulfate. I think there's actually a great evidence. Like they do things for blood circulation that are quite profound. I've seen some things around autism and heparan. I've also seen some other reports that say heparan causes Candida to become highly aggressive and basically to tunnel into your tissues and things like that.

Do you think there is more use for injectable heparan or other heparan supplementation that medicine should be looking at, or is there a risk to that?

Stephanie: You are asking an extremely interesting question for me right now because I am studying that right now.

Dave: Oh, are you really? That's so cool.

Stephanie: Yeah, and it's actually a really, really, really interesting story, what I'm discovering. You're going to hear it for the first time.

Dave: This is so exciting. I had no idea you're working on this, but cool.

Stephanie: This is really, really amazing. Looking at drug side effects, there's this huge database from the FAERS. The FDA has this huge database of adverse event reporting system for drugs. We're digging in through that and looking through and doing all these analyses, and I think we've discovered something absolutely astonishing. Heparan sulfate is one of the bad guys.

What we've done is we looked at death and we looked at diseases associated with death, and then we looked at drugs associated with those diseases, and then we said, "Which of those drugs are linked to death?" and we've got a short list. In that short list are several drugs that are biologicals. Heparan sulfate is one of them, and then there's protamine sulfate, protamine sulfate, heparan sulfate, Trasylol, which I had never heard of before. It's another very interesting one.

There's a small set of drugs, really, really interesting because every one of them, when you look at how it's manufactured, you can say, "Oh, my God, glyphosate."

Dave: No way.

Stephanie: It's unbelievable. In fact, I found some great papers. There was a paper on protamine sulfate. It talked about 4 cases where they just were so puzzled. This is over a period of 10 years. This is after glyphosate has been in the market for 10 years. It was something like 1984. They were like, "We've got these 4 cases. They're really bizarre because it's a

reaction to protamine sulfate that we've never seen before, a very different kind of reaction that's not involved with an allergy." They gave the specific details of this reaction of these 4 patients. They all had a consistent story, and every one of those things are something that's known to be there when somebody tries to kill himself with glyphosate.

Dave: Really? You're saying glyphosate changes the way the body responds to its own heparan?

Stephanie: I'm saying there's glyphosate in the heparan sulfate, in it.

Dave: Oh, so it's a manufacturing problem because this contaminant is everywhere.

Stephanie: I think so. It's coming from blood. Glyphosate goes into the red blood cells. We have anemia. We have a massive anemia epidemic right now, exactly in step with the use of glyphosate on corn and soy crops. The anemia is a consequence of the red blood cells being killed by the glyphosate. When you're getting heparan, you're getting it out of the blood. If you're not aware...

Dave: Of course.

Stephanie: ... you're going to get glyphosate. I looked at the steps they are using to try to protect from contamination, and those steps are not going to stop you from having glyphosate there.

Dave: This is basically a potential contamination story.

Stephanie: I think it's true for all of them. It's really, really interesting. One of them comes from sturgeon sperm, sturgeon testicles. Sturgeon, that's those fish.

Dave: Yeah.

Stephanie: They just use lots of those sturgeon testicles to get this drug. I have articles from Iraq about the sturgeons dying out because of exposure to glyphosate.

Dave: Wow, and glyphosate definitely targets your reproductive...

Stephanie: Glyphosate goes into the testicles. I mean, it's like wow. I was dumbfounded because I was studying drugs and I was trying to stay away from it. I'm like, "This is not glyphosate. This is drugs." I looked at glyphosate on the brain, of course. All of a sudden, it hit me. Oh, my God, this is glyphosate. I said, "Why? Why would heparan sulfate be so toxic?" I think it's a great drug, heparan sulfate, because it's essentially what we need. Why wouldn't you just use heparan sulfate? If it's contaminated with glyphosate, you're going to get glyphosate toxicity from it especially if you're already heading in that direction because you've got depleted sulfate. It's just going to take you down. It's going to draw you over the cliff.

Dave: People might say, "Why do you use heparan? Why does this apply to me?" Here's the deal. If you have a blood drawn, and they're re-injecting anything, it is not uncommon to put a little bit of heparan in there. The reason that I'm familiar with this is because I'm actually putting together some materials for people on how to do ozone therapy. What you're doing in ozone therapy, you draw blood, and the "safest" way is to mix the blood with heparan, mix ozone in the blood and re-inject it because you don't want it to clot. Right?

The ozone may actually break down glyphosate. Who the heck knows, but I wouldn't want to do that. Like I've actually elected to not have heparan in those sorts of procedures for myself even though it's recommended and you have a slightly higher risk of blood clots because I think the downside of heparan is higher than it would be normally. It sounds like trivia, but here's the thing. Ozone therapy is about to explode because it works on things metabolically that you cannot address with Western drug style medicine. It's been used in places where there was a restriction on drugs like Cuba and Africa, where

there just wasn't the money for them, and in Russia even. It's cured things that shouldn't be curable. We've had guests, for example, in Bulletproof Radio even talking about Ebola, like curing people with Ebola using injectable ozone, but I don't know if he used heparin.

Stephanie: It doesn't always happen. It's rare. You'd be unlucky. It's like a lottery. I mean, you might or might not have glyphosate in there, but, occasionally, it's going to come along. You're going to get a batch that's contaminated with glyphosate, and then you're just doing a lottery. It's like taking the gun and grease the bullet there or not, boom. You're taking risk with it.

Dave: This is a broader problem in medical research, particularly in nutritional research. One of the things that drives me nuts is that these so-called lipophilic neurotoxins. These are fat-loving toxins that dissolve like food coloring into, like food coloring goes into the water and these are dissolving into your fat, including the fat in your membranes and into your cholesterol and your bile, and they can recirculate and permeate your system.

When someone says, "Oh, I did a test of saturated fats," but they don't know if they're using saturated fats that have these fat soluble toxins or not. They're actually testing toxins and fats together. They just never rather to look for the toxins.

Stephanie: This is true for all the studies they're doing on food. I am like so amused by it because they'll get all these inconsistencies. I'm so frustrated with them. They'll say, "Oh, we them fed saturated fats, fed them unsaturated fats," and they don't give you the specifics. Where did that fat come from? Was that using hexane? Did it have glyphosate? Was it grown with glyphosate? Did they use hexane in the processing? Those are the things that are causing all the results, and then they're ignoring those things. They ignore the hexane. They ignore the glyphosate. They speak about it as if it's just this particular metabolic food. The effects that it has and what they're ignoring is the elephant in the room in all of the studies.

You get this very inconsistent results because, over here, in America, you do the study, you're using this GMO Roundup Ready soybeans to make high fructose corn syrup and you're feeding it to rats and they're all getting really sick, and then you're saying, "Oh, yeah, fructose is really toxic." If you took fructose from a fruit that was grown organically, you wouldn't have that effect. It's crazy.

Dave: It's crazy. It really confuses people because you could find studies that say cholesterol is bad, but, if you look at some of these toxins, they're structurally almost identical to cholesterol and they're circulated through all the cholesterol pathways. Even if you're looking at transsulfuration, this thing your liver does to make sulfur into sulfate and to basically work sulfur through, transsulfuration does sulfatetify into sulfur, if that's a word.

Stephanie: Yes. That's a great way to say it.

Dave: I just verbed a noun.

Stephanie: The real thing is spelled ferulate, but that's kind of an awkward word to say.

Dave: Thank you.

Stephanie: I like sulfatetify.

Dave: When you're going through that and you're like, okay, it turns out that people who get exposed to Lyme disease or mold toxins and things like that, they oftentimes have genetic defects in the transsulfuration pathways. Then, all of a sudden, you add glyphosate, which puts a load on there, and then you add these lipophilic toxins and then you say, "Oh, it's cholesterol." Really? Wait a minute. It's a classic problem that has 3 things. It's the straw that broke the camel's back, and you can't say it was one or the other because they all happened. That's where double blind studies fall on their face because double blind studies are designed

to find 1 cause. When you're dealing with 3 causes, you're going to get random results.

Any business school major can tell you that because we do things like conjoint analysis. Any proper statistical study and scientist could do this, but, when you're a double blind person, you're blinded and you're only looking for single causes.

Stephanie: Yeah. It's worse than that. Do you know who Seralini is, his study on the rats? He's a really great guy in France. He's written a lot of papers about glyphosate and about GMOs. He did a study on rats, it's quite famous in our circles, where he exposed them in their entire lifespan to GMO Roundup Ready food as well as served glyphosate. He had 4 different groups and there was the control group, and he saw all these problems that these rats had.

Monsanto had claimed that the GMOs were great, there was no problem, the glyphosate is great, there's no problem, but they always only looked 3 months. When he saw his rats at 3 months, they seemed fine, but, by 4 months, they started to have problems. As long as you restrict your study to be only 3 months long, you can hide the evidence.

Worse than that, Seralini has just come up with a new paper where he's showing, and this is what I have long suspected, is that the so-called control group, what are you feeding the control group? What are you feeding the control group?

Dave: It's getting GMO feed with-

Stephanie: Yeah. Now, when you're exposed to...

Dave: Such bad science.

Stephanie: Yeah, you're studying some chemical. You're studying hexane, let's say, and you've got the guys who are getting the hexane and the guys who aren't, but the guys who aren't getting hexane are getting the glyphosate

and getting the GMOs. They're getting all that stuff, and it's messing them up. Then you say, "Oh, well."

There's actually a paper out there. I was so amused to find this paper where they diagnosed. They did a study on control group rats, and they said, "Oh, yes, these rats, they all get all these different cancers." They document, oh yeah, 6 percent chance of this and blah, blah, blah, all these different cancers. They're sort of saying this sets the bar. As long as they're getting no more than that many cancers in our test group, we don't have to worry about our test drug. You know what I'm saying?

Dave: Yeah.

Stephanie: If we compare our toxin to this control group who's being poisoned by glyphosate, and then all the things that they're getting are the things that glyphosate causes. They don't say that in the paper. They don't mention glyphosate. They don't even say what the rats are eating. I can bet money it's glyphosate that's causing all those cancers. Whereas, what they want to argue is, "Oh, yeah, you know, rats get cancers. Everybody gets cancer. That's just part of life."

That's not true, if we were not exposed to those toxins, and we've got millions of toxins that we're exposed to every day, maybe not millions, but hundreds and thousands. We can't avoid them, and they're causing cancer. They at least should be feeding their control rat organic feed, filtered water. They have to be careful. Of course, they have to have the proper nutrition, all these things to give the best shot at the control group. That will reduce the amount of noise that you'll see, which will give you much greater chance to get statistical significance on your results for your test product.

Which will almost guarantee that your product will be taken off the market, so, of course, they don't want to do that. Right? They're very happy to say, "Oh, yeah, the control group gets cancer, too, so here we are."

Dave: The sad thing is-

Stephanie: It's very frustrating.

Dave: Rats are kind of bulletproof. They deal with a lot of toxins in their liver. Humans and pigs are really weak because we rely on our kidneys to handles toxins. Other animals use the more efficient liver part. This is why like pork, if you're going to eat it, and this should be really carefully fed pork because pork fat is delicious and amazing, but not if it's full of glyphosate contamination and it's full of mycotoxins from their feed, which is a documented issue. You get all these things, and then you get these people who are completely unscientific and say, "Animal protein is bad for you because of toxins."

Stephanie: Exactly. Every single thing you look at, oh, saturated fat probably got a bad rap because what they were doing was getting pork fat from pigs that were being fed GMO Roundup Ready feed. I mean, the pigs are sick.

Dave: Then you hydrogenate that just for good measure.

Stephanie: Yeah, and, in fact, you dump toxins in your fat cells. That's what you do. That's why people get fat actually. I think glyphosate is making us fat. By the way, glyphosate is extremely well-correlated with obesity.

Dave: I was going to ask you about glyphosate and sulfur and obesity. You read my mind. Let's talk about the other thing that makes you fat. How does glyphosate or how does sulfur play a role in you getting fat instead of just having cholesterol problems?

Stephanie: Sulfur is extremely important for detoxifying toxic chemicals of both sulfate and glutathione, glutathionelade, the toxic chemical. That's a tough one, too, or you sulfate it and you ship it out and it gets disposed of. The liver does this. The CYP enzymes are involved. The liver is impaired in its ability to do this, and so these other chemicals become, like benzene-related compounds, they become much more toxic. Hexane is used, by the way, to separate the fat in, say, canola oil from the beans,

soybean oil. Hexane is really a toxic kind of benzene-related chemical that, in the US, we have no regulation on how much can be in the food. We don't care. We don't even look. We're using it to produce these cheap oils, the soybean oil, the canola oil. It's part of the problem there.

I think if they've got both glyphosate and hexane, I think they're really toxic. The two are really synergistically toxic because of glyphosate. First of all, the hexane probably helps the glyphosate get in and then the glyphosate prevents the hexane from being detoxed. If you're lucky, you get fat and you dump the hexane, all these other benzene-related PCPs, all the POP, the pervasive organic pollutants, all these things that are all over the place, the plastics, you can dump them in your ... and also the iron, because iron becomes a problem, too, with glyphosate. You can dump them all into your fat cells and keep the rest of your body healthy, or you can stay skinny and get sick. That's kind of your choice, I think, if you are being chronically exposed to these chemicals along with glyphosate.

Dave: One of the risks I have posted on the Bulletproof website, this thing called the Rapid Fat Loss Protocol. I didn't put it in my book. It actually says in big letters like, "Really you should do this for this reason and, if you're going to try and lose a lot of fat, you're going to expose your brain to a lot of toxins, so you want to bind the toxins using charcoal in the gut." I actually manufacture a highly absorbable glutathione that's got a lactoferrin bound so it's absorbed all throughout the GI tract and not just in the oral mucosa like liposomal glutathione. I use this regularly, obviously.

If you're going to be losing a lot of weight, you need to regulate glutathione, you need to bind any toxins so you don't have to put through the kidneys and liver because, otherwise, you just get tired and your joints hurt and get swollen and you feel like you're hung over all the time, and you're basically poisoning your brain. You'll recover eventually if you're lucky, but maybe you should lose weight at a normal pace, which is still pretty fast on a normal toxin-avoidance high fat, with the right kinds of fat, and avoiding all the frankenfood, kryptonite foods

like canola and soy and things. Few people understand that all of toxic metals, all those plasticizers it's all in your fat.

Stephanie: Yes, and they're going to dump it lose when you lose that fat. There's no way around that. It's true, which is demoralizing for someone who is carrying around a lot of fat. Fat has bad rap, but, actually, when you look at people who are sick for example with heart failure or something, the fat people are the ones who do better in terms of surviving heart failure, living longer with heart failure. They do better because they have that resource to hide the toxins and they also have that resource to provide fuel when their bodies are so sick they can't really eat anymore. They have some extra fuel hanging around, which comes in handy as well. I don't promote getting fat, but I think in this society we live in, with all the toxins we're exposed to, that's the, a biological mechanism that some of our genes are telling us that's the way they cope with this. That's why we have this obesity problem.

Dave: There's no question in my mind that toxins are a contributing factor to it. It's rough because you don't know between 2 people who are obese. Like one of them may have major toxin exposure. The other one may have major metabolic dysregulation that may also be from a toxic composure. One is directly storing toxins, the other one just has a broken thyroid because of that.

If someone is listening to this right now and they're going, "Good God, this sounds like a complete like can of worms erector set. I have no idea how to deal with all of those, but I'm fat and I want to do something," based on what you understand with all these environmental toxins like glyphosate, based on what you know about sunlight and all this, okay, you want to lose weight, but you don't want to poison your brain if you're going to do it, what would you think about as a computer scientists, computer hacker kind of person? I really want to know what would you do for people who want to safely lose those fat cells?

Stephanie: I think sunlight is an actually excellent way to lose weight, getting sunlight exposure, because that helps you to be able to detoxify things.

That's what it's all about. Once you can detoxify, your body will unload those fat cells. It wants to get rid of those fat cells. It just can't. It's just like cholesterol being stored in the artery wall. The fat is being stored in the fat cells because it's harboring these toxic chemicals. Once your body is repairing itself and has the detox capabilities, and this of course means eating your sulfur-containing foods, eating organic, a 100% organic, whole foods, all that stuff, and getting lots of minerals and vitamins, making sure you have a high micronutrient content in your food, which really just eating egg yolk is going to get you a long way there.

Dave: Is it UVA or UVB? Like those are the 2 main components of sunlight. Do you know which one it is?

Stephanie: Oh, which one is good? I suspect both. I'm afraid I'm going to get mixed up on which is which because I know that the sunscreen masks one and leaves the other one in higher concentration, and the one that it leaves behind is the one that's causing the cancer in the context of sunscreen. I can't remember which one is which. I don't want to say it here.

Dave: I'm going to confess the same thing. I always have to Google it because there's two of them.

Stephanie: A and B, I can't remember which one is it, which one is B.

Dave: One is good. One is not so good.

Stephanie: The one that the sunscreen preferentially absorbs is the one that is the okay one, and the one that's left behind is the one that becomes toxic because the sunscreen is not taking care of it.

Dave: I have a-

Stephanie: That might be also because there's not tryptophan to convert it into something, to use it to make energy and then to convert it into a lower frequency where it's safe.

Dave: Wow. This is so incredibly complex even for you and me. We spend a lot of time reading papers and stuff like that where normal people spend time doing something that's more fun probably.

Stephanie: There's nothing more fun than trying to figure out this puzzle. I just love it. I just can never get tired of it. It's wonderful all those papers that are out there especially the open-access papers. I really love them, the ones that aren't the behind the paywall. The journals are triply much more courageous to go ahead and publish creative ideas. Whereas, the sort of prestigious journals that are hiding behind the paywall where you've got to pay 40 bucks to read the article, they are very careful not to publish anything that isn't sort of within the mainstream view of the world, which, of course, is a broken view, so it becomes problematic.

I think it's awesome that those open-access journals exist. I find so many papers where someone is just being very thoughtful, creative, looking, reviewing the literature and coming up with some new theory to explain something. I mean, I just came across a paper yesterday which was just marvelous, talking about this disease called kwashiorkor. Kwashiorkor is a nutritional deficiency condition that's rampant in Africa and other places around the world with kids that can't get enough nutrition.

I think kwashiorkor is actually a glyphosate poisoning disease. These people didn't say that in this paper, but they talked all about the sulfated heparan sulfate being deficient. It's exactly the same story that I've been saying is written up in this paper. I'm just really wildly excited about it. It's just published in 2015. Of course, I don't have the authors handy. I read it yesterday and I was just so thrilled.

It's so fun to be able to just come across a paper that you could see these guys are on the same thread. Those papers are almost always in this open-access community rather than in this closed behind-the-paywall prestigious journal. Those guys are being very, very conservative about what they will publish. You find the new ideas, the creative ideas outside of that mainstream source, I find.

Dave: One of the things that I've been accused of is, I look at mold toxins, and I don't think that they cause everything, but I can quote papers that say there is a high correlation and, in some cases, causation for it, that at least some of the time that they're a contributing factor, so people will be like, "Dave, to you, everything is caused by mold toxins?" No. It's an unknown thing.

Stephanie: Aflatoxin, yeah.

Dave: Yeah, like aflatoxin, ochratoxin A, and all those other things. I know some of it very clearly because I measure the stuff. I see where it is. I know the national regulations. It's pretty obvious when you dig in, but there are other ones who are like, "Okay, we're speculating there, but it's an intelligent speculation." You must get that, that same criticism where you're like, okay, when you have a hammer, everything looks like a nail, so, therefore, okay, you've got autism, obesity, heart disease, Alzheimer's and a bunch of other bad stuff that's tied to this one compound, and their study is funded by an industry that say the glyphosate has actually low toxicity because they're looking at direct toxicity, not environmental effects.

How do you address the people who are like, "Okay, it can't all be glyphosate?" Like what do you say to that?

Stephanie: No. I agree with them. I mean, it's obviously not all glyphosate. I just feel that, when I look at the list, I mean there's a certain small set that I'm focusing on myself just because I have a limited amount of time, and I can tell you the three that I'm very, very interested in. There are three, glyphosate, aluminum and statin drugs. Those are my 3. I pick them for a good reason, because all three of them are considered to be pretty much nontoxic and even very good. All three of them have this notion that, "Oh, this is really great stuff." The statin drugs, they're supposed to be safeguarding us against a heart attack. They're putting so many people on statin drugs. You've got like something a third of the adult population or some crazy number on statin drugs right now.

It's pervasive in the exposure. It's considered a great thing, and it's toxic. That's true for statin drugs. That's true for glyphosate, and that's true for aluminum. It's only since the late 1800s that we've figured out how to use aluminum, and we love it, to make aluminum foil, aluminum pans. Aluminum is a great metal to work with. We're putting it into vaccines to use it as an atrovent . It works great as an atrovent in vaccines. Its only problem is that it's causing brain damage.

Dave: There is a group of people who say don't use aluminum deodorant. By the way, I still say don't use aluminum deodorant, but then, all of a sudden, we "proved" or at least we theorized that aluminum is not correlated with Alzheimer's disease, so then all of a sudden-

Stephanie: There's plenty of evidence that it is.

Dave: Yeah. I suppose that the people who are listening in their cars, not watching, didn't see me make the little air quotes around "proved." There's basically a big study that wasn't that well-done, if memory serves, about, oh, yeah, that was all wonderful, that was all just hippies, be quiet and smear your antiperspirant on and don't worry about the aluminum, but there's pretty good evidence that biological high levels of aluminum are bad for us. Can you sort of in a nutshell tell people what aluminum does and why they should basically limit the amount of aluminum that they inject or smear on themselves or eat?

Stephanie: Yeah. I mean, aluminum is one of the few metals that the biology has no use for. The biology does not have any way to use aluminum in any kind of biological system, probably that's because it sticks around as plus 3. It doesn't like to move to different valences. Iron has a plus 3, plus 2 state. Manganese has multiple states. You can push electrons around and do interesting things with actually creating reactions that can produce products that are of interest using these things as catalysts. Most of the metals have really important roles as catalyst for different enzymes that are specifically designed to use that metal as the catalyst.

Aluminum is a very interesting exception, that there isn't any enzyme anywhere in biology that wants aluminum as its catalyst. That's because aluminum can't move. It's always plus 3. Plus 3 is really scary because that's a very strong positive charge in a very localized area. What it'll do, for example, with the glycocalyx, which is the sulfate that's making the jello around the edges of the capillaries, the aluminum comes in there and it's got such a strong positive charge, it'll just tunnel right through the jello and stick to the sulfate and de-active it. It'll basically bind to those attached glycosaminoglycans that are in the extracellular matrix. It's a lot of big words there, but aluminum will get inside the cell and mess up the cytochrome P450 enzymes, which are really, really important enzymes I mentioned, in the liver, detoxing. They make the bile acids and then, in the red blood cells, they make the sulfate. I mean, aluminum is a train-wreck for red blood cells just as glyphosate is, too.

The other really scary thing to me is that aluminum and glyphosate bind together, and so I have a theory that aluminum, that when you have glyphosate in your blood and you get a vaccine, the aluminum, the glyphosate binds to the aluminum and then it escorts the aluminum to the terminal watershed. That's going to be either the pineal gland up here in the brain or the kidneys. In the pineal gland, the glyphosate delivers the aluminum to this brainstem where there's all this important brain stem nuclei, but one of them is the pineal gland. It's going to deliver aluminum to the pineal gland and mess it up.

Studies have shown that the pineal gland accumulates much more aluminum than other parts of the brain because it's outside of the blood-brain barrier. There's access to the blood in the pineal gland. The aluminum messes it up, and then you get things like sleep disorder, which is another one of these epidemics that's going up in step with glyphosate used on corn and soy crops. I think the aluminum and the glyphosate are working synergistically to cause harm.

Dave: That's still a theory? You haven't proven that, but you've got some interesting things that point that out.

Stephanie: That's a theory.

Dave: Okay. Cool.

Stephanie: I have papers that have been published on it.

Dave: Yeah, it's a plausible theory for sure. That's the nature of science, right? Like there's a lot of thing where well-

Stephanie: Yes. It needs to be proved. I think it suggests experiments that people should try to do to see if it's true.

Dave: Yeah. All right. Let's talk about statin drugs as well. I have generally been opposed to them, but they have a sneaky side effect or maybe sneaky side benefit even that I'm going to quiz you about.

Stephanie: Okay.

Dave: Tell people listening why the case against that especially for just routine use.

Stephanie: Oh, I hate the statins. I mean the reason I hate them, of course, is because they disrupt your liver's ability to make cholesterol, which is like so important for the entire health of your body, particularly the muscles and the brain because those cells, the muscle cells and the neurons, really, really need cholesterol to work properly. They become preferentially harmed by statin drugs in part due to the fact that they don't have enough cholesterol. There's other issues, too, because statins don't just disrupt cholesterol synthesis, they break a very, very important pathway at its face. It's sort of like cutting down a tree at its roots. You lose all the branches. The branches produce all kinds of important things also besides the cholesterol, things like coenzyme Q10, which is essential in the heart. Heart has the highest content of coenzyme Q10. That's what protects you from heart failure. That's produced by the same pathway that the statins interfere with.

It's been shown that statins cause a deficiency in that enzyme, a really, really important molecule in the heart. Statins cause an endless list of side effects. I've been studying. As I said, I've been studying drugs and I've been looking at statins. It's just remarkable the number of side effects they cause. There've been papers published to show that they increase your risk of diabetes. They enormously increase your risk of neuropathy. They cause cataracts. They cause hair loss. They cause arthritis. They cause gut problems. All these things that are really associated with getting old, statins cause them.

They cause an increased risk. This is well-documented in the literature. You're trading off trying to protect yourself from a heart attack. Often, they only protect you from the small heart attacks that aren't really going to do any harm. They sort of build up. I think they build up resistance so that, by the time you do have a heart attack, it's going to be a big one and it's more likely to kill you. I don't think they even protect you in the sense of heart attack death. They interfere with your body's ability to execute the small heart attacks that actually would not have hurt you. They would have actually, I think, benefited because I think the heart attacks help you to produce sulfate and recover from your problem. Instead, you can't because a statin drug gets in the way, and then you end up with increased risk to a more severe heart attack that could cause harm, more harm.

That's my suspicion.

Dave: Wow. You're the first person that I've met who said heart attacks might be good for you at least the ones that don't kill you.

Stephanie: Yeah, I've studied that, too. It's extremely fascinating because a heart attack actually is orchestrated as an incredibly complex process, part of which is releasing taurine. There's a huge amount of taurine stored in the heart. The heart, the brain and the liver all store lots of taurine. Taurine is a sulfur containing amino acid. It's a very interesting amino acid. It has sulfonate, which is almost sulfate. It just needs 1 more

oxygen to become sulfate. Taurine is inert. It's extremely hard for it to react.

I think the heart attack goes through all these shenanigans to make taurine react and ends up producing sulfate from taurine and, therefore, recovering the sulfate supply that's desperately needed for the heart not to fail.

Dave: You think the heart attack basically causes this huge wave of taurine, which then resets the sulfate levels so that things can function, if it doesn't kill you. It's a pretty traumatic event. Wow. There's so many big things that happened. That's outside my wheelhouse, but it's plausible on its face, but it seems like avoiding the situation that caused the heart attack in the first place is preferable.

Stephanie: Certainly, which means getting enough sulfate. That's how you avoid the heart attack is by getting the sulfate, in my opinion.

Dave: Now, this is a trivia question. You're probably one of the few people who might know it. Do you know what the first statin drug was?

Stephanie: Oh, there was red yeast rice. Is that what you're talking about?

Dave: Even before that, it was a nice statin, the antifungal, but it doesn't really lower cholesterol very much. It doesn't get absorbed in the body at all. It's just a very potent antifungal.

Stephanie: Oh, interesting.

Dave: All of the other statin drugs are potent antifungals in addition to like breaking the pathways we talked about. One of the other theories that I think has a lot of evidence, and I'm quoting A. V. Costantini, a researcher who spent a lot of years studying mycotoxins. There's a known cause of atherosclerosis, and it is mycotoxins. He quoted about 900 studies in his this book about that, a lot of them were correlation. They weren't all causation, what we know in animal husbandry. This gets weird because

we're talking about multiple small things that, for instance, in pigs, when they increased the amount of molds in their feed, the number of atherosclerotic lesions basically that the incidence of heart attack in pigs goes up, but, if you're also increasing glyphosate or limiting sulfur or increasing the excretion of sulfur, maybe one of those by itself wouldn't matter at all.

One of the theories that I have around statins is that, in addition to having the known effects on metabolic pathways that inhibit your ability to make cholesterol, which is necessary for life, they also are killing fungal infections in the body. These sort of intracellular things, they're subclinical. They're just kind of there. Yeah, I get a little dandruff here, I get a little Candida there, but limiting those things actually does have an impact on cardiac health. It's like it's such a complex ball of worms.

Stephanie: They're produced by a fungus, right? The original of the red yeast rice is a fungus.

Dave: Yeah.

Stephanie: Yeast, that's interesting. Actually, this is really, really interesting. You're going to cause me to go research this topic because it's fascinating. I'll tell you my take on mycotoxins is that sulfate is needed, it's always back to sulfate, by the lysosomes to degrade busted materials. In the process of living, you get broken molecules, and they need to be broken down so that you can refurbish them and use those raw materials to make something new. That happens in the lysosomes. The lysosomes use sulfate to maintain the acidic environment that they need to make that happen. It works with iron. Sulfate works with iron, and the lysosome should be able to break down those broken molecules.

When your body can't do that, then you pile up a lot of junk, things like amyloid beta in the brain, for example. You pile up a lot of junk. What's really interesting is that the fungus can go in there and kill the cell and eat the junk. The fungus is actually, in a way, a cleanup operation for a

system that's got no garbage trucks. Basically, your garbage is all piling up everywhere and you're in trouble. The fungus comes along and it eats the garbage. It's basically clearing the garbage.

Dave: It's funny when people go through a process chelating mercury, which is another one of those persistent toxins in the body, it is really common to have a Candida or a yeast flare up in the body because yeast will sequester mercury so it doesn't go into your liver or your brain or your tissues. Your body will intelligently allow yeast to flourish because they'll hold the yeast and then you'll-

Stephanie: I love that. I love that, because, for me, I'm always looking for the positive side of all the natural biological things, including all the pathogens. I feel like they all have a positive side. Biology is so smart. Everyone is a community. We're all working together here. We're the host. We're sort of the nest where all these microbes are living in our gut, on our skin. We're their home. They help us. We help them. Everyone's in it together. When we're getting poisoned like this, those pathogens are coming in with a goals to try to rescue the situation. This is something. I'm really trying to look at it that way.

Then, if I stated it that way, then I go and I try to see how can that be, where can I see the science that shows that there's some positive benefit. That's really, for example, with the fungus, that they come in and clean up the debris because the debris will eventually kill you.

Dave: There was permaculturist I had dinner with in New York, and I'm blanking on his name right now, like one of the smartest permaculturist I've ever met, who put it really succinctly. He said, "Dave, the job of fungus is to remove unhealthy things to make way for healthy things." This is true. It's true in plants, right? You want the sick plants to die so healthy plants can take their place. We need that in nature.

Now, from a nature's perspective, you want the sick people to die to make way for healthy people. The fungal things that we're seeing and all these other things, they're a natural processes, but when you spray crap

like glyphosate or maybe these other pollutants that we're putting out there, they mess up those systems, and you get sicker, you're more susceptible. Nature's own balance gets broken, and that's a scary complex incident that I just don't think we have mapped well enough. It seems it's going to take a lot more computer science to get that one done.

Stephanie: Now, I really like that point of view. I really think it's true. In fact, fungus infection is actually killing lots of species right now. Species are disappearing because of fungus infection. There was an interesting article in Nature not too long ago that showed this breakdown. It showed a tremendous problems with fungus infection in both animals and plants particularly in the United States. We did have it over the entire globe, and we had a huge cluster in the United States because we're using so much glyphosate.

The glyphosate actually has been shown to produce this aflatoxin-producing toxin, a fungus to cause that to overgrow on corn. I think that glyphosate is a major contributor to the fungus infections. For example, the bats are having trouble with a fungus infection on their nose, which I suspect is going back to glyphosate exposure. Of course, there's all those other chemicals that are being used on the crops. I don't want to say glyphosate is the only one. They're all bad. We need to go back to organic and we need to fix the soil, too. We need to have sustainable agriculture, get the soil humus back really, the nutrients back in the soil, the microbes back in the soil.

We need to fix the soil first. That will solve not only our health and also help the butterflies and the bees to recover, and it will improve climate, help to fix climate change.

Dave: It's about changing things at a very small level to cause much bigger change. In fact, one of the projects that I'm working on that's about to come to fruition is a strain of bacteria, actually, multiple strains of bacteria, that break down mycotoxins and eat toxic mold as a fuel source. It's something that you inoculate your home with. You literally

put it in the environment the way it's supposed to be so that, if there is water intrusion, which happens in at least half of the houses.

Stephanie: Yeah. Sure. You can get toxic mold in the home for sure.

Dave: Yeah. I just said it in a whole documentary on toxic mold, and Daniel Amen and Mark Hyman are in it. It's affected me personally. If you want to get fat quickly live in a moldy house. The idea of changing this tiny bacteria so they start eating the fungus and then they fight with each other and then create this thing called balance that we used to have naturally. I think there's going to be a lot more of this kind of stuff coming out. I'm just really excited.

Stephanie: You've got some great ideas. I really appreciate what you're doing. It sounds terrific.

Dave: Thank you. Also, we're coming up on the end of the show. There's a question that I've asked every guest on the show. I'm really curious to hear your take on it as a computer science turned biological researcher. Given everything you know, not just in your realm of research, but your life experience, if you had 3 recommendation for people who just wanted to perform better at whatever they do, so not physical or mental performance, if you want to be better at everything, these 3 things matter most, what are they?

Stephanie: I guess I might say love.

Dave: That's a great answer.

Stephanie: Relationships, having deep relationships that are personal and meaningful to you would be certainly one.

Dave: Good relationships.

Stephanie: Yeah, and then, of course, healthy food, eating food that's ... Yeah. Then, I guess, maybe I'd have to say sunlight.

Dave: Sunlight. There you go. Pretty straightforward and awesome advice. Stephanie, thank you for your continued curiosity and for putting cross-discipline things to work. You're taking the computer science way of thinking and bringing it over to biological systems. I appreciate and admire that. Thanks for continuing to push on those big 3 things, aluminum, statins and, basically, glyphosates and sulfates. I guess that's the other side of glyphosate.

Thanks for continuing to ask the questions that are hard to ask. I appreciate that, so keep doing what you're doing. The world appreciates it.

Stephanie: Thank you. Thank you for your vote of confidence.

Dave: Where can people find out more about your research? Is there a web page you'd like them to go to?

Stephanie: I have my webpage where I have some of my stuff posted. It's not easy, people.csail, C-S-A-I-L, that's my lab, Computer Science and Artificial Intelligence Lab, .mit.edu/ and then my last name, "Seneff," S-E-N-E-F-F. They can Google my name, and they'll find various interviews like this one and all kinds of stuff.

Dave: Awesome.

Stephanie: My name is rare enough that it'll pretty much be me if you type, even the name "Seneff," you'll get my stuff.

Dave: Yeah, it's actually a really great gift to have an unusual name.

Stephanie: It really is.

Dave: Yeah. I have a similar name, so that always helps out everyone. If you want to Google "Stephanie Seneff," it's S-E-N-E-F-F, and that's probably the easiest way to find her. You'll probably see Dr. Mercola's interview with her as well, which is a great interview.

Stephanie, thanks again for being on the show.

Stephanie: Thank you. My pleasure.

Dave: If you enjoyed today's episode of Bulletproof Radio, I would love it if you went out and picked up a copy of the Bulletproof Diet and gave it to someone you care about. If you're not going to do that, just have your Bulletproof Coffee or go online and say something nice to someone. Just do something to make the world a little bit better today. You don't have to do anything big. Just do a little thing because, if everyone does a little thing every day, the whole system tends to change, and that's cool.

Have an awesome day.

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