A Special Interview with Dr. Stephanie Seneff

By Dr. Mercola

DM: Dr. Joseph Mercola
DS: Dr. Stephanie Seneff

Introduction:

DM: Welcome everyone. This is Dr. Mercola. Today, I'm here with Dr. Stephanie Seneff who is a major resource in an area that many of us are not very knowledgeable and that is sulfur. Dr. Seneff comes to us through an interesting perspective which she's going to share in a moment. Initially, you got your degree in electrical engineering and computer science; really a hardcore scientist from some very prestigious engineering schools like MIT.

Many may not realize that I was also interested in engineering when I was in college. So I researched all the different schools and it's clearly MIT, Caltech, Stanford – those were the top of the line. You've got your degree in there. And then you made this conversion to biological sciences and really have a passion in sulfur and you're going to help educate us about that today.
Why don't you tell us initially how you made that transition because it's a little bit of an unusual shift.

DS: It certainly is. In fact my undergraduate degree at MIT is in biology with a minor in food and nutrition. I actually had some good preparation in the undergraduate curriculum that allowed me access to the research literature at this time. Once I started returning to biology I returned with an absolute passion. The reason was because – I mean, there were personal reasons why I was upset with the way the medical establishment is treating things like cardiovascular disease. I didn't believe the current dogma. I just did not think it was right particularly with regard to cholesterol.

I always had believed that cholesterol is a very, very important nutrient. Cholesterol is to animals as chlorophyll is to plants. It basically gives us mobility – the ability to move and it gives the nervous system the ability to think. These are two things animals do well and plants don't do at all and they are crucial to animals. Without cholesterol we can't do it. I feel cholesterol, you need to think about cholesterol as a very important nutrient not to demonize it the way the medical industry has done.

DM: That's a good point. What I have neglected to mention in your introduction is that you eventually developed an affiliation with the Weston Price Foundation and actually are going to be speaking at the November Dallas conference along with me.

DS: I'm very excited about that. I'm going to be talking all day on a lovely date (11/11/11). I really encourage people to come on down because I'm working very hard on my slides for these presentations and I have a lot to say. I'm very pleased.

DM: It's the only conference I'm speaking at all year. I'm really excited to be there.

DS: I love them. I think they are so fantastic. In fact I went back and read Weston Price's book. Weston Price of course lived in the early part of the last century and is an amazing person. He was a dentist and he went all around the world studying indigenous diets. His book is just fascinating.

What impressed me was he would describe the things that the indigenous people especially ate and many of those things were especially high in cholesterol – things like caviar, of course seafood and liver and adrenal glands of the bear. I mean just incredibly high cholesterol content in these foods that they treasured. I felt like they were acting appropriately. And here we are today – America I think is the only country that actually has an upper limit on the nutritional requirement for cholesterol. It is so insane.

DM: That's exactly what I was thinking of. You mentioned these dietary sources – my understanding is that about 80% to 90% of the cholesterol in our body is actually made by our liver so it's not really dietary sources. Maybe you can help us understand the differentiation and distinction between the dietary cholesterol which is clearly important and the cholesterol the body makes.

DS: Yes I can. In fact, I get very annoyed when I hear this and we hear it a lot. That your body can make all the cholesterol it needs and therefore you don't need it in your diet. While it is true that your body can synthesize cholesterol, it's not an essential nutrient like some other things are. However, foods that contain cholesterol contain a lot of other things that are very, very important to you that are critical nutrients. Cholesterol is associated for example with choline, all the fat-soluble vitamins – vitamin A, vitamin D, vitamin E, vitamin K, zinc, iron.

DM: So it's a marker. You may not necessarily need the cholesterol but you need the other micronutrients that are associated with it in the foods that contain them.

DS: You absolutely do. And you need them in association with cholesterol in order for them to be properly digested. So you can't just take a pill for one of these things. It's not going to work.

The other thing is your liver can make cholesterol but it takes a lot of effort. It's a 25-30 step process, very complex and you require substrate of course. The liver has a lot of functions. So making cholesterol is just one of the things it does. If you're eating a high fructose diet which most people in America are, one of the things the liver is going to have to do is to turn that fructose into fat. I'm sure you've read or seen the videos of Dr. Lustig.

DM: Yes.

DS: Lustig from U.C. San Francisco.

DM: He's a pediatric endocrinologist.

DS: I was mesmerized. I watched his video. I couldn't stop watching it. I don't watch that many videos. I'm very delighted when I see someone else who is thinking along the same lines I am and articulating it so well.

So the fructose goes straight to the liver. The liver gets right on the task of converting it to fat and then it has to store the fat and it needs cholesterol to store the fat but it can't make cholesterol while it's processing fructose. It's got glucose in fact. Insulin suppresses the fat system. The fat system is basically shut down in the presence of insulin.

So when there is high glucose in the blood, the liver is kind of caught in a hard place because it can't make the cholesterol it needs to store the fat that it's producing from the fructose and things get behind. I think in many cases, people are facing a cholesterol deficiency because they don't have it in the diet, because the liver is working overtime on other things.

The other problem that's really huge is the cholesterol sulfate which I don't know if we should switch to that topic at this point.

DM: We'll go in to the more basic before we go to cholesterol sulfate because this is going to be a long complex discussion. There are so many areas that we want to go into. Just finishing up on the cholesterol issue, the recommended dietary allowances in the United States are about 1000 mg or so?

DS: I don't know the number actually. I just know there is an upper limit.

DM: Yes because you go over it and supposed you're getting too much but do you have any recommendations for an optimal amount to take?

DS: I actually think it's hard to get too much especially in the American diet.

DM: You almost can't overdose.

DS: Yeah. Eggs are a marvelous food, egg yolk in particular. It's a crime when people throw away the yolk and make egg white omelets.

DM: For my breakfast everyday I throw away the white and have four egg yolks.

DS: There you go. That's exactly the thing you should be doing. Egg yolk is an incredible food. It's also quite economical. I think there is no reason why we should not be eating more eggs. Eggs of course have sulfur as well. As you know, that's our topic, sulfur.

DM: Sulfur, at least regular chemical sulfur is yellow.

DS: Yes.

DM: If you know from chemistry. Is that one of the reasons why the yellow color for the egg yolk?

DS: I don't know but I would guess that's quite likely a possibility.

DM: You've discussed how you transitioned. Was there any pivotal personal stimulus that caused you to make this transition?

DS: Yes there was. Of course there was this autism event which happened. We talked about this earlier, I had a best friend at the time, 30 years ago, who had a son who was – he got a DPT shot and then he had a high fever when he got the shot and a week later he had a seizure and then sometime later he was diagnosed with autism.

At the same time, Barbara Loe Fisher had written this book called *DPT: A Shot in the Dark*. It had come up quite recently. I read that book through. I had a son who was three years old at the time ready for his booster shot and I was worried. I went to the doctor, I said, "I don't want the Pertussin just give him the DT." I was afraid I would have some flak. I was very happy that the doctor said, "No problem. I know the problem with the P. We're going to leave it out." So he just got the DT shot.

The son of my friend is basically institutionalized. So this cued me in to that. But I also knew that cholesterol from my biology and my nutritional studies as an undergraduate, I knew that cholesterol was incredibly important to the brain. Twenty five percent of the cholesterol in the body is in the brain. The brain has only 2% of the body's weight. So you can see that it's definitely enriched in cholesterol.

The cholesterol is absolutely essential in the brain for neuron transport. When the brain is deficient in cholesterol, you have a hard time thinking. I suspected from early on, from 30 years ago, already they were talking about low-fat diet and I never bought into it. I have never eaten low fat diet. I have never bought a low fat product.

DM: You're one of the rare people because many experts I know who hold the position that we do, we're fooled by that. I was one of them.

DS: I don't blame you. It was so strong.

DM: I was totally fooled. I did low fat. I was so behind it. The science supposedly was there. You're the only person I could think of that didn't get caught up on that.

DS: I know. You can see that at this point when people are starting to question the low fat diet, I'm ready because I have always embraced it. I always ate butter. I never ate margarine. I never drank low fat milk. I loved dairy and every dairy product I consumed is high fat including I think high fat yoghurt which is hard to find.

DM: You have to make it yourself.

DS: Yeah, I know. And sour cream which I love is a very healthy food because it has both the fat and the lactate. Lactate is also a very, very interesting fuel because it's not sugar.

[----- 10:00 -----]

Sugar has a lot of bad issues. It has a negative charge, lactate. So it's very interesting that it carries its own negative charge. As we'll get to later, negative charged particles in the blood are very, very important to the blood's colloidal stability. This I think is a crucial thing that's happening to people as they get older. They lose the colloidal stability in the blood and they start to get into serious problems with blood clots and hemorrhages because of that.

DM: It's sort of an electron deficiency syndrome.

DS: Yes.

DM: EDS you could call it.

DS: I like that. That's a very good term.

DM: What sort of epiphany did you have about sulfur?

DS: You asked me the question which I didn't really answer. I went to the 30 years ago but there was also an episode four years ago when my husband was diagnosed with cardiovascular disease. They found a blocked artery and they put in a stent and then they put him on a high dose of Lipitor 80 mg, four times the normal dosage. His cholesterol level was very good before. Of course the Lipitor drove it down to ridiculously low values not seen in nature. Of course he also had some side effects as you might imagine.

I started studying statins. I started furiously studying everything I could find out about cholesterol and statins. I knew it was wrong. I knew this could not be right. I had to work on him for quite a while but he did finally – of course, his doctor said, you have to take this 80 mg, absolutely no less, very firm about that. So he's facing a doctor who is advising him on the one hand and then me who is saying the exact opposite.

To his credit, I was writing articles on the web. I was doing everything I could to convince him and he did. He finally decided I was right, the doctor was wrong and he went off the statins. Of course, all the symptoms went away. Now he's very healthy – four years later. He's doing great and he doesn't take statins. His cholesterol levels are actually still very good. They're basically where they were and they have always been fine. It's not high and it's not the problem. I don't believe in fact that statins are useful for heart disease period. I can get into that later but I have a lot of things to say about statin drugs.

DM: Were you able to figure out what triggered his heart disease?

DS: Of course I started reading all kinds of things about metabolism and heart disease and all of this. I identified the problem eventually as a cholesterol deficiency problem which is extremely ironic.

DM: Interesting.

DS: Heart disease I think is a cholesterol deficiency problem and in particular a cholesterol sulfate deficiency problem. The way I figured that out was I was studying how the plaque – the information is actually completely available in the research literature. It's quite remarkable. You have to piece it together. You have to kind of solve the puzzle.

But if you read, and I give these people a lot of credit. There is a lot of really wonderful articles that are available on the web from the research journals that describe in detail metabolic processes that they're understanding intricacies of what's going on in specific cells and in specific situations.

The story with the plaque is very very clear to me. I believe I'm right. It would not make sense really for the body. I think biology is very intelligent. It has an intelligence it's remarkable. It would not make sense for the body to simply pile a bunch of crud on an artery that supplies the most crucial organ in the body which is the heart, block that artery and clog the artery. It does not make sense to do that.

The mechanism that is cardiovascular disease is actually a factory to produce cholesterol sulfate. The macrophages in the plaque take up LDL, the small dense LDL particles that have been damaged by sugar so that these particles are in the blood. The liver cannot take them back because the receptor can't receive them because they are gummed with sugar basically. So they're stuck floating in the body. Somebody needs to get rid of them.

Those macrophages in the plaque do a heroic job in taking that gummed up LDL out of the blood circulation carefully extracting the cholesterol from it to save it – the cholesterol is important – and then exporting the cholesterol into HDL – HDL A1 in

particular. The macrophages in the plaque do this. So now the cholesterol has been transported into HDL A1. That's the good guy, right (HDL).

The platelets in the plaque take in HDL A1 cholesterol and they won't take anything else. The LDL, they can't touch it. HDL A1 cholesterol, somehow it's like a signature that it's healthy cholesterol. They take in sulfate and they produce cholesterol sulfate in the plaque. The sulfate actually comes from homocysteine. Elevated homocysteine is another risk factor for heart disease.

DM: That was developed by a Harvard physician who figured that out.

DS: Yeah. Homocysteine is a source of sulfate. It also involves Hb. You have to consume energy to produce sulfate from homocysteine and the red blood cells actually supply the ATP to the plaque. So everything is there and the intent is to produce cholesterol sulfate and it's done in the arteries feeding the heart because it's the heart that needs the cholesterol sulfate. If you don't do it, what you end up with is heart failure.

I can tell you that in the 10 years since statins were first introduced from 1980 to 1990, the incidence of heart failure doubled. Right now, heart failure has beat out cardiovascular disease as the number one cause of death in America.

DM: When did that transition occur?

DS: I don't know but I read that it's true today.

DM: It's interesting.

DS: It just kept on going up along with the increased use of statins. It is very clear to me that statins are causing the heart failure. I can give you all the reasons why. Of course you know about coenzyme Q10 and that's part of it. Statins not only interfere with cholesterol synthesis but they basically interfere with an early step in the mevalonate pathway. And that mevalonate pathway is the central pathway for all the sterols, steroid management in the body.

All the sterol products; cholesterol, vitamin D – vitamin D is actually very, very similar to cholesterol and it's produced from cholesterol in the skin. And then you have all the sex hormones – estrogen and testosterone, all of those and then you have cortisone. You have the dolichols which are involved in keeping the membranes inside the cells healthy. You have the Coenzyme Q10 which is critical to the energy generation in the Krebs cycle in the cell.

All of these products of this pathway (mevalonate pathway) are messed up by statins. I don't personally understand why anyone would think that was something that would be worth taking. Here we are with tens of millions of people feeling convinced that they have to take their statin drug to keep their LDL under control.

DM: I always thought that there was one small subset of people who have the genetic condition familial hypercholesterolemia where they have cholesterol levels in excess of 330-350 because of an (indiscernible 17:16).

DS: Right. That's true.

DM: Do you think that there is an indication that they would benefit from statin drugs?

DS: If I were one of them I would not take a statin.

DM: Really? What are your reasons for that?

DS: I just think that the drug is far too destructive. I cannot believe that something that interferes with something that important in biology could possibly be a good idea even in that case.

DM: That was my only exception but it still is less than 1 in 1000 people taking statins.

DS: It's a very tiny piece of the population. I just feel the drug is so toxic that it can't even be good for them. That's my personal opinion.

DM: You're probably right. From that understanding of the cholesterol sulfate is how you got into the broader picture of sulfur because it has far additional implications other than heart disease but perhaps you can continue to expand on the heart disease implication.

DS: I had a few epiphanies along my research path because here and there I would get a paper that would suddenly enlighten me and then it would take me down an entire new direction. The fact that the platelets, they were clearly very happy when they saw cholesterol sulfate and when they didn't, they were unhappy. So it was clear that the platelets needed cholesterol sulfate in the plaque to be happy.

And then I started looking in. I found a wonderful article by a guy named Strott. It was called *Cholesterol Sulfate in Human Physiology: What's it all about?* A fascinating article. Cholesterol sulfate is a very overlooked molecule. There are not that many people doing research on it.

DM: Do we have an assay for that? There is not a blood test for it?

DS: There is but we don't do it. I think there are some easy experiments that could be done measuring people's cholesterol sulfate level with reference to how much sunlight exposure they get.

This is where I got into another idea. I was sort of trying to figure out where this cholesterol sulfate came from otherwise. The statin attitude is, okay you've got high

LDL – high LDL is correlated with heart disease. We've got a drug that can knock that LDL down and then voila, you're going to be happy.

My attitude is, you've got high LDL that LDL is needed for something. What it's needed for is to produce cholesterol sulfate to supply the heart and probably also the brain by the way because you get blocked arteries feeding the brain as well. How can you produce that cholesterol sulfate some other way in order that the cardiovascular disease does not have to be there? That's my thinking. What is the way that cholesterol sulfate is normally produced?

When you read something like Strott's article you will find out that the skin produces huge amounts of cholesterol sulfate. It's very high concentration in a healthy skin in the epidermis and in the outer layer. That cholesterol sulfate in the skin is very important for keeping microbes out and for keeping water in among many other things but it basically provides a healthy barrier to the world in the skin.

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DM: Does some of it get transferred into the blood?

DS: Exactly. This article by Strott said we're not sure where it comes from in the blood but probably the skin provides a large part of what's in the blood. Vitamin D is produced in the skin and it's sulfated. This is something very few people realize. The vitamin D that you produce in your skin goes into your blood as vitamin D sulfate.

DM: Interesting.

DS: I think it's very, very important. When you take a vitamin D pill it's not sulfated.

DM: Because for the longest time and to this day, my consistent recommendation is on the importance of vitamin D is to first get it from the sun. That's the number one recommendation. Obviously, a large percentage of the population cannot do that in the winter at least in North America.

My second recommendation is to use a safe tanning bed which more closely approximates the sun.

DS: I agree with you.

DM: If that's still not an option then to swallow the vitamin D orally but that is the last choice which is probably better than not taking any but still not as good as the sun.

DS: Yeah absolutely.

DM: Just from a theoretical perspective it made sense but I didn't understand the science behind it but it sounds to be one of first good explanations as to why that is true.

DS: It turns out there is a food that contains vitamin D sulfate naturally and that food is raw milk.

DM: Interesting. Of course.

DS: Very interesting. And of course our government is trying very hard…

DM: Would it be raw milk products too like…?

DS: I think so. I don't know if processing, you know, what happens to it.

DM: Like the butter or the yoghurt or kefir.

DS: I don't know for sure but I know raw milk contains vitamin D sulfate. I think it's absolutely essential for the baby. This is also something extremely interesting. I'm going to get off on a little tangent here with the sulfate because this is something I only discovered recently. I was really thrilled to discover this.

A woman has about 1.5 – there is a unit they use – but 1.5 units of cholesterol sulfate normally in her blood. When she gets pregnant, this number starts going up and throughout the pregnancy it rises in her blood. But more than that cholesterol sulfate accumulates in the villi in the placenta that sort of hook up with the baby's blood supply. This is where the nutrients are transferred from the placenta to the baby.

The cholesterol sulfate rises tremendously in those villi over the course of the pregnancy going to levels like 24. So 1.5 to 24 – that's hugely more cholesterol sulfate in those villi towards the end of the pregnancy and then when the baby is born, colostrum contains a lot of sulfur even more than milk. Mother's milk contains sulfur as well. There is a very strong attempt to get sulfur to the baby right around the time it's born but more than that cholesterol.

The thing that is really special about cholesterol sulfate is that it can travel freely in the blood. It's water soluble. It's actually soluble in both water and fat. Cholesterol has to be packaged up inside LDL in order to be transported.

DM: The sulfate attachment makes it water soluble.

DS: Sulfate is what makes it water soluble and that is true for all the sterols or at least many of them. I have certainly found it to be true for estrogen, for vitamin D so all of these things and even things like resveratrol goes into the blood sulfated.

DM: I didn't realize that the vitamin D was sulfated. Of course the vitamin D that is formed in the skin that gets transported is not really the active form. It gets converted by the liver and the kidney. But is this sulfur still contained into the active form?

DS: It's interesting with sulfate because sulfate actually inactivates vitamin D. The sulfated form of vitamin D does not work for calcium transport which I find very, very intriguing. And in fact, I think it's the sulfated form for vitamin D that offers the protection from cancer. It strengthens your immune system. It protects you from cardiovascular disease. You know how they say vitamin D does all these things.

DM: Sure absolutely.

DS: It's good for your brain. It helps depression. I think all of those effects of vitamin D are effects of vitamin D sulfate.

DM: And your suspicion is that the simple oral non-sulfated form will not provide the same benefits.

DS: And cannot get there. I read that it cannot be converted to vitamin D sulfate. I was stunned to read that.

DM: That is an amazing point.

DS: Yeah. So you have to get the sulfated form in the skin. And then the other thing that's really interesting with the baby is that a mother who has high cholesterol, high serum cholesterol – would you guess that her baby would have high serum cholesterol or low serum cholesterol when it's born? This is of course a loaded question.

DM: I would suspect it would be high.

DS: It's low. Can you figure out why?

DM: It's using it for synthesis of important components.

DS: It can't get through. The mother has high serum cholesterol I think because she has low serum cholesterol sulfate. I think the two go together. The way to bring down your LDL in a healthy way is to get sunlight exposure in the skin. Your skin will produce cholesterol sulfate which will then flow freely to the blood not packaged up inside LDL and therefore the liver doesn't have to make so much LDL. So the LDL goes down.

In fact, in places that are sunny have significantly – there is a complete inverse relationship between sunlight and cardiovascular disease – the more sunlight, the less cardiovascular disease. I read a lovely article which pretty much just (indiscernible 25:33) you're looking at places and the amount of sun and latitude versus cardiovascular disease, it's a straight line.

DM: The key assumption there however is that people are going out in the sun because it's certainly possible to live in tropical environments and stay inside all the time or go outside completely with your skin covered.

DS: That's right.

DM: So you don't get the benefits. It's not just the living environment, you have to be exposed to the sunlight on your exposed skin.

DS: That's right. So this thing with the baby then is that the mother who has high cholesterol, has low cholesterol sulfate, both the cholesterol and the sulfur can't get delivered to the baby and therefore the baby is born with low cholesterol. The baby is also born with fatty deposits in its arteries already, fatty deposits.

The fatty deposits are supposed to be associated with high cholesterol but this is low cholesterol plus fatty deposits. They are there I think to start this cholesterol sulfate program that's replacing the one that isn't happening because there is an anticipation that this kid has a problem and has the same problem that adults have when they get cardiovascular disease.

DM: But it's normal physiologically because that's the way healthy children are born.

DS: Children who have adequate cholesterol sulfate delivered from their mother do not have (indiscernible 26:50) fatty deposits?.

DM: I'm sorry I missed the (indiscernible 26:51).

DS: It's a consequence of the low cholesterol. It's association of low cholesterol with fatty deposits rather than high cholesterol. It's bizarre. But the high cholesterol that is associated with fatty deposits in the adult that it's causing heart disease is a solution not a cause. It's a solution.

DM: It's a complete turnaround.

DS: It's a complete turnaround. The worst thing you can do is to clobber the LDL for the heart disease because you're going to end up with heart failure.

DM: Which is just for reinforcing a common fact that I think a number of our viewers may not be aware of but one in four Americans over the age of 45 are currently on this drug therapy (statins).

DS: That is incredible.

DM: That's one in four (25%).

DS: That is so shocking. I have to say I know personally, they're prescribing to young newly wed women in their 20s who are about to start a family and they're not letting them even know. The doctor doesn't even tell them that this is class X for pregnancy like thalidomide.

DM: I did not know it was class X.

DS: So you don't even know it. It's shocking to me.

DM: It's class X? The only other class X I knew was Accutane.

DS: Thalidomide. Remember thalidomide?

DM: Or Accutane too.

DS: Thalidomide was horrible. I was a child when I started seeing those pictures.

DM: That was actually one of the good things the FDA did as a world leader.

DS: I was so proud of my country and it pains me when I think today where we have come. I remember, I was 10 years old. I was a girl and there was a woman who headed the FDA and I saw this article in like Newsweek or something and there were these babies without arms, without legs, without ears and this big article and it was heroic. This woman who headed the FDA kept the drug out of our country. I just stood tall as an American and as a female. I was so proud.

DM: It's probably one of the last good things the FDA did.

DS: I'm so frustrated today at where we've come in this whole thing. It's just amazing.

DM: It was started with good intentions as many federal agencies are. They tend to deteriorate over time as they had this merger of corporate influences that really misdirect their initial intentions.

DS: It's gotten to the point where the FDA is basically as I see it owned by the drug companies because a lot of their funding they get from the drug companies. It's in their interest to please the person who gives them money. It's an extremely broken system right now I feel.

DM: That has resulted in one in four Americans…

DS: On statins.

DM: Actively being encouraged by the media, by almost every health expert out there.

DS: It's amazing. I have friends and they have a whole bunch of problems with their health and every one of those problems I happen to know is a side effect of statin because I have read so much about statins and I have even studied actually statins. I have papers that I'm going to be presenting at conferences, two papers.

This is actually wonderful because it's blending my real work which is building spoken dialog systems with this sidekick thing which is going to become my fulltime job in the future. I'm working towards that goal. So the beginning thing is to build these systems which are spoken dialog systems that provide access to information on the web. What I did was I got a whole bunch of statin drug reviews by patients.

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You can grab these from the web. They are on places like Web MD. I mean, all these sites that have drug reviews of side effects of experiences with all the different drugs people might be taking.

DM: So these are reports that patients have and they just compile them?

DS: It's very much grassroots patient provided reports.

DM: Web MD facilitates that? That's surprising.

DS: Yeah. There 's also PatientsLikeUs…

DM: Because they are really sponsored by the drug companies.

DS: I know. They provide an opportunity for people to just fill out their experience with the drug and sometimes they'll say it worked great and I'm very happy. So every drug has all these reports and you can just grab them from the web and you can process them using natural language techniques.

There is a straightforward mathematical formula you can use to figure out by looking at word frequencies. If a certain word shows up a hundred times when people are talking about this drug and only two times when they're talking about that drug then you can guess that this drug probably causes that side effect. You can actually have a specific measure of the likelihood that this distribution would have occurred by chance.

DM: Is this something you figured out or is it something you learned…?

DS: That's standard – I mean, I know it because it's standard stuff in my field. I'm just applying it to a very new domain. No one else that I'm aware of has actually applied it to this domain.

DM: That's a very interesting innovation.

DS: It's very, very useful and it's terrifying actually what you find out about statin drugs by doing this. My papers talk about it.

DM: What have you learned? If you can share that with us now…

DS: Muscle pain and weakness which are known side effects huge, you know, 0.00000…several zeros likelihood of this distribution occurring by chance. What we did is we took all the pile of statin reviews like 8000 of them and then we sampled 8000 other reviews distributed in the same age.

It was nice because the reviews all tell you how old the person is so you can sample from this large, you know, 100,000 reviews of all different drugs and sample a population that has the same age distribution as you're seeing in the statin drugs because you wouldn't want to be comparing children with old people. And then you can just look at the words and see which ones come out much more commonly on the statin side. So muscle pain and weakness are hugely more common on the statin side.

But also things like ALS which is Lou Gehrig's disease, Parkinson's disease, neuropathy, diabetes, arthritis, of course cognitive problems. All of these things are statistically significantly more likely and in many cases, strongly statistically significantly more likely with the statin drugs than with this collection of all of these other drugs. These I think are all side effects of statins. It's very, very disturbing in my view.

Of course ALS, I mean, is also – other people have written about statins causing ALS. I'm not the only person who has. In fact all of these things, there are articles about diabetes and statins, you can find these in the obscure literature of course.

DM: The diabetes connection is actually a relatively recent observation.

DS: There are a couple of recent papers that I am aware of that talk specifically about statins causing diabetes.

DM: Which is surprising because it really wasn't known (indiscernible 33:02)

DS: Alzheimer's of course has a very interesting story with statins. One of the things I find is I think the industry intentionally tries to promote the concept that their drug protects from something when they I'm guessing think it does the opposite. They want to prime you to think first of all that it protects and then finally you found out it doesn't actually protect after all. Rather than thinking, maybe it actually causes it.

Alzheimer's is very interesting because early on they pushed hard. Newsweek had that article saying how isn't this great even in addition to lowering your cholesterol, you will also protect yourself from Alzheimer's. Now there just has recently come out a placebo controlled study – and I'm sure they tried hard to get the drug to behave itself in Alzheimer's and they found that the treatment group had worse outcome than the non-treatment group – increased accelerated mental decline in the people who were taking the statins.

DM: Just a question I had on some of the statins, the studies suggest that for people with heart disease that there may be another benefit from statins; this anti-inflammatory,

anti-thrombotic component which may actually be beneficial not really (indiscernible 34:16). I'm wondering what your comments or views on that are.

DS: Yes, I have read several articles along those lines and that's kind of become I think almost accepted even by some of the mainstream researchers that it's the anti-inflammatory effect that is offering the protection that you observe. For the men in their 50s carefully controlled designs they can show – and they have numbers like 30% which sounds really good, 30% decrease in the incidence of heart attacks. This is men in their 50s and men in their 50s don't have many heart attacks. So in terms of the absolute numbers it's actually very, very small.

DM: Right. That's a major sort of play on words that they do, the difference between absolute and relative risk reduction which makes it appear far greater impact than it really is.

DS: Absolutely the case. In fact it would take 60 men in their 50s to take a statin drug for four or five years in order for one of those 60 men to get rid of one heart attack and it might even be a very small heart attack that doesn't really matter and everybody else would have no benefit. All of those people would suffer from all the side effects that statins cause.

I think statins basically make you grow older faster. That's the way I would most easily characterize them. It's interesting some of the side effects that we found, you know, losing your hair and of course mental decline, frailty. Frailty is just huge. Statins really make your muscles weak. You can't open the pickle jar anymore. And arthritis, diabetes – these are all things that are associated with getting older.

DM: Alzheimer's

DS: And Alzheimer's of course and Parkinson's and ALS – all of these things is basically statins make you grow older faster and then you end up with heart failure. They cause heart failure is also statistically significant and then liver disease and kidney failure.

DM: Do you think that the risk for heart failure overall is increasing the total death rate even with people without heart disease that it compensates for the benefit they get from the anti-inflammatory, anti-thrombotic benefit.

DS: We go back to the anti-inflammatory – I didn't quite understand this question maybe you should say it again.

DM: There is a certain benefit from anti-inflammatory and decrease in the blood viscosity. Is that overwhelmed by the risk for heart disease that results from taking these statins? Heart failure is what I mean.

DS: Heart failure is a different syndrome altogether. That's why I think they keep talking about cardiovascular disease. They're careful to use the term.

DM: When you typically hear about the term cardiovascular disease that excludes heart failure. It's a totally different disease category.

DS: Yes, which is very convenient for them because then people aren't really realizing that the statins are causing this.

DM: That's another way to confuse people and mislead them.

DS: Absolutely.

DM: When actually in the total perspective it really should be classified as part of heart disease because it's affecting the heart.

DS: I know. It annoys me that they get by with that.

DM: It's a technicality.

DS: They also cause all this calcium build up. They get these calcified valves and things like that. Calcium is very, very important for signaling in muscles. Of course the heart is a muscle. I mean you figure if statins wreck the muscles which they do to the skeletal muscles. They absolutely wreck them. The heart is a muscle too. The only reason the heart is not wrecked as badly is because the skeletal muscles are tasked with helping out the heart.

It's interesting what happens with statins – this is actually an interesting story. It's another essay that I wrote on the web. I think even after I wrote the sulfur one. The statin drugs interfere with the liver's ability to make cholesterol. Obviously they do that. The liver needs to make cholesterol in order to store fat. It needs to store fat in order to process fructose.

Fructose of course, high fructose diet, is a huge problem. The liver can't process fructose anymore because it can't store it as fat with the statin because it can't make the cholesterol. Now somebody else has to take care of the fructose because fructose is really bad. It's much more glycating damage.

DM: I didn't realize there was another alternative for detoxifying fructose other than the liver.

DS: Yeah, there is and it's the muscle cells that will rescue the body.

DM: I did not know that.

DS: What they do is they go into anaerobic metabolism because you cannot handle fructose in the context of aerobic metabolism. You're going to get glycation damage. You're going to get oxidation damage. It could be a mess. So the muscle cells go into an aerobic mode where there is no oxygen and they take in the fructose ferociously and they skim off a tiny bit of energy from it just enough to kind of keep going and then they produce lactate.

So they basically convert the fructose into lactate and the lactate fuels the heart and the liver so the skeletal muscle cells make a heroic sacrifice in statin drug therapy in order to rescue the heart and the liver. And then the heart and liver are able to use the lactate for fuel and therefore they can stay healthy. But the muscles get completely wrecked and then you end up in a wheelchair or something like that. It's really scary I think that particular aspect of the statin drugs.

DM: Is it different from the rhabdomyolysis with the bursting…

DS: The rhabdomyolysis is because the muscles got wrecked and the hemoglobin, the myoglobin in the muscles precipitates out and the muscle falls apart and then the myoglobin gets into the blood and then the kidney has to dispose of the myoglobin. It has to get rid of all these things in the blood that you don't want there because they're going to make a mess of things and the kidney gets destroyed by the myoglobin that gums up the kidney.

DM: Because it has to filter it out.

DS: It has to filter it out and then that kills the kidney. Rhabdomyolysis is the very severe outcome of the muscle damage that happens in rare cases in statins.

[----- 40:00 -----]

DM: But in virtually everyone you had this muscle damage occurring as a result of trying to detoxify the statins.

DS: Yeah. Going back to this thing about statins and anti-inflammatory I think it's true. It's actually complicated because I have actually read articles that say both ways and depending upon the concentration of all these stuff. What they do is they mess up the cell's ability to signal to others to communicate with other cells. There is a whole communication process that goes on in the plaque orchestrating this activity of producing the cholesterol sulfate.

You need to oxidize the LDL in order for it to be taken up by the macrophages. You need these oxidizing agents to do that when you don't have enough cholesterol sulfate. The statins interfere with that so you can't. The cells basically are crippled and they can't do their job which is to produce the cholesterol sulfate and they couldn't anyway because the LDL is also clobbered. So that it's a perfect storm to decrease the

bioavailability of cholesterol sulfate to the heart which then means that the heart's deficient in cholesterol and deficient in sulfur. Those are two very bad deficiencies.

Of course there is the coenzyme Q10 which is critical for the energy generation. When the cell walls of the muscles in the heart are deficient in cholesterol then the cells start leaking potassium because the cholesterol keeps – just like the cholesterol keeps the skin barrier healthy, it also keeps the cell barrier healthy.

DM: Is it the cholesterol sulfate?

DS: Cholesterol actually. But the cholesterol sulfate delivers cholesterol. Actually cholesterol sulfate can go in to membranes 10 times as well as cholesterol. So not only is it good at moving around in the blood. It's also good at entering the membranes. I think the sulfate – I'll get to the sulfate in a moment because that's also very interesting, they (indiscernible 41:54) outside to create a negative charge around the cell which is incredibly important for the cell's health. The cholesterol in the cell membrane keeps the potassium from leaking.

This is talked about very extensively in another article that I read that was very, very interesting and I have forgotten – I'm losing the name of the author but anyway this was all about cholesterol and membranes and ion leaks. Without adequate cholesterol, the potassium leaks out and the cell has to consume a lot of energy to keep that potassium in against that gradient. So it's constantly pumping the potassium back in again.

What it can decide to do instead is let the potassium go, let some of it go and bring in calcium instead because calcium is a bigger molecule and it won't leak out. I think that's what's going on with all these calcifications. What happens is all your artery walls get calcified and your heart valves get calcified and meanwhile your bones gets leached of calcium and you end up with osteoporosis because the calcium is being stolen from the bones in order to provide it to all these cells that are deficient in cholesterol in their membranes and therefore have to replace potassium with calcium because you need to have the ions in order for the cell to be functioning at all. So there is a replacement going on.

And then once the calcium is inside the cell cytoplasm, there is much less of a calcium gradient between the cytoplasm and these internal cells – you have to get the calcium transported across the internal membranes in order to trigger a contraction. So the muscle cell in the heart becomes less able to contract as a consequence of having too much calcium in the cytoplasm and then you have the less energy generation because of the coenzyme Q10 depletion. So several ways in which…

And then also you have an increased risk of infection in the heart. That's because of the lack of the sulfate. The sulfate keeps the negative charge around the outside of the cell and the negative charge keeps the bacteria out.

DM: And this would be an infection from an organism floating in the blood (indiscernible 44:00) infection of the heart valves?

DS: Yes. All these microbes that are getting through the skin because of the lack of cholesterol sulfate there. So they get into the skin, they also get into the gut and they get into the lungs more easily because of the lack of cholesterol sulfate then they get into the blood. And then again because of the lack of sulfate, they get into the individual cells that are lining the artery wall and even penetrating into the heart muscles and that gives you things like myocarditis, heart infection, infection of the heart.

DM: Not actually inflammation but most likely inflammation from the infection.

DS: It's pretty much a bad scene.

DM: You've done a wonderful job of explaining how important and integral the sulfur is with the cholesterol in heart disease and the whole complex issue of the statin therapy. What other areas have you found sulfur to be important for in human health?

DS: One thing I would really like to cover is this idea that I discovered. First of all I was aware that sulfate was being produced in the skin. So I was looking at which cells produce cholesterol sulfate and then I was trying to figure out how does the sulfate get produced. I started studying sulfate the molecule. I was trying to figure out how could the skin produce it.

I had this thought from sulfur metabolizing bacteria and I wondered whether possibly the human might be able to do something similar to what these bacteria – these bacteria can actually live on sulfur as their source of energy. I started exploring the skin and looking for molecules that might be able to do something in terms of producing the sulfur. I was really seeking answers.

I finally figured out something really remarkable. I zeroed in on eNOS, the molecule eNOS (Endothelial Nitric Oxide Synthase). It was showing up in cells that were producing sulfate. It gave me a hint that maybe eNOS actually produces sulfate because red blood cells have eNOS. They have eNOS and it's not clear why.

I read a wonderful article – obviously the author was very puzzled. Red blood cells have this thing that produces nitric oxide. Nitric oxide would be a disaster for red blood cells because hemoglobin will bind the nitric oxide and it will be sort of like carbon monoxide. It will prevent the hemoglobin from being able to carry oxygen. So it's a really bad idea for red blood cells to make nitric oxide yet they clearly have eNOS which is the supplier of nitric oxide. Platelets have it and they also produce cholesterol sulfate.

Mast cells in the blood also have eNOS and they produce not cholesterol sulfate but they produce heparin. Heparin is the most negative molecule known to biology and very, very highly sulfated. So all three of those cell types in the blood that produce sulfate also have eNOS and then eNOS of course it was named for the endothelial

lining of the artery walls. So eNOS is all over the place in the endothelial lining. eNOS is also in the skin, in the epidermis, the keratinocytes which are the ones that do the tanning. It just seemed like eNOS was the right molecule for the job.

And then I started looking at how eNOS works and it was perfect because eNOS is an interesting molecule. It has a flavin group that actually receives sunlight and emits electrons. It's a sunlight to electron converter if you will. When it gets shined on by sunlight it emits electrons. It directs those electrons over here to a heme group and the heme group has an iron molecule and then the iron molecule attracts oxygen. So you've got oxygen coming in, I think from the air. In other words the skin is actually breathing oxygen into this eNOS…

DM: It's not just being (indiscernible 48:00) from our lungs to the blood stream.

DS: Yeah. I believe this and I think this is such a wonderful idea that I want to believe it.

DM: Passive diffusion.

DS: You know newts can breathe through the skin. So it's not like it can't happen. I think we're doing the same thing. I have a feeling it's part of why we're hairless as well because I suspect you have more access to the sun. The electrons fire at the iron molecule which has an oxygen attached to it and it produces superoxide (O2 minus).

And then conveniently and I had just remembered how happy I was when I saw this article that talked about this eNOS molecule. There's two of the eNOS that go together and they form a cavity between them and inside that cavity is a zinc molecule. The zinc molecule is going to create positive charge. Again, the (indiscernible) are like, there is this cavity, we have no clue what it's about. It doesn't have any relevance to making nitric oxide but it must do something but we don't know what it is.

Well, here is what it does. It draws in -- those superoxides go into that cavity because of the zinc and then the zinc also attracts sulfur as it turns out. They talked about it in the articles -- four sulfur molecules that are hooked to cysteines and the cysteines are highly preserved in the molecular structure of the eNOS molecule. You've got all the ingredients. You've got the sulfur. You've got the two O2 minuses. SO_4^{-2} is sulfate. That's the same as $S\text{-}O_2^- O_2^-$. So there you are. I think it's perfect.

And the other really neat thing is that sulfate is actually, if you breakdown the sulfate you will release energy which means that the sulfate is actually absorbing the energy from light so that it's a battery. I think of the skin as a battery – or solar panel you might say – taking in the sun's energy and saving it in the form of the sulfate molecule storing the energy in the sun.

DM: I have always thought that was true. I have given the analogy that plants absorb the energy from the sun through that mechanism. Obviously, they use chlorophyll and other components.

[----- 50:00 -----]

I thought that it seemed logical sense that we would have some capacity to absorb energy from the sun directly but I never heard of a molecular explanation like that. That's just fascinating.

DS: I think it's really a neat idea. I haven't read it anywhere but I have read all the pieces that make it make sense. It just seems perfect to me that that would be the reason why that cavity exists.

DM: Do you think there are significant amounts of energy that are absorbed?

DS: I do. In fact I did some calculations. So then you ask what sulfur does. I have a lot of thoughts about what sulfate does. One thing I'm quite sure of is that cholesterol sulfate is highly protective against bacterial and virus invasions. That's why sun exposure protects you from infection. It strengthens your immune system. That cholesterol sulfate is incredibly important to immunity.

I read a wonderful article from 1936. This is another one of my epiphanies. I have all these – it's such a wonderful process. I have to say the whole thing is very exhilarating when you find these articles. 1936 – and these guys did a study of starch. They were looking for things that would break down starch in different ion combinations. They tried a bunch of things. They found that the very best by far was ferrous sulfate, iron sulfate with some hydrogen peroxide. So you need again the oxidation. Hydrogen peroxide and ferrous sulfate will breakdown complex sugars into basic things that can then be easily degraded and turned into energy.

What this fascinates me with is I think the sulfate – well the macrophages when you see what's going on when they're fighting an infection – because the macrophages are heavily involved in fighting infections – so a red blood cell will trap a microbe and then it will signal and then the macrophage will actually eat the red blood cell and the microbe.

The red blood cell has the iron in the hemoglobin and then the macrophage will then start releasing nitric oxide to kill the bacterium and then what I think happens – and then this heparin goes in there which is just sulfate, tremendous amounts of sulfate and heparin that gets dumped in to the artery wall where the macrophage is trying to take down this invasive microbe. So the cell membrane of the microbe is these lipopolysaccharides. These are complex sugars.

It's likely that the human doesn't actually have enzymes to breakdown all the different complicated sugars of all the different species that might come its way. So it needs to have a non-enzymatic method to break down that cell wall. I think the non-enzymatic

method that it uses is ferrous sulfate to break down the sugars in the walls of these invasive species.

DM: And our body has its own supply of ferrous sulfate. Typically, if one is low in iron that is considered an inorganic form of supplementation, a relatively poor one because it's potentially toxic if you take it in excess. It can kill people.

DS: I know iron is very tricky. In fact iron toxicity shows up a lot. I think it's because there is not enough sulfate. It's not binding to the sulfate. I think the ferrous sulfate mechanism I think is designed for this…

DM: So we'll use it biochemically internally. So even if we have another source of iron from meat which is not ferrous sulfate…

DS: Yeah. We could turn it into ferrous sulfate. I think we do that. I think we do it in the caveolae – there are these little cavities that are in the walls of the cell wall and in the endosome where it fights off the bacteria. There is basically all this machinery inside the cell where you can contain the iron in a safe place and use it to degrade things like the cell walls of bacteria because if we don't degrade those things they're going to cause all kinds of problems because you're going to have these reactions. You get these reactions to these complex sugars.

DM: From my understanding too, I mean, iron is enormously useful. Most many, not most but certainly many pre-menopausal women and children or adolescents are deficient. But the problem when you become a post-menopausal woman or for almost all adult men is that we tend to have an excess...

DS: Yes. An excess in the wrong places.

DM: And then it tends to be counterproductive because it's a potent oxidant stress.

DS: I think that whole problem is we can't store it properly and I suspect that has to do with things like cholesterol deficiency in the cell but I still need to do some more research to figure out the details there.

DM: So the actual levels reflected by ferritin levels may be elevated because of sulfur deficiency?

DS: Yeah. Sulfur deficiency, sulfate deficiency and cholesterol deficiency. So these caveolae – I mentioned the caveolae very briefly but they are these very interesting little caves – caveolae means caves – in various spots around the cell wall. They are sort of contained regions where I think reactions can take place safely. It's sort of like a fireplace. I think of it as a fireplace. I think this ferrous sulfate actually helps to breaks down sugar and keep the sugar from being toxic in these caveolae. So if we don't have enough…

DM: Are these sugar polymers or single monosaccharides?

DS: I don't know. Again, I'm getting into sort of bold territory and some speculative ideas. I'm quite fascinated by the fact that ferrous sulfate is a very potent molecule for breaking down sugars.

DM: It makes sense because it's a non-specific, non-enzymatic way to (indiscernible 55:20)

DS: Yeah, non-enzymatic which is crucial for all these external organisms that we don't have the enzymes to break them down and they'll become toxic. We'll get these sort of immune reactions if we don't clean them out, if you can't clean them out. I think that's a crucial thing and then the sulfate also is absolutely crucial as I said for the negative charge. All the red blood cells have a negative charge around them which makes them repel each other. So if they didn't have a negative charge they would glom together.

DM: That's called rouleaux. You see them in a microscope. They are a stack of red blood cells.

DS: Yes. It's beautiful isn't it? That's lovely.

DM: Well, it's a bad thing to have but when you see it it's a sign of problems. It's most likely some type of electron deficiency which could be an artifact of sulfur deficiency.

DS: That's what I think because I think sulfate is an incredibly super molecule for giving you the negative charge. And then you have all the cells in the body. You have these extracellular matrix proteins. They have lots of complicated names. They are basically fats and sugars, complex sugars and sulfate. The sulfate part is very important. I think it gets depleted as you age because of this inadequate supply of cholesterol sulfate.

Eventually, you have to start getting sulfur from wherever you can get it. One of the places you can get it from is the collagen that's in your joints. Collagen has all these disulfide bonds that give it its strength. So if you start stealing sulfur from collagen…

DM: The chondroitin sulfate.

DS: Yeah, chondroitin sulfate that's right, chondroitin sulfate, heparin sulfate, keratin sulfate. All of those sulfated proteoglycans are in this extracellular matrix. It's actually fun. I think it's just like the glial cells in the brain.

I remember reading a long time ago, first reading about the glial cells and how they were just like a cushion and then I said, no, that can't be true. It's got to be more important that. It turns out that they are absolutely essential for all kinds of things in the brain.

I think the same is true of these extracellular matrix proteins that people aren't really paying a lot of attention to them but they actually have a very, very important role in keeping the cell healthy.

DM: And when these proteins are damaged or deficient in sulfur and they start to diminish then one of the side effects, my understanding, is that it can lead to arthritis.

DS: That's right. I think that's because you're depleting your collagen from your joints. That's what's causing the arthritis to (indiscernible 57:42).

DM: To supply this sulfur.

DS: Yeah, to supply the sulfur and then the collagen because it is in fact degrading the collagen. That's what's happening when you look at the arthritis. It's degrading it to get at the sulfur I suspect.

DM: Is this sort of a reversible process?

DS: I would hope so. Certainly, if I had arthritis I would be spending a lot of time soaking in hot springs, you know, they have these sulfur hot springs.

DM: Sure.

DS: You can get magnesium sulfate. I recommend that as a source of just sulfate.

DM: So it's possible to absorb this passively through the skin?

DS: Yes it is. I think that's a good therapy to help. And of course getting – when you make the sulfate in the skin it's possible that you're even bringing the sulfur in from the air which I find also a wonderful idea. Oxygen is in the air and also hydrogen sulfide and so when your skin is making sulfate, it could be that it's getting the sulfur from the air.

And then this also makes an interesting point that the Clean Air Act which has removed sulfur from the air is working against that so that the air is depleted in sulfur. And also water, filtering watering removes the sulfur from the water. We're conspiring to reduce our sulfur supply.

DM: My personal supply of water is from a well so I don't have a municipal water supply. We clearly have some sulfur containing bacteria in the well. So it produces hydrogen sulfide which is the rotten egg smell. It becomes somewhat offensive. The typical strategy is to chlorinate the well or use some type of chlorine injection system to remove the hydrogen sulfide. I'm wondering if you can comment on the wisdom of that and if there is a benefit to drinking hydrogen sulfide in the water from the bacteria.

DS: I think basically hydrogen sulfide you're basically going to lose it because it's a gas. It's just going to disappear. You need it fixated as a sulfate or something.

DM: So you're not going to get any from the water supply even though it's in there.

DS: Yeah. Once it's hydrogen sulfide you're stuck. I think in fact the filtration process produces hydrogen sulfide and extracts the sulfate therefore from it -- loses the sulfate in the filtering and ends up removing the sulfur. In fact, hard water – it's very clear that people who drink hard water have on average a decreased risk of cardiovascular disease compared to people who drink soft water.

[----- 1:00:00 -----]

It's something people haven't been able to figure out why.

DM: Do you have any speculations?

DS: I think it's the sulfur. The softening process removes the sulfur.

So you can get sulfur from water, you can get it from air potentially through the hydrogen sulfide that comes in and gets fixated in the sulfate. You can get it from vegetables, the sulfate, if the vegetables are grown in soil that contains adequate sulfate. I think that sulfur is overlooked – our modern farming methods tend to remove the sulfur from the soil and then we put in all these nitrates and phosphates…

DM: The commercial agriculture. Organic farming practices would tend to increase it.

DS: Organic is great.

DM: Obviously the normal strategy is to use a food based approach rather than taking a supplemental form. If one was compelled of the evidence and the research and literature that you're reviewing of the importance of sulfur and improving it in our system, what is the best way to increase sulfur?

DS: I believe the best way is eggs and meat and seafood.

DM: What type of quantities are we looking at?

DS: I believe in eating a lot. Actually, I have adjusted my diet in the last few years ever since my husband had his cardiovascular issues towards less and less carbs. I already was very happy to eat fats and cholesterol but I have been conscientiously avoiding carbs in the last few years particularly of course empty carbs; flour, sugar, noodles, pasta, rice, basically eliminate those from your diet. I feel that's a very important thing to do to keep down the carbs.

DM: Does that have an influence with the sulfur?

DS: I know you asked me that question a lot, how do I answer that?

DM: They are important for a number of reasons. We can go on for a long series of time to the importance of lowering your carbs in general or insulin.

DS: Having inadequate sulfur actually I think leads to an inability to bring sugar into the muscle cells.

DM: So there is a connection with sulfur and diabetes?

DS: Yeah. So if you don't have enough sulfur, you can't process the sugars in the muscle cells. This gets into the whole issue of the fat cells playing a role in converting the sugar to fat in order to supply the muscle cells with fat which is another thing that I believe. I think the reason why you get fat is because the muscle cells can't handle sugar and the fat cells have to play this role of translating the sugar into fat. You asked me a question, I don't think I answered it.

DM: I'm just trying to get a perspective quantity wise because you had mentioned that when you cut down your carbs….

DS: Well that's why I'm saying eat a lot. So by virtue of cutting down the carbs, you end up increasing those foods that contain sulfur. I try to eat a lot of high protein, high fat foods and also animal products and high saturated fat as opposed to unsaturated fat. Saturated fats are considered unhealthy. Again, I think that's incorrect. Of course coconut is a vegetable fat that's also very, very healthy.

DM: But there is not much sulfur in coconut oil is there?

DS: Coconut has sulfur.

DM: It does.

DS: Yes.

DM: That is surprising.

DS: Olive oil has sulfur too.

DM: Interesting.

DS: But another interesting thing is that the Mediterranean diet for example which is very popular and probably quite healthy but I believe the Mediterranean diet only really works in the Mediterranean.

DM: Because of the soil.

DS: Yeah, the sulfur.

DM: The foods are grown in (indiscernible 1:03:31) sulfur.

DS: The Mediterranean actually has a lot of sulfur. It's interesting. Greece and Italy are major world suppliers of sulfur. They also have very low cardiovascular disease.

DM: Interesting.

DS: It's very interesting in Greece there are these two islands; one is Crete and one is Skopelos. Crete is in the middle of the Mediterranean Sea and it sits on top of the ridge crest and the ridge crest has all this basalt rock. Basalt is a very good source of sulfur. Skopelos is the top of a limestone mountain. So it's all limestone. Crete and Skopelos have very similar climate, very similar diet. Skopelos has five times the risk of heart disease compared to Crete. The difference is sulfur.

DM: It's a pretty strong epidemiological support for your hypothesis.

DS: Yeah. Iceland is a very healthy place to live. I think you know that.

DM: Sure.

DS: Very, very low infant mortality, under five mortality very, very low, cardiovascular disease. They have a lot of good things and tons of sulfur because they're on top of the ridge crest of the mid-Atlantic Ocean. It's a healthy place to be on top of an island that is a ridge crest of an ocean because then you're going to get a lot of basalt rock.

Also for example in the U.S. the lowest obesity rates among children is in Oregon. Oregon has that whole cascade mountain chain that's all basalt rock. That's another indicator. I feel like there is a pretty strong correlation between sulfur…

DM: I want to get back to the obesity link but I still want to finish up the quantity of sulfur. Just to get an idea, generally, higher amounts of animal fats and proteins. For eggs, if someone wasn't going to – for whatever chose to minimize their meat intake. What number of eggs would you suggest?

DS: I don't think there is an upper limit. I think eggs are very healthy.

DM: How about a minimum level?

DS: I guess one a day would be. I would encourage peopleto do that.

DM: What is sort of a window or range that would be enough to shoot for, I mean, 6, 10, 12, 4?

DS: I don't eat lots and lots of eggs. I try to eat seafood actually.

DM: Are eggs a higher source than meat?

DS: One of the problems is that sulfur doesn't have a minimum daily requirement which is just shocking to me. As a consequence, it's very hard to find out which foods contain it. I'm very frustrated by that. I'm guessing because of cysteine – sulfur is contained…

DM: In amino acids, right?

DS: Yeah. Sulfur containing amino acids are essential amino acids; cysteine and methionine. Those are more heavily populated in animal products than in plants. I think those are a very good source of sulfur found in meat and seafood. I think actually oysters are a fabulous food. They contain cholesterol, sulfur, zinc. They have lots of zinc. Zinc is important because remember it's in the cavity. I think a zinc deficiency may also be playing a role.

DM: This would lead one to believe that someone choosing a vegetarian or even worse a vegan dietary choice for whatever reason may be at risk for developing a severe sulfur deficiency as most of these are animal based sources.

DS: I would absolutely agree with you. I'm quite disturbed by this kind of veganism that seems to be catching on right now. I think it's definitely a very bad choice.

DM: So if someone chose to do that, you know, certainly including animal products – I guess there is different versions of vegetarianism and certainly one could include eggs as part of that and fish. That would be sort of the next step up at least to have some eggs and fish to prevent that.

DS: I think seafood is incredibly healthy. In fact, there is a theory that humans evolved on the seashore. I think it has a lot of merit. Elaine Morgan was a woman in Britain. She's been writing books every 10 years that advocate this notion of the seashore origin of the human species which I find really fascinating. I suspect that she's right and you see a lot of course early man on the seashore with the shells and everything.

DM: And the omega-3 fats in the brain.

DS: I think that actually if you look back at our original diet or at least the diet when we became human I suspect that it was extremely high in seafood. Clams, oysters, crabs, lobsters, and seaweed itself is also very healthy as a plant. I think that if you could do that kind of a diet, I think it would probably be very healthy.

DM: For those of us who may not be able to consume as much sulfur and it sounds like it's even really difficult to identify the sulfur in the diet because it isn't really well quantified. So if we want to give another boost, I mean, the basic premise is that it's almost always better to get nutrients from food, whole foods, unprocessed foods.

DS: Yes. I agree with that.

DM: That's the basis. But say for someone for ethical or spiritual reasons is choosing a vegan lifestyle and they still aren't convinced of the benefits of sulfur, are there any supplemental forms that you have found to be useful or are we entering the same realm and dilemma that you referenced earlier with vitamin D? While vitamin D is great there is research to support it but it's only when you get it naturally that there seems to be the benefit. When you take it orally, it's maybe not so beneficial.

DS: Yeah. I don't take oral supplements for sulfur. I guess there is chondroitin sulfate which perhaps because of the sulfate. I look for things that have sulfur in them and chondroitin sulfate could be a possibility but I don't know. I haven't taken it. I probably wouldn't take it. I think soaking in magnesium sulfate baths.

DM: So magnesium sulfate would be one that you would consider.

DS: That's how you simulate a sulfur hot spring by just buying a big carton of Epsom salts and toss them in the water.

DM: Is it a pound, 2 lbs, 10 lbs? How long would you stay in the water?

DS: I actually do Epsom salts. It's like the only thing I use besides just natural foods. I just sprinkle a little actually in the bath maybe a couple of times a week type of thing. I would just soak in it in a hot bath.

DM: A few tablespoons, a few ounces?

DS: It's probably a quarter of a cup maybe.

DM: So a few ounces.

DS: Which is less than what they – because you can use it to treat aching muscles or something. I don't know what that is but it's more than that. I use less than what they tell you on the box.

DM: Do you use it on a daily basis?

DS: Twice a week in hot water and soak in it.

DM: So the recommendation of these Epsom salts in a tub for arthritis most likely for the sulfur.

DS: Arthritis, it's exactly right because it's resupplying the sulfur which then means you don't have to get the sulfur out of the joints, the collagen. I think it's completely obvious why. It would protect you from arthritis.

[------ 1:10:00 -----]

DM: That's your best recommendation supplemental because there are other forms like MSM.

DS: There is MSM and I don't know. We talked about that earlier but I don't know.

DM: So it may benefit, you just haven't studied it.

DS: Yeah. I don't know how to find out either which is a little bit frustrating. I could be a guinea pig and try it. It might.

DM: Because there seems to be some compelling – certainly a lot of people promote it and they wouldn't promote it without some basis. I'm wondering have you looked at the reasons that they're recommending it and just not found that the science is there?

DS: I have not done the proper study because I tend to not like avoid…

DM: Avoid supplements.

DS: Yeah. But you should actually look into it because I think if you could determine scientifically, be convinced, I think then it would be very compelling. Certainly, we need sulfur. I think our whole modern lifestyle has kind of conspired against it and then of course there is nobody advocating sulfur in the (indiscernible 1:11:07)

DM: Well certainly it's in the minority. The closest would be those who recommend MSM for sulfur.

DS: But I mean the government, the nutritional experts…

DM: There is no conventional health expert. There is none. There is just some of the people in the natural health world. One of the other benefits of sulfur sufficiency was the relative resistance to obesity. That doesn't seem an obvious connection. I'm wondering if you can explain…

DS: That's this thing I explained about the sugar because I think that if you don't have enough sulfur, you don't get enough cholesterol in your cell walls, you don't have enough of these caveolae and the caveolae are where the sugar comes in. The sugar only comes in through the caveolae into the cell. So the insulin based sugar transport into the cell is derailed if there isn't enough cholesterol because there isn't enough sulfur.

DM: That is interesting. It's fascinating.

DS: And then the muscle cell has to revert to using fat. That's why the fat cell has to convert the sugar into fat and store it as fat so that it can fuel the muscle cell. I think that's the whole story with that. I think the fat cells also store toxins because there is various toxins that you can't get rid of them. Sulfur is actually very important for getting rid of toxins.

This gets into actually vaccines because one of the toxins in vaccines that I think is a very serious problem is aluminum. Aluminum sulfate is a molecule that is used in chemistry to precipitate proteins out.

DM: Is it as an adjuvant too? Is that where they use it?

DS: Aluminum is an adjuvant in the vaccine and it's an adjuvant because – I guess you probably know all about the vaccine situation. I have just been getting on board with vaccines and I've done a lot of studying of vaccines in the last few months. I'm deeply disturbed by what I'm seeing.

They add the aluminum in order to get the child to react enough because if the child has a strong immune system, and you just give them a vaccine of some dead microbe, the body is just going to slough it off. It's like okay, this is no big deal. I'm not going to even bother. And they won't develop a memory and they won't actually be resistant to the disease.

So they have to put something else in the vaccine to make you react more. And they have discovered that aluminum works really well for that purpose. They have been increasing the amount of aluminum that shows up in vaccines quite systematically over the last 20 years particularly over the last 10 years. Of course also they have been increasing the number of vaccines that children receive as well.

DM: There are a number of experts who believe that aluminum is actually far more dangerous than the mercury.

DS: It's absolutely the case.

DM: Which is in the form I believe it's ethyl mercury which is far more toxic than methyl mercury that uses thimerosal as a preservative.

DS: I got totally into this. In fact, you remember that I did this study of all the statin drug side effects. It turns out the U.S. government provides you with a very wonderful database which is all the vaccine adverse reactions. There is a database called VAERS.

DM: The VAERS database.

DS: Vaccine Adverse Event Reporting System. It's wonderful. I got the whole set like 330,000.

DM: It's open to the public. Anyone can use it.

DS: It's terrific – 330,000 records. I have been doing the same thing with the vaccines that I did with the statins earlier. I am finding out extraordinary things. I started out of course with autism. Autism and vaccines is a huge controversial issue right now. There is this horrible story about Wakefield and how people thought, you know, the Wakefield story, where he published a paper in Lancet about the kids who had autism and then said that the vaccine was contributing. He was accused of fraud. His paper was withdrawn. His credentials were removed. He had to leave England. I think it was a mess.

Of course the whole world found out -- they made sure everybody knew about this event and then the message that got out was there is no relationship between autism and vaccines, forget it, get over it, it's done. Of course the autism community will not give up. The people think they're just so foolish they just won't give up.

The fact is they are on to something. It is very clear to me. It's really sad what happened because when you look at that statistics, I have been looking at everything – first starting with autism then moving on to aluminum which is a natural progression because I looked at the autism and I just said, let me just see how many cases they mentioned the word autism somewhere in the report, over time, starting in 1990-2010. What you see is astonishing.

There is like this kind of very low level until 2000 it skyrockets and then it kind of bubbles around but it's high the whole rest of the time, 14 times as many counts after 2000 as before 2000 of autism mentioned in the report. So something happened at 2000. So then I started searching the web to figure out what might have happened in 2000 and I found that in 1999 they removed the thimerosal because they said, you know what, it's not the mercury but…

DM: The CDC and the EPA got involved with it.

DS: They said, if you guys think it's the mercury fine. We'll get rid of the mercury just to appease you.

DM: Even though they did in a (indiscernible 1:16:00) and it's still today is in flu vaccine except for the inhaled ones.

DS: I know. They have been bringing it back in. I suspect they're bringing it back in because they know the aluminum is worse but they don't want to tell us that. This is what I think. So then…

DM: They substituted the aluminum for the thimerosal because it's also a preservative?

DS: Yeah.

DM: I didn't realize that.

DS: It's confusing because I read a lot of stuff. They did in fact put in more aluminum that's very clear at the same time as they removed the mercury. Now exactly why they did that, I don't know. Whether the mercury is also an adjuvant – the aluminum is definitely an adjuvant and the mercury is a – well the other thing that might have happened – this is a very interesting idea, they put it into individual glass vials because they couldn't have the big vial because they didn't have the mercury in there.

Glass and especially the rubber stopper have aluminum in them and if it's stored in a glass vial it can leach the aluminum out of the rubber stopper and out of the glass. It's possible that it got even contaminated with aluminum through that process. This actually happens – there is a real problem with aluminum contamination in dialysis fluids that causes dementia. I don't know if you know about all of that but it's very clear.

DM: They have aluminum binders to prevent that.

DS: It's very, very clear the aluminum is causing the dementia in the case of the dialysis. Dementia has something in common with autism I think. I looked at the symptoms before 2000 and after 2000 and I looked to see which symptoms were much more common after 2000 and there were several and they were scary. Things like seizure, high fever, death and fatigue and depression and a bunch of things that were more common after 2000. So then I could find out from the web which vaccines actually contain aluminum and which ones don't.

So I did another cut on the data for all the data, the ones that contain aluminum and the ones that don't contain aluminum. I did the same thing, looked at the symptoms and there is this set of 13 symptoms that show up extremely probably in the contained aluminum camp and in the after 2000 camp. In other words, there is a set of symptoms that are highly correlated with both after 2000 and containing aluminum which implies that the difference is the aluminum in the before and after 2000.

And then the other problem is aluminum binds with sulfate. Sulfate is needed to remove aluminum from the body. So I started studying sulfate in autistic kids and it's very clear that they are deficient in sulfur in a major way. They have only one third as much free sulfate in the blood as normal kids. Sulfate binds to the aluminum and it exports it from the body. So if you don't have enough sulfate you can't afford to do that because if you get rid of too much sulfur your blood will coagulate. You will be in deep trouble or you'll hemorrhage; one or the other.

I mean you're basically caught in a very difficult situation when you don't have a healthy colloidal suspension because you don't have enough negative charge around all the cells. So you can't afford to deplete the sulfate so instead the aluminum accumulates in the brain and in the brain it causes severe problems as is seen with dialysis.

DM: The last National Vaccine Information Center conference which I believe about two years ago in Washington D.C. they had a presenter Dr. David Ayoub I believe is his name. I actually interviewed him. His whole presentation was in the toxicity of aluminum and how it relates to autism and some of the compilations.

DS: That's perfect.

DM: We'll hopefully have a link to that and his presentation too.

DS: That's excellent.

DM: It was a fascinating interview. There is another presenter who is going to be at the Weston Price Foundation. I'm sure you're familiar with her, Dr. Natasha Campbell McBride.

DS: I heard her give a whole day seminar.

DM: She really opened up my eyes that yes the aluminum may be an issue but it may only be an issue if you have this predisposing condition which has to do with the whole gut flora.

[----- 1:20:00 -----]

DS: It's a combination.

DM: It's that combination that really predisposes them.

DS: I have been studying the effect of sulfate in the gut because it's clear autistics kids have issues with their digestive system and they have the leaky gut problem and they have the peptides, they get opioids in the brain and all of that. Sulfate is necessary. It catalyzes the synthesis of enzymes that breakdown the gluten and the casein so when there is not enough sulfate those enzymes are not working properly such that gluten and the casein don't get properly broken down and the peptides end up undigested and then the gut is leaky for the same reason that the skin is leaky because there isn't enough sulfate.

The peptides get into the blood. They make their way to get past the blood brain barrier for the same reason. In other words, all the barriers are deficient with the inadequate cholesterol sulfate. The peptides get into the brain and they cause this opioid effect like morphine in the brain of the autistic child and of anybody who has got this kind of leaky gut problem which is like a huge number of people in this country.

I mean there is huge issues with digestive system right now with Crohn's disease and the irritable bowel syndrome and GERD, you know, the gastroesophageal reflux disease and all that stuff. I think all of them are potentially related to the sulfur deficiency problem. So I sort of think it's like the explanation of everything.

DM: Sure. It's definitely a crucial component. One of the other elements you mentioned is the detoxification. One of the central molecules of detoxification is glutathione and it's really dependent upon cysteine which is a sulfur-bearing amino acid. My understanding is that whey protein from raw milk would be one of the highest concentrations of that cysteine so it's a really important precursor for glutathione because many people can take supplemental glutathione which has intrinsic problems for absorption and stability and it's very expensive it can be. To me it seems the best way to improve your glutathione levels. It's probably one of the more important molecules for detoxification would be through this mechanism. I'm wondering if you can comment on that.

DS: I totally agree with that. I think that's a very good comment. I completely agree. Glutathione is really, really important. It's a small molecule. It's got the sulfur and it's very, very important as an antioxidant. I think it gets depleted when you've got the sulfur depletion and that may be a crucial part of the problem why you get all this oxidative damage.

DM: So you think even if you have a total overall sulfur deficiency which is sort of independent of the sulfur bearing amino acids that it will seek to extract that or it will somehow impair the production of glutathione?

DS: I think glutathione will get depleted just like the collagen.

DM: But it's going to suck the sulfur from the glutathione.

DS: It's sucking sulfur from wherever it can find it. I suspect even multiple sclerosis could be a consequence of sucking sulfur from the myelin sheath. Wherever your particular genetic make-up decides is the right place to steal the sulfur that's the kind of condition you're going to have as a consequence of your sulfur deficiency. It could be a variety of different things.

DM: Have you done any analysis or epidemiological reviews in these areas that you mentioned earlier such as Oregon in the cascades mountains and Crete in Greece where you have looked at some of the diseases like multiple sclerosis or other conditions which seem to be dependent on it? Have you noticed any changes there?

DS: The only thing I can say about multiple sclerosis is it's quite interesting, I have an email correspondence with somebody. I don't remember his name. He's doing a study on a group of people who have multiple sclerosis. He discovered by interviewing them that every one of them was not breast-fed. I think that could well be related. That they didn't get the proper sulfur in the early months of their life because they weren't breast-fed. Other than that, I don't know anything else. I know multiple sclerosis is related to vitamin D deficiency. Vitamin D definitely helps it. I suspect that does mean again sulfur.

DM: The refinement and the understanding may actually be more properly or specifically via sunlight exposure on exposed skin.

DS: Vitamin D as a proxy for cholesterol sulfate. That's what I think. I think a lot of the things that – there have been a lot of confusing experiments with vitamin D where they have had sort of failures. They think vitamin D should help this because they see that those people have this advantage and they feed them vitamin D and it doesn't do a damn thing for them because they're not getting the vitamin D sulfate. They're not getting the cholesterol sulfate. That's what you really need for the…

DM: I couldn't agree more. I haven't taken oral vitamin D in well over a year yet my vitamin D levels are sort of super normal. They are close to 80 or 100 or over 100.

DS: So you get a lot of sunlight.

DM: I seek to get an hour to two hours a day if I can depending on the weather of course. I do my work outside. It just seems that's what we're designed to do so it's in my view is sort of crazy not to reproduce the optimum.

DS: This is great because I find I'm always struggling to get enough sun of course especially in the winter. I live in Boston. At work, I take an hour out of my day – if it's a sunny day I take a walk outside but it's winter so it's very, very hard.

DM: Even if you walked outside in the winter and it was a sunny day and the temperature was 70 degrees which can happen in January. It's not common but it can because of the angle, there is not a significant enough UV penetration to generate any vitamin D.

DS: That's where maybe the tanning room would be the answer. I actually make a special effort to go to a sunny place a couple of times in the winter but not everybody can afford to do that.

DM: It's definitely sort of ideal, at least for those of us who live in the United States. There is really only Southern Florida and that's about it. Even California is a little bit too cold.

DS: And children today not only are they discouraged, I mean, it's frustrating how religiously we're thought to cover them with sunscreen every time they go outside. It's just very, very shocking to me that the medical experts are telling them to do this. They are finally I think beginning to realize that there is an amazing vitamin D deficiency but then they think…

My sister had a vitamin D deficiency diagnosis. She lives in Idaho and doesn't get much sun. The doctor says, stay out of the sun and take this 10,000 units vitamin D supplement pill. Their message seems to be the sun is really bad for you. The fact is that the use of sunscreen has gone up by 30 fold since like 1970 and the incidence of

skin melanoma has been steadily rising over that entire period by 3% every year. It's not actually working.

DM: Part of the problem as I understood is that almost all of the original sunscreens filter out UVB which causes the specific portion of the spectrum that causes our body to make vitamin D. They would filter that out and it didn't filter out UVA which is what causes the cancer. It was actually increasing it. There is still a number of sunscreens that do that. It's totally backwards. But a number of them have caught on. Now, they filter out UVA and UVB.

DS: But they also have aluminum.

DM: That's a good point. I didn't know that. And they have other things like oxymethoxybenzoate (OMZ).

DS: Yeah, chemicals. I basically don't like to put chemicals on my skin.

DM: There are some safe sunscreens and there are indications to use that because the sun can be a problem. Not many of us are going to be climbing Mount Everest but if you're climbing Mount Everest…

DS: Actually, I ran into trouble a week ago. I thought I had plenty of tan base and I went hiking, a 10-mile hike up in the Sawtooth Mountains in Idaho. A bright sunny day and it was too much.

DM: That's probably 10,000 ft or 12,000 ft?

DS: Yeah, it's up high and it's just like there is that unfiltered high air sun. It's just (indiscernible 1:28:01).

DM: But even if you go higher like 20,000 feet or so you take your goggles off and you will be blind. You will absolutely be blind because there is just no protection up there. There are appropriate indications to use your sunscreen. Just overall, it's probably not wise in general for certainly the indications of using them now.

One of the other components I think you had mentioned earlier when we were talking about statins is the connection with sulfur and Alzheimer's or dementia. I'm wondering if you can comment on that.

DS: Well in fact people with Alzheimer's have sulfur deficiency in the brain. There is this sulfatide-ceramide ratio that they have measured. Sulfatide of course contains sulfur and it's related to ceramide. So sort of with and without sulfur. Alzheimer's patients have a much lower ratio of sulfatide to ceramide than normal people which suggests the sulfur deficiency. What I think actually, so you know the flu shot contains aluminum…

DM: Flu sprays don't but the shots do.

DS: Yeah. Old people are encouraged to get their flu shot. Be sure to get your flu shot every year. And every year they get a flu shot, they're injecting aluminum straight into the blood. If you eat aluminum 99% of it goes through the gut and doesn't absorb. If you inject it, a hundred percent of it is going to go into the blood. If you don't have enough sulfate to get rid of the aluminum, the aluminum is going to end up in the brain.

Aluminum sulfate as I said salts out proteins so you're going to get precipitates of things like amyloid plaque because of the aluminum sulfate. I think that the aluminum combined with the sulfur deficiency is a major contributor to Alzheimer's. In fact I would even say Alzheimer's and autism are the same disease. I sort of had this idea that they were the same and then I started searching the web and I came across a web page. I was really delighted to see this. There is a woman called Jeanne Brohart. I think she's a mother of an autistic child. She has this web page where she did this whole chart of autism, schizophrenia, and Alzheimer's. She showed how they have all similar features.

[----- 1:30:00 -----]

She was proposing that they were essentially the same disease at different ages. I think that's a really neat theory. I would even add ADHD, manic depression, that all of these things which are occurring at different stages of life, every one of them have to do with a combination of cholesterol sulfate deficiency and too much aluminum exposure. It's a possibility that I find very interesting.

DM: So if someone watching this video didn't understand the process before and now is enlightened and had perhaps received annual flu vaccines for the last 10 years and now is concerned about this and certainly didn't pay attention to sulfur components. By addressing the sulfur and increasing the intake as we had discussed earlier, would that help reverse this or once it's in the brain, is it too late?

DS: Of course I don't know. It's hard to find out something like that but I would guess since sulfur can help you to expel the aluminum, the more sulfur you get the more chance you have to do that but whether it sort of ends up in the brain and kind of gets locked in that part and it can't get back out again, I'm not sure.

DM: So like anything in life the best approach is prevention.

DS: Yes. It's absolutely the case.

DM: Aluminum toxicity is a big issue. I have not actually used antiperspirants for three decades or longer which is to me insane because the way most antiperspirants – the antiperspirants stops the sweating. They work through aluminum salts.

DS: It's terrible. I haven't used it.

DM: Would you guess it's one of the higher sources of aluminum exposure that people are using?

DS: I would imagine so. I would imagine that it's getting in and especially if you don't have enough cholesterol sulfate because then your barrier is not as good. I also have never used deodorants. I just basically refuse because they're toxic.

DM: There may be some benefit to deodorants. Deodorants don't have the aluminum but the antiperspirants do. In my view there is just no indication to ever use those. They are toxic and they can only cause harm.

DS: Yes. I completely agree.

DM: If for whatever reason you disagree with that or you don't believe it, at least get enough sulfur so you can help prevent this because it's so much easier to prevent the problem than to solve it.

DS: Absolutely.

DM: Aluminum has been notoriously difficult at least in my memory to detoxify.

DS: I think that's likely.

DM: I had never really heard the association with the benefit of sulfur in aiding that detoxification but it makes sense.

DS: I think that it takes time. It sort of stays in the blood and gradually works its way into the brain and gets past the blood brain barrier but it may not be able to come back out. It may get trapped inside the brain. I think Alzheimer's is probably very, very hard to treat once you have it which is very discouraging to think about because it's of course on the rise and it's very scary to think about what we're facing.

DM: It's unfortunately one of those epidemics. We have heart disease and diabetes, obesity and Alzheimer's.

DS: They all I think are related to the sulfur deficiency problem.

DM: And you know our dietary component, sunlight deficiency, electron deficiency. One of the areas where we're starting to really understand more and teach more is about just connecting with the Earth where you're walking barefoot and grounding which is a massive source of electrons.

DS: Yes. I know what you're referring to.

DM: I'm glad you're familiar with that. It seems to me from what you've been describing that the sulfur would be an important component too because ultimately these electron transfer has to be stored somewhere and is it the sulfur capacity that allows it to sort of form this battery that we can store that charge?

DS: I think that's exactly very, very well said. In fact, I know you had Gerald Pollock on your show. I really enjoyed watching his video and also the video of his lecture. I think his lecture was fantastic where he discussed all these things about water and these negatively charged particles and how they build these exclusion zones. I don't know if you remember but if you shine infrared light in particular on these particles then the exclusion zone grows by four times.

I think that there is a complete analogy in the blood because the blood is the water and then you have these negatively charged particles are the cells like the red blood cells and the white blood cells and the platelets and all of those are negatively charged particles in the blood. They have an exclusion zone around them according to Pollock's theory. That exclusion zone is going to exclude bacteria and viruses. If they don't have enough negative charge that exclusion zone is going to be smaller. And if they don't have enough infrared light exposure, that exclusion zone is going to be smaller. That's going to allow the bacteria and the viruses to invade and not just the cells in the blood but also the endothelial lining of the blood and getting out into the tissues. You really have a much, much worse problem with microbe infection if you don't have enough sulfate in your blood.

DM: So sulfate again is the primary or the chief or one of the central areas where they store these negative charges.

DS: I believe that. There is also COO^- (carbonate). These extracellular matrix proteins have these negatively charged things but I think the sulfate is the key one that keeps you healthy and the carbonate is kind of a backup system. I actually have a whole theory I'm working on of a cascade – ways to manage oxygen transport. I think of sulfate as an oxygen transport management system because it has SO_4. There are four oxygens in there.

Nitrate is another example (NO_3^{-2}). That's got oxygen. I think that there is a cascade in life as you first lose ground on sulfate then lose ground on nitrate and then finally stop with carbonate as the oxygen transport system. Once you're down to carbonate, you're in really big trouble. You're basically going to be facing cancer or AIDS or various autoimmune diseases and cachexia, this sort of muscle wasting disease. You're basically at the point where you can't even eat any more because everything is toxic to your health because your blood is so sick in terms of this lack of these mechanisms of oxygen transport that you can't utilize fuel because you can't transport oxygen and the mitochondria become really in trouble.

DM: So the sulfur portion is the pinnacle.

DS: I think so. I think that's the one you want to keep. As long as you can in your life you want to keep that one going. The way you do that of course is the ways we have described.

DM: One of my questions was how – since there really isn't a good test for cholesterol sulfate or any other real marker, blood test for sulfur.

DS: There is a blood test because occasionally I have seen reports of cholesterol sulfate levels but I don't know who does it.

DM: Do you mean cholesterol sulfate?

DS: There is an ability to measure it because I read articles in which they report cholesterol sulfate levels.

DM: But it's not available commercially.

DS: It's not done routinely.

DM: It's more of a research tool.

DS: Yeah, a research tool. There is something that exists that is a research tool.

DM: So it's not a commercial test. So the average person is not going to be able to do that.

DS: Yeah. The same for vitamin D sulfate too I think. I think people just measure vitamin D. They don't specifically measure vitamin d3 sulfate? (indiscernible 1:37:03)

DM: Well there is three. They can measure – they really don't measure vitamin D. They may measure 25-hydroxy D or 25-dihydroxy. Those are the two that are measured. The dihydroxy really doesn't need to be. It's very rare where it's ever beneficial and it's a lot more expensive. But there is really no commercially available assay for sulfate. The question becomes at what point – the deficiency syndromes would probably be the symptoms of the diseases that we have just discussed and it doesn't make any sense. Since there is no downside from your perspective. I guess if you ate pure sulfur, the chemical, it would be a potential problem.

DS: Right. I think it would be very hard.

DM: But if you're getting a food-based source, you can't overdose on this stuff.

DS: That's what I feel.

DM: More likely probably the same thing for magnesium sulfate in the water because your body is going to not absorb it if it's overloaded most likely. It makes sense just to make sure you have enough.

DS: Exactly.

DM: The question is you haven't used it – at least you haven't had the opportunity to review the literature on the sulfur with respect to supplements like MSM. We'll look into that and see if we can…

DS: I would be very interested to see what you find.

DM: Compile some analysis as to what the thought is on that. I really appreciate your wisdom that you have shared. It's unusual to find someone who has got the scientific training and background as you obviously do and then really has the opportunity to just delve into the literature and review it and put it all together because this is a giant puzzle. The information is out there.

DS: It is.

DM: There are so many researchers. That's one of the reasons that I started this site because I have recognized for a long time that there are these incredible individuals. Pollock, as you mentioned, is an example of one guy who has done this where they had just committed their entire life to really understanding this one small area but no one has really given them a voice and no one is really putting the whole picture together.

DS: I think there is too much specialization because it really is amazing. I think if the left hand were talking to the right hand, they would have figured out the same thing I'm figuring out. But everyone is specialized. So they become experts in this one small area and they're not able to generalize it across all the different other things that are happening. I'm happy to read anything about anything whether biology and metabolism and cancer and heart disease and whatever. I'm just soaking up the knowledge. In every paper I read I try to fit it in.

DM: That's what I shared with you too because my training is as a family physician and that's sort of a generalist where we take rotations in all the different subspecialties and we seek to provide a comprehensive integrative approach to the patient. Someone has got to be the captain of the ship and help them understand what it is and that's really I perceive the role that we're doing here is finding these spectacular pearls of wisdom that the researchers are coming together, putting it all together and presenting it in a practical way that people can utilize to prevent disease and improve their health.

DS: Absolutely. I'm in great admiration of those people who are writing those articles that are the technical articles explaining what's going on in the biology and those are the ones I really like.

DM: We greatly are appreciative of your efforts because we need that connector. You're the connector to take the research, synthesize it and provide us with practical information that we can use. It's all part of the (indiscernible 1:40:31). Are there any other areas that you would like to comment on with the sulfur or things that we may have overlooked?

DS: The vaccines perhaps because I just read an article by Mark Blaxill. Do you know Mark Blaxill?

DM: I don't believe so.

DS: He heads the website called Age of Autism. I just recently just actually just yesterday I finished reading this long article. It's a three-part article that he wrote about Gardasil, the vaccine Gardasil. I don't know if you follow that.

DM: Sure. We're quite familiar with Gardasil. It's one of the worst ones out there. And it's getting worse because they are increasing the indications for it. They're actually giving it to boys now.

DS: It's a very scary story. I was deeply disturbed by it. It corroborates what I was suspecting but in spades. It's sort of like it's much worse than I realized it was. Gardasil, the research was done in NIH which makes it quite unusual. There is this whole idea emerging of the government working with the industry. In fact it's sort of in my field as well. So the government doing research, the industry doing research, the government being able to throw the research over the fence at the industry who can then sort of productize it and market it. But then the NIH researchers get money because they are the inventors.

So they're making a lot of money off of the product that's being sold by the company, Merck it turns out in the case of Gardasil. Then the FDA has to be approving the vaccine but the FDA is part of the government and they've got their buddies over there. I mean the whole thing is extremely incestuous it seems like. The FDA just sort of runs through the approval very quickly and the Gardasil is…

DM: Well, they have these experts that are appointed basically primarily through the industry that have phenomenal conflict of interest and they have this small panel of experts who actually are in charge who makes the recommendations and essentially once that recommendation is made it's rapidly adopted by the federal health authorities and essentially becomes law because almost all the state public health authorities require it and mandate it as part of the process to enter the education system or any health institution too.

DS: The story then ends up involving Rick Perry, the governor of Texas who very quickly soon after the FDA approved the vaccine, he mandated it for the girls in Texas. So then all these kids are getting this vaccine and it's incredibly – I have looked at it. The same thing I have done with everything else, Gardasil, not Gardasil for the same

age group and it's amazing. It is much worse. It has the same problems that aluminum has only much worse. So it must be very high aluminum content. The thing that really disturbs me – and he talks about this in the article – had not imagined this would be the case. When they studied the drug, when they do these trials, the placebo is not a placebo. It only has to not contain the active ingredient and the placebo actually contains the aluminum. They put the aluminum in the placebo. I cannot believe they can get by with that.

DM: Yeah. That's the standard of research.

DS: It's so incredible.

DM: They show no differences because they didn't exclude the toxin.

DS: Yes. It's got the toxicity in there already and therefore they say, it's only a little bit worse than the placebo. But look at the placebo, the placebo is terrible. Glaxo went to the exercise of showing that the placebo itself is toxic. I'm just stunned. Of course, Rick Perry all got ties in to Merck. Everything is all tentacles everywhere. This machinery is in place. Pretty soon I think all states are going to be like mandating that these girls get this ridiculous vaccine which doesn't really make any sense even if it works in my opinion. It makes very little sense. It's supposed to protect against cervical cancer and it's like an anti-cancer vaccine which has kind of a nice buzzword to it. I suspect it would wear off even before they would actually need it anyway because they're getting it at 11 or 12 years old. I just can't imagine the consequences in terms of depression. Depression is a very strong reaction.

DM: I believe the new recommendation is to lower the age at which it's being given.

DS: I know. They have started with nine year olds. I don't understand where is the check.

DM: It might be part of the infant recommendation schedule. It's one of our initiatives. We have four primary ones. Actually, rapidly going into five. One of them is from health liberty perspective is to make sure that we maintain the freedom of choice so that individuals can do their own independent research to objectively determine whether or not the risk outweigh the benefits for any specific vaccine and have the ability to make the choice whether that's right or not for them rather than risk having their child taken away from them for refusing to give a vaccine that they perceive is dangerous.

DS: It's insane and in a country that prides itself on offering freedom. We don't give ourselves freedom of choice there. I believe that the vaccine ought to be one hundred percent made optional. That the government might strongly recommend and might show why they think this is a good idea but the individual choice is up to the parent in all cases. A parent should always be able to opt out on the vaccines. I find it annoying that they think the child who is not getting the vaccine is the one that's at risk right? All

those people who got the vaccine why are they worried? They are protected. I don't understand why they get upset with people who are not.

DM: One of their justifications is that if that number of unvaccinated increases that's going to essentially increase their risk for the disease spreading.

DS: But it's only going to spread to the people who aren't vaccinated. So the people who supposedly if the vaccine is working. Of course I don't really think the vaccine works.

DM: That's all questionable and speculative and then when these epidemics – many outbreaks do occur, you know, from my understanding and review there is really no difference or even a higher percentage of the vaccinated who actually come down with the disease.

DS: I know. Plenty of the vaccinated kids are not really protected. They are in a hard place because they have put in all this awful stuff, the adjuvants in order to get the healthy kids to react but the unhealthy kids, the kids who have a weak immune system can be killed by it. I mean the vaccine can kill them. I just think like sudden infant death syndrome that occurs – much higher probability like three or four days after certain vaccines. I have seen papers about that.

There is also I think all the food allergies. This is another area that I have gotten into with the vaccines. I got tipped off on the peanut allergy and the egg allergy. Of course the vaccines are often grown in egg so you end with some egg in the vaccine itself but they even put peanut oil into the vaccine, again, as an adjuvant. This is something you can react to. What happens is that you get this vaccine. To you it looks like a very strange animal that's got some peanut oil and it's got some aluminum. It's got some toxin of some sort like pertussis. It's like a really weird animal and your body is reacting to that whole package. It thinks that peanut oil is part of the problem and it's something it can react to so your body becomes confused and thinks peanut oil is pertussin or something like that. And then you get this very strong allergy to peanut oil. So I started exploring. I got peanut and eggs and then I started looking at the vaccine ingredients and everything that looked like it was a food, you know, you had like gelatin and soy. There are all kinds of things in the vaccines. It's nice you can find all the ingredients on the web. Every one of them, I would do a search for allergies and everyone of them I was finding allergies and then I came across this web page, of course, this woman and another woman who has a web page where she's done a nice job of showing that she was able to identify a vaccine associated with every single food allergy she could find except for one something in Japan that was probably in Japanese somewhere and she couldn't find it. But I mean very, very strong I think compelling argument that vaccines may be the key contributor to this huge increase we have seen in food allergies in the last decade. It's going to become a serious problem now. One or two percent of the population has peanut allergy. One or two percent have egg allergy. Some of these allergies are so potent they can just die from handling peanuts.

DM: It's probably in conjunction with the other variables we had mentioned earlier which is the sulfur deficiency in combination with the gut flora being messed up. So you combine those and you add this toxic vaccine to the mixture and you have a prescription for trouble.

DS: Yeah. It's just really scary. Not encouraging I think.

DM: But fortunately if individuals have the information and the knowledge they can make proactive choices and prevent these. This is not necessarily rocket science. We tend to find out this information long before it's well accepted and adopted by the conventional community. If you do your homework you can be armed with the proper tools to protect yourself and your family.

DS: That's true. In fact it's very nice that it is not very costly even. Certainly going out in the sun is free. I think that if people grassroots can learn to take care of themselves in the right way we can really see a difference in the quality of people's health looking forward. It just has to happen in the grassroots forum I think because it doesn't look like the experts are catching on.

DM: I would agree. Any other words?

DS: Exhausting. That was quite a whirlwind tour.

DM: I think you have given them a lot of information. I want to thank you again for flying to Chicago to provide this information to us.

DS: Thank you. I'm very delighted. I'm very pleased that you invited me.

DM: And helping us really share this really crucial information. It's so foundational, so important and really not well understood or really presented in even the alternative natural medical literature. Not many people understand this. Certainly conventional. Thank you for helping us get up to speed in this area. I look more for integrating this into our health in the future so that we can continue to take control of our health.

DS: Thank you. I will continue of course to do my research. I'm very eager to understand more corners of the story. It's just been a really wonderful experience. The research itself is _. I still have a lot more to learn myself.

DM: I'm sure we all do. It's a journey. If we ever believed we have arrived I think we are kind of seriously deluding ourselves. Thanks again.

DS: Thank you.