

Dr Osborne, Gluten-free Society interviewt Dr. Stephanie Seneff 2017

Dr. Osborne: Hi. This is Dr. Peter Osborne with Gluten-free Society and today I have a very special guest on the phone with me, Dr. Stephanie Seneff of MIT. Dr. Seneff, thank you so much for being present today and taking the time out of your busy schedule to speak with us.

Dr. Seneff: My pleasure. I'm delighted.

Dr. Osborne: Would you introduce yourself and just tell everyone what your background is and what your education is?

Dr. Seneff: Yes. I'm at MIT. I've been here all my adult life. I went here as an undergraduate, majored in biology with a minor in food and nutrition. My PhD is in computer science and I've spent many years working in computer science and I've spent many years working in computer science natural language and understanding processing. Many papers published and whatnot.

Over the past seven years, I've been transitioning more to the biology side again, returning to the past, in a sense. I've become really passionately interested in trying to understand what's causing all of the problems that we're seeing today in our health. I'm convinced that there are major environmental toxins that are making us sick, and I need to identify which ones they are. I've been systematically studying that for the last seven years and really gained a lot of insight and understanding about what's happening, and now the question is how to fix it, I think.

I've published several papers in the last few years in biology and medicine, with co-authors, collaborated with a number of people in this space of the role of environmental toxins in modern diseases.

Dr. Osborne: Your recent paper, Interdisciplinary Toxicology, co-authored with Anthony Sampsell, was what actually turned me on to some of your work and theories around Roundup, the chemical that is prominently being used on many of our crops. Can you talk a little bit about Roundup and talk about its use and how that's increased? Let's go into how you found the correlation between its use and the increased incidence of gluten reactivity.

Dr. Seneff: It's quite amazing. I mean, when you start looking you see that among all the chemicals that are used in growing our crops today, Roundup stands out as one whose usage rates have gone up alarmingly in the last ten years, directly in step with the alarming increase in a number of diseases, one of which is Celiac Disease, which seems to have just appeared out of nowhere. I don't remember even knowing the word a few years back, and now you've got the gluten free section in every grocery store in the country, basically. It's just come out of nowhere.

Interesting thing is that wheat, of course wheat has been changed through the years. They've done a lot of genetic modifications of the wheat. It's not the same as the heritage wheat was the in past, but I don't think that's the key problem. The problem, I think, is that the glyphosate in Roundup, glyphosate is the active ingredient in Roundup, is being sprayed on the wheat increasingly right before the harvest.

Just a few days before the harvest, they spray the wheat with Roundup intentionally, in order to kill it.

Wheat is not Roundup Ready. There are many crops that are GMO modified to be Roundup Ready, meaning that they don't die if they're exposed to this toxic chemical. Almost all plants die. Glyphosate is a universal herbicide, which is why people find it attractive, and it's considered to be nontoxic, so farmers think it's a good choice.

Unfortunately, that is wrong. That is an incorrect assumption, from what I've seen. I mean, the research that's been done already, there are a lot of papers that we've quoted and referenced in our paper, showing that the idea that glyphosate is nontoxic is simply not true.

We think the wheat gluten actually binds to the glyphosate and that disrupts the process that usually happens in the digestive system that would make it into a nontoxic form. That chemical process gets disrupted by the glyphosate, and then the gluten becomes something that the body becomes allergic to. That is what causes the cascade that leads to celiac disease.

Dr. Osborne: What you're saying, then—I want to put it into very laymen's terms for some of our listeners—is that the glyphosate being sprayed on the wheat binds to the wheat and basically increases its toxicity or makes it more toxic. Or are you saying that the wheat—

Dr. Seneff: It makes it allergenic.

Dr. Osborne: Okay. It just basically makes it more allergenic.

Dr. Seneff: Yes

Dr. Osborne: I've read some papers, and some of the things you've mentioned in your research are the effect on transglutaminases. I've read some papers on adding microbial transglutaminases to dairy products and how that increases the allergenicity of dairy, because it unfolds proteins in the dairy that actually look very similar to gluten and therefore increase that reaction.

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Dr. Seneff: That's very interesting. I didn't know that, actually. That's something new to me. I guess—

Dr. Osborne: I'll have to send you that.

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Dr. Seneff: Yes, I would love to see that. Another interesting thing that directly connects to glyphosate: Glyphosate kills [bacteria](#), and it preferentially kills the good bacteria in your gut. One of those is bifido bacteria, and those guys are really important for processing the wheat, the gluten. When they're destroyed by glyphosate, then the wheat suffers not being fully digested properly, such that it remains in the allergenic forms in your gut and causes this reaction. The fact that glyphosate kills these bacteria is another feature that's going to lead to celiac disease.

Dr. Osborne: We have a function basically on the normal microbiome within the gut wall, that it has antibiotic-based effect on preferential bacteria that aid in the digestion of difficult to digest proteins. Have you seen the new research that's come out on [sourdough bread](#), adding high levels of lactobacillus?

Dr. Seneff: Yes, that's another one, lactobacillus, that's also preferentially killed by glyphosate. Glyphosate kills the ones that you need to be able to properly process these foods.

Dr. Osborne: We have an effect on gut bacteria. Then we have the fact that it makes food that is sprayed with the chemical more allergenic. In essence, people react or respond even more aggressively to them than they otherwise would. What are some of the other effects that glyphosate has on the human body, or on the plant, that affects the human as they eat it?

Dr. Seneff: That's right, because the argument is that glyphosate disrupts this critical pathway in plants, called the shikimate pathway. That pathway produces three essential amino acids, which are called aromatic amino acids: tryptophan, tyrosine, and phenylalanine.

It turns out, these three amino acids are really important to our health and we depend on our food and our bacteria to produce them for us. The food that is exposed to glyphosate is depleted in these nutrients. The gut bacteria can't produce them in the context of glyphosate, so we end up deficient in these nutrients, and one of the big ones is tryptophan.

Tryptophan is the sole precursor to serotonin, and serotonin deficiency is a huge problem in the modern world. It's linked to depression, violent behavior, obesity, and celiac disease. I think serotonin deficiency is a critical piece of the puzzle, as well.

Dr. Osborne: No doubt. You said tyrosine, as well?

Dr. Seneff: Yes.

Dr. Osborne: We have tryptophan and tyrosine, so serotonin, as well as tyrosine being a precursor for thyroid hormone. I know in my clinic, that is one of the most prolific problems. Patients will come in and they will have hypothyroidism or will have developed [Hashimoto's disease](#).

Dr. Seneff: Right.

Dr. Osborne: What you're saying about glyphosate is that it can cause deficiency in the actual amino acids in the food that we eat, because the plants need to be able to synthesize those foods to survive and glyphosate inhibits that process. What you're also saying is that glyphosate destroys and damages our gut flora which helps us to digest the food and produce these amino acids, so there are two mechanisms of action here that are causing that deficiency?

Dr. Seneff: Yes. You're good. Great summary.

Dr. Osborne: Big problems, right? I know one of the things in our clinic that we use or that we measure, oftentimes we'll measure serotonin and oftentimes we'll also try to measure thyroid hormone, and this is very prolific, we'll see these numbers coming back. I know if we look at even the top five drugs in the United States, one of the top in that is antidepressants.

Dr. Seneff: Right.

Dr. Osborne: Now, let me hear your thoughts on serotonin's impact on gut motility. We have a gut nervous system and its primary neurotransmitter is serotonin. Can you comment a little bit more on that?

Dr. Seneff: Well, yes. Actually, what I think happens, and this is speculation. We didn't find papers that said this, but we could see the evidence from the details in the research—that the serotonin producers in association with celiac disease are very aggressive to make serotonin, whenever they have a chance. I think it's because of the tryptophan deficiency.

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As soon as you eat some food that has tryptophan in it, your cells in your gut that make serotonin grab the opportunity to make it, and they make too much, and then you get things like nausea and diarrhea. It gives you the gut mobility. It overdoes it. It's because your body is so desperate for serotonin that the moment it gets the opportunity, it has to overdo it to take advantage of that opportunity, because it's so scarce and it needs it so badly.

I think there's sort of a swinging back and forth between too little and too much. It ends up with diarrhea and constipation, depending on the diet, because you just aren't getting a steady supply.

Dr. Osborne: Great point. We get kind of a transient up and down effect based on what the diet is giving, because the gut is in a state of deficit.

Dr. Seneff: Oversensitivity because of the deficit.

Dr. Osborne: Right. Then it needs to be able to produce, so when it gets the opportunity it makes an abundance.

Dr. Seneff: Too much. Yes.

Dr. Osborne: One of the things I read about in your paper was the cytochrome P450, which is the enzymatic systems within the [liver that help the body detoxify](#). Can you tell us the effect that glyphosate has on those particular systems?

Dr. Seneff: Yes. That is a huge piece of the puzzle, and were really astonished as we looked at how many different aspects of celiac disease were connected. Celiac disease is a very complex disease with a lot of interesting comorbidities. What's amazing is that so many of them can be explained simply by the cytochrome P450 enzymes, which you can call CYP enzymes for short.

They're amazing. There are so many of them in the liver, and they do so many different things, and all of the things that they do are disrupted in celiac disease. It's really perfect. Glyphosate disrupts those enzymes, that's been shown in rat liver. In the liver of a mammal, glyphosate interferes with the cytochrome P450 enzymes.

For example, a simple example, is that they activate vitamin D. When you measure vitamin D, you're measuring the form that's been activated by the liver using a CYP enzyme. I'm sure that you've been hearing, all of a sudden we have a massive vitamin D deficiency problem in this country, so the solution is just to pump everyone full of vitamin D supplements. The problem is due to, I believe, the fact that glyphosate is preventing the vitamin D from getting activated, which is why it's low, and it's low in association with celiac disease. It's that simple.

Dr. Osborne: Okay. It actually inhibits the activation of [vitamin D](#) metabolites that go about to bring about hormonal functions for vitamin D.

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Dr. Seneff: Exactly. It won't work if it's not activated. On the other hand, the CYP enzymes break down retinoic acid in the liver. Retinoic acid is something that can cause troubles, both in terms of introducing this new condition called eosinophilic [esophagitis](#), which is like an inflamed esophagus, and people have trouble swallowing. It's a new disease, first identified in the 1990s. I think it's a direct consequence of glyphosate and excess retinoic acid plays a role in that.

It also plays a role in infertility and in birth defects, and celiac people have an increased risk of infertility and of producing offspring with birth defects, which I think is again due to the fact that there is too much retinoic acid because it can't be broken down by the CYP enzymes in the liver.

Dr. Osborne: Basically you end up with vitamin A toxicity.

Dr. Seneff: Right. Vitamin A toxicity and [vitamin D deficiency](#), and then you have the bile acids, which there are several CYP enzymes involved in producing the bile acids in the liver, which are then sent by the bile duct into the gut, to deal with digesting fats. I think a lot of people are going to have trouble digesting fats because they're not producing the bile acids because of the CYP enzyme problem in the liver. That's also associated with celiac disease.

Dr. Osborne: Just one more fact. I'm going to just repeat that and make sure I hear you correctly. The abnormal function of these liver enzymes responsible for detoxification as well as metabolism, as well as production of bile, are hindered and so what you just said was that bile inhibition leads to fat absorption

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problems, and so our fat-soluble vitamins like vitamin A and D and E and K, as well as omega-3 fatty acids and other fats, are now at risk for becoming deficient.

Dr. Seneff: That's right, and of course messing up the digestive system because the fats don't get digested.

Dr. Osborne: Right. Now you have a higher acidic fatty acid component in the gut, and that's now an increased risk for certain types of cancers.

Dr. Seneff: Right.

Dr. Osborne: We're just talking about one chemical, here, and so far we've got glyphosate damaging bacteria, we have glyphosate creating detoxification problems in the liver, creating absorption problems with nutrients. What else do you see in your research? Actually, let me back up. We have it interfering and interrupting tyrosine and tryptophan metabolism, leading to potentially psychiatric disorders and thyroid problems.

One of the things you went into pretty good detail with your paper was the vitamin and mineral deficiencies, and I know we've talked about vitamin D and we talked about vitamin A toxicity, but let's talk about iron and selenium and some of the other things.

Dr. Seneff: Right. Totally. There are a whole bunch of these minerals, especially the rare minerals like cobalt and molybdenum. These are really critically needed for certain enzymes that do really important things in the body, and you have iron and zinc. All of these minerals are going to be deficient in the food that's been exposed to glyphosate, as well as in the soil, even, and in the body as well. You're going to have trouble absorbing them.

Glyphosate chelates these minerals. It forms a cage around them, such that the bacteria can't get at them even, so the gut bacteria become deficient, and then they die because they can't get these critical nutrients. Because glyphosate is caged.

Also, the bacteria that are killed are ones that break down phytates, and phytates also bind to these minerals. Because the bacteria are killed that would break it down, the phytates become more abundant and those also chelate these minerals. These things are both working against you that you're going to have deficiencies in iron and zinc and molybdenum and cobalt and all these things, each of which has a huge number of consequences in terms of your health.

Dr. Osborne: Cobalt, as an example, in my 13 years of practice, I see more vitamin B12 deficiency than any other nutrient loss. That's cobalt is vitamin B12 forming.

Dr. Seneff: Essential for B12 function, yes.

Read more at <https://www.glutenfreesociety.org/gluten-or-glyphosate-part-3-interview-with-dr-seneff/#PEm5BoUOqPFLf7Ci.99>

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Dr. Osborne: The other one I see is [iron deficiencies](#). Very common. The other big one I see is B vitamins across the board, which we know are synthesized largely by bacteria in the GI tract.

Dr. Seneff: Right. Then molybdenum is involved in sulfite oxidation. People end up with sensitivity to sulfites because they can't oxidize the sulfite to sulfate, which would make it safe. Sulfite's very reactive and you need that in the gut, the molybdenum, to be able to detoxify the sulfites, for example, in wine.

Dr. Osborne: Sulfites in other foods that are added, that have added sulfites.

Dr. Seneff: Yes, right, for a preservative.

Dr. Osborne: I want to back up just a minute and tie that in, because now I'm thinking as we talk about sulfites, one of the things I see with sulfite reaction is histamine release from the eosinophils and you just mentioned a moment ago the concept of eosinophilic esophagitis. Right? Is that a corollary then that we're making that that leads to the inability to process sulfites, which leads to mass cell mobilization, histamine release, and subsequent inflammatory damage?

Dr. Seneff: You are right. You know a lot. That's beautifully said. I couldn't have said it better myself. You get an [inflamed esophagus](#). That's a big thing in infants, too. We see a lot of infants that are getting an acid reflux that's not the normal acid reflux, it's this other problem which is a new problem today because of this.

Part of that is insufficient supply of sulfate. If you can't oxidize the sulfite, you can't make the sulfate, right? You end up with a sulfate deficiency. That I think is behind, as I say on my webpage, you'll see that sulfate is my big thing. I think sulfate deficiencies behind so many problems in modern society and we have various

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ways in which it can be caused by glyphosate and that's just one of them. Many different ways in which glyphosate disrupts sulfate.

Dr. Osborne: I want to get into that, but before we do, I want to bring up another point because you mentioned infants developing acid reflux. What do we see a lot of infants using? Infant formulas, right? These are largely corn and soy based.

Dr. Seneff: Yes. That's really scary.

Dr. Osborne: Coming from GMO, right, coming from [GMO crops](#) with lots of Roundup in them.

Dr. Seneff: It terrifies me.

Dr. Osborne: We didn't have these problems before. I even see the same thing happening now in elderly because they're being told to drink drinks like Ensure, which are basically just adult version of baby formula.

Dr. Seneff: Right. Oh gosh. That's just really scary. The [soy](#), I don't eat soy unless it's 100% organic, I just won't go near it, and corn likewise. I won't touch it. They're so contaminated. Both of them are GMO, Roundup Ready, 90% of the crop. Spray the Roundup on it, it doesn't die, soaks it up.

There is very little monitoring going on. This is the other thing that's very disturbing. The government thinks it's safe so we don't look at it.

Dr. Osborne: It's just an assumption that it's safe, that looking forward we don't have anyone aggressively pursuing any kind of investigation as to the increased modern diseases that we're seeing, just since the use was implicated.

Dr. Seneff: Right.

Dr. Osborne: Talk a little bit about sulfites. You mentioned that, and you said lots of side effects to that metabolic pathway. Talk a little bit more about that.

Dr. Seneff: There are several ways I think that glyphosate disrupts sulfate. One is serotonin. Actually, it's very interesting, serotonin is sulfated in transit. It's produced in the gut. Most of the serotonin that's made in the body is made in the gut, and then it's shipped to the brain as a sulfated molecule. It's actually delivering sulfate to the brain.

Sulfate deficiency in the brain is a very strong feature of autism. People have looked at the cerebrospinal fluid of autism patients post-mortem and shown that the heparin sulfate in the fluid in the fluid is depleted. Major problem, I think, with autism is insufficient sulfate in the brain, and part of that is because the serotonin sulfate is not arriving, both because the serotonin's deficient and because the sulfate's deficient. With sulfate, of course, we have the problem of the sulfide oxidase, which would produce sulfate from sulfide, but there are other ways to make sulfate. They're also derailed, too. One of the ones that I've written about in another paper, we have a proposal that a particular enzyme produces sulfate in the skin in exposure to sunlight, and this enzyme is a CYP enzyme.

If glyphosate is getting into the blood and the red blood cells have this enzyme, we believe they use it to make sulfate. They make cholesterol sulfate, it's well established that the red blood cells produce cholesterol sulfate, which is then distributed to the tissues to provide both cholesterol and sulfate to the tissues, so this CYP enzyme is going to get disrupted by glyphosate and that's going to reduce the supply of sulfate in that way, as well.

Then, on top of that, we believe that glyphosate competes with sulfate. In the free cell state it's very difficult to transport because sulfate tends to turn water into jello. That's a feature of sulfate, when it's landed in the positive where it's working, but in transport it's very difficult to transport sulfate because it will turn the blood into jello, which would not be good.

Glyphosate does the same thing, so we think that glyphosate jams the channel between the gut and the liver such that free sulfate can't go. We think this is why it's very interesting that these bacteria overgrow, [inaudible 0:22:46] that produces precresol. Precresol can be sulfated. That becomes a way to deliver sulfate to the liver, packaged up with precresol.

Precresol is a toxic chemical. Once it drops off the sulfate it becomes toxic, so it attacks the liver, but the liver is getting the sulfate that it desperately needs in the process. The gut bacteria are really collaborating with us to maintain the health of the whole system.

It's really a collaborative process. Even the pathogens are doing something essential in the face of this miserable situation. They're delivering the sulfate, but at the same time they're delivering the toxin, and they're doing that for the liver and the kidney.

Dr. Osborne: As a delivery mechanism, we're basically getting it to the liver by demand but we're dropping off toxins to the liver as a result.

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Dr. Seneff: Right, because the things that would not be toxic are not doing it, because the serotonin's not doing it, the dopamine's not doing it, the cholesterol's not doing it. All the normal processes that we have in place to deliver sulfate are broken, therefore you have to kind of come up with these other methods that are really dangerous. The product, once the sulfate has dropped off, you've got the toxic chemical to deal with.

Dr. Osborne: Would you or have you come across any research on non-alcoholic fatty liver disease in glyphosate exposure?

Dr. Seneff: I should do that research because I'm sure it's connected, but I haven't. I haven't done that explicitly, so I don't know if there are papers on that.

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Dr. Osborne: I've seen it clinically and could probably write a few. I have actually seen a number of patients who were accused of being alcoholics by their primary care, even though they didn't drink at all. In my clinic, we get them off of grain, which is a large part of where they glyphosate is being delivered. I'm just curious if you'd come across anything in the literature.

Dr. Seneff: It's on my list of things that I'd like to write about. I've been looking into that. I've got so many things I'm looking into and we try to figure out what's the next, something crystallizes. Anthony and I are just doing all this reading, all this studying, and then something will crystallize into a story and we'll put it together in a paper, and we'll do that again. We've got several topics right now that we're playing with but we haven't figured out yet which one's going to be the next one out the door. You know? The fatty liver is definitely there. I think that's because the liver is processing sugar, actually, fructose, and turning it into fat, and it's unable to ship out the cholesterol through the bile duct because of the disabled CYP enzymes, so the cholesterol piles up. You have to store cholesterol with fat, you know, you can't just store cholesterol unless you have a proportional amount of fat. In some sense I think the liver's just overloaded with cholesterol because it can't get rid of it through the bile acid. That's also why the LDL would go up, so it would ship it out as LDL, or it could just store it locally. It also might choose to store the cholesterol because it's waiting for an opportunity to get sulfate so that it can make cholesterol sulfate. Sulfate is the deficiency that's holding the cholesterol back. The fatty deposits are there to store cholesterol temporarily until there's an opportunity to release it, either in an LDL particle, or in the bile acids as cholesterol sulfate. A lot of cholesterol sulfate goes into the bile acids, which it can't make because of the CYP enzyme problem. That's another way.

Dr. Osborne: It's just a vicious cycle, basically.

Dr. Seneff: It's just a mess. You look every which way, it's just a mess what goes on.

Dr. Osborne: We've talked a lot about the damaging effect of this chemical. Can you share with our audience, where is their risk of exposure? We know grain, but can we go through some of the different foods and things we want to absolutely avoid?

Dr. Seneff: Certainly. Yes. The top of the list is going to be all of the GMO, Roundup Ready crops. Those are the core crops of the processed food industry, so you've got the corn, the soy, the canola, which is one of the cheap oils that's used very frequently in processed foods. Sugar beets, alfalfa. There is actually just a small list of crops that are grown in huge amounts and that 90% of them are GMO Roundup Ready. Those are going to be really bad. Basically, don't eat them. That pretty much means don't eat processed foods, because you kind of can't avoid them. High fructose corn syrup is going to be corn. Sugar beets is going to be sugar, and if you're going to go sugar cane, sugar cane is not Roundup Ready but it's sprayed with glyphosate right before the harvest, just like wheat. In fact, sugar cane, agricultural workers are coming up with kidney failure in alarming rates in countries where the sugar cane is grown, in Sri Lanka and India and South America. Actually, two countries have been proactive to ban glyphosate: Sri Lanka and El Salvador. I'm really thrilled about this. In the past year, in fact El Salvador just a month ago, the governments have banned glyphosate usage on their crops. I think that's a great move and we need to have all the countries do that. They're going to, I think one by one, they will. It'll eventually be like DDT, taken off the market, but I don't know how long it's going to take.

Dr. Osborne: Well, you're battling a pretty powerful and pretty wealthy corporate conglomerate.

Dr. Seneff: I know. They fight hard, too. They fight dirty, so it's going to be quite a battle, I think.

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Dr. Osborne: Now, you listed a table in your paper on the different commodities and the parts per million of glyphosate found. I'm going to assume it's a pretty comprehensive list and I'm going to put a picture of that list up for my listeners, if that's okay if I can use that?

Dr. Seneff: Okay, good. That would be great. Yes.

Dr. Osborne: Several of the things, as I went through your list—I don't know if you've heard of this, so I want to share it because our listeners have heard of it and I want to make a correlation here—there is a concept going around right now in the gluten-free world called “cross reactivity.” This is when you have an antigen that is similar in structure so that when it binds to a receptor, like an HLA-DQ receptor, if it's similar enough in structure to the gluten proteins that we've identified for celiac disease, that it can create a TH1 or TH2 inflammatory immune response. Many of the things that you've listed as being higher content glyphosate are the foods that they're finding have greater degree of cross reactivity.

Dr. Seneff: That's very interesting. Wow.

Dr. Osborne: That's something that to me, light bulb just turned on in my head.

Dr. Seneff: Right. I wouldn't have recognized that but that's extremely interesting. I have suspected, by the way, that even cigarettes and alcohol toxicity, I don't know to what extent their toxicity is directly tied to the toxic poisons that are in them. If you think about smoking, tobacco is one of the crops that's Roundup Ready, so they're going to spray glyphosate on the tobacco and then you're going to smoke it. If you're getting glyphosate in your lungs, that's going to be very toxic. You know? You wonder, if you were smoking organic tobacco, it might not be so bad for you, you know?

Dr. Osborne: Right. Well, I've thought that often because we have a history of Native Americans with long histories of smoking, but very little evidence of lung cancer.

Dr. Seneff: Interesting.

Dr. Osborne: Is it actually the tobacco or is it what we're doing to it?

Dr. Seneff: They might be growing tobacco that's organic.

Dr. Osborne: Exactly.

Dr. Seneff: Alcohol, of course, is a grain. Barley. The UK is really suffering right now with a lot of obesity and heart disease. The United Kingdom is struggling to figure out what's going on. I am guessing that they're spraying, I know the UK is spraying Roundup much more right before the harvest than they used to just a few years ago. They've been increasing that practice in the UK, of spraying these crops with Roundup right before the harvest, and barley is one of those crops, and barley is beer. Beer is very popular in the UK. I am guessing that a reason why they're having so many health problems there recently is because they're drinking beer that's got too much glyphosate in it.

Dr. Osborne: On that same note, in the United States, many of the food manufacturers for the celiac disease and gluten sensitive population are producing substitutes and largely, as we all know, they're corn based, rice based. Sorghum is becoming the new super grain, but sorghum is one of those also on the list that is high in glyphosate.

Dr. Seneff: Interesting.

Read more at <https://www.glutenfreesociety.org/glyphosate-and-gluten-the-connection-continues-part-5/#56GB7Zy8LPZw59yL.99>

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Dr. Osborne: We said at the very beginning of our conversation that the government considers glyphosate safe. Do you have any evidence or research, any animal or human studies, that show a part per million dose where we start really seeing problems and damage showing up?

Dr. Seneff: Well, there's the Serolini study. Are you familiar with the Serolini study?

Dr. Osborne: No, I'm not.

Dr. Seneff: He's in France and they did a very interesting study on rats. They fed them GMO foods with and without glyphosate, so they had four different groups of rats, with BT corn as well. There was a BT, there was the Roundup Ready, there was a GMO, and then there was the Roundup Ready GMO with the Roundup itself. There were different conditions, and they compared them to rats that were fed an organic diet of the same foods.

These rats, they fed them these diets throughout their lifespan, from birth, and what they found was that they didn't see any problems at all until four months. For the first three months, things were fine. Problems started to show up at four months.

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By the end of their life, they had huge mammary tumors and liver toxicity, kidney toxicity, early death, lots of problems. This paper was written up and published, and then maybe a year or two later it was forced to be retracted, which happened Thanksgiving Day this past year. Just this past Thanksgiving Day it was retracted. The journal put pressures on them, probably because of pressures from the industry. You can't prove that.

The journal even admits that the retraction is not based on any grounds. There aren't any legal grounds for the retraction, given what's required for a retraction, things like cheating which simply weren't happening. The claim was that there were not enough rats for statistical significance, and the fact is that they didn't have any fewer rats than there were in all the studies that had been done by the industry, but had only gone for three months.

Basically, the same kinds of experiments had been done by the industry over a three month period, to show no harm. You have to wait four months to see the problem. That's the thing, is that it's a slow, insidious toxicity that you don't immediately see.

As long as you cut the experiment off after three months, then everyone's happy. You can go home and go ahead and eat your glyphosate and poison yourself, and not know better, because you think it's fine. You have to go through these longer studies in order to see the damage, but then they managed to get this paper retracted, so now it can't be used as evidence to try to convince the government to worry about glyphosate.

Dr. Osborne: That sounds like politics to me.

Dr. Seneff: I know. It's amazing how much power there is in money, and this is what we're up against. People would rather have people suffer from all these problems than to not make that money, apparently, which I find shocking.

Dr. Osborne: Any time I deal with patients, many of them are very hesitant to want to change their diets, right? They're used to a particular way. Food is such a social addiction and so you're not just battling, "Take this food out of your diet," you're battling marketing, you're battling years of people having traditions that they've created with these different types of foods.

Dr. Seneff: Also you're battling the fact that when you eat these potato chips, you don't feel anything. You don't have this direct sense of, "Oh my god, this is killing me," because it's an insidious process that happens slowly over time. No particular piece of food you eat, you can't connect the dots, unless you do it rationally and you see the long term evidence from the literature and you finally are convinced.

My husband and I, now, we just buy everything organic. Luckily, we live near a Whole Foods and it's a wonderful store. We won't make it if it's not organic. It's been neat that Whole Foods has so many choices.

Dr. Osborne: The takeaway is grow your own food in your own soil without these pesticides, or buy it organically. What do you think about, I know one of the things that we see in the grocery stores and Whole Foods does this, is importation of a lot from South America. How do you feel about that?

My concern with a lot of that is how much control do we really have? Our EPA doesn't have a control over that and we know that for many of the crops that we do import, glyphosate is used in great quantities.

Dr. Seneff: What are you saying? Are you saying if it's an organic product from South America, do we trust it? Is that what you're asking?

Dr. Osborne: One, do we trust it, or two, is it as organic as it would be if it were grown in the U.S.? Is it grown right next door to a potential glyphosate field or an infected field?

Dr. Seneff: That's probably happening in the U.S. as well, right? Here, U.S., buys 25% of the world's glyphosate, so this is probably almost the worst place to grow an organic crop, to try to keep yourself from it.

Dr. Osborne: Interesting.

Dr. Seneff: There is going to be glyphosate in the soil. The stuff doesn't break down. They claim it breaks down quickly but I have seen studies in certain soils, like with high hummus and high acidity that can last for 20 years.

Dr. Osborne: 20 years. What do we do if it's in water runoff now?

Dr. Seneff: I know, that's another problem.

Dr. Osborne: Have you come across research that shows what kind of filters will remove it? Are we talking about potentially granular activated carbon, maybe zeolite, have you read anything about that?

Dr. Seneff: I don't know, and of course no one's trying because it's harmless. This is the really insidious thing about it is no one thinks it's a problem. They don't even measure it. There was a paper that just came out looking at glyphosate in rain, in I think Mississippi, and it was like 86% of the time they found it in the

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rain in the study that they did. It was in an area near crops that were being sprayed with it, but it's very hard to avoid.

Even if you're going organic, you drink a glass of water and you don't know how much is in there.

Dr. Osborne: Right.

Dr. Seneff: It's kind of scary. To think that it's all over the place, it really kind of makes my skin crawl. To think of these people making more and more of this chemical and pouring it out into the world. It has just become harder and harder to try to figure out how to keep from getting yourself exposed to it. You have to move to another planet to get away from it at this point.

Dr. Osborne: You need a new spaceship and a community to go, right? Let's just kind of summarize, then. You have this ubiquitous environmental chemical. 25% of its use is right here in the United States. It's used on a number of different foods, whether in Roundup Ready seeds or as a weed killer to soak with, or to allow for crops before we harvest them, to kill the weeds before we go and make a harvest.

It interferes with liver enzymes that aid in detoxification, primarily sulfites and -fates and affected, which can contribute to or can cause similar symptoms that we see with hyper allergic or allergenicity, as well as autism and other conditions. It can affect the gut bacteria, affecting our synthesis of vitamins and our ability to digest our food, making our food more allergenic.

It can affect the absorption of nutrients through its chelating effects, so it binds to certain minerals that we require, as humans, to function. It can interfere with metabolism of certain amino acids, like serotonin, tryptophan, and phenylalanine, which are important for the function of our thyroid gland and our gut function and our brain function.

The only real tool that we have to reduce and minimize our exposure is basically educating consumers and intelligent selection of food, and potentially filtration of water. I'm going to look more into this after we're done and find out if we have any evidence or any research on how we can pull this from the water, what kind of filtration devices we can use. I would assume, or maybe even surmise, that maybe reverse osmosis would probably be the best scientifically to pull this type of chemical out, and maybe carbon wouldn't be sufficient.

Our best bet is to buy organic, and to cook with organic foods and eat organic foods—

Dr. Seneff: And whole foods, of course.

Dr. Osborne: —And whole foods. To not eat out and to not buy processed foods.

Dr. Seneff: That's right. It's a pretty strict rule but it's worth it.

Dr. Osborne: I agree with you. I see it every day. My journey into this was treating patients who had gluten issues and celiac disease who were not responsive. In other words, they were in that refractory category where they wouldn't get better. It started with grain elimination and eliminating other grains. When we eliminated all the grains, we found a huge improvement in all of these patients who were failing to respond.

Dr. Seneff: Yes.

Dr. Osborne: This has been very great. This has been a wonderful conversation.

Dr. Seneff: It has been. I appreciate your knowledge. You are definitely a quick study and you know a lot already. Very impressive. It's wonderful to talk to talk to someone like that.

Dr. Osborne: Thank you and likewise.

Dr. Seneff: It's been great. Thank you so much for doing this.

Dr. Osborne: How can our listeners find you? You mentioned a website. Is there something you have that we can send them to read?

Dr. Seneff: Yes. If they type my name, they'll find a bunch of stuff. I've done various videos with Dr. Mercola and with Geoffrey Smith, and radio interviews, and also I have various papers and essays on my website, slides from talks I've given. There's a lot of material, if you just type my name, you can find things. I can give you the web page but it's a bit messy. people.csail.mit.edu/seneff There I have a bunch of pointers to various papers and essays and slides, and stuff like that.

Dr. Osborne: I'll make sure to include that link for everyone listening. Okay. Well, again, Dr. Seneff, thank you so much for taking part in our discussion and bringing to the table so much great, valuable study and research that I think is going to help change a lot of lives.

Dr. Seneff: I hope so. It's a positive note to know that at least you do have an option. I think that's a wonderful thing that people can buy organic and that places like Whole Foods do exist. We're not completely frustrated that we have to eat the poison. I think that's a huge benefit, and as more and more people eat organic, then more and more people will produce organic because it will sell. People will be

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willing to pay the extra price and the farmers will probably be happy not to have to deal with the chemicals, so it will be a win-win situation. Great. Thank you.

Dr. Osborne: Great. Well, thank you, and have a wonderful afternoon. I'm going to be in touch on the back end. There are some things. I'll send you that paper on transglutaminase and maybe we can have another conversation in the future.

Dr. Seneff: Excellent. Yes. That sounds very interesting. Thank you.

Dr. Osborne: Have a wonderful day.

Dr. Seneff: You too. Bye.

Dr. Osborne: Thanks. Bye.

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