GMOs REVEALED

Episode 10
Transcript

Patrick G. : I'm excited to present to you bonus episode 10 for GMOs Revealed. I'm your host Dr. Patrick Gentempo. We have a great slate of people for this bonus episode. We start with Christian Krupke who is an associate professor at Purdue who has some very interesting things to tell you about relative to his area of expertise and how it relates to pesticides and the impacts that GMOs and what's sprayed upon them is having on our environment and on our world.

Next we interview Dr. Les [Barison 00:00:34]. Dr. [Barinson 00:00:37] is a medical doctor who has looked at the relationship between glyphosate and the rise of certain diseases in our culture, and I think you'll be fascinated and quite frankly somewhat disturbed by what his findings are.

Then we have Dr. Alex Lu who's an associate professor at Harvard School of Public Health, and he has looked at the impact of glyphosate on colony collapse in the bees. I don't know if you've watching TV over the last several years, but there's been many specials on this, and the reverberations and the impact of colony collapse is significant and threatens humanity, something we need to know and understand and another reason why we need to end this madness called GMOs and what's sprayed upon them.

Lastly, we have one of the greatest agents for change in the world of natural health, Dr. Joe Mercola. I have known Joe Mercola for many years, and Mercola.com has had a reverberating impact on the world that's taken very strong stance on many issues. If there's anybody that understands the impact of GMOs on the world and on your health and solutions to that, it is Dr. Joe Mercola, so you're going to really enjoy what he has to say.

So enjoy this bonus episode. There's a lot of terrific information in here, and I'll see you on the other side.

Interviewer: Christian, I've read a very interesting article that you had written, and I'd like to have you first start off by telling me who you are exactly at Purdue, what you do, what your research entails, and what your actual field of study is?

Christian: Okay. I'm an associate professor of entomology here at Purdue, and my specific area that I work with is corn and soy

bean insect pests. That area of study led me into this story that you're referring to, which is some of the unintended consequences of managing those pests, and those unintended consequences were honey bee deaths in the spring linked with corn planting.

Interviewer: And corn planting, conventional corn planting or what type of corn planting?

Christian: This was the planting of corn seeds that are not organic. All of our corn seeds that are not organic is treated with several pesticides including fungicides and insecticides. The insecticides are in the neo [inaudible 00:03:05] class, and there was what was causing the deaths of these bees. If you think about the 95 plus million acres of corn in the United States, all of those acres, virtually all of those acres except less than half a percent that are organic, all the rest of those acres would be treated with that cocktail of pesticides.

Interviewer: Even the GMO corn?

Christian: Yes.

Interviewer: So I thought the whole point of the GMO corn was that it didn't need to be sprayed with everyone, just the glyphosate. Can you tell me a little bit about that?

Christian: Right. So the GMO corn that is marketed for the control of insects is also called BT corn, and there are two main groups of insects that you're targeting there. One is the moths that start out as caterpillars and feed on the ear itself and on the stock of the corn, and the other one are beetles called root worms that feed of course on the roots. You've got BT that targets both of those and is effective at managing them.

The neonicotinoids insecticides on the seed don't cover those groups. So they're marketed for everything else, other insects that feed below the ground, on the roots of the plants and so forth.

Interviewer: And what they're covered in the neonicotinoids, which have only been used fairly recently in a large scale, just since the mid 2000s.

Christian: Yes, that's right. Approximately a decade or so, a little bit more. About a decade, it would be fair to say.

Interviewer: Which is really when we started seeing the colony collapse disorder or the disappearing of bees on a large scale.

Christian: Well and the colony collapse disorders was a tricky thing, because once it was defined, we could name these differences in the hive abandonments. So it may well have been going on before that, but it wasn't named, and people didn't know what to look for and they didn't know what to call it. They would just call it oh, those bees [inaudible 00:04:56]. So tying cause and effect of colony collapse disorder with any event, including these neonicotinoids is difficult because we weren't looking before, and we didn't have a name for it before.

Interviewer: But your research has shown the addition of the neonicotinoids has certainly contributed to the large disappearance of bees that we're seeing right now.

Christian: What our research shows and focuses specifically on is the spring bee kills, and you have large visible deaths of bees outside of colonies, so you have carpets of dead bees outside the colony. In the spring, which is when the colony should be doing the best. This is a little bit different than hive abandonment, which happens usually in the colder months leading up to spring. This is covering, okay, why do we have bees dying in April and May.

Interviewer: What happens if all the bees die?

Christian: If all the bees die everywhere?

Interviewer: Yes.

Christian: Well then we have big problems, not the least of which is many of our main food sources of nuts, berries, fruits, vegetable, require honey bees or some other insect pollinator. Honey bees are by far the major one. They're the only one we have in wide scale domestic stocks. They're the ones that we know how to manage and move. For example, the almond pollination event is the largest pollination event in the world. Many, many thousands of hives.

Without honey bees, there's really no second line of how we get these plants pollinated. There has to be an insect that visits these flowers to get a fruit or a nut or vegetable to set.

Interviewer: Are you saying that if all the bees disappeared, and again, it's not going to happen overnight, but they're dying in record numbers, that we would actually see increased hunger or at least increased hunger for produce, I mean I don't know what else would be left for us to eat?

Christian: Yeah, well you would have a deficit of produce, of fruits, vegetables, nuts and so on. In the short term, the cost would go up. In the long term, yeah, some of those things may not be available. Without honey bees, there's no question that we would have an altered choice of menu options.

Interviewer: That poses another question that you may or may not be able to answer. It's not quite your field. However, if the bees are being poisoned, there's some toxin from everything we're spraying or soaking the seeds in, do you think there's one bio accumulation in terms of in the bees, in the things that would eat bees, or does it mirror what's going on in the bees, do you think that mirrors what's going on in other animals, perhaps even human kind? So if it's toxic for the bee's system, bio system, do you think it's toxic for other animals' or species' bio systems?

Christian: Well in the case of these particular group of insecticides, neonicotinoids, are they toxic for other systems, and certainly they're toxic for many other insects, other invertebrates, things that live in the water, things like earth worms and so on. That is known that that toxicity is there.

As far as humans go, this group of insecticides, one of the main reasons it became so ubiquitous so quickly is that it was safer for mammals and less mammalian toxicity than its predecessors.

Interviewer: However it works on the nicotinoid receptors.

Christian: That's right.

Interviewer: Which means that it works on the central nervous system, and we have nicotinoid receptors, and usually acetylcholine works along with those receptors, and that's a huge part of our thought process. I mean acetylcholine, we couldn't think clearly without acetylcholine. We wouldn't move clearly. We wouldn't move effectively without acetylcholine. All our muscles rely on it. So I know it was thought to be safer, and again, you study insects.

Christian: That's right.

Interviewer: And not mammals, but for somebody who has been trained in mammalian health, specifically human health, it doesn't make sense that while they might be safer, it seems like the accumulation of something that interferes with acetylcholine would be quite damaging.

Christian: Neonicotinoids have qualities that make them good insecticides. One of them is that they're water soluble. So they move with the water up into the plant. So you can coat a seed, and at least part of that material goes with the water into the growing plant, but much of it does not, and it goes with water elsewhere. It does not bind to soil very well, so where does it go? It follows where the water goes. It can go to the surface waters. It can be found in surface water, ground water, and so on.

So this is a characteristic that makes it a good pesticide. It also makes it hard to deal with when it's not in the plan and on the plant anymore because water of course doesn't stay in the field where the rain happens to fall. It can move sometimes in ways that are counter intuitive.

Interviewer: And have water areas, water ways or water reservoirs been tested that are somewhat far from where the last neonicotinoids had been placed? Are we finding their presence in water that's a distance from where they're being used?

Christian: In some cases. The best data I know of on that front come from Canada where they've been testing at various distances from where the treatment was applied, but I can't give you a maximum distance of how far that was. I don't know.

Interviewer: But it's being found in the ground water.

Christian: Yeah, it's being found in water that is near agricultural fields at varying rates, and in hindsight, it's not surprising because it is water soluble. To expect it to all go up into the plant, which is exactly where we want it, and to only kill pests is unreasonable. That's not the way the physics of these compounds works.

Interviewer: I'm assuming this is being found in water that makes its way into drinking water for people or drinking water for animals.

Christian: That I don't know. I don't know the answer to that.

Interviewer: Is it easily filtered? How can you extract if what drinking water?

Christian: These are small molecules, which is part of why they're water soluble, so filtering them might pose come technical difficulties. I don't know how easy or hard it would be to filter them, and I don't know how much you would need to filter them, actually. What would be the acceptable level, and I know those levels are published, but I don't know off hand what they are.

Interviewer: How do we know? How are these acceptable levels even created? Who comes up with what's the acceptable level of a neonicotinoid when we don't even know the risks on animals and on people?

Christian: How you register a compound as far as mammalian toxicity goes, that's a whole universe that I'm not all that familiar with. Of course you know that rats are the species that they usually use, but how they fill the risk cup as they call it at the EPA, I don't know the answer to that.

Interviewer: What about the combination and let's stick with the bees, because that is a territory that you're really comfortable with, when you look at things that are affecting bees, and you look at things individually in a lab, they might affect bees in a certain way, but when you mix them all together, do they affect bees differently? My question really pertains to can I extrapolate that to animals and people? Maybe this insecticide by itself isn't too bad. It's a little bad, but not too

bad. But when you mix it with a fungicide and a herbicide and maybe something else, are we getting a cocktail of something that has some synergistic effect?

Christian: Certainly, we know when we mix toxins in many systems, the results are more negative than the added effects would be expected to be. So there are synergies. That happens all the time with pesticides as well. In the past the work with the bees has been focused on why are the bees disappearing, what is the cause of CCD, but now we know it's not that simple. There isn't a cause. There isn't if we do this, then everything will turn around. What it appears to be is there's a laundry list of causes that includes pesticides that includes pathogens, [inaudible 00:13:07] mites. But the number one cause depends on where you live.

If you live in an area where there's an intensive pesticide use, intensive neonicotinoid use for example, then that would be at the top of the list of stressors for those bees, but it's certainly not the only one because now you layer [varroa 00:13:23] mites on top and pathogens on top. If these bees are drinking from puddles that have neonicotinoids in them and eating pollen that has low levels of neonicotinoids in them, it's reasonable to expect that they would be more susceptible to pathogens, and there has been work that has shown that's the case.

Interviewer: That was my next question, which is if all these things render the bee more susceptible to pathogens, they've evolved with. They've always evolved with [varroa 00:13:50] mites. They're not new. Could you, and again, it's not your field, but do you think we could extrapolate that to people? People eating produce that now have herbicides, pesticides, fungicides, genetically modified organisms. So there's this whole cocktail now, and we know that disease is on its way up. It's an exponential climb for autoimmune disease, things like Alzheimer's, cognitive problems, autism. There are just so many diseases that are climbing exponentially, and I forgot to mention breast cancer, cancer in general, but breast cancer specifically. Could it be that it is now making human kind more susceptible to disease just like it makes the bees more susceptible to disease?

Christian: I don't know of any research that would draw that link. The biggest problem is what is the exposure, what is the control group in other words, people that are not being exposed to any pesticides. I don't know that there is such a group of people. To try to draw these linkages, there's so many confounding factors that I don't even know where you would begin to do such an experiment. It's very difficult to get cause and effect data for what you're talking about, where you have this background, this cornucopia of pesticides, most of them are at rates that we have no reason to think would be harmful. What if you have 17 of them at these low rates? What happens then? I don't know.

Interviewer: It sounds like there's a lot of we don't know.

Christian: Mm-hmm (affirmative).

Interviewer: Which brings me to the question of the concept of the precautionary principle. I know other countries do things a little differently. In Europe, they tend to respect the precautionary principle a little more than we do. Maybe not a whole lot more, but certainly it is something they at least say that's a mission in the European Union. Do you feel that going forward we should be looking at things differently? Should we be releasing pesticides and herbicides and fungicides differently? Should we be looking at them more closely? Should we be using or honoring the cautionary principle in terms of unleashing things on animal kind, plant kind and mankind. What you said, in 10 years, nobody really know what's going to happen in 10 years. At that point, it's in our water, and at that point, maybe it's in all our water.

Do you think going forward, is the scientific community talking about honoring the precautionary principle and looking back and going wow, maybe we need to do things differently?

Christian: Well definitely. The precautionary principle is in line with how most science is done and how most scientists think. You try to be very conservative in your recommendations and try to ensure before you make a conclusion this is safe or this is not safe, that you have the data to back up those statements. In the case of the precautionary principle in registering pesticides, some of that has started to happen in

terms of the honey bees because the honey bees have been so well covered, and their numbers have been declining. So what the EPA has done is revisit how they asses pesticides before releasing them into the environment in terms of honey bee health, so looking a little more closely at different types of studies, more rigorous studies and so forth.

But when you have a pesticide that is registered on hundreds of millions of acres, it's hard to close the door after the horse has left the barn kind of thing. That's the spot we get into when we don't apply a more rigorous precautionary principle. One of the main reasons we don't is because there's a strong demand, a strong push to grow more food.

Interviewer: Are we seeing more food grown with neonicotinoids or the creation of GMO, or is this really a push to sell more neonicotinoids and get money funneled into the GMO, into the very industry that's creating them? Is it really to improve mankind's yield of food, or is it to make money? How does the industry play into this?

Christian: Well when you mix together the GMO and neonicotinoid, that's a thing people commonly do, but they are separate and distinct. The GMO crops have documented efficacy. They do work on significant important pests. So they're filling a void. The neonicotinoids are quite different. We've had a hard time documenting benefits in terms of yield, in terms of production, in terms of even just the dollar, the economic benefit. We've looked in soy beans, we've looked in corn. We've looked across multiple states as well. The benefits are hard to find, and we've not been able to consistently measure them. People ask well if neonicotinoids were restricted or eliminated in field crops, and that includes your corn and soy beans and wheat and so on, what would happen if there was a restriction?

From our research and the data I've seen, it wouldn't miss a beat in terms of yield. So from the scientific efficacy point of view, the yield point of view, I've not seen data to support that we need to treat all these seeds, but yet that's what we're doing.

Interviewer: It sounds like, in this example, the push to sell neonicotinoids even though they have this outcome, they're adding to the disappearance of the bees, it really doesn't improve any yield, so it's really just a push to sell product.

Christian: Well it's based on the very simple premise of an insurance based mindset. These insects may be there one out of 10 years, one out of 100 years, one out of 1,000 fields. It's marketed as insurance against these outcomes. It's marketed as something inexpensive, easy, that can be put out there and guard against these things that usually won't happen.

The question becomes is that worth some of the non target effects, some of the unanticipated negative effects? It looks like it may not be because we can't get these benefits, these yields. But in the defense of the people planting these seeds, farmers and producers, they don't know. This information is just now coming to light. The premise has been this material will work. This is a good product. This is a product that will be beneficial to yields. That's been the premise. The premise has gone largely unchallenged for a long time.

Interviewer: So in theory, these insects that could occur one in 100 years, one in 1,000 fields, what are these insects, and who is telling them this?

Christian: What the insects are, they include mostly insects that feed on the root and on the seed. So this is the early days after the seed hits the ground in April or May. You have insects like wire worms, seed corn maggots, white grubs. Again, these are usually grub like or caterpillar or maggot like insects that live in the soil so you can't see them. So they might be there. There's no way to see unless you dig them up. There's no good and easy way to monitor for them.

So that creates uncertainty, and uncertainty creates fear, and fear leads to this prophylactic application of pesticides. That's been the approach that's dominated the Midwest in terms of these particular pesticides on large acreage crops.

Interviewer: So this is fear that happens naturally in farmers, or was there a marketing of this fear?

Christian: Well, a lot of our pesticides, all of our pesticides are based on guarding against every contingency that could affect yield. As crop prices go up and crop prices are at unprecedented highs in the last two years, it becomes more and more attractive to use an insurance based mindset for whatever it is, pest management of insects, fungi, whatever, you name it. The crop value has gone up. Insecticides are cheap. They're cheaper than they've ever been relative to crop value. That's a lot of what's driving their adoption. In addition to fear of unknown insects and so on, the fact that it represents a small part of your overall cost of doing business has a role to play as well.

Interviewer: Who pays for the untoward effect of the use of all these chemicals? Do the farmers who are using them for the cheap insurance policies pay? Does the chemical industry pay for this? Or will it be you and I and everyone else paying for the untoward effects when the bees, if the bees' colonies really decline at the rate their declining, crop prices will go up. Who's going to pay for that?

Christian: Well in the case of the bees, and you lose bees, the first person that pays is the beekeeper to get more beehives. Then a beekeeper can or cannot continue to pay, sometimes they go out of business. Then after that, the consumer pays in the form of increased crop prices. That's the short term legacy of fewer honey bees would be increased prices for certain commodities.

Interviewer: I'm assuming there's a cost for having chemicals in our water, whether it's a health cost, whether it's a cost in terms of treatment, water treatment, because I know that the water departments and cities test for more chemicals, and every year there's more chemicals, and they have to find ways to get some of these chemicals out if they're shown to be deleterious to human health. My question is who's paying for this cheap insurance? Where are the costs really going? Is this really a free market? This cheap insurance policy, is it really cheap insurance policy? Who's ultimately paying for it?

Christian: Well in the past, we've seen that these cheap insurance policies certainly wind up being expensive, and that can take many forms. One of them is resistance to a pesticide, and then you have to pull that pesticide away and perhaps

replace it with something that's not as friendly, cheap, whatever that positive aspects of the first pesticide were. The other thing, the other cost that you're getting at is a monetary cost, and who bears that cost of environmental cleanups and so on, and those are generally born by the people doing the cleaning up.

Interviewer: So you and me.

Christian: Potentially, yeah.

Interviewer: So going forward, researchers are really thinking about the precautionary principle, but what does that mean, what we've been doing for the last several decades? And if moving forward, people like you and other researchers are now saying before we release a new herbicide, fungicide, pesticide on our crops, let's look at them longer in the lab and see what the health effects are, is there going to be resistance from the industry? I mean the industry is there to make a living. They're there to make money, make profits. But what you're saying, it implies we haven't be using the precautionary principle or at least not very well up until this point. Is there pushback from industry?

Christian: Certainly. There are multiple stakeholders in any of these registrations of pesticides. On one extreme, you have the individuals that want this material to get to the market soon so that it can be used because it will have potential benefits. Regardless of timelines for looking at it and so on. Then on the other side, you have a group that would like to study thoroughly and look at every contingency.

We tend to in some of the recent examples, wind up too far on the side of being perhaps a little bit hasty in terms of quick fixes because there's so much pressure to produce more. Doing more with less. In other words, getting more yield per acre, whether it's to feed people or aid or what have you. Any time you have that enormous pressure, you're going to get pressure to stop the science and more forward with the registration.

Interviewer: So there's pressure to get them out on the market.

Christian: Yeah, definitely.

Interviewer: And again, we're talking about crops of corn and soy, and we're talking about large scale crops of corn and soy, and I'm assuming, and you can tell me if I'm wrong, that a lot of that goes into, aside from the animal feed, it's going into a lot of what we'd call snack food, junk food, a lot of the corn is going to make corn syrup or sugar, fake sugar from corn syrup. So we're not talking about nutritionally feeding the planet or nutritionally feeding our country. We're talking about making more junk food.

Christian: Well some of it is corn syrup. Some of it is feed for livestock. Some of it is bio fuels. Corn is, as you know, our number one crop and is used for many, many things. So to say should we move away from corn, can we grow other things? We could, but I think in the short term, the better target would be corn's not going anywhere. We have entire towns and cities dependent upon corn. Let's try to do a little better. We know what we can do better. We know we can improve, so let's do it.

Interviewer: How can we improve?

Christian: Well for one thing, the example I just gave of these pesticides that we're using that have no demonstrable benefit, and yet, if you are a farmer, and you want to buy corn seed that isn't treated with neonicotinoids, you cannot find it.

Interviewer: You can't find corn that's not treated with ...

Christian: No. If you're a large scale corn producer and you want to plant, let's say your elite, hybrid, what they call raised source hybrids. These are strong performers. You want your GM and your BT toxins, and roundup ready. But you don't want seed treatments, you don't want neonicotinoids in there, because you've seen well maybe they don't provide yield benefits. You can't buy that. You cannot buy them without neonicotinoids on them. It's not widely available.

In fact, for our research, we had to call multiple seed dealers to find it. It's difficult to find. That was small research plots. If you're planting hundreds, thousands of acres, it becomes of course more difficult.

Interviewer: What about non GMO corn? Can you find non GMO corn that's not soaked in neonicotinoids?

Christian: So when you say non GMO, you mean not roundup ready and not BT corn.

Interviewer: That's right.

Christian: If it's conventional corn, in other words, non organic, it will also have neonicotinoids on it. Everything that is not organic, every kernel will have neonicotinoids on it.

Interviewer: Is there any hope for farmers or for somebody to make supply available to farmers that does not have neonicotinoids, does not have seeds soaked in neonicotinoids?

Christian: Oh certainly. It comes off the plant that way. So it should be in theory, very possible to offer untreated seeds, and in fact the Canadian seed trade association in response to some of these questions that we're talking about with bees and so forth and water quality issues, has pledged for 2014 to have the same hybrids that growers want available as treated with neonicotinoids or as not. So they've gone on record as offering that.

So it's been done there. It could be done here if there was the will to do so.

Interviewer: Do you think the will to do so is growing?

Christian: I think it's growing, but I think it's a long way from a reality. I think the first thing that needs to happen is producers need to know that this material is not a pre-requisite for growing a crop. It's far from it. It doesn't show consistent benefits to yield. It doesn't show any consistent benefits that we can measure in terms of insect feeding or crop height or anything.

Interviewer: In terms of roundup ready and BT corn, and that is the majority of corn grown in this country, so it's the majority of corn that's eaten whether directly or because you're eating a piece of beef that was fed this corn throughout its life.

Christian: Sure, yeah.

Interviewer: Knowing what we know now about how ... Again, it's not your field, but knowing what we know about how we live very closely with all the bacteria in our gut, and what the roundup ready, the glyphosate does to bacteria, how it interferes through the [inaudible 00:29:48] pathway, knowing that, how do you personally feel about eating BT and roundup ready corn?

Christian: Well I think two things. I think number one these products should be labeled so that everybody can decide for themselves what they want to eat, what's in their food. Everybody's entitled to know that. But number two, for me in particular, when you talk about BT or roundup ready, I don't have a strong opposition to foods that are made with those particular hybrids, partly because the alternatives and the other ways of growing corn had some real downsides in terms of chemicals that were used there, too. In comparison with those, the BT and the roundup ready are actually on balance preferable for the human health aspect in my opinion.

Interviewer: But given the choice between corn that was raised organically without chemicals added to it or being soaked in neonicotinoids, and GMO, BT or roundup ready corn, which would you choose to eat?

Christian: For a lot of these things, if the price were the same, I would choose the organic produce, simply because with organic produce, there are many insecticides, pesticides in general that cannot be used on those crops.

Interviewer: Why wouldn't you want to ingest them?

Christian: In a lot of cases, these pesticides are applied prophylactically and they're applied in the absence of pests. To ingest these compounds and to be part of the consumer base that ingests them, you facilitate continuing to put them out there with no reason to do so. We do need some pesticides to grow food. There is no doubt. We do not need these pesticides to grow corn and to grow soy beans, and we should be able to vote with our wallets, so to speak on those sorts of issues.

Interviewer: It's only your opinion. I know this isn't your field specifically, but I've looked at research and seen rates of illness, specific illnesses especially in children going up since we introduced the neonicotinoids specifically and also even backing up a little bit before that since we introduced the GMOs. Now we don't know either way definitively, but my question to you is since moving forward, we don't really know what the health effects are going to be, the long term. Doesn't that sound like an experiment?

Christian: Yeah. That question, I'm not comfortable with because it has so many human health aspects that I'm just not confident on. I haven't read the literature, and I don't know.

Interviewer: Theoretically though, let me ask you, if we unleash something that's going to be used by animals and people on a daily basis, several times a day if you think about it, we don't really know the outcome 10 years, 20 years.

Christian: Right, right.

Interviewer: From a scientific definition, is that not an experiment?

Christian: Certainly. We don't know with any of these pesticides when we release them how they will behave when they're out in the environment and our history is littered with examples of these good intentions in terms of pesticides in general going awry from time to time. The minute we think we've got it figured out, that's when we know that we need to revisit our assumptions and look more closely just because of the areas that we're farming on. The scale, the magnitude, the new areas that we're pushing agriculture into, and in many cases, we could do things differently, better by some definitions, but we aren't because there is a knowledge deficit out there in terms of getting to the end users, the producers, the farm producers.

Interviewer: One more question because you mentioned this, and I don't know what you think about the research, but if you look at research that has been done, and I'm talking about [inaudible 00:33:29] research and some others, where they looked rats who have been exposed to organic produce versus conventional, but sprayed with roundup, and then GMO, which has both the roundup and the ...

Christian: Right.

Interviewer: The animals that were exposed to the third group actually fared worse than the animals exposed to just the pesticide laden produce.

Christian: Right. Yes.

Interviewer: So that takes me back to something that you had said, which you had said the GMOs theoretically are better than the conventional ones that preceded them because they had less pesticides. They still have lots of roundup on them.

Christian: Yes they do.

Interviewer: They're sprayed heavily with roundup. It's looking like perhaps, we don't really know the long term effect of that accumulating in us. Again, from a scientific definition, is that not an experiment?

Christian: Well, there's a couple things in this question here. These experiments you talk about with the rats and the tumors, there are several large methodological problems with that set of experiments. We actually read this paper for lab meeting a few months ago or more than a year ago now. So drawing conclusions from that paper is going to be shaky and not going to get you very far because that's just not the way our dietary exposure to these compounds occurs.

Interviewer: In what sense?

Christian: Well the magnitude was too high. The rates were too high. There were no intermediates as there would be in the processing of corn before we ate it. Those intermediates weren't there in the rat system. In other words they were eating corn. Here's the corn that was grown. Eat it. We can't eat that corn. We don't eat that corn.

Interviewer: No, but it gets ground. It gets cooked. Does baking it take out glyphosate?

Christian: I don't know.

Interviewer: It doesn't. So I'm not sure how that matters. But my question then would be the reverse. Do we have evidence? Do we

have a study that used animals in a different way with corn in a different way and bigger numbers, because I've looked at all the research, that shows that it's safe?

Christian: I don't know.

Interviewer: That's an interesting question isn't it?

Christian: Yeah. I don't know the answer to that.

Interviewer: Can you tell me a little bit specifically about your study with bees?

Christian: Right. So this was a study we initiated beginning in 2010. Did more in '11 and '12, looking at why we were having reports of dead bees at apiaries in Indiana, that coincided with corn planting. What we wanted to know is why are these bees dying, what is happening, is it something connected with corn planting? So we collected dead bees, looked at what was in them and on them in terms of pesticides, and we looked at a wide screen of pesticides, hundreds of different candidates. What kept coming out was the neonicotinoid pesticides, specifically the ones that are put on corn seed. That led us to look at okay, how are we getting corn seed that's being planted in the field, what is the intersection of honey bees, because they are not interested in corn fields, they're not interested in corn planters.

After testing dandelions and soil and pollen, the contents of hives, the pollen in hives, and the material that comes off of planters, we found that number one, neonicotinoids were present in all of those, but number two, the material that was coming off these planters was a very very high rate of neonicotinoid dust and that this dust we think is the main bad actor in causing these bee deaths in the spring time.

Interviewer: It's very important.

Christian: Yeah and it's something we can do something about. What we're hoping for is that we have next year and the year after we have compounds that we can add, lubricants that we can add that don't cause this massive dust off, that don't abrade the seeds and basically push this material out into the environment where it can go where the wind carries it or the

water carries it and so on. Of course, the doesn't do anything about what you're putting in the field. It doesn't reduce the amount that you're putting into the environment. But it contains it. It's a little step forward potentially.

Interviewer: Is there pushback? I mean is anybody denying that these neonicotinoids, does the industry that makes the neonicotinoids deny this is contributing to colony collapse or the bees' death?

Christian: Well it depends on how you phrase it. I think it's widely accepted now that some of these spring deaths have been caused by this planter dust and planting, and industry, the [inaudible 00:37:59] have been part of the effort to reduce that dust, but at the same time, there are claims that there have been no documented effects, no scientific evidence that colony health is affected negatively by neonicotinoids. But that's not true. There are many studies at the colony level that show negative effects of neonicotinoids, not just lethal effects, but sub lethal significant effects, homing failures, reduced rearing of queens and so forth.

There's never going to be a perfect study that satisfies everybody, and every study can be picked apart, and that's what you see happen consistently. The shortcomings of various studies are pointed out, and they're rendered less declarative. There's less unambiguous because you can point out that not everything was done properly. Which no study is perfect, especially with honey bees that are hard to work with.

Interviewer: Who's behind stating that these studies don't really prove what your study has shown? Is this another independent researcher, or is it the industry?

Christian: Well there are lots of papers out there, scientific papers, on this honey bee issue, especially with respect to neonicotinoids. Most of the field work has shown that there is an effect of neonicotinoids. Sometimes the rates are high. Sometimes the rates are low. Sometimes the effects are stark. Sometimes the effects are very subtle. Sometimes there aren't effects. The declarative statements that there is no scientific evidence of colony health, that claim is usually put forward by the [inaudible 00:39:28] themselves.

Interviewer: So the industry.

Christian: Mm-hmm (affirmative).

Interviewer: That's not so surprising.

Christian: No. It isn't surprising. Again, in the absence of a definitive perfect study, very tightly controlled, all factors minimized except for this one, you'll always have this. We've seen this over and over again in history. We never have the smoking gun. We never have the paper we point to and say there, that solves it. You never will because we're talking about hundreds of millions of acres. How can there be one answer that covers hundreds of millions of acres? You'll never have that. It doesn't happen.

Interviewer: So Les, thank you very much for letting me talk to you. I know you're busy. You've been very busy with the campaign in Washington, and you're a physician by training, correct?

Les: Correct.

Interviewer: But I know that your passion of late has really been looking at the research on GMO food on the effect on health.

Les: Correct.

Interviewer: I'd like you to tell me what research you're looking at and what you know.

Les: Let me tell you a little bit about my background, so give you a little bit of a context. I am board certified in internal medicine, fellow of the American College of Physicians, so I was traditionally trained, but my whole 30 year career was focused on prevention, wellness, getting people off of medications, trying to prevent disease rather than treating disease.

Prior to about four months ago, I used to tell people that GMOs in my opinion were the biggest threat to our health that I'd seen in my entire 30 year career. Then Howard [Leiger 00:40:59] came up to help support our I522 GMO labeling campaign, and I got to travel with Howard for two days, and he's a soil scientist who really specialized in helping people do remediation of their soil and get their soil

back if it's been contaminated with genetically modified crops, and he's been involved in soil science for 30 years. He's just an expert in this area.

Howard had just published with Judy [Carmen 00:41:23], a veterinarian from Australia, back in June, a journal with inflammation study, which was profound. Tony, you being a physician as well, you know that chronic inflammation is the basis of 90% of the disease that we have today. What Howard had done was he would go around and talk to the veterinarians who were being involved with the slaughtering of animals. All of the veterinarians basically said it's normal to have a pig's stomach basically looking like this. This is basically what a normal pig stomach would look like feeding non GMO type of a diet.

Then the pigs that were fed a GMO diet, this is what their stomachs looked like, this red, inflamed, ulcerative type of condition. The pigs that were fed antibiotics and GMOs had a lighter, pinker stomach, but they still had a lot of ulcerations so it didn't totally protect. Most animals are fed antibiotics today, which is why we have so much antibiotic resistance.

This was a very startling thing. The other thing was that pig intestines and animal intestines where we make sausage, the sausage casing, the intestines are so raw and fryable, we have to import the pig casing from New Zealand because we don't have animals in our county that we can actually make sausage casing from because again, all of the GMO crops are destroying the insides of our farm animals.

Interviewer: I've not ever heard that. That's crazy.

Les: This was an explanation. What happens is disposal also happening with soy, not just corn, but for instance, BT corn, one of the main crops, basically the insect has been programmed through the genetic modification to basically poke holes in the insect's stomach, therefor the insects will then die.

What's happening is we're either eating the corn, which is basically in everything, or the animals are eating corn. What's happening is they're getting all this intestinal permeability and this leaky gut type of syndrome where we

take food stuffs into our body, the food stuffs then leak out the intestines and the stomach, into our body cavity, they're taken back up into our blood stream. The blood stream then recognizes this is a foreign material, and it manifests this anti autoimmune response because it's never been seen, and this could be the basis of why we're having so much autoimmune disease increase in the last 20 years.

Interviewer: So this study was just done on pigs, and it was really just looking at the stomachs.

Les: Correct.

Interviewer: But what they found were ulcerations, and it makes sense based on what we know about the BT corn. How do you that's impacting people when they're eating it? What's the picture regarding this? Do we know?

Les: To me, this is why I've been just so inflamed in the three months since I met Howard, is because this literally describes a lot of the chronic disease that we're seeing in an explosatory type of manner over the last 20 years, and we have a huge amount of autoimmune disease. We have a lot of gut and inflammatory bowel disease. If we don't have a healthy gut, it affects every aspect of our body from cancers to autism to brain to everything.

Interviewer: So this is what you're saying, but do we know? Is there data to show this, to support this?

Les: This is what's fascinating. We went over to meet Nancy Swanson, who is a scientist and retired physicist from the University of Washington, who has impeccable background and skills, and Nancy has been doing some journalism and investigative journalism on her own, and what she has actually found is the scariest thing that I've seen in my entire career. What Dr. Swanson did was she then took a whole variety of chronic diseases, which is why we have concerns about Obamacare and the big huge healthcare budget, and she started looking at these different diseases, and she looked at the incidence, and what she did was she would look at either the incidence or the prevalence or the deaths.

For instance, she went to the Center for Disease Control, the CDC, and looked at their mortality data. She just looked, all this data is published, and she had to do some painstaking effort to put some of this data together and tease it apart. Let's look at diabetes. That's a good example. Here you look at the instance of diabetes, and you can see the prior to 1996, it's basically a flat curve, but in 1996, when the crops were planted, the instance of diabetes absolutely just took off.

It's staggering. If you look at obesity, and we think of people who have diabetes are generally overweight, but the correlation is even different. You can see with obesity, the same type of thing, where the instance if fairly flat, but then it just takes off in 1996. Obesity is the basis of so many diseases that we see, and I think it's only part of that picture. I think it's only connected with the GI tract and all this intestinal permeability and these gut problems, people don't, physicians in general don't think of it like that. They really just treat obesity as an isolated type of a problem, and the gut is really related to the whole body.

Interviewer: And physicians don't typically look at gut health anyway.

Les: Correct.

Interviewer: It's really a new thing that it's in the mainstream media right now.

Les: Absolutely.

Interviewer: When it's always been an issue. So what other diseases have you correlated with the planting of the GMO crops?

Les: Well let's take a look at the brain. The brain is not an isolated organ that sits on top of our neck. It's also basically very much tied to gut permeability and the intestinal health and our gut flora, probiotics, I mean a whole bunch of things. Let's look at Alzheimer's. The implications in terms of the expensive drugs that people have to take, the nursing home care is out of sight, long term disability type of care where families have to take of family members that they can't afford or the time off from work to deal with all this stuff, it's all tied to the same situation.

If you look at the graph of Alzheimer's prior to 1996, the incidence is very flat, and it just absolutely took off. What if GMOs were really the basis and the cause for this huge amount of money and energy expenditure that we emotionally and financially have to put to the side because of dealing with older people? We're getting there.

Interviewer: It definitely would be one of the reasons. There's always been some people with Alzheimer's so to see the rise like that ...

Les: It's huge.

Interviewer: Would be a contributing factor.

Les: Absolutely. Senile dementia, same thing. It's profound. But let's go back to the other side of the spectrum and look at autism. Here we have these problems with these younger people. We don't have a lot of explanation behind it. A couple of my key friends are involved with autism research, but again, it's huge.

Interviewer: Wow.

Les: The graph is flat and then takes off.

Interviewer: It really does.

Les: So for instance you look at the incredible amount of money, the schooling, the educational, the problems that we have. When you have an autistic child, look at the quality of your life at home, the dynamics, how tight the family is because of all the emotional strife that goes on, the problems with school, having to take time off from work to support the child. It's profound. Same side, other side of the spectrum with our youth.

And yet, if GMOs are basically the cause of this, we're putting bandaids on our medical system. Obamacare is not the answer to dealing with medical care. We need to go back and take a look at our food supply. Nutrition is the basis of 85, 95% of our chronic disease situation. We need to basically get a handle on why are we letting these corporations buy are way and stop our having an influence as a population to go on and be health like many societies throughout the

world. The correlation is so high. It doesn't prove that indeed the GMO crops are causing this, but the correlation is so high, you've got to wonder what else is going on.

We have a huge amount of environmental toxicity, plastics, a lot of toxins in what we're eating, what we're exposed to on our skin, but this correlation to me dwarfs anything else that I've seen in my 30 year career and is literally very likely the basis of the chronic disease explosion in the last 20 years.

Interviewer: Well it certainly gives you reason to take a second look and look closely. It's interesting because of all the effects on the gut. Now this makes so much since because if we are seeing autism related to it and behavioral problems related to it, we know now, especially of late, all the research on gut-brain connection, and the flora, the bowel flora being so important for psychological health and neurological health. Have you been involved in the research, or are you just somebody who takes the research and you educate ...

Les: I'm working with Dr. Swanson just to give her some clinical help with my background and to make the information a little bit more practical, explain things and help her do some of this investigation. Her being a scientist, she does impeccable scientific journalism, but from a clinical perspective explaining what these things mean, and this is important, this is not as important and help bringing it to life.

Tony, this is a graph that looks at the incidence of the GMO crops when they're first planted. To the farmers, this is the best thing since sliced bread. They didn't have to do any weed control. They just took to it. It had just exponential type of acceptance and was used and just dramatically had a rapid rise in terms of the incidence of the GMO crops that were planted.

Interviewer: What year was that, 1996?

Les: 1996.

Interviewer: Wow. That's several fold higher.

Les: It just took over night. [inaudible 00:51:24], which is a masterful company trying to figure out how to psychologically get inside the farmers' heads. The farmers basically had a wide acceptance of the GMO crops, and they started planting this. It spread, and they had no concerns. They had been told that GMO crops were safe and on and on.

Interviewer: They just accepted it blindly.

Les: Absolutely. And even fast forward 20 years today, we accept it blindly as well, but three years earlier, Michael Taylor, who is one of the lead lawyers for Monsanto had become one of the top positions in the former Bush-Reagan administration. He basically passed legislation that said that GMO crops were no different than non GMO crops and never have to be researched. The FDA then turned the investigation of GMO crops over to the biotech companies that were producing these and said you have to establish a safety mechanism. So any time a new crop comes out today, the FDA turns to Monsanto or other companies, and they say is this stuff safe, they say absolutely, and we turn our head.

Interviewer: Wow.

Les: Michael Taylor today, in the Obama administration in the FDA food safety [inaudible 00:52:39], and this revolving door [inaudible 00:52:42] who's in the secretary of agriculture, all these people have come in and out of these Monsanto and these [crosstalk 00:52:47]

Interviewer: Clarence Thomas.

Les: The revolving door is just permeated every aspect up through Clarence Thomas on the Supreme Court, all over the place. There are hundreds of these people in every branch of the government, and it's a masterful plot to take over our food supply, but they literally want to own our food supply, and they don't care what they have to do to stop us in the process.

Interviewer: You're right. It's a masterful plot. I think that's the best way to term it. It is. They're infiltrating ... If this is all true, they're infiltrating top level and maybe even down into these grassroot efforts. I don't know what you can tell me about

what happened in Washington in the last, even November 5th, but you guys failed on the initiative.

Les: We lost 51 to 49.

Interviewer: Oh it was close.

Les: Which was incredibly close. A lot of the grassroots people in Washington as well as there was a huge grassroots coalition in California that were involved with Pro 37, the same thing. They felt people really need to know the health risk and the health dangers of GMOs the right to know, which is the premise of the two campaigns is not enough information. You really need to know what's the problem. Then if people are educated, then they would be willing to agree, but the campaigns limited their message to the right to know.

Interviewer: What could have been done differently that maybe would have had a better outcome?

Les: Well my whole career for 30 years was involved doing a lot of patient education. How do you get inside somebody's head to make them want to look at something, to evaluate it, become more aware, and want to do something about that lifestyle and make a change? That's a very difficult process for most of us myself included. I've learned from my own mistakes and my own fears to learn how do I interact with other people.

If you extrapolate this to the campaign, if people are not aware there's really a problem, with everything else that's going on, their kids, their family, their jobs, why are they concerned about this GMO crop stuff, it's not important to them when they've never even heard of GMO crops. I think the most important thing is really a huge education campaign, so people are really aware of how potentially dangerous this stuff is. We have huge amounts of scientific studies in animals. This human correlation data from Dr. Swanson is profound, which really explains a lot of why I've been in practice the last 30 years in terms of the diseases I've had to interact with and take care of patients.

I think it's really critical that we have a multi-faceted campaign to make people aware, which will create some

fear, and then they'll want to take some action. People do not take action unless they're alarmed.

Interviewer: So that it reminds me of having true informed consent.

Les: Absolutely.

Interviewer: While they achieved the right or bought their right to say that there's no difference between GMO food and conventional food, it's patented.

Les: Correct.

Interviewer: It's patented, so obviously it's not the same. If it comes to a risk, it's not just the right to know if a food's GMO, you have a right to know if you want to be part of this experiment. It's an informed consent.

Les: Absolutely. I mean our kids' lives are being totally changed today, and it's staggering to think that we have no control and that basically everybody is bought. The decisions are crammed down. Everything is hidden. The research, especially with what's happened in the last few months, Monsanto and these other biotech companies will have a huge amount of money and a lot of influence everywhere they go are basically buying their way to control our minds and our food supply. They want to control the seed population.

If you think that 90% of the corn, the soy, the sugar, the canola, 90% of the seeds are genetically modified. When are we going to wake up and realize what is happening? People can't afford their health insurance. That's why we had to establish Obamacare. What is going on?

Interviewer: So I'm going to ask you what I ask a lot of people I interview. The industry side says, and the people that are pro say that if you question the safety of GMOs you are really questioning science, and you're questioning progress because GMOs are progress. This is what the industry says.

Les: There's a lot of things that are said on the press, even up to the presidents, and it's not just this president, but the previous president, because people will listen to one little sound bite, and they take it as gospel, and they don't

question it. People don't question authority, so to speak. When they hear something that's profoundly put out by the biotech companies, they accept it as gospel. They're not going to go and research it. They don't have the backgrounds. Even the reason for questioning this type of information.

Interviewer: What was the CDC and the FDA and NIH, what do they say about GMOs and correlation to disease? Are there any public statements? Do we know where they're sitting on this? I'm just curious.

Les: I can't speak about NIH, and I can't speak about the CDC, but the FDA today basically allows the biotech companies to establish a new genetically modified crop. They then turn to that company and say is this new crop safe, Monsanto and these other biotech companies say absolutely, and therefor, they go ahead and approve these crops. You've got Tom Vilsack, the secretary of agriculture. When you have people like that and Michael Taylor, who today is an FDA foods safety czar in the Obama administration. These people are at that top of policy decision making. To try and improve genetically modified salmon, they just rushed in even with Dr. [Hubers 00:58:24] incredible information and concern, they absolutely just blasted genetically modified alfalfa and put it on the market.

This is because corporations have been buying their way into our decision making process. There is no decision making coming from the public. It's not about health. It's all about the companies making money.

Interviewer: So they get labeled as G-R-A-S, basically, right? Generally regarded as safe, and that's their status. What about academics? What about the study that was going on at Stanford? Where are the universities on this in terms of nutrition? Are they bought too? What's going on?

Les: Since I'm not in academics anymore, which is my decision, there's a lot of support. All academic institutions, whether it be in medical school or just in regular colleges, they're financially in grave danger. When they can get money from the biotech companies to support their chairs and their endowment funds, they'll do anything. Next thing you know,

the decisions are being curtailed and made, again, by these biotech companies.

Its ability to control our press, our legislation, every aspect of government.

Interviewer: Alex, thank you so much for letting me come and speak with you.

Alex: My pleasure.

Interviewer: I'd like you to start off by telling me who you are, what you do, where you are, and what kind of work you're doing right now?

Alex: I'm Chensheng Alex Lu. I'm a social professor in the school of public health at Harvard University. My research interest is looking at how people exposed to pesticides and what will be the health effect as a result of the pesticide exposure.

Interviewer: So specifically, exposure to pesticides, what are the health effects?

Alex: Yes.

Interviewer: And you've been looking at not just the health of humans. You've been looking at the health of bees.

Alex: Right.

Interviewer: Can you tell me something about that?

Alex: That was the issue that started in 2007 when I learned from the TV program about mysterious scenario that happened in Florida, in terms of massive amount of honey bee disappear in the winter time. So at the time, I treat that as another mysterious ecological problem, that not necessarily related to pesticide. But once I start researching what related to bee and health and so on, I realized that pesticides may have something to do with so called colony collapse disorder.

But I waited another two, three years, hoping that other bee scientists would tell us exactly why bees disappear and cause CCD. But never have satisfactory answers. When I first came here, at Harvard University, I had the opportunity to apply

for the campus wide faculty research grant, which is very small amount of money, but I had this very interesting and in the way that very fascinating hypothesis. So I was so determined to make it happen, to make this research happen.

It took me a year to organize everything, to put all the key player in place, and we did it. But I have to say that at the time, the interest is really not to solve the honey bee colony collapse disorders. I also believe that that pesticide that their interest had something to do with human health. But at the time, in terms of human health research for those pesticides, called neonicotinoid is essentially zero. There's no research.

Interviewer: There's no research on ... Say that again, neonicotinoids?

Alex: Yes.

Interviewer: And they've been used as pesticides for how many years?

Alex: So neonicotinoid has not been on the radar screen until bee colony collapse disorder. So that was 2006, 2007, but even before that neonicotinoid as a group is the most commonly used insecticide in the world, including the United States.

Interviewer: Is it an insecticide or is it a pesticide?

Alex: It's an insecticide.

Interviewer: Right. So it's used to ward off insects eating crops as opposed to weeds.

Alex: Exactly.

Interviewer: Interesting. When did it come into use?

Alex: It actually started in the 1990's, but not to the extent until 1998, 1999. So if you look at the pesticide usage history for example, there's always one dominant group that being used in different areas, so we started from [inaudible 01:03:15] those organo [inaudible 01:03:17] and then we face it now because of [inaudible 01:03:20], and then we use organophosphate for almost 30 years.

By now there's abundance of research suggesting organophosphate linking to different type of health outcome. So government took action on organophosphate, and then we move on to pyrithrate, which is another group of insecticides.

It's always kind of in [inaudible 01:03:45]. There's one pesticide used, and then it phase out, and another one comes in, so on and so forth, but for some reason, neonicotinoid always always under the radar screen, but has been commonly used. It was kind of like a misconnection. There's a disconnection here that we know those pesticides had been widely used but there's no data. The question is how government can approve the use of neonicotinoid without any health effect data.

Interviewer: How can they?

Alex: Well this is report made by American Bureau of Conservancy, actually if you read the report you get a sense of how and why government, especially federal government approved those pesticide use without data, because they think this is urgently need, otherwise farmer will be left without any pesticide usage.

Interviewer: So it was approved through an emergency status.

Alex: Exactly. And some of the EPA staff, the scientific staff actually warned EPA that those pesticides actually could be very problematic, but [inaudible 01:04:46] decided to ignore their own internal recommendation and approve the use of neonicotinoids.

Those are stated and documented in the American Bureau of Conservancy report, which is made public in April 2013.

Interviewer: Do you think it's the neonicotinoids that are causing the colony collapse disorder?

Alex: According to our bee research, yes. The hypothesis that we have back in 2009 was something like when we talk about genetic modified corn, it's really just add in a bacteria called BT, and the BT somehow rendered the corn plant resistant to the harm of the pesticide that farmers sprayed when they

were still at a seedling stage. So BT become a magical bacteria to protect corn plant, and that's part of this so called BT corn. But farmer has been planting BT corn for almost 20 years. Guess what. Resistance show up. So none of the BT corn retain their mojo.

Interviewer: None.

Alex: None.

Interviewer: None of the BT corn, none of the GMO corn.

Alex: In fact a lot of professors and extension agent researcher actually warn USDA and EPA that you have to find a solution, otherwise, those BT corn will be useless because the root worm problem is so severe, and they don't get killed. In part, I think they were somewhat indirectly promoting neonicotinoid use.

Going back to the hypothesis that we have in 2009 was that during that time, the company that manufactured BT corn, which is Monsanto, they need to find alternative. They need to find something else, because this thing is not going to work, especially in United States. BT corn might be still useful in other places that don't really have a long history of planting BT corn, but in the United States, they're useless.

They found this wonderful insecticide called neonicotinoid. The reason they can use neonicotinoid because the unique characteristic of the insecticide, which is systemic. So no other insecticide has this systemic property, in which you don't need to spray this pesticide. You just coat the seed with those pesticides. When they were still the seed. Then you coat those pesticide on to the surface of the seed or even make them soak it in the concentrated water. Then by the time you plant the corn seed, the pesticide will grow with the plant to every part of the plant.

Interviewer: So it gets incorporated in all the cells.

Alex: Exactly. So the residue of the pesticide that used to be in the seed will be translocated to every part of the plant including corn, including the pollen, including the leave, and then [inaudible 01:07:54].

Interviewer: What about including the animal that eats the plant?

Alex: We probably don't know. What happened is that the corn that we harvest from those genetic modified crop are made for something else. One thing that really put the corn in use is so called high fructose corn syrup. It's a liquid sugar water. It was predominantly used in beverage industry and other processed foods. Somehow, commercial beekeepers started using high fructose corn syrup in late 1990s because they found that honey is actually a very valuable commodity. So they scrape off all the honey at the end of the season, but they have to put sugar back to the hive, otherwise, the bee has no food during the winter, so they've been using high fructose corn syrup. It was fine, although some beekeeper questioned about the nutrition content of high fructose corn syrup, but not to the extent that feeding bee hive with high fructose corn syrup would kill the whole colony, until Monsanto experimented this practice by coating this see with neonicotinoid. That was 2005, 2006. Guess what, a year later, they wipe out 93, 95% of the colony in this country within the commercial beekeeper industry.

So that was my hypothesis. My hypothesis can be supported by the fact of what's going on in the field. So we went out to get a bucket of clean high fructose corn syrup, which is low neonicotinoid, and then we put some neonicotinoid. In this case, we used imidacloprid which is the most commonly used neonicotinoid in the world, not just in the United States. So those level of imidacloprid in high fructose corn syrup that we added to does not kill the bee right away. Meaning the bee was still healthy during the time that we feed them those pesticide contaminated high fructose corn syrup.

But guess what, 23 weeks later, the hive that we treated with imidacloprid, they just die one after another. They not only die one after another. The way they die, the post mortem observation that we had are consistent to the report of CCD.

Interviewer: So in the CCD case, in the colony collapse case, they weren't having high fructose corn syrup with the insecticide. They were eating high fructose corn syrup made from corn with the neonicotinoid.

Alex: Right. So basically the experiment that we did in 2011, 2012, basically mimic what commercial beekeeper has been doing in their own professions. The only factor that we put it into the experiment is adding those imidacloprid to the high fructose corn syrup. Also we set up a control hive right next to the pesticide hive. The control hive all survived. The only one die, but die of the disease that is very different to those CCD hive.

We published a paper, and got a huge pushback.

Interviewer: What was the pushback?

Alex: Well the pushback was saying it was a very small study, Dr. Lu treat that hive way too high. It's not a level to be encountered in an environment, and so on and so forth. So we actually have a very difficult time to publish that paper in the United States.

Interviewer: Who were you turned down by?

Alex: We have been rejected by four or five different journals, and some of them actually went through the peer review and the peer review's comment, as a researcher, in my job for almost 16 years, those comments were nowhere close to being constructive, collegial, or positive.

Interviewer: Can you give me an example?

Alex: For example, they criticized the way that we spell honey bee. It should be one word or two words. They challenged the CCD is a global phenomenal. The reviewer said the CCD only limited in United States and so on. That's what I'm saying. It's not only the comment of very very destructive, it's not as a professional. When we review a paper, manuscript, the purpose is to help the author to get the manuscript published unless it's really really something that should not be published. We did it in a way to support our colleague and get the paper published. But for some reason, this bee paper was so suppressed. [inaudible 01:12:58] by somebody else, that you cannot penetrate.

So we decided to publish in another journal in Italy. We actually have similar comments, but once we addressed the

comments, we were able to get the paper accepted and published. That lead to a lot of publications about whether that pesticide is really the cause, and that paper fortunately or unfortunately that we published in Europe, that was included in the European Union's decision to temporarily band those pesticides for two years.

So the paper was cited. Our paper was cited in the final documentation that was finally approved by the European Congress, and they took action. Whereas that European never been cited by our government in the United States.

Interviewer: How long ago was that in Europe?

Alex: 2012.

Interviewer: 2012. So it's still under moratorium.

Alex: Yeah.

Interviewer: Well I find that the European Union tends to use more precautionary principle.

Alex: Right. So the precautionary principle is actually written in the European Union constitution.

Interviewer: Oh. I wonder why.

Alex: It's their constitution saying that if there is something that causes environmental damage, although there are variations and social ways of finding, as long the finding is scientifically credible, government need to take action. That's the major difference between European Union and United States.

Interviewer: So have we seen colonies come back in Europe? I mean has there been improvement since they've put a moratorium on the use of ...

Alex: I think it's too early to say. I think they just started this temporary ban. I think in two years, we should know. I think there's a huge caveat here, is who actually do the [inaudible 01:14:50], who actually monitoring the status of the colony in Europe. In my opinion, there's a huge penetration from industry, especially policies like this. So obviously, they want

to get it resolved in favor of their stand, not the government arguments.

I think the policy by taking those neonicotinoids away from the agricultural use for two years is a very good policy, but my concern is if in the process of monitoring the health of the colony in Europe has to be independent, has to be very neutral. Otherwise, the outcome is still not very good.

Interviewer: So the question I would have would be the professional beekeepers, they are only harmed in this. What do the professional beekeepers say? What do the behavioral or the apiary specialists, the bee specialists say about this? Again, the beekeepers can only be harmed if they're losing their colonies. Where are they in this debate?

Alex: I think this is a very interesting question. I think the professional beekeepers are very unique in the sense. They are not a big industry, so they cannot help each other. As long as there's one leader, making the call, most people will listen to that person. But they don't know exactly who that person is, who actually this person is working for.

One of the person that always writing the email to criticize our paper, that published, actually is a commercial beekeeper.

Interviewer: Really?

Alex: So when I asked him this question about why are you so object to our findings, in which we try to protect your honeybees, he really had no answer. If you were a beekeeper, and you had been suffering from the CCD, and then somebody embossed and published a paper saying this could be the reason that you lost so many hives, why are you so object to?

Interviewer: It doesn't make any sense. There might be things going on that we had no idea.

Alex: Right. And this person eventually become one of the key person in a company called Bee Logic, which was bought out by Monsanto a couple months ago.

Interviewer: Well that's your answer, isn't it?

Alex: Right.

Interviewer: That's exactly what I was starting to think is that maybe these beekeepers are getting monetarily reimbursed somehow.

Alex: Right. So a lot of a commercial beekeeper may agree with what the study's finding, but I think they're probably not in the position to express totally different opinions to the people that run this whole organizations.

Interviewer: So in Bee Logic, does they organization the beekeepers to move the bees around to pollinate?

Alex: Bee Logic used to be an independent bee research company, but just because Monsanto and other pesticide company realized that neonicotinoid is really important to their business, and it's being challenged, so they need to have a bee research company so they can, in a way that they're producing the result that they want.

Interviewer: So Alex, what would happen if all the bees were gone? What would happen to our farming culture, our food chain, do you know?

Alex: In fact, I can tell you right now, that the bee population as a whole, their health is deteriorating. I saw the data showing that in 2010, we only had 50% of the colony left after World War II, meaning that we think that with that 50, 60 year period in the United States, we lost half of the colony. For any reason. That is really alarming because bee is somehow very very unique in terms of being the pollinator. There's only one pollinator, which is honey bee, that can do such efficient job, pollinating the tree. In other words, if you say we have another 50% colony die this year, the first industry's that's going to suffer from huge economic loss will be almond in California, because we produce 95% almond in the world.

Interviewer: And almond trees ...

Alex: An almond tree somehow has to be pollinated by bees, for two reason, one their [inaudible 01:19:40] grow. In this small area in the middle of a central valley in California, if you don't have bee, which is millions of bee, you cannot

accomplish pollination within that short period of a window, which is 10 days to two weeks.

That's one thing. The other thing is at the time, the temperature still really cold. We were talking about early March. If you don't have a healthy honey bee colony, they could not go out and work. So that is alarming.

Then you think about other places like Washington state, Oregon. They have a lot of tree orchards. Apples and pears and cherry and so on and so forth. You think about Massachusetts. We have cranberries, blueberries. You think about in Florida, we have citrus industry. Those are heavily dependent upon honey bee pollination, and there's no other natural pollinator can take over honey bee's job.

Interviewer: But is there an artificial way of pollinating that perhaps some of these companies are working on?

Alex: Well it look like they were developing these robotic bees, also called genetic modified bee. The critical point here is that the honey bee, if there is something going on within honey bee colony, that prohibit them from over winter, then the colony die. So over winter is a key right now.

In our study shows, pesticide that harm them in a way, not kill them right away, but ...

Interviewer: They can't pollinate.

Alex: They cannot live through the winter, so usually CCD happen during the winter from or toward the end of winter month, meaning that this colony somehow lost their ability to over winter, so the key point is what caused their inability of over wintering. Our government research suggests it's all about because of the pathogen infestations, but my argument is if it was really caused by those pathogens, right, most of the bee would die in the hive. But CCD is not.

Interviewer: They die out of the hive.

Alex: You cannot see the dead bee.

Interviewer: They're gone. They just disappear.

Alex: Yeah.

Interviewer: Well and the pathogens have been around always, so what's making them susceptible to the pathogen, why suddenly.

Alex: Exactly.

Interviewer: They've evolved with all these pathogens, but I have to bring you back to this one point. So the same companies that are presumably contributing or causing this colony collapse disorder, are now coming up with drone bees to do the work of bees, so they would own the world's pollination? So everything we know in terms of fruit, tree fruits, and tree nuts would be owned by them.

Alex: Yeah.

Interviewer: 100%.

Alex: Yeah. If they make it successful.

Interviewer: So these are not actually bees. They're not insects. They're not live beings. They're robotic, mechanical entities, correct?

Alex: Well if you think about it, they can make bee just like genetic modified corn or genetic modified soy beans, so before we have this GMO, farmer know how to save seeds for next year. Right? So now, because of GMO, you couldn't. You have to buy seed from the company every year, because they put out this enzyme that kill the [inaudible 01:23:10] of those seeds.

Bee is the same thing, because the natural bee cannot over winter, so they probably die out through the winter, so they can come up with genetic modified bee, so what they die out in the winter because next spring you buy bee from me, and they will pollinate your crops.

Interviewer: And we think they're working on this.

Alex: I think they're working on it. I think there's a couple of so called rumors. For example, the almond industry, they collectively developed this kind of bee, which is not genetic modified, but they are not designed to pollinate, but somehow they feel like this is probably our safety, if the bee

cannot work, then we have this traditional bee that don't really pollinate that efficiently, but at least they have something else.

I think there are people testing so called genetic modified bees, see whether they can pollinate but die out through the winter, and they can buy them again. Another possibility will be to introduce another species of bee, which is not native to North America, called [inaudible 01:24:19] bee. Do you know what those are?

Interviewer: Are those the killer bees?

Alex: Exactly.

Interviewer: And the problem with them ...

Alex: Well there's a couple problems. One, they are very violent. That's why they're called killer bees. I don't think they are appropriate for pollination. Second, they cannot withstand the cold winter.

Interviewer: They're from Africa.

Alex: Right. That's why. I think a killer bee can survive in Texas or Arizona, but nothing north of those states. So it might be difficult to bring those killer bee to the north to pollinate almond for example. They claim that those killer bee are tougher and stronger against pesticides, so that part suits their interest very well. I think it would be a huge mistake to bring Africanized Italian bee to United States because I don't even want to think about the consequences. Can you imagine in our environment, there's always killer bee around?

Interviewer: They go out and sting everybody?

Alex: Yeah. So in a way, they're very aggressive. The Italian bee that we used to have, they actually are very nice ladies. As long as you don't bother them, they don't bother you. If you have the intention to harm their colony, then they will come out and sting you, but if you just leave them alone, they leave you alone. Usually, the injury happen not because of honey bee, because of yellow jacket or Africanized Italian bee. Can you imagine we have those killer be around? That

would be something I would not want to have in my back yard.

Interviewer: So the other thing that brings up the question about honey. If bees, unless it's organic honey, honey that's created in an organic environment, people are eating honey, and the honey must be loaded with the neonicotinoid.

Alex: It's a very interesting question. I think you can call yourself as organic beekeeper, but I don't think you have control in terms of bee will go, unless you know that within this three mile radius where the bee hive is set up, there's no pesticides, then I would say that honey from the hive will be likely organic honey. But once bee fly out to the environment, they can forage whatever they want. There's really not much control the beekeeper has in terms of my bee only go to organic field and not go to the conventional. So you're right. Honey could become a good indicator of whether your bee has visited somewhere else that has a pesticide. Either honey or pollen.

Interviewer: So the other question I have is there must be some countries, maybe that have not used the neonicotinoids. What is the quality of their bee colony? What is the quality of their bee colonies right now? Do we know?

Alex: I don't think there is a place that's free of neonicotinoids because again, neonicotinoids is the most commonly used insecticides. I don't think there is one.

Interviewer: Well only Europe right now. There's a moratorium for two years.

Alex: Hopefully. But you know what, the other thing about the neonicotinoid is they actually behave similar to DDT in terms of their biological half life. Once you put those neonicotinoid in an environment, so for example, inject it in the soil, and the soil leech out to your ground water[inaudible 01:28:01], their half life is as long as DDT if you apply those neonicotinoids on a yearly basis.

Interviewer: Does Monsanto make this neonicotinoid as well?

Alex: No.

Interviewer: No, it's not Monsanto.

Alex: No. Monsanto is not a pesticide manufacturer.

Interviewer: Well they make round up.

Alex: Yeah, they made round up. That's the only one they make.

Interviewer: But not insecticide. So who's making ...

Alex: A lot of those big players. Bayer CropScience, Syngenta, BASF.

Interviewer: Okay. So we have these companies making this insecticide that there's evidence now since we've been using it that the bees have been dying off. None of the companies did safety studies, and none of the governments insisted on safety studies. Is neonicotinoids been used in medicine? Had it been used before? Why do all these governments just assume there were no safety studies needed?

Alex: Government ignore the fact that those neonicotinoids are systemic. But the industry used systemic as a clause to support the safety of their product, because they tell government that you don't have to spray neonicotinoid.

Interviewer: Oh I see.

Alex: You inject it to the soil. You put it on the seed. There's really no open air application. There's no crop duster flying over the field and dump the neonicotinoids. Because of the, governments say sure.

Interviewer: So it was never a concern how it would be when it was ingested or bio accumulated.

Alex: Exactly. Pesticide will never be tested in the consumer market in terms of whether there will be a health until the epidemiology research suggests there is an adverse effect.

Interviewer: What are the epidemiological ... What is the epidemiological results study? What do they imply ...

Alex: None.

Interviewer: So there's nothing. There's no studies on this.

Alex: There are some animal data, but there's no epidemiology research.

Interviewer: There's none.

Alex: None.

Interviewer: Do we know how they affect a body? Where do they ... What do they block? How do they work in a system?

Alex: So if you do a [inaudible 01:30:10] test, so neonicotinoids inhibit a receptor called [inaudible 01:30:16], which is an important receptor that is responsible for your neurological functions. But we do know now that pesticides and other chemical as well likely to insert their action other than that specific mechanistic pathway that we know.

Interviewer: So neonicotinoids were not used in World War I or II as nerve gas.

Alex: No.

Interviewer: This does not come from that.

Alex: It's not coming from the organophosphate part of the family. It's actually from the nicotine part.

Interviewer: But there are other nerve toxins that have been used in warfare that work similarly that work in the acetylcholine [inaudible 01:30:57].

Alex: Right. But the organophosphate act on the enzyme itself, but neonicotinoid act on a receptor. Yeah. It's different.

Interviewer: Wow. It's really scary. You know, to imagine a world without bees, I can't even imagine. It seems really sad for me. How does it affect you? Are you a father? Are you a parent?

Alex: If you look at my research and the statement I put out or the paper that I published, I never call for [inaudible 01:31:31] specific pesticide. I actually call for responsible usage. I do believe there will be a balance, that the farmer used pesticides to whatever they want to serve their best interests, but by the time the farmers harvest their crops, there will be very little or none residues. I would say that

would be a perfect scenario. But for neonicotinoid, I do have to say that we need to ban them. They were not supposed to be part of this whole society.

While I can say is that we learn from our current study that the harm that neonicotinoids could do, not only to honey bee, but human health as well, is beyond what we know. That could be a huge public health threat.

Interviewer: I would imagine it could affect cognitive cognition?

Alex: Yes.

Interviewer: And physical movement because acetylcholine is a very important neurotransmitter.

Alex: There are already study from countries like Japan, for example. They see that neonicotinoid, the level that don't cause any harm that you can manage right away, but the fact brain functions, especially brain function in kids, in fetus, in newborns. They've done this in the rodent studies, not human.

Interviewer: Rodent.

Alex: Yeah, rodent studies.

Interviewer: Can you tell me what the rodents looked like? Could they not learn? Did they have hyper activity?

Alex: Exactly.

Interviewer: Did they have social anxiety?

Alex: So there are markers you can collect from animals like mice or rat.

Interviewer: Absolutely, they're smart. They're really smart animals.

Alex: Right. So there are actually data from those animal studies, suggesting the neonicotinoids could trigger disease like ADHD, autism, those type of neural impairment.

Interviewer: Sure.

Alex: If you think about if those animal studies suggest the neuro development hazards, then you can also interpret the way they could also cause neuro degenerative disease.

Interviewer: Absolutely.

Alex: So they are on the same spectrum, it depends on the age of the individuals.

Interviewer: Right, and the stage of development.

Alex: Exactly.

Interviewer: I know that acetylcholine is very very important in terms of the whole vegetative rest and relaxation state.

Alex: The thing about this statement, I wrote with two beekeepers. They are not scientific person, they are just experienced beekeepers.

Interviewer: They understand bee behavior.

Alex: Oh yeah. They understand more than anybody else. That's why it took me a year to find my collaborators. When I proposed this idea, they were actually quite skeptical about whether or not [inaudible 01:34:20], makes sense. I think if you read the Boston [inaudible 01:34:23], you get a sense about how they look at me, and so on and so forth. I mean seriously, before Christmas 2011, 2010, they thought that [inaudible 01:34:36] experiment failed because no bee died. They were actually fine, and they're about to go on vacation. Right there, we start getting phone call from people that we have a bee hive in their back yard, and they say your hive died, one after another.

Guess what they told me. They said those bee must be crazy because they are not supposed to go out in the winter. That's their instinct. Just like one hive has only one queen. There's no two queens. That's their instinct, but somehow in the middle of the winter, which the ground are still covered by the snow those bee willing to go out and obviously die because they cannot survive in the winter.

So what's going on? They knew that those hives only treated with pesticides, whereas the control hive sit next to them are fine.

Interviewer: And they didn't go out.

Alex: So their first reaction to witness the CCD in our experimental site were those bee are crazy because they didn't die right away.

Interviewer: And the studies in Japan with the rodents with the mice and the rats.

Alex: Yeah.

Interviewer: The rats and the mice looked cognitively impaired.

Alex: So they were introduced very low level of neonicotinoid, in this case imidacloprid, the same pesticide that we used for study, and they see those outcomes. So that prompt us to do another study, year two study, which is the day that we are collecting and writing a paper right now. The result actually was very very shocking.

Interviewer: But you're not going to shock me today with it. I'd love you too. Can you shock me today with it?

Alex: I just don't know how quickly my paper can be published, but we can come back and talk about it.

Interviewer: Absolutely. It's really scary stuff. One last question regarding the government. The EPA, do they know about your studies, do they care? Have you talked to anybody at the EPA? That's one question, and then the other question I'd like you to address would be have you looked around the country and seen academic centers that should be doing work on this either that were doing work on this or should be, change gears or switch gears or go away from this or say the contrary, and if so, have you seen ties ... Have you seen unusual things? Have you seen BAFS or Bayer, Monsanto, CFOs or CEOs coming into these academic centers and suddenly becoming part of the academic center? What have you seen going on? Why isn't anyone else doing this incredible research?

Alex: When we have the data from our first study, I actually wrote the letter other the US EPA administrator, Lisa Jackson. I send the same letter to the director of office of pesticide program. To basically tell them the result. I considered that as a very significant outcomes because directly we proved pesticides an issue. Obviously, Lisa Jackson resigned from her post. The director maybe still there, but he made no mention of that study.

Interviewer: You heard nothing from them.

Alex: Right, exactly.

Interviewer: Amazing.

Alex: And I even wrote another letter to him to directly respond to the criticism that made by the Bayer Crop industry.

Interviewer: And you heard nothing.

Alex: I heard nothing.

Interviewer: So here you are, associate professor at Harvard in the school of public health, and you write ...

Alex: That's not really broken my heart. The thing that really broke my heart was that EPA had decided to host a scientific advisory panel to discuss the pesticide harm to the honey bee. That was the first panel meetings. I have been invited by USPA to attend that specific panel meeting since 2004. Every time I was invited, I submit my documentation that prove it, and I physically show up in the meeting and discuss the content and wrote a report.

This time I was invited.

Interviewer: You were or wasn't?

Alex: I was.

Interviewer: You were, okay.

Alex: Then I was de-invited.

Interviewer: You were de-invited.

Alex: Yeah.

Interviewer: You were uninvited. Wait, you've been invited every year. You contact the EPA to let them know that your research shows there's a problem with neonicotinoids. And you get invited and then uninvited.

Alex: Right.

Interviewer: What did the un-invitation say? I don't even know what to call it. It's an un-invitation.

Alex: Basically he said, he is the person that coordinated the meeting, so he called me one day and said Dr. Lu, unfortunately, I have to tell you you are de-invited to this panel meeting, and I said well I know that you are just coordinating this whole process, but I do really want to know, what is the reason. Do I have a conflict of interest? Usually it's the conflict of interest that make you de-invited.

Interviewer: Sure.

Alex: Because you have to submit the paper work and show. If you own like a million share of Monsanto stock, then you couldn't go to the meeting.

Interviewer: Or maybe those are the only people going to the meeting.

Alex: But he said that's not really the case. The case is that we found the expertise that you have, meaning they found somebody else that will further my seat on the panel. So my question is that who else?

Interviewer: Did you ask?

Alex: I didn't. I know he's not really the person to make the decision. I don't want to make him feel bad about it. I thought about this. I said well maybe there are some other people that do pesticide research that I can live with that. But pesticide and colony collapse disorder, especially these pesticides, I don't think there's anybody else in this country could do a better job as an independent scientist to discuss this subject at EPA.

Interviewer: Did you have them put it in writing? I'm just curious.

Alex: No, they would never put it in writing.

Interviewer: Very interesting.

Alex: They don't even send me email. They call me.

Interviewer: They don't want any written documentation that they're uninviting you.

Alex: But the response from the OPP was that we found other expertise.

Interviewer: Has this event happened?

Alex: It already happened.

Interviewer: Do you know who it was?

Alex: I didn't know. But there's no other people on the panel could do a better job to discuss this subject than I would do.

Interviewer: And this is the EPA. This is a governmental agency.

Alex: Yeah. So that really broke my heart. That really broke my heart. That is something that I would never forget.

Interviewer: Something you'll never forget.

Alex: Yeah.

Interviewer: What do you think about that? That's a sad statement.

Alex: So something actually very interesting happened at the beginning of May 2013. European Union decided to implement this two year ban. And two days later, US EPA and USDA host a press release of the report. Basically the report is totally different to the European Union decisions. The report basically said you know, we'd look at these things, which is [inaudible 01:41:56] factorial, commonly caused disorders. We're going to spend another five to 10 year to study exactly what caused that so we can take a better approach. In the mean time, we're going to implement a couple policies that make sure we protect honey bee from whatever harm there would be. None of the, none of the things that is state in the report are specific enough that you

would believe the honey bee health in this country would be protected.

The worse is that although the press release was cohost by USDA and EPA, they said that whatever say in the report does not represent government's position. So who actually wrote the report? That's the question.

Interviewer: Industry.

Alex: Right. So the report is a proceeding from two meetings. One symposium, one workshop, all host by the industry.

Interviewer: Well there's no surprise.

Alex: That's another interesting question that we should ask the public American people is that majority of the neonicotinoids are manufactured by European based company, Syngenta, Bayer CropScience. They couldn't convince their government their product are safe to honey bees, but somehow, they're able to convince our government that their product's safe.

Interviewer: Well that seems to be the theme in a lot of the things we're investigating for this movie is that for some reason, the United States is probably the best government you can buy.

Alex: Yeah.

Interviewer: What about the other part of my question, which is academia? Have you seen this kind of behavior coming from academic centers?

Alex: So one part of academic research quite obvious is the agricultural research. So long time ago, the government actually initiated a very good policy established [inaudible 01:43:50] university, so in those [inaudible 01:43:52] university have these so called very strong and very active agricultural research, which actually benefited a lot of farmers, but over the time, those agro chemical industry understand how they can play this game so they can bring government, which in this case, USDA and farmers together in this extension agent that if we can sponsor their research, then obviously we can inference their decision, their technology and so on and so forth so the GMO is a perfect example, why so quickly the GMOs can populate across the

country just because of endorsement from our USDA. And then we apply those technology to the farmers so farmer can do everything just one stop with Monsanto. They are replicating this in this whole honey bee scenario because they believe that if we can bring USDA, in this case EPA, too, together with some of the commercial beekeeper, nobody can break this alliance, and we can do whatever we want.

So when you look around, when CCD just happen, US congress actually appropriated a certain amount of money to USDA to do the research.

Interviewer: Oh why?

Alex: People like me has no access to that [inaudible 01:45:21]. In fact, there are some entomologists in different university argue that how USDA use those money.

Interviewer: Yeah. Be really nice to know.

Alex: How they use the money. So my observation was since 2006, since the CCD story broke, industry quickly formed their alliance, and have those people published paper in a journal, so those people form the peer review pool.

Interviewer: Right. So they have control over what is being published right now.

Alex: Yeah, they have the control. So people that never belong to this fraternity or sororities, that your paper will have a hard time to go through their peer review process. And that's what happened to us. One question that I got from those nasty harassing email was what do you have been in this whole big research. They even criticized that in the paper that we published, who can claim themselves as a bee researcher.

Interviewer: Yeah. It's amazing. Now what's going on in other parts of the world in terms of this research?

Alex: So European Union actually look at this very seriously, and that's why they have those bans. There's many many people, researcher across the European continent, they believe pesticide is the culprit of this whole CCD issues. Actually more studies show up right now in the literature right now in

terms of acclimating the hazards of those neonicotinoids of honey bee either acutely or chronically.

Interviewer: What's going on in Asia, in China?

Alex: Well Asia, they still have the problem. But somehow, they don't really have the CCD problem. I think in part because most of the Asian country are in the much warmer regions.

Interviewer: Oh right, okay.

Alex: Again, winter is a key season.

Interviewer: You need to have winter. There must be winter to see the colony collapse disorder. That's a key ingredient.

Alex: Right. Almost I can tell you this country that has a very obvious winter season, and they also have the neonicotinoid usage. They will have CCD.

Interviewer: So Russia is seeing this problem as well.

Alex: Japan has CCD. I've never heard of Korea, but Japan has CCD. [NHK 01:47:51] did a CCD documentary about three years ago. There's three hot spots in Japan that always has a CCD problem. So Canada has CCD problem. It's a global phenomenon for sure, especially country in the colder region.

Interviewer: So if it's a warm region, the bee won't die from this ... Because their abnormal behavior will not kill them.

Alex: They die not in consistent to CCD symptoms.

Interviewer: Wow. Very serious stuff. Thank you so much.

Alex: You're welcome.

Dr. Mercola: My name is Dr. Mercola, and I'm a family physician, and I transition into a physician journalist, and I founded Mercola.com. Our mission is to educate the public about health issues. Now I first became fascinated with health after reading Dr. Ken Cooper's book Aerobics in 1968. I started running at that time, and I've been exercising ever since. After 42 years of running, however, I realized this

wasn't the healthiest approach. So I shifted to a better type of exercise, which is high intensity interval training, which was call peak fitness, and also include strength training and flexibility.

I was also interested in nutrition, but my understanding of a healthy diet has radically evolved since I was in medical school. So my commitment and passion has grown to be far more comprehensive than just improving nutrition as I'm not focused on the threats that actually limit people from applying the information once they know it.

So now I focus on the pernicious collusion between the government and the drug and food industries that put road blocks in the path of people actually applying the information that we teach them.

If you travel, and you go into a typical hotel or a fitness center, you'll find that the vast majority of people are focusing on cardiovascular exercise, but my experience about 80% of people. That's certainly better than sitting on a couch, but the newer research is showing that there's far better exercises for far less investment of time, effort, and energy. So the high intensity exercise training involves pretty much any type of aerobic activity, but done in a position where you're first warming up, and then going out at full maximum intensity for about 30 seconds or so and then recovering for 90, and then doing cycles of that. So of course, a cool down afterwards. Then combining that with strength training, and there's many different varieties of strength training, but I think that's a really important part of a comprehensive exercise program.

Well the evolution that I went through, and actually many other individuals who were confused by what is called the low fat approach, which was precipitated primarily by Ancel Keys, a researcher in the fifties. So the focus was on lowering your fat content. There's only three primary nutrients one can use, fat, protein, and carbohydrates. So protein concentration is going to stay about the same. So if you lower the fat, you're going to increase your carbohydrates, and that can be problematic for many people because it raises insulin resistance and causes many chronic degenerative disease.

With the most part, I realized I've cut down the carbohydrates and replaced them with healthy fats, not necessarily highly processed vegetable oils, like omega six fats, but mostly high quality animal fats that are raised humanely and properly and organically and not in an industrialize cage animal feeding operation.

Well, my diet typically is about 60% high quality fat, maybe 20% protein, and 20% carbohydrate. A typical breakfast for me would consist of two tablespoons of raw, organic, grass fed butter that I melt, and then I put that in some dehydrated cucumber pulp, which is leftover from my vegetable processing. Then I put in four raw eggs, and to that I add half of an avocado.

In addition, which I think is really the last part of the puzzle is I add about four to six ounces of fermented vegetables, something like a sauerkraut, which really provides, and we actually had this objectively documented, about 10 trillion colony forming units of beneficial bacteria. So it's a phenomenal way to massively improve your health. The gut is really the key to optimizing your health, and it's really one of the reasons why sugar's so dangerous because it negatively influences the good bacteria in your gut.

Other types of animal fats that I would use would be coconut oil, obviously is not an animal fat, but coconut oil, butter, raw eggs and then healthy meats.

No, in many ways, it's very similar to the drug industry. It's a very large corporation that has access to many billions of dollars, which wields enormous influence. But primarily the single most important influence is their ability to effectively lobby congress and initiate legislation which essentially decimates effective competition. So they are able to set up an industry which works very efficiently, and the analogy to a factory is very appropriate here because that's what they do. They get a factory farm, and it works great, factories do, for making commodity products that we all benefit from, like an iPad. Thankfully these processes exist.

But when you apply them to food, the model doesn't work, and you can create food that will provide you with calories, but there's so many downsides to that that's actually going to

have a very very powerful destructive influence on a person's health.

The food chain is really challenging to put it mildly. You don't have to be a rocket scientist or have a medical degree to understand it. All you have to do is walk into virtually any grocery store in the country. You can see that the vast majority of the food that's being offered to America is really highly processed. The problem is that 90%, 90% of the food that Americans consume is processed food. That's the challenge.

So yes, there's specific problems within the industry that lead to this, but it's this consumption of massive amounts of highly processed foods that are really the core of the problem. So the really, if you want to get healthy, one of the primary rules that needs to be followed is that someone has to spend time in the kitchen, whether it's you, a spouse or someone you hire, and you need to prepare your foods fresh, and you need to have the highest quality possible ingredients. If you rely on processed foods, you're going to have a significant negative influence and impact on your future health.

There is a significant gap. Unfortunately, the industrialization has really started to penetrate into the organic market because these food giants realize there's enormous amounts of money to be made. Any time they have large amounts of revenue to be secured, there's powerful influences that seek to change the whole model. That's what's happening, and there's a real effort to fight that.

But the primary difference, if an item is truly organic is that it is not exposed to pesticides or herbicides. But in addition to that, and this is a really important part of the label and really what had been decimating the future health of our country. Not so much now, but the direction we're going, it's not good. That is this reliance on genetically engineered foods.

So not only is the genetic engineering a problem by creating anthogens that have never existed before, and they can contribute to things like infertility and potentially decimation of the species by not allowing us to reproduce.

But also a big portion of the reason why these seeds are genetically engineered is to provide resistance to a very potent and powerful herbicides. The primary one is glyphosate or roundup, and that is just pervasive in all these foods because they spray it like crazy so these weeds don't grow up, and it's highly contaminated, and it's a very potent, systemic influencer of hormones and other complications. It's not only the anthogens from the genetically engineered food. It's the contamination with these potent herbicides.

How does it get better? It gets better by giving people the information. Unfortunately, with the biotech industry, primarily, Monsanto who seems to be the leader in this area, there is this powerful and incredible effort to delude the public. They've effectively penetrated virtually every area of the government. Because of that, it's virtually impossible to pass effective legislation to provide the simple basics of letting people know whether or not the food their purchasing has genetically engineered components or not. They have made very specific and vigorous efforts to prevent people from even becoming aware.

The answer to your question is we're going to be starting this in California where we use a legislative process that require the food companies to simply label the food. Once that label goes on a food, most studies have shown that it's going to be the equivalent to a skull and crossbones, because the vast majority of people, well over 70%, some studies show up to 90% of people will refuse to purchase that food. So there's been such a vigorous effort from the food industry giants to prevent this from occurring.

Just as in Europe, where essentially most genetically engineered foods are not sold, it wasn't done through a government legislative process. It was done through simply requiring the companies to label. Let the consumers make the choice because an informed and educated consumer can vote with their pocketbooks.

The only thing on the label is simply an identification that this food contains genetically engineered material. That's it.

Most Americans believe that drugs are actually perform a highly beneficial role. But once you understand health and

nutrition, you begin to appreciate that drugs are rarely ever the answer for virtually every health condition. They occasionally can be used. But the primary reason why one might reach the conclusion is they're typically watching TV. Since 1995, virtually 15, 15 years ago, it's been legal in the United States, and the United States is only one of two countries in the world that it's legal to advertise prescription drugs. It's an illegal process everywhere else in the world.

So you hear these strong motivations and brain manipulations that these are the solutions. They in now way, shape, or form address the cause of this. Now collectively some of the largest pharmaceutical companies have I believe a $500 billion of annual revenue. So there's enormous power and influence that results from that, and the employ some of the most sophisticated and intelligent marketing strategies known to man. Part of this includes phenomenal political lobbying efforts so that they can go in and manipulate the legislation and pass laws, which essentially eliminates the competition. They make it illegal for people to offer simple inexpensive solutions that truly and authentically treat the cause of the problem.

Certainly, an informed parent should be concerned for their kids and their grandkids, and essentially all future generations because if we don't address these important topics, at some point, it's going to be too late. The genie's out of the bottle. You've really catapulted or started a domino process, which can be very difficult if not impossible to reverse. So the key is going to be to learn more about this information, to question a recommendation by your physician, and of course, physicians ideally should be tremendous health coaches to help people understand the process of the disease they have and let them know on their options and choices, but don't rely on your physician as just as the solid answer.

Do independent research. Thank god we have the internet, which is really a radical revolution that didn't exist for the most part in the last century, but now you can go to a search engine like Google and type in any question and see a whole variety of different answers. Of course you have to select some wisdom, because there's some challenges out there,

but it's easy if you spend some time, effort, and energy to sort through those, and you can come to a reasonable conclusion and make an educated guess. You don't have to rely on the physician like you did 50 years ago because there really wasn't any other practical way to get that information.

One should have a health coach, and so as an educated health professional, who has advanced training, and one of the best ways to find that, because you need a coach. Unless you're a health professional yourself, you need a coach. Even then, it's probably still good to have a coach, but the best way to find it, because many people going into this model aren't aware of where these people are because it's not an area of where they're networked in. It's an easy process to do is that there's health food stores all over the country, and most communities have a few. If you just go in and talk to the people there and discuss your problem and ask who in that community is the expert that they would recommend that you see, and eventually you'll reach a consensus, and then you can use that person as an advisor to consider some of the options.

It's important to remember that health is not a static process that we know. It's dynamic and always changing. On our website, we go through 1,000 articles every day to review all the literature that's being published because we're learning more and more, so the correct answer, the appropriate answer for any specific person is highly individualized, but it also changes with time so it's an evolving process.

Well the system is fatally flawed, and we don't have to look too far to realize that because the United States is rapidly going down economically. We are spending over 2.5, rapidly approaching three trillion dollars a year. I don't think any of us would have a problem spending that much money if we got results, but we don't have very good results. We rank 49th in longevity. We're equally far down the hill for infant mortality. We're not getting the results for that investment.

So eventually, we're not going to be able to afford these choices. It's a simple, basic reality. It's a fatally flawed system that eventually most experts believe will crash. Then we're going to have to rely on solutions that truly address the foundational causes of the healthcare problems that people

are facing. It's unfortunate in many ways, it's like an alcoholic. Many tend not to get better until they're in the gutter. I suspect that there's a good possibility that our country will have to reach that level of decimation before they really become strongly motivated to find these specific solutions because we're just not going to have the resources to do it.

It's been my experience, I've been in this field for about 20 years now, and we see a progressively increasing number of people who are more frustrated with the system. This is largely a result of people dying from the system. Every year, 125,000 people die from properly prescribed prescription drugs. If you added all the mistakes that physicians make and hospitals make and drugs, side effects, the medical system is now the number one cause of death.

If you start impacting hundreds of thousands of people every year, that message starts to spread because you're not only affecting that person and their relatives. It's their friends and family. This is progressive realization that the system is flawed and it's challenged. As a result of that, more and more people are beginning to seek out alternatives to what's been traditionally recommended.

Well, tragically, the human ... Humans are not typically motivated, at least in my experience ... It's really a small segment of the population that's motivated to stay health without some type of other influence. Even with all the dangers of smoking, we still have 25% of the population smoking cigarettes, and we know about the dangers of tobacco. I don't think we should ever outlaw them. I'm a firm believer in freedom of choice. So people have the information. They're going to make choices that are not good for their long term health because they're focused on the short term rather than the long term. We are reaching a potential progressive plateau of the people who would be interested in making a shift if they knew, if they weren't manipulated and deceived and brainwashed by the powerful marketing influences that has been wielded by the pharmaceutical industry.

Well I think we can look to the tobacco industry for some interesting historical perspective. Because for many years,

the tobacco industry was rigidly denying that smoking caused lung cancer. Despite of all the scientific evidence. They specifically resisted that. Many people still smoked. Many healthcare professionals smoked. 80% of nurses smoked. Eventually that information now has became known. And now we've reached a plateau, but still, even though it's known, there's 25% of people.

There's been this interesting movement within the government, specifically the CDC to develop this educational campaign where they show fairly significant, horrific complications from end stage smoking, such as amputations and Buerger's disease and emphysema. While this is frightening when you're in that age group, the people who are 19 and 18 years old, they don't understand. They don't believe it's going to happen to them.

I'm glad to see this happening. It is kind of surprising considering the tremendous influence that the tobacco industry has on congress, but it is happening. But you have to compare that. So where are these ads going to be seen, and how is that balance? We have a relative small amount of marketing dollars being spent on these ads. We have $10 billion every year that's being spent by the tobacco industry. So it's just a simple numbers game. You could have the best educational campaign, but if it's not spread far and wide, and it's balanced against $10 billion in the tobacco industry, it really doesn't result in effective change behaviorally.

The pharmaceutical companies as I mentioned earlier collectively generate revenues about half a trillion dollars a year every year. That can generate enormous influence to the point where they can afford to spent in the United States every year four trillion dollars on direct to consumer advertising, which is only legal in the United States and one other country in the world. The tobacco industry spends 10 trillion, but it gets better because at four trillion, is an additionally they spend four times as much, $16 trillion every year to leverage that money to educate physicians. They know how to effectively use their revenues to get the maximum bang for the buck.

It gets even better because the average physician doesn't get $10,000. That's what the average amount is. Some physicians

get far less, maybe under 1,000. But select physicians, physicians who are chairman of departments or peer review editorial boards for important medical journals or hold important positions in the government, they might get a quarter of a million or half a million dollars.

They know how to use their revenues to purchase influence that really sets policy, not only governmentally, but also what is considered to be the standard of care. By changing and evolving that standard of care from the very day a medical student goes into medical school to the time they graduate and they continue practicing, there's this pervasive influence that's generated by very effective marketing skills of the pharmaceutical companies.

Drug companies control the entire system because it's a well documented fact that the drug companies have the largest political lobby in organizations. They're some of the most clever marketers on the planet because they know how to leverage their resources by bribing politicians to give them an unfair advantage in the marketplace, by placing legislation that is absolutely devastating to their competition. This is typically implemented through federal regulatory agencies like the FDA and the CDC. Most people are under the impression that political corruption only involves somebody handing over a check and getting a favor. That's not the case at all. The foundation of the corruption is really all about bribery that involves giving a gift to somebody who makes a decision on behalf of the public.

At the end of the day, that's really what bribery is. The system has never changed and continues to this day because the people who make the reforms are the people in the system that are responsible for changing it. So reform efforts are merely fake efforts to tweak the current, corrupted system. For example, the system forbids lobbyists for taking a congressman to lunch for $25, but allows them to take him to a fundraising lunch where they can give him $25,000, and they call it a fundraiser. They have all the same actions and all the same interactions with that congressman. The only solution is to prohibit members of congress and their staff from ever becoming lobbyists in Washington.

So if you make the choice to serve the public with public service, then service the public, not yourself. Unfortunately, that simply is not going to happen any time soon.

You know, in many industries, and we don't have to look too far, such as technology, what are my other passions, and the most profitable and wealthiest company on the planet is Apple Computers nowadays. It's number one. It's applauded for its innovation. Unfortunately the same innovative tendencies does not extend to the health field. This is largely, not exclusively, but largely result of the pervasive collusion between the government and the drug companies. They wield about a half a trillion dollars of annual revenues, and this is able to essentially manipulate the system.

So as a result, if they perceive a threat to their revenues, and they have very clever and sophisticated models to predict these threats, something that would essentially be a radical breakthrough, such as a treatment for cancer that really is effective and works, they will identify this threat very early on and use federal regulatory agencies like the FDA and maybe even the CDC, but primarily federal regulatory agencies to shut that operation down. They'll come in after them with guns to shut them down and close their operation to essentially strip them of all their revenues.

However significant the threat is determines how much effort and energy is directed towards squashing that threat. Certainly, the ability to practice medicine is a state granted privilege. It's a license to practice, and that license can be revoked. Part of the process is to essentially establish standard of care through this very sophisticated and clever system of influencing the trend setters by essentially bribing them. Once that standard of care is set, then these local medical board can go in and reprimand a local physician's license who doesn't follow the standard of care, and they can legally do this and essentially quiet them.

Of course there's this social condition where an individual, a physician, who may be aware of some alternatives is going to be highly reluctant to participate in that because he's going to be looked as unusual or weird, so there's a social pressure

to follow that in addition to the local medical boards and authorities.

So these local medical boards, if they reprimand a physician's license or even worse take their license away, then their very ability to earn a livelihood is obliterated or severely impaired, so as a result, I mean many healthcare professionals have enormous loans out, and they have responsibilities, and they don't have a lot of extra revenues to fall back on, so there's this fear that gets generated, very real fear that motivates them to follow the standard line.

The whole medical system is designed to essentially create barriers to competition, and they do this in a number of ways. They have professional organizations, like the American Medical Association, which essentially is a trade organization, which can facilitate passing regulations and rules, which essentially limit their competition, and they can even go so far as to whole professions, such as chiropractors, and establish, threaten them and establish legislation, which essentially limits their ability to function and practice freely.

Fortunately, the truth eventually comes to the surface and law suits can be filed. They're very expensive to do, but they can be filed, and those actions can be corrected.

I am doing this out of passion. I would recommend anyone pursue whatever their passion is because then you know you're going to be successful. I'm beyond passionate about this topic. One of the side effects of that is that I get to apply this information to myself personally, so as a result I hardly ever get sick, and I know I'm going to live a long time.

I have many, many years in front of me to work on my mission, and my mission is to catalyze the change in the United States that will essentially educate people to let them know that there all alternative approaches, that they don't have to rely on dangerous drugs and surgeries that could potentially kill them.

Patrick G. : I hope you enjoyed this bonus episode of GMOs Revealed. As a quick heads up, you can still support the mission and own GMOs Revealed for 50% off of the normal price. I have to say this has been one heck of a journey, and I can't tell you the

level of gratitude that I have that you took this journey with me. This issue is a huge issue. I believe that this whole GMO scenario is the biggest environmental catastrophe in the history of human kind. I want to highlight that we have shown individual people, even stay at home moms, who have taken action, and have activated millions of people to create awareness around this issue that is so sorely needed. Here we are human beings on planet earth, and we have a conscience. We also have a responsibility. We have a stewardship that we live on this earth, and we leave it to those behind us. And this whole scenario surrounding GMOs, you've seen the journey, you've seen the interviews, you've seen the experts. You now understand what's going on. Knowledge is power. But if you just sit with the knowledge and don't do anything, nothing changes.

So let's not only have the power of the knowledge but let's have the transformation of the action that should follow that knowledge. We worked tirelessly on this project because the stakes are high. We have a deep feeling of spirit and gratitude for the community that has emerged out of this GMOs revealed project, and that's you. So let's you and I together make a difference in this world so we can lay our head on a pillow at night and think about the fact that we're living our life in a way that's making a difference. Thanks so much for taking this journey with me.