



**Transcript – Why We Need to KO GMOs with Don
Huber #318**



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Speaker 1: Bulletproof Radio: A station of high performance.

Dave Asprey: Hey, it's Dave Asprey with Bulletproof Radio. Today's cool fact of the day is that the coffee plant's natural defense mechanism is caffeine. Bugs don't like to chew its leaves but bees like the caffeine boost so the bees keep coming back for more, just like we do. Who would have thought that caffeine was actually also one of the primary defense against fungus that coffee has.

The more there's a fungal attack on the coffee plant, the more caffeine it makes, which I find fascinating. This is one of the reasons that Robusta coffee. The stuff that you generally don't drink has more caffeine is because it's usually moldier. If you haven't heard about Freshbooks yet, listen up. These folks are on a serious mission to help small business owner save time and avoid a lot of the stress that comes with planning a business.

As a small business owner myself, I pay a lot of attention to not wasting my time and not wasting my staff's time, and one of the things that makes a big difference is pain free invoicing for freelancers and small business owners. Using Freshbooks, you can take about 30 seconds to create and send an invoice and you get paid online because Freshbooks gives their clients tons of ways they can just pat you with credit cards or other ways which can seriously improve how quickly you get paid.

In fact customers get paid five days faster on average. You'll also get an instant notification to tell you whether your clients looked at the invoice, the second they view it, so you don't have any more excuses from people saying they never received an invoice that you know they got. Freshbooks also let's you keep track of your experiences, it's ridiculously simple, no more boxes full of receipts.

For me, that's some of my personal kryptonite, expense reporting drives me nuts, making it simple with Freshbooks is really cool. The Freshbooks mobile app let's you take photos of your receipts and Freshbooks organize them for you later. You can then create expense reports for you and it also makes claiming expenses at tax time a breeze.

Freshbooks is offering 30 days of unrestricted use to all Bulletproof listeners, totally free right now and you don't need a credit card to sign up. To claim your 30 day free trial, go to freshbooks.com/bulletproof and enter bulletproof radio in the how you heard about us section. Before I introduce today's guest, I want to read you a quote from him because it's a really powerful quote and something that really leads into what we're going to be talking about.

He says when future historians come to write about our era, they're not going to write about the tons of chemicals we did or did not apply. When it comes to glyphosate, they're going to write about our willingness to sacrifice our children and to jeopardize our very

existence by risking the sustainability of our agriculture. All based upon failed promises and flawed science.

Now that's a powerful quote and it comes from a powerful guy as well. I am interviewing today Dr. Don Huber who's a professor emeritus of plant pathology at Purdue University. He's a retired colonel with 41 years of military service where he studied man-made in biological threats. He serves as the APS coordinator for the emergent disease and pathogens committee as part of the USDA and has spent over half a decade looking at plant diseases focusing on soil-borne problems, microbial ecology and host-parasite relationships.

He's a leading voice in the anti-GMO and anti-roundup movement and a crusader for upgrading our food in all ways. Dr. Huber, welcome to the show.

Don Huber: Thanks, Dave. It's an honor to be on with you.

Dave Asprey: All right. I'm just going to go there. How are you able to be a leading voice of anti-GMO and anti-glyphosate and hold a position at a major university. It seems like it's hard to do that these days.

Don Huber: Well, I'm retired, that makes a big difference.

Dave Asprey: Got it.

Don Huber: A young professor would have extreme difficulty in surviving in the environment as we find it in the academia today.

Dave Asprey: The fact that they can't fire you gives you the power to speak the truth.

Don Huber: Right. At least it's a major incentive. Now I've been sharing my research on glyphosate and the GMO crops for probably 15 years before I retired. It wasn't until my letter to Secretary of AG, Vilsack was leaked to the public, it was very confidential letter that I wrote when I was chairman of the USDA NPDRS committee as the APS representative in that position and I was saying some things that were presenting some very serious potential consequences for us as far as threats to our agriculture.

Others were seeing them a whole sole, they're seeing them in different areas. I felt compelled to write that letter. I guess in some respects would apologize for the language that it was written in, because it was written to a politician with the anticipation that that letter would be shipped over to the risk management people and then I would be able to share the details and the seriousness of the concern.

Once that letter was leaked to the public, it went viral and that provided the opportunity then for me to be a little more open in sharing. I felt obligated to write a second open letter to the public to explain why I had written the first one to the secretary and everything has just expanded from that point.



- Dave Asprey: Do we know who leaked the letter?
- Don Huber: We don't. Some of my colleagues in USDA think it was probably someone on one of the commodity boards that we really don't have any good idea of who leaked it.
- Dave Asprey: What was the content for people listening who haven't seen it, what does the letter say?
- Don Huber: That was a letter alerting the secretary to concerns that we had as far as the deregulation of Roundup Ready alfalfa. If what happens to alfalfa follows what happen to deregulation of roundup ready corn. Then we could very easily lose our fourth most economic crop, our number one forage crop in the country to a plant disease that we consider rather innocuous because we have very excellent resistance, genetic resistance to that disease.
- The problem is when you apply roundup to it, as we find with some of our roundup ready crops that then that disease becomes very intense because the roundup will nullify the genetic resistance. In corn for instance in 2012, we lost 1 billion bushel of corn to a disease that we considered a very wimpy disease of no significant economic consequences throughout the corn belt, and that's Goss's Wilt.
- Dave Asprey: That was B with a billion you just said, right?
- Don Huber: Right.
- Dave Asprey: Could we turn that into ethanol or was it not even useful for that so they don't eat it?
- Don Huber: That's lost production.
- Dave Asprey: Good God. I think of the habitat destruction that happened to make all of that. There's no animals living there, there's no grasses, there's just nothing but plowed basically sterilized soil with no food to show for it.
- Don Huber: That disease has continued to spread 30 years ago. It was limited to six or seven counties, Eastern Nebraska and Western Iowa, it's now anywhere in North America and anywhere in the world. We have shipped contaminated seed. That disease has taken over because we've increased the virulence and we've reduced the resistance of the crop. There's a sister to that same bacterium that attacks alfalfa, and we're only able to grow alfalfa economically at least because we have genetic resistance to that particular disease.
- If glyphosate applications do the same thing to alfalfa in nullifying that genetic resistance like it does in corn to Goss's Wilt, then that crop is in serious jeopardy, and our agricultural economics from an animal production standpoint could be very severe. I asked the secretary then in that letter to do the research before the deregulation because no one had looked at it, no one had even considered that aspect but that was in the position that I was in, that was a responsibility that I had, was to notify the secretary and other people and that was the purpose of the letter.

Knowing that he personally wouldn't be addressing that, but certainly risk management and other people would be involved in respond to it with the appropriate scientific research then and studies that would give us that assurance that the moves that we took would be in the best interest of agriculture.

Dave Asprey: You also removed plausible deniability.

Don Huber: I'm not sure what plausible deniability infers in that.

Dave Asprey: If you're in a political position or in any position, and you don't know about a problem and you didn't solve the problem. You have one set of responsibility. If you're in a position and you were notified of a problem and you didn't take action on it, you have another, as we say moves the bar up for what your appropriate and legal behavior should be.

I'm not looking to suggest that there's anything nefarious there, I'm just saying that a letter like that has a lot of power because now you know there's a problem, you are duty-bound to examine the problem whereas before, it might be a problem, it might not but I didn't have an expert to really point it out, so I didn't think it mattered.

Don Huber: That was a serious concern for me. There were four points in that letter but that was a major one, I'm asking the secretary to delay deregulation before we had the research to confirm that that was in the best interest of our agricultural production.

Dave Asprey: You're sitting in this position where you realize that we have a major threat to our food security and one that still may come to pass and that we don't have appropriate oversight, basically companies are going to sell what they're going to sell because they're going to make money on it. Most of them doesn't have a very good track record of watching out for anyone but their own interest. I think that's pretty well established at this point.

There are two different issues that come together here. One is you said GMOs are the biggest scientific fraud since the Piltdown Man which is a major accusation and then you have another thing, glyphosate salt is bad for soil and bad for people, and they're separate issues because you can use glyphosate without GMOs, and you can use GMOs without roundup.

Let's talk first about glyphosate and roundup and then let's talk about GMOs with or without glyphosate because I want to understand, given your very deep experience in the field why you feel that way about GMOs apart from glyphosate. What is glyphosate for people listening who don't understand it very well, what are its mechanisms of actions and why should we pay attention to it, why does it matter?

Don Huber: Glyphosate is a very unique chemical. It was invented by Jim Chang in San Francisco when for Stauffer Chemical company, they had the patent on it and they patented it in 1964 as a very strong mineral strong mineral chelator. A chelator is a compound that can grab onto another element, change its physical characteristics without becoming a part of that

element. It's a chelator, we use chelators quite a bit in agriculture and in other areas to increase solubility of chemicals.

We use them to move minerals and chemicals across the plant memory. In the case of all of our herbicides, all of our weed killers are all mineral chelators that will immobilize a particular nutrient. Now most of them fairly specific with glyphosate and also glufosinate, liberty would be a common name for glufosinate, they're sister compounds. All under the patent of the Jim Chang had as chelators or minerals.

They immobilize those minerals so they're no longer available land for the physiological functions that they regulate in the plant. It's our minerals, manganese, copper, iron, zinc, those minerals that make our enzymes work. If you want to shut down an enzyme system, you merrily immobilize that mineral that is the co-factor or the catalyst and regulator of that particular function.

I've likened this to having a 200 horsepower engine in your car, it can get you up to 60 miles an hour in a hurry, you can do, travel long distance with it, but it doesn't do anything until you turn the key on. What these minerals do especially our micro-nutrients is that they're the key and with the herbicide with something like glyphosate or any of our herbicides.

They pull the key out of the ignition, in other words, they make that mineral solid, it can no longer fit in the slot that would activate that enzyme. You have this powerful engine that's just a piece of steel out there or aluminum or whatnot. Until you turn the key on. To shut down those physiologic systems, we use chelators that immobilize those enzymes and turn the system off. Glyphosate is unique and it's a very broad spectrum chelator.

It immobilizes iron, copper, zinc, manganese, cobalt, nickel, any of the ions, calcium and magnesium. Most of our resides are fairly narrow spectrum chelators. When Jim Chang patented glyphosate as a chelator in 1964 it was primarily used to clean boiler, because it was such a strong chelator especially for calcium and magnesium and iron that you get scale built up from.

10 years later, Monsanto realized well this seems a very broad spectrum powerful chelator that shuts down plant systems, and they patent it as an herbicide so that it's a very broad spectrum herbicide, essentially killed everything. That's where the genetic engineering comes in because they engineered a plant that could tolerate the glyphosate has a bacterial gene, that isn't sensitive to glyphosate or it requires a different mineral element that isn't chelated or totally immobilized by glyphosate.

It keeps functioning so you can now apply glyphosate directly to those plants that are protected because of the bacterial genes that have been put in. The whole program there with glyphosate is that it has multi-functions. It's a very unique compound again. In 2000, they patented as a broad spectrum antibiotic. This antibiotic is being applied indiscriminately in our society, in our environment, essentially at the tune of about 300 million pounds a year.

Where we're concerned about antibiotic resistance of the tetracycline or penicillin and those are all targeted applications not general applications like we're using glyphosate and we only use 29 million pounds. To get excited about antibiotic resistance, the first thing we should be addressing is glyphosate, very broad spectrum powerful antibiotic.

The other thing is that glyphosate is, you might say a false amino acid. Amino acids are the building blocks for our proteins. For peptides and proteins and those nitrogen materials that we rely on for enzymes and other functions, that the glyphosate as a glycine amino acid analog. Also has the ability to disrupt actually the structural composition by replacing the normal amino acid with the synthetic amino acid to disrupt the physiological functions in animals as well as in plant.

Dave Asprey: People who are long time listeners to Bulletproof Radio know that I'm a huge fan of collagen. I manufacture a grass-fed collagen peptide, and one of the big reasons I use collagen is because it's full of glycine amino acid, and that is the natural amino acid. I did not know until you just told me though that roundup could act as basically synthetic glycine, you build broken collagen connective tissue in your body if you're exposed to roundup or at least you could do that.

Don Huber: Yes. It would disrupt that structure or composition of the collagen, and not only that, it's probably going to have an even greater effect as a chelator for those enzymes that give you the opportunity to build that collagen to start with, but then you would have a false collagen or a defective collagen in that system where you have glyphosate present. You mentioned the collagen and bones, that's one of the areas where glyphosate accumulates in the body.

Dave Asprey: Wow. This is totally news to me. I've read quite a lot about the research on this, but I didn't understand that. If you look at the other places where collagen is important, stretch marks. You want to fix stretch marks. Here's the deal, having organic agriculture might be a good idea if you don't want bad bones, and bad stretch marks.

I don't have a study that says it causes stretch marks, but I can tell you if you have defective collagen there's a good chance that your skin isn't going to be very stretchy and you'll get stretch marks. What happens then if we take this antibiotic that we like to call an herbicide even though it kills more bacteria than plants probably. In fact, we know that it does that. What does that do to the bacteria in our gut?

Don Huber: Extremely damaging. Because it's an antibiotic. Against the good guys, not the bad guys. You end up with what we call dysbiosis in the guy, a disrupted balance but the organisms that are very sensitive to glyphosate are the ones that manufacture a lot of our neuro compounds, melatonin, serotonin because they all come from Tryptophan or Tyrosine or Phenylalanine, most of the amino acids that we can't produce ourselves.

We rely on our gut microbes to produce or synthesize those compounds and then make them available for us as nutrient supplement, so that when you take those organisms out

which glyphosate does, then you deprive the body of that neurological function. You deprive that's also a basis for our immune function. You have your cystine as part of your glutathione. You have glycine, part of your glutathione molecule, and your glutamine.

Those three will make up your immune system. Your glutathione is the right powerful antioxidant. You deprive the body then of some great critical elements. As a consequence, then those organisms in the gut are insensitive to glyphosate take over. We don't have any roids of nature. That'll be something that'll come in and fill that void very quickly. The ones that fill the void are the clostridial species, your e.coli, your dysteria, your salmonella because they have an alternate type of metabolism that isn't shut down by glyphosate.

They're able to take over. We see a huge increase in difficile diarrhea for instance are in chronic fatigue syndrome which is clostridium botulinum. You see the leaky gut from clostridium perfringens. All of these are just the manifestation of the power of glyphosate in eliminating all of those natural barriers and natural biological controls that we used to have built into our system that are now taken out because of this antibiotic activity of this herbicide.

Dave Asprey: If someone listening to Bulletproof radio right now, wants to go out and eat a piece of toast made with grain that was desiccated with roundup, they sprayed roundup on it right before harvest and a ball of yogurt, what's going to happen in their gut?

Don Huber: They're going to end up with a fair amount of glyphosate because when glyphosate supplied to that grain as a desiccant or a harvest aid, at that time, the only place that this water soluble systemic chemical can go is right into the grain. That's where it accumulates. It accumulates in those growth point, be the root tips, and shoot tips and the reproductive structures.

At that point, the only structure that is going to receive the glyphosate is going to be the reproductive structure. That's the grain that goes into your cereal, your corn, your soy bean oil. All of those things then accumulate glyphosate.

Dave Asprey: Is that going to be enough glyphosate to disrupt all the Lactobacilli from the yogurt?

Don Huber: It takes less than a 10th of a part per million to be toxic to Lactobacilli and Bifidobacteria and those other beneficial microorganisms in our gut. Yet EPA says it's fine to have 30 parts per million in grain up to 400 parts per million in some food products. Now a half a part per million will disrupt the endocrine hormone system directly.

Part of that by chelation, part of it maybe from glycine, this artificial glycine impact substitution and others just because of the overwhelming effect of this very unique chemical and its broad spectrum activity against everything that lives.

Dave Asprey: Do you think that there will ever be executives from the companies who make this stuff, who have seen those research, are they going to be held responsible for crimes against humanity, that's a serious question? Not meant to be. What you said, they're so impactful.

Hundreds of times more than we know breaks us.

Don Huber:

Well, there are lawsuits going on now for non-Hodgkin's leukemia has been quite well established scientifically. Parkinson's disease is another one that's been well established. Part of the problem is that the research that should have been done 35 years ago on safety has never been done. You look at the safety tests that were submitted to the EPA.

You find even as recently as 2014 and a study that was submitted. The control rats had 118 parts per million glyphosate in their feed, they also were loaded with GMO proteins, and yet the test was to establish the safety of GMOs and the herbicidal chemicals. Of course the end product of that was they're substantially equivalent because wasn't it large differences between the two groups of animals.

Well, the two groups of animal from the scientific standpoint were fed the same thing. There shouldn't have been scientific difference, but Steve Druker in his book *Altered Genes, Twisted Truth* has documented that this is probably the greatest scientific fraud we've ever had since the Neanderthal man.

Dave Asprey:

Wow. It's profound stuff and it's really disturbing that this is still going on. One of the things that I wrote about in the Bulletproof diet is that when you use glyphosate, it increases natural toxin production. I spent a lot of time looking at microtoxins, because they inhibit mitochondrial function in humans, amongst many other things linked to cancer and all. Can you talk about what glyphosate does to the natural production of bacterial toxins and microtoxins in soil and in crops?

Don Huber:

Well, again as a very powerful antibiotic. First thing it does is eliminate your natural biological controls. A lot of organisms in the environment that would suppress our toxin forming fungi especially your *Fusarium* and *Aspergillus*, the two of the big ones. There are number of others that fit in there but certainly when you remove those natural controls and then provide an environment physiologically for those organisms to flourish, you'll see the toxin production greatly increase.

When we've looked at the *Fusarium* toxins for instance, in corn and wheat and barley, that we used to always look for. The T1 type toxins. Because in the North American environment, we didn't have an environment that was conducive for the T2 toxins that were used in Cambodia against the among people at the yellow rain type toxin.

We could trace the source of those toxins back to regions which had the environment where they could be produced and so made it easy to distinguish between the two toxins. Now with the extensive use of glyphosine, we find a dramatic increase in T2 toxin production. Not only that, in cereal grains and small grains, wheat and barley for instance, that we used to only see the toxin really produced in the grain.

We didn't see it in the root system even though we had extensive root colonization. If you look at Andreas Tideman research. He reported at the national *Fusarium* head blight conference couple years ago. He said it's not safe to even use a straw or stubble for

bedding now, for our pigs and cattle because those toxins are produced in the roots and trans-located up. It means that you can have very healthy looking grain that will have high concentrations of the mycotoxins in them.

Then if you use the straw, that you can end up with infertility because it is estrogenic type compound and you see all of the other consequences that a very simple molecule can change.

Dave Asprey: What we did is we spray the antibiotic on the soil, we removed healthy soil bacteria that allowed the hostile soil fungus to grow out of balance and to colonize parts of the plants. Now very potent fake estrogens, Xenoestrogens like are forming in our crops. The crop looks healthy but it's full of toxins and then you eat it. What are the effects that happen from both eating roundup itself as well as these secondary nature made toxins in response to this? What happens in the human body when we consume all these stuff?

Don Huber: Well you have both the toxic problem and you have the glyphosate problems. You have to very potent toxins, the toxins of course, a lot of it fusarium toxins are neuro toxins, antibiotic toxins, you have muscular types of interactions there.

Dave Asprey: Protein synthesis inhibitors.

Don Huber: Then you look at the broad spectrum damage that the glyphosate molecule itself does, and some of those are a parts per billion. Dr. Nancy Swanson for instance said in Seattle and Andrew Loo had a publication out last year. They took the CDC data for 22 diseases. These are diseases that were reaching pandemic proportions. We haven't used that term for them, but a lot of our GI tract diseases that we've already mentioned.

You have a lot of the other types of disease, the neurological, Alzheimer's, you have diabetes, you have the increase in cancers and all of those types of diseases, but to have 22 and they plotted against the USDA data then for the use of GMO crops and glyphosate. You see that it's the same epidemiological curve that fits all 22 of those diseases, and there are actually another 10 that you can plot against that curve. Now you can say correlation isn't causation but I can guarantee you that when you see 22 diseases that fit the same curve, it's not coincidence.

Dave Asprey: Correlation is great evidence although it's not causation.

Don Huber: We should have and that was one of the responsibilities that we had with the USDA NPDRS program was when we would see that kind of an anomaly from a historical standpoint or see that increase in disease. We would assemble a scientific panel then to investigate. One of the things that we haven't done with those diseases is address the question, well, is it causation or is it correlation?

Nobody wants to look apparently. We look for all other excuses, you look at the Zika virus and all of those things as an excuse for microcephaly, well, all you have to do is go up to Yakima, Washington. You can see exactly what glyphosate does when you put it in three

rivers that go through Columbia basin through the Yakima area, and Benjamin County and Hamilton County.

Look at the epidemic they have now of Anencephaly where the baby's brain doesn't develop fully and they're usually born still-born but if they live, it's usually 24 to 48 hours that you get a hold of your child. Major epidemic. Very clear association of when they started dumping glyphosate herbicide and to those three rivers for invasive wheat control.

EPA says that's fine, that's okay. Medical personnel are told not to talk about this because of the privacy of those individuals. The epidemic continues to take a consequence, a tragic consequence on those families.

Dave Asprey: My first book was about fertility, my wife is infertile when I met her and we restored her fertility and one of the chapters in there is environment. You've got to have very clean water. It matters, including what you shower in. It shouldn't matter that much because you shouldn't be able to assume that those things are there, especially North America. It's just not how it works anymore.

Don Huber: We used to say if you're really fertile, maybe you should change water or not drink so much of that water. Now that's not the case, now we find the glyphosate in the water. Again it disrupts the endocrine hormone systems, so that's your fertility. As well as a lot of other systems, your thyroid and everything else coming there at very low levels. That's a half a part per million and you look at the amount of glyphosate that and a few samples that had been run on in people's urine as an indication of how much they're consuming in their food.

You'll see that it's many times over 28 to as much as 400 times higher than the scientific study show will disrupt the endocrine hormone system. Actually far disruption of the endocrine hormone system, any amount is toxic. It depends on the damage it's done, it depends on the developmental stage that an individual is in or a fetus is in. Any content, it should be zero from endocrine hormone function relationship.

Dave Asprey: That's disturbing. For people listening who are thinking of having families, it's particularly important and I don't say not just for the woman. If you want to have healthy swimmers, as we like to call them as a guy. If you're disrupting your own endocrine system, you're getting a lot of these xenoestrogens that you're basically ruining your own fertility.

Both parties who want to have successful kids, need to get roundup out of their diet, and they also should get GMOs out of their diet. Could you talk a little bit about what GMOs might do to our own genes?

Don Huber: Well, GMO, genetic engineering is based on flab science, it's fossil science that served us well in our early understanding of genetics and daily in genetic and that for traditional breeding. It was a functional relationship that fit into what we were seeing. We abandoned that concept of one gene, one function about 50 years ago.

Genetic engineering still based on it. That's its whole premise is that we'll take this one gene or little section of genetic material, insert it, we're not going to do anything to the rest of the genetics, but when you do that, you disrupt the integrity of the whole system because our current concept and this came about as a result of sequencing the human genome is that it's a spatial relationship.

Each gene is in a spatial relationship with all of the other genetic material and that entire chromosome, not only the chromosome but the entire nucleus and it's in a three dimensional relationship. It's not in a flat relationship. It's not in a flat relationship. A two dimensional like we typically picture it. It's in a three dimensional relationship.

You end up with a lot of tags sticking out or that ball of yarn if you want to look at it in that respect. Those genes disrupt then a spatial relationship between genes and that spatial relationship is also influenced by the environment so that if that wasn't the case in the development of an individual whether it's a plant or a microorganism or an animal.

That in the development, everything would just be a one big lump of callus, and that's what we see in a petri dish until we change the environment and then we start getting differentiation. You reconstruct a plant in that process and generic engineering from a single cell. As you reconstruct it, you'll start out with a bunch of callus and then you modify the environment.

You have the same genetics there but you modify the environment and you get some leaves coming up or you get some roots being produced and modify it a little more so that you can get some tillering and some other component. It's the same genetics, but it sets spatial relationship between the genes as its influenced by the environment.

Well, in genetic engineering, you're throwing in, forcing in material that then changes the spatial relationship, for that whole series of entities of regulatory and dictatorial type of system, and at the same time you're also adding additional genetic material from viruses, to promote your trait characteristic to get it to be expressed in the new individual.

You're adding antibiotic marker genes so that we can see them directly, and know which ones had been transformed, which ones haven't. It's a tremendous disruption. Those genes then are very promiscuous because they're not established and as a component there, they're an outsider that's come in, and it's like if you want to go to Chicago and establish a gang, you're going to have a lot of materials, you're going to have to overcome and other gang members.

Whereas we're not looking at a gang here, but it's that same principle of the disruption of the genetic integrity then because these materials don't become incorporated as a full component of the genetic system. When we eat that material in, the microorganisms in our gut can pick up those genes because they're promiscuous, they can be spread in pollen to other plants.

They can be picked up by soil microorganisms and then 10 years later, as those bacteria

would be decomposing corn stubble for instance or corn roots that had been genetically engineered, those soil microorganisms, some of them the same organisms that we use for genetic engineering for transferring the material in are also soil organisms.

They can then re-engineer plants 10 or 12 years later that would produce the whole same potent toxins that we may be very concerned about as we are with the starling, corn produced a very toxic protein as far as animal consumption. Now we have fields that we can't row corn for export because of the potential when if they have grown a starlink corn or one of those hybrids 15 years ago before we pulled it off the market.

That they can still re-engineer then corn and the concern from several countries is that we don't want any of it unless it's certified that it hasn't been grown on any one of those fields that grew that particular variety of hybrid.

Dave Asprey: Most people living in cities who don't work in agriculture, haven't run farms, have no idea that that's possible. You plant something, genetically modify that makes any one of variety of toxins that we cause it to make, you burn the field down and 10 years later, you might be going a different seed from the same general family. The soil bacteria reintroduce those genes.

Don Huber: You can see not just from the soil organisms but when you eat that genetically modified corn or sweet corn or canola or whatnot. Then you also can pick up those genes, you may do it through your microorganisms but in the study in [Sheffield township 00:45:57] Quebec here just a few year ago, found that 93% of the women working, carrying the genetically engineered proteins in their blood. 70% passed it across the percentile barrier to the developing child in the womb.

Dave Asprey: We have no idea what those specific things do.

Don Huber: We've never tested any of those toxins, any of those proteins for safety. We've tested the protein as it's produced by the bacteria. We've never tested the protein as produced in the genetic engineering scenario.

Dave Asprey: Wow. This is concerning. My background is computer hacking, computer security managing complex systems and those systems are nowhere near as complex as the food web. Looking at things like that is really scary. Are you concerned over the next 100 years about a global population boom?

Don Huber: I'm not concerned about a boom. I'm concerned about survival.

Dave Asprey: Yeah. Me too.

Don Huber: If you look at the report last year, we've had a 30% drop in fertility, just in the last five years. It's hard to have a family anymore. Some people say it was great for teenagers, but I'm telling you it's pretty tough on survival and in 2002, the situation had reached a point that the head of the United Stock Growers Association gave testimony to the senate ag

committee.

That there are two contagions that were threatening survival of the animal industry in this country. One of them has premature aging. You take an animal to market and you don't get paid for the effort and pride that you had in raising that animal because a prime beef now looks like it's a cold 12 year old cow coming out of cold out of a dairy.

The second thing was reproductive failure with anywhere from 40 to 50% pregnancy loss. Then that's on top of a 30 to 40% infertility rate to start with. That area is very crucial. It's in cattle, pigs, horses, sheep, even in poultry, we're finding it difficult for reproduction, the same thing in humans.

We see fertility drop and had a nurse that works at one of the fertility clinics in California for in vitro fertilization said it's difficult to even fly in sperm and eggs that are viable enough to even go through that very delicate procedure to try and have a family.

Dave Asprey:

My wife is a [inaudible 00:49:21] trained physician and she does fertility coaching online now with people around the planet. A standard part of helping people get pregnant, you start months before you want to get pregnant, you don't eat GMOs, you don't eat glyphosate, you eliminate that systematically from your house, from your life.

Your systems can come back online, it just takes some time. There are some people where they probably never will. Like you I don't have a concern about overpopulation of the planet. I have a concern about rapidly falling fertility and it's getting worse every year, so the next two generations are, they just won't be as big as these, at least not in the developed nations that have this industrial agriculture.

I have two healthy young kids, [inaudible 00:50:04] an organic farm and you don't bring roundup on here, and if I could make, the island where I live, GMO and roundup-free I would because I think it increases property values to be able to say there is none of that stuff around here. Why don't you move here, land is twice as expensive because it hasn't been poisoned.

Don Huber:

Well, you brought up the virus, my USDA colleagues commented to me on the bird flu epidemic that we had through the Midwest this year, and eliminated 46 million chickens and turkeys. The interesting thing was that as my USDA colleague made a comment, he said it's really a strange spring that we had this year because the organic flocks didn't lose a single bird.

The free range flocks, are they organic or just regular? There wasn't a single bird with bird flu. It was only those confined feeding on the GMO feeds. You say well, what's the association? Well, certainly one of the associations is that you have the viral promoter genes in that feed. That's the virulence gene. You can take a very weak virus that doesn't do anything to you except maybe make you feel a little bit sluggish for a day or something like a Zika virus.

You have that virulent, viral, virulence gene to it, that's a promoters, that's what makes that virus more active and you're going to have a more severe response to it. We saw that as a devastating response to our poultry industry with this bird flu epidemic this last year.

Dave Asprey: Engineering weakness into biological systems. It's so risky, because biological systems share information with each other. I think we've engineered some profoundly weak humans who are susceptible to diseases we shouldn't be susceptible to.

Don Huber: Well, you see a lot of the physiological changes not just some of those are from a gut, microbiome changes. You also see it from just a direct effect of the high concentrations of glyphosate in our feeds, so that there's one country that last year in their legislature passed a law that you no longer have to declare the sex of your child at birth.

You say well, that's kind of a dumb law, isn't it? Can't you just look at the plumbing and tell whether it's a male or a female? The truth is, you can. Because with the endocrine disruption, there are many situations where there's not a clear delineation of what the sex is.

Dave Asprey: What country is that?

Don Huber: That's one of the European countries. [crosstalk 00:53:20]. You have that or neither one is predominant.

Dave Asprey: Asexual.

Don Huber: What they did then was give them six months so they could do the genetic testing and see whether they have the XY chromosome before they rushed into surgery to dictate what that child was going to, typically be for the rest of their life. It changes everything that we value, everything that we hold dear in our entire system. Whether it's the environment, whether it's our soil health, human health, animal health, crop health.

This very simple compound and the GMO crops that is applied to 95% of them. All have a very far reaching long-term basis, it's not just now or tomorrow. We're talking generation effects, when you talk disruption of the endocrine hormone system. There's a good book, it's an older book now, I think 1984 or somewhere in there.

Our stolen future. That's before people recognize, or the authors recognize the tremendous impact of glyphosate, but just discussing what happens when you disrupt the endocrine hormone, system with the right chemicals. Because those are what we're all dependent on, Isaiah said your whole flesh is life. Well, we're dependent on those crops, agriculture is our basic infrastructure.

If we ignore it, then the consequences impact us not just today from a nutrition effect but also as you've indicated from the toxins and the other effects that come in from an environmental standpoint.



- Dave Asprey: People listening to this episode are probably are going, we're completely screwed. You have 11 kids and 35 grand kids. What do you tell them to do?
- Don Huber: Tell them, eat healthy.
- Dave Asprey: Which clearly means.
- Don Huber: Grow as much of your food as you can on your own, have a garden. Some of those things, some can, some can't. Find out what's in your food. Be active in making sure that you know why you can't do that without labeling, without having some testing done. Now we are getting laboratories now. They're getting the test down so it's in a reasonable 30 to \$100 range. It's worth testing of finding out how much you really consuming with the type of diet that you're eating.
- Send in your own sampling. Now when that comes back at 70 or 80 parts per million, don't commit suicide, but you know, it's you got to change your diet. Some other things in Europe, they actually market a product called active wall man, it's a humic acid product and there are some other materials here that well, actually [inaudible 00:57:15] out of the body.
- Dave Asprey: Humic acid. Interesting what are the materials would you recommend for that?
- Don Huber: [inaudible 00:57:22] is one on the research. Does look good. Very strong chelator but also on that tetrahedron structure. If you can get size down, has the ability to absorb it. These two entities have been quite effective in improving fertility.
- Dave Asprey: You're exactly right. Bentonite clay is the other name that you just used it. That's the street name for it. Yeah, Bentonite clay and activated charcoal are things that I use on a regular basis, I actually manufacture a small particle size activated charcoal, because removing biotoxins seems to make me perform better.
- Don Huber: Now with the activated charcoal. It'll pull a lot of the toxins out. It doesn't pull glyphosate unless you have Sauerkraut juice with it.
- Dave Asprey: Now, that's news to me. What does Sauerkraut juice do to charcoal?
- Don Huber: Sauerkraut juice provides the lactobacillus and a [inaudible 00:58:26]. Those are the organisms that do the fermenting of the cabbage to make Sauerkraut. That's an excellent source, are those two bacteria to recolonize your GI tract. As Dr. [inaudible 00:58:46] has shown that in combination with the activated charcoal, that the Sauerkraut juice is very effective. The Sauerkraut juice on its own, has a very beneficial effect.
- You get some of the combinations, in Sauerkraut juice, the humic acid. The humic acid is definitely an improvement in animals, in cattle, it may take seven or eight months before you get full restoration of reproductive ability both in the bulls as well as in the cows. Had a bull breeder in Nebraska tell me that we're on a plane to New York and he said it had to

pull 40% of his bulls out of service, he couldn't get conception.

With the activated charcoal and [inaudible 00:59:42] in seven or eight months, you'll see that restorations, sperm counts, sperm help to improve. You'll see conception levels rates restore and back more to normal. [inaudible 01:00:04] two to three months. It's a much shorter period there, they have a little faster recycling time.

Dave Asprey: Pigs and humans are similar in the way we detox. I find that humans are similar that way. When you use those compounds to find the endocrine disruptors, to find the microtoxins, to find the glyphosate that we bounce back pretty quickly but it's not a good idea to get pregnant three months after you do that, because you should get cleaner before you get pregnant. Give yourself six months if you can do it. Because that gives you time to build up some resilience and rather than getting pregnant when it's first possible.

Don Huber: The reason for that is, while it's pulling the glyphosate, it's also pulling a lot of your beneficial minerals because those compounds are chelators, and you want to build those back. Manganese is really important for fertility.

Dave Asprey: For glutathione production.

Don Huber: For glutathione and also for the endocrine system for your enzymes involved there. [Jeffrey Shepherd 01:01:11] at veterinary pathologist, university of Minnesota. Was on a program that I was on and he was reporting on his five year study on birth defects in cattle, and also on still burst, and he found that 100% of those calves that were deformed and stillborn were extremely deficient in manganese.

He said well what about healthy ones, well he found 63% of his healthy ones were also extremely deficient and so he started looking at the feed. He found that the feed level is now the high levels that he could find in any of the feed whether it was corn, whether it was hay or a pasture. The highest level is what we used to consider just the average.

His low levels, you wondered how did those plants could even any photosynth because he found some of them down to as low as one part per million of manganese and you have to have manganese to split that water to get the hydrogen combined with carbon dioxide to farm the sugar.

Dave Asprey: This is one of those things where people have this idea, I should get all my nutrients from food. You have no idea what's in your food because the level of manganese could be high, it could be low but the odds of it being high are pretty low right now just because we've been farming for too long, because we spread crap on the soil.

Don Huber: Well, you have an extremely powerful chelator that ties up the manganese. Even if it's there, it's not going to be available physiologically, and then if it is available physiologically with the amount of glyphosate that you're eating and getting in if you look at the geological, the US geological law surveys, the amount that we're getting in the air and water just because of the indiscriminate use is enough to immobilize a lot of those minerals

that you have to have.

You may have a fair amount of manganese available in the plant. When it gets into your body and you mix it with this very powerful chelator, you're not going to have it available for all of those physiological functions that it needs to be functional for.

Dave Asprey: I tested low on manganese even though I supplement, probably the most expensive pee on the planet, I take pissfuls of very carefully targeted supplements, I was still low. I was kind of surprised, but I cranked it up, took an [inaudible 01:04:00] form of manganese of couple months and got my levels back up but most people they don't test that stuff.

Don Huber: Of course with manganese and [inaudible 01:04:12] you have a relatively narrow window compared to something like iron or calcium or magnesium. You could also overdose and that's one of the reason why you really should test and see what your status is. Eating a lot of nuts. You're going to get a lot of these minerals, micronutrients that you're not going to get from other sources. Hopefully we won't get caught like we did in California last year where a million pounds of almonds were rejected by Germany because the excessive glyphosate.

Dave Asprey: I was about to say I could see where that's going.

Don Huber: They hadn't applied glyphosate for two years to any of those orchards.

Dave Asprey: Wow.

Don Huber: In many of our soils, we have over I think [Frank Dean 01:05:14] showed and [Andrea Como 01:05:17] in Canada. Frank Dean in the US were showing over 100 pounds of glyphosate per acre still sitting in our soil because it's a very difficult compound to degrade, very few microorganisms can chew it up.

Dave Asprey: There are more than a few medical professions who listen to the show and there are also more than a few farmers and ranchers that listen to this. I suspect they're skewed towards the organic side of things because there's always that sort of a bias. If you listen to this and you're running or you're investing in or you own a crop land and you want to make a lot of money, stop spraying round up on your land now.

Because right now organic certification is really expensive, I'm working on organic certification for my own farm right now and I'll get it because it's never been sprayed and it won't be that hard to do, I can pass any test because it wasn't in production before. However, if you have land, the amount of time that you haven't sprayed it with glyphosate is going to increase its value.

If you stop spraying now you'll have a lot more money a few years from now because people will hear this show and people will see all the other research, all the movies, documentaries, books, like the cat is out of the bag. If you're a late actor, you'll have the least valuable farmland and the least productive farmland.

If you're an early actor and you stop doing this crap now, and you start restoring your soil, you're going to make a lot of money. If you're an investor, you should pay attention to that. This is a long term trend, it's a 10 year plus trend but it's money on the table, if you're trying to make a living, growing food which is kind of an important thing to do.

Don Huber: Yeah. The natural half life of glyphosate can be anywhere from a year and a half for as long as 22 years. Now, we do have people that are, that have developed some, what appeared to be in the early stages very effective biological cocktails that you can get out there and get some much more rapid degradation and clean that up, but it's another expense, but at least not quite as bleak now as it look five or six years ago.

Where we were having difficulty even finding organisms that could break it down. One of those organisms that can utilize it as a nutrient source is fusarium. We talked about why we have all these toxins [inaudible 01:07:44]. We're feeding it. We're simulating it. That carbon phosphide it's not a phosphate compound even though we lump it with the organic phosphates, but it's a phosphide.

The enzyme that breaks that carbon phosphide bond, it vary rare in nature. In these cocktails, they're making sure they get those there and really looking very promising for us, at least a way out in a reasonable period of time. Otherwise, we're talking generations.

Dave Asprey: Hopefully science can save us from science. In fact, it seems like that's always been the way it's been since the invention of fire.

Don Huber: Yeah. Well, science has always produced other knowledge, greater knowledge and then we recognize their other side effects, unintended consequences as a result of that and we've been able to make progress because in the past, we always recognized it. We always said, okay, what's the consequence, what are the unintended effects, and then we address those.

When it came to genetic engineering, that was prohibited, that kind of thinking is [inaudible 01:09:10] and academia, and industry, and everything else. They said these are substantially equivalent, you can't do any testing. The USDA group that was setup with 26 of our real elite academic institutions, land grant colleges and a technical advisory committee was setup to determine safety of GMO crops in 1992 or 1991.

We had them available to us at the time. They weren't commercialized, but after three years, they wrote an open letter to the EPA who they were working with and said we're prohibited by the companies from doing any testing. These are proprietary product and they threaten to sue us if we publish any negative data from it, plus they don't make the materials available to them for testing to start with, and it's illegal for them to generate because again it's a patented product.

If you look at the EPA and the FDA policies, they say we can't release any of the material because it's a proprietary product and even though they go ahead and deregulate them,

nobody's had an opportunity to see what that looks like until just recently. Then you find the fraud in the falsification of data.

Even in those tests that are submitted to the official agencies, [inaudible 01:10:53] in 1991 at the EPA even sued several of the labs that Monsanto was using. For instance, the IBM or IBT I believe it was, I forgot what the names, all those labs. Anyway, it's open court documents, that you can get. You can go to Wikipedia and it'll give you a little rundown on some of those court cases.

They sued them for just blatant falsification of their data. Fined them \$19.2 million and a few of those laboratory people for perjuring themselves in sending that false data, got free room and board for a few years. Those situations, that's all public record as the fraud that's got in it. Steve Druker again in his book altered genes, twisted truth had very meticulously documented many of those situations showing how the system has been corrupted at the expense of health.

Dr. Swanson and her publication and the group publication there with the CDC data just title it something like GMO and glyphosate effects on a deteriorating health in America. It's a very well done, very statistical type of a presentation, but you see that scientific censorship that's going on. We hired a tremendous geneticists at Purdue when I was still on the acting faculty before my emeritus retired status.

Tremendous individual who did some research showing that the mode of action of glyphosate isn't the chemical resistance, it's a matter of resistance to the soil-borne pathogens that are the organisms that really to the do the herbicidal activity. It's increasing disease susceptibility. Well, that threatened the endowments and some of the income.

He was released as soon as his six year probationary period was up and we were able to pick him up tremendous geneticists, a great scientist and we were happy to have him. You find that going on all the time. Barney Gordon, a great agronomist. One of our land grant universities, [Yen 01:14:06] made a mistake of publishing some of his research to alert his farmers to the need in the genetic engineered crops to increase their micronutrient levels.

They're not going to be as available. They're not as efficient in taking those nutrients up and also then when you apply the glyphosate, you reduce the availability of those nutrients, so you need to look at those soil and tissue test and say okay, I've got to add a couple of pounds of manganese, there's one of the things he was looking at.

Maybe as much as five pounds while it only takes a half pound for the total sufficiency of the plant, but to overcome that, then you need to add more. Well, as a result of publishing that, he got verbally beat up pretty bad, and a few months later, published an apology for publishing his science, which he stated I published it so our growers could maintain their production efficiency.

Had to apologize, said I didn't recognize the unintended consequences of publishing my data. Well, as part of that scientific censorship that is prevails throughout the whole system

when it comes to genetic engineering. It's really more of religion than it is a science. The science again is fossil science, the whole premise that it's built on. It's an exciting area. I've been involved in it for a number of years.

Do things that we couldn't do otherwise, but also you have to recognize that you may only look for one thing, but you're doing many other things in the process that you'd better be very concerned about until they're tested thoroughly.

Dave Asprey: We're reaching the stage where the economic impacts of the scientific censorship are too great to ignore. When you've lost half your crop of chickens, when 40% of your animals can't reproduce, you're going to go out of business and especially if you're a small farmer, there are a few of those left, but if you're a larger farmer and you have shareholders and boards of directors.

It doesn't matter what the official censored scientific story is, either the animals reproduce or they don't. If at the same time, your animals don't reproduce, you can't reproduce. Even though you can or you can't, that's when people start looking at what works, instead of what's supposed to work. I think we're hitting that tipping point, where you just have to do that because you want to eat. You have to do that because you want to have kids. That's going to shake up agriculture. Honestly, I think there's going to be a few chemical company executives in jail for a very long time. I think it's probably well deserved at this point.

Don Huber: Well, it's estimated by one lawyer at least that the medical trust fund that will be required for our genetic engineered damage, the glyphosate damage will exceed \$200 billion. I think that's probably just the tip of the iceberg.

Dave Asprey: We agree there. Well, Dr. Huber, this has been a fascinating conversation. I learned some things I didn't know when I consider myself relatively well read on this topic so thank you for the new knowledge. I know listeners enjoyed the heck out of this. There's a final question that I'd like to ask you that I've asked every guest on the show.

It's if someone came to you tomorrow and said based on your whole life experience, not just your profession and your academic side. If they said I want to perform better at everything I do in my life, what are the three most important things I should know? What would you tell them?

Don Huber: First one, I think it's your attitude and for me, it's my relationship with my maker. That's critical because it dictates how you approach problems and how you approach things. Along with that is we don't live in an isolated hermitage and family is a critical structure that I value above all else essentially in that area.

In order to have that ability and to have that relationship with each other. You have to feel good, you have to be healthy, you have to be a contributor to society rather than a drain on society. It's that opportunity to serve and to both in family and community and worldwide. I've had that privilege and I really appreciated being in international consultant and working on a lot of projects around the world.

That you realize that we all have a place and a role together that if you're not healthy, you're not able to do any of that. Your health has to be a priority for you and whether that's going to encompass a spiritual and mental health as well as the physical and health that's involved there. Those are my priorities. I guess shooting from the hip.

Dave Asprey: Well, there's always the best answers, so thank you.

Don Huber: Now my wife might change those priorities a little bit.

Dave Asprey: They tend to do that, don't they? Well, thanks again for being on the show. Is there any particular resources you'd like to direct listeners to to learn more about your work or about just the GMOs and glyphosate in general?

Don Huber: I think there are some good reviews out, Steve Druker's book deals with just the process of genetic engineering and the problems there. Excellent book, you can get it on Amazon or number of places. There's GMO Myths and Truth which is a review of I think pretty close to 800 peer reviewed scientific studies.

Where they, Michael Antonio at King's College medical school in England and Claire Robinson and John Pagan here in the US, editors of that but they look at all of the promises, and all of the promises that GMOs that were given to us 25 years ago have all been proven to be fail promises. They look at those promises because they're still touted and I've gone through them and have the actual scientific data to show what's happened.

How those promises really materialize for us? It's an open source about 400 page book that they can get on the Internet and that I understand they're trying to come out with a hard copy on it now, but it is available free and an excellent resource and then these other reviews, Nancy Swanson's book has four papers last year.

Just showing what happens to the physiology of a plant when it's genetically engineered as far as the new toxins that are produced, the Formaldehyde accumulation, the depletion of glutathione and those things. There's some excellent sources. You don't have to read all 1,700 papers that show concerns.

Dave Asprey: What I will do is I'll link to all of those resources in the transcript for this podcast, so people who are listening can go to the Bulletproof website and we'll have everything we said transcribed and at the end of it, there'll be just direct links so they can either buy the book on Amazon or download any of the papers. That's it.

Thanks again for being on Bulletproof radio. This has been a really excellent interview and thanks for your life's work on this stuff. I think you've really shined a light where it needed to be shined.

Don Huber: Dave. I'm still having fun. I have a concern for kids, but I also know that if we work at it, if we recognize the problem, we can correct it.



Dave Asprey: We can indeed and you've given listeners several really good ideas here, and hopefully we move the needle for millions of people with this conversation. That's what I'm working to do. Thanks again.

Don Huber: Thanks, Dave.

Dave Asprey: If you enjoyed today's episode, you know what to do. Stop eating glyphosate, that will be the number one thing to do. That will make you perform better, it'll make a bigger difference in how you feel every day, how you perform and your ability to do all the other stuff you want to do, to just about anything else you could do except maybe Bulletproof coffee, they might be near each other.

I'm serious about that, there's no glyphosate on my land, there's no glyphosate in my food. My kids never come near this stuff. They don't eat school lunches, or they go to a school where school lunches don't have glyphosate. Whatever it takes, you got to get this out of your own system. Out of the environment around you and especially out of your kid's environment.

It is a matter of life and death. It is a matter of survival of the species, but it's actually not as hard as you might think it is. This is something you can do and I think it's really important. When you do this, it makes you a more powerful human being and that is very very precious. Have an awesome day and I'll see you on the next episode.