# Are Chemicals ACTUALLY Making You Sick?

## "Checkup with Dr. Mike" Apple Podcast with Dr. Ailey Cohen and Dr. Andrea Love, May 7, 2025

### Excerpts Focused Primarily on Pesticides and Organic Food

[The Real Organic Project generated this transcript of Dr. Mike's May 7th podcast using an internet based program. The transcript lacked identification of who was speaking; the name of speakers are now identified throughout (COHEN; LOVE; DR. MIKE).

The transcript also did not accurately capture the dialogue when two or three of the participants were speaking at the same time. Such passages have been corrected in this transcript through reference to the recorded dialogue.

In the transcript, some sections not addressing pesticides and organic food and farming have been omitted. Places where content was deleted are denoted by the addition of dots, "...My point was...".

The transcript contains spelling errors and minor deviations from the recorded dialogue. In various places, a time stamp appears that correlates with the time during the 160 minute podcast that a given conversation occurred.

This document includes about 25 of the 70 pages of the full transcript. Listen to the full podcast at: https://podcasts.apple.com/us/podcast/are-everyday-chemicals-actually-harming-your-health/id1646695974?i=1000706698847

The Real Organic Project provided the full 70-page transcript to Dr. Benbrook. We asked Chuck to participate in a Real Organic podcast covering many of the issues addressed in this Dr. Mike podcast. Chuck's Real Organic Project podcast was recorded on July 1, 2025 and is accessible here.

At our request and in preparation for the ROP podcast, Dr. Benbrook read through the Dr. Mike podcast transcript and addresses areas where

inaccurate or misleading information was presented. This now 47-page transcript contains added commentary by Chuck that is indented and labeled as "***CMB***:".

This deep dive into the ongoing debate over pesticides and organic food makes clear why these issues warrant more, and fresh, attention by the organic community.

[00:00:00] DR. MIKE: Welcome to the Checkup podcast. On this episode, we're answering a simple but loaded question. Are the everyday chemicals in our food, water, and homes truly wrecking our health or are we overreacting? Our guest today is Dr. Ailey Cohen rheumatologist and environmental health advocate who says that everyday chemicals we're exposed to are the number one cause of most acute [00:01:00] and chronic health conditions.

She's here promoting her new book *Detoxify*, which really hammers the message that these toxic chemicals are not only all around us, but we shouldn't wait for more research to be done before we act. Given the gravity of her claims and expertise required to properly explore them, I invited microbiologist, immunologist and biotech scientist, Dr. Andrea Love to give her perspective on the matter.

Fair warning, this discussion is probably the most spirited we've had on the podcast thus far, and I certainly didn't expect the dramatic turns it took through several of the segments. It truly highlights how passionate both guests feel about the topic at hand.

Without further ado, please welcome Dr. Ailey Cohen and Dr. Andrea Love to the Checkup podcast.

ANDREA LOVE: I'm Andrea Love. I have a PhD in microbiology and immunology. Um, I specialized previously in academic research in infectious disease immunology, so understanding host response to infection and how. Um, you know, the immune [00:02:00] system mediate symptoms and res resolution of infection.

Um, I now work in life sciences biotech, where I focus on technologies and assays for, um, preclinical translational and clinical research for vaccine development, cancer, immunotherapy, cell and gene therapy... I also do science communication, um, through immunologic.

DR. MIKE: Cool. How about yourself?

AILEY COHEN: Well, that's a tough gig to follow. Thanks for that. Um, so, um, a physician, Dr. Ailey Cohen, I am, uh, trained in internal medicine, then board certified in rheumatology. Went on to do training with the Dr. Andrew Wees program for integrative medicine and became board certified. And all this time...was learning environmental health haphazardly and basically, you know, started to write [00:03:00] textbooks and books on this topic...

DR. MIKE: Got it. And I'm a primary care doctor, so I'm neither an expert in any of these, uh, fields, but I see the struggles that my patients have.

Both in making a decision of what products they should buy, what products they should avoid, what they read on social media. And as we know, there's a lot of misinformation on social media. There's sensationalism, there's fearmongering, and we even see that in our politics these days. So very complicated for the average person to parse through all that data.

So I'm excited that I have both of you here today to sort of get down to the bottom of things and figure out what's what, what we should be looking for. What is a bit too scary that we shouldn't be focusing on. And find that sort of middle ground that we could all agree on...

COHEN: ... On average, you would think that if you are knocking out microbes that actually are balanced on a microbiome, it's all about balance. It's, it's, you know, do we have as many or more non pathologic microbes in these microbiomes, wherever they may be, versus the pathologic?

And when you knock down the everyday good guys, you're allowing the potential risk for the bad pathology, the bad pathogens...the interior of the gut is very susceptible to things like chlorinated drinking water or, you know, ultraprocessed foods. Many pesticides on fruits and vegetables...

DR. MIKE: Mm-hmm. Dr. Love, I saw you having some reactions to..

LOVE: ...These claims, they're based in cherry picking... so like the pesticides that are on foods, the trace levels that are parts per billion, parts per trillion... [00:32:00] on a conventional food product or...claims that children living, living on farms had reduced, you know, rates of asthma or autoimmune disorders or things like that.

The claims about microbiome and what's a good microbiome and what's a bad microbiome are way overstated by people who don't fully understand what the microbiome is, particularly when we talk about gut microbiome...

***CMB:*** So what is known about the impacts of pesticides on the gut microbiome? Dozens of published studies report a link between pesticide exposures and alterations of "normal" gut microorganisms. Many, but not all such studies discuss heightened risk of adverse health outcomes as a result of such impacts on gut microbial communities. It is now widely accepted that microbiome "health" plays critical roles in a person's immune system, autoimmune disease, on a person's mood and behavior, and in hormonal expression, reproduction, and epigenetics.

In both animals and humans, significant microbiome impacts have been reported following even low-level dietary exposures to certain pesticides. Some of the pesticide-induced changes in microbiome composition are linked to adverse health impacts possibly driven by altered microbiome functionality.

Science has confirmed that adverse impacts on microbiome "health" brought about by pesticides are occurring, but is a long way from quantifying such impacts sufficiently to support changes in risk assessment methods and policy, and regulatory decisions. We know enough now about a few pesticide-microbiome connections to warrant efforts to reduce dietary exposure, but not enough to do so comprehensively across all pesticides.

This creates the prospect that regulators might restrict the use of a given pesticide because of evidence of adverse impacts on the human microbiome, only to shift use and exposures to another pesticide that has not been studied, and might actually pose greater risk of disruption in the microbiome. This is a contemporary example of the practical challenges regulators face as new science begins to recognize new risks associated with ***some*** pesticides in ***certain*** circumstances, but not all.

COHEN: ... And instead of spending money on a lot of testing, that is often done, especially in say, functional medicine and integrative world. I think for very, um, you know, reasonable and judicious practitioners, it's best to take some of that money and put it into USDA organic foods, for instance, which we know is the only regulation that we have in the food system.

***CMB:*** The USDA organic standard is the "Only regulation we have..." Not true. Many agricultural inputs, practices, and systems are regulated. The adequacy of such regulations is often questioned, and for good reason (think nitrogen in Iowa drinking water), but regulations do exist.

The Pure Food Act of 1906 also gives the Food and Drug Administration (FDA) authority to regulate the food system.

However, US organic standards and requirements are the only regulations that effectively eliminate exposures to synthetic chemical pesticides in food that account for nearly all pesticide risk to the general public (not including people applying pesticides, or living near recently treated fields). Organic food also reduces exposure to antibiotic residues in food and lowers selection pressure for antibiotic-resistant human pathogens.

DR. MIKE: What's the difference between a USDA organic versus a traditional product?

COHEN: Great question. So, USDA organic began in the 1990s, and it took about a decade to get it into the system as something that actually matters. And it really, basically, the main goal of USDA organic is to keep synthetic chemicals or compounds out of the food system in a way that is reasonably done.

***CMB***: Organic food existed before it became part of a federally regulated industry. The Organic Food Production Act passed 35 years ago. The regulations took a decade to promulgate. The protracted and spirited debates in the 1990s about the goals of organic farming and benefits of organic food, and what needs to be required and accomplished via organic food and farming regulations, and in particular, how to deal with pesticides, have largely slipped out of sight, out of mind. The USDA was faced with conflicting goals that were resolved through a highly transparent process. The USDA created a National Organic Standards Board with representatives from all the relevant constituencies of the organic movement. Finalizing the regulations required reconciling a diversity of suggestions advanced to USDA via what was then a record-breaking number of public comments for a proposed rule.

The organic community needs to do a better job educating the current generation of young farmers, chefs, food industry folks, and political leaders regarding the goals of organic farming, and how the core goals are addressed in current law and regulations. Such understanding is critical to accurately identify what is wrong with current law and regulations, and how to fix both.

COHEN: So it's [00:41:00] not perfect, but is the best we have... it regulates basically thousands of pesticides, particularly pesticides and fertilizer chemicals that are allowed to be part of the food that is USDA [organic] grown.

Um, it also limits, uh, it actually does not allow for any synthetic coloring, any synthetic preservatives like BHA and, um, BHT, um, amongst others. It does not allow, um, I think I said good, uh, food dyes...it doesn't allow for genetically modified ingredients. So the USDA organic designation...is kind of a democratization... [00:42:00] about the food system because it is now accessible to everybody. It is not something that's limited to the rich.

Um, and frozen USDA organics are actually remarkable because you can get 'em anywhere now you can get 'em in any big box store across the us and they have the added value besides not having chemicals in them, a large dose of chemicals. They also have high nutritional value. So they're nutritionally sufficient because they're flash frozen.

Mm-hmm. And that really adds to the health of the gut microbiome, the health, our gut, which really plays into, again, many of these studies showing that the gut is critical to the development of autoimmune and immune disorders.

DR., MIKE: What's the difference? You said like synthetic pesticide? Mm-hmm. Versus a regular chemical organic pesticide. What's the difference between the two?

COHEN: ... when we think about the, first of all, there's over 13,000... [00:43:00] registered pesticides that are used in farming.

> ***CMB***: People sometimes confuse two numbers: the number of registered pesticide products on the market (over 25,000). Widely applied pesticide active ingredients like glyphosate are formulated into a hundred or more “pesticide products”, hence the difference in these two numbers.
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> This distinction is significant and comes up several times in this podcast. Most EPA-required testing is done on pure active ingredients, while most risk to people handling and applying pesticides, and to the environment, are brought about because of applications of formulated products.
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> Formulated products are a mixture of chemicals. The addition of various so-called “inert” ingredients in pesticide formulations often alters – and for the worst – the physical and chemical properties of a formulation, and

its toxicity, environmental fate, exposure levels, and the risks arising from a given application.

Systemic problems with current pesticide risk assessments and regulation will not be fixed until necessary changes are made in law and regulations to focus scientists and regulators on the properties and toxicity of the ***formulations*** people and the environment are actually exposed to.

COHEN: Some of them are also allowed into the food system...but in terms of which ones are allowed to be in the organic food system and which ones are not, it's not perfect. There are complaints amongst certain ones, but it's thousands of chemicals different in terms of what can be allowed.

DR. MIKE: But in terms of impact difference... What changes for a person if I eat an organic pesticide food versus a synthetic pesticide? Food is on a practical level, is anything changing in my body?

COHEN: So first all your, yeah, your blood levels will change. So organophosphate, pesticides can be measured, glyphosate can be measured, which is Roundup. These levels can be measured in human fluids...[00:44:00]

***CMB***: Cohen is correct. Multiple published studies report a huge drop in levels of pesticides in urine collected from people who switch from conventional food, and especially fruit and vegetable products, to mostly organic food. The reduction in exposure to synthetic chemical pesticides, and associated risk from such a switch, is usually 90% or more.

But another foundational point is critical in response to Dr. Mike's question. The pesticides allowed for use on organic farms and ranches are derived from, and contain ***natural*** active ingredients, things humans have evolved with over the eons.

Copper is an example that comes up later in the podcast. Fixed copper compounds ("fixed" as in less water soluble) are regulated as pesticides and are used to manage fungal diseases, algae, and tadpole shrimp. Elemental copper is also an essential human nutrient for which the government has established a Recommended Daily Allowance (RDA). The reasons why copper has a RDA are explained here by the NIH. But too much copper can harm people, the environment, and impair soil health. This is why the USDA Organic Standard places limitations on the use of copper-based pesticides than do not apply nor appear on the labels of copper fungicides sold to conventional farmers.

> The EPA exempts copper from the requirement of a tolerance because the EPA has concluded it is virtually impossible for legal uses of copper fungicides to result in residues high enough to pose human health risks. Indeed, there is ZERO evidence this has ever happened. Still, critics of organic (and Dr. Love in this podcast) cite copper fungicides as among the reasons that organic food is not pesticide free (true). Dr. Love even suggests that the pesticides used by organic farmers may be riskier than the pesticides used on conventional farms (not true).

DR. MIKE: Means something practically so, means something?

COHEN: Well, we don't know who's gonna develop a problem or not, right? But we do know that when they're in your body and they haven't been, your body hasn't been used to these... So there's not only just the gut microbiome interface issue, where you're killing off microbes like you would in a field, right. These are pesticides, but you also have the potential of doing things like, um, molecular mimicry, which is when your body, uh, basically doesn't recognize these compounds entirely [and] fights against them...

DR. MIKE: And that doesn't happen with organic pesticides? Well, it's, it's humans are very, you know, there's many confounders, right? When you're talking about human beings. Mm-hmm. And you [00:45:00] can't isolate just one chemical to one um, expression.

COHEN: ... if we're gonna recommend say, yeah, do this pesticide versus this pesticide, we should have a reason for making that recommendation. Well, the idea is that our bodies are going to have more than a few chemicals in them at any given moment. Mm-hmm. Because your body is a sack of chemicals... I'm talking about this is how we look at this holistically. We don't need these chemicals. They're not great for human existence. They're not great for human health.

> CMB: Many people would disagree with Cohen's assertion "We don't need these chemicals..." It is a very broad statement. While it is true that humans were able to survive as a species before pesticides were invented, and it is possible that alternatives to all pesticides might someday sustain agricultural productivity at or beyond current levels, our current food system would be seriously disrupted if all pesticides were banned overnight. "We...", as in society, need farmers to have effective ways to keep pest losses from getting any greater than they already are (the average globally is between 20% and 30% of potential harvests, lower in most US crops, including some organic ones).

> In the near-term, farmers—including organic farmers—will need some pesticides. In the long-term, harmful synthetic pesticide use could be reduced substantially by adopting Integrated Pest Management (IPM) systems that rely on prevention, cultural practices, and biological control. Organic farmers are mandated to use IPM practices and can use a limited selection of pesticides only if preventive measures and biological, cultural, mechanical, or physical methods are insufficient. Policy and R&D investment patterns will need to focus on non-chemical control strategies before pesticides can be rendered mostly unnecessary.

DR. MIKE: I agree. I I'm just curious specifically for the, the, the reason why is I had, um, the newly appointed FDA commissioner. Mm-hmm... Dr. Marty Macari on the podcast not too long ago. And he said that, uh, or he recommends organic foods to people. And I said, that's interesting why; he said they're pesticide free, which they're not, [00:46:00] 'cause they have organic pesticides. But if we're gonna say organic pesticides are healthier, why are we making that recommend? Like you said, your blood levels go up, but we're not sure what to do with that number. If a patient comes in and has sugar in their blood, that could be totally normal in physiologic sugar, or it could be at a level where we call them pre-diabetic diabetic.

So what's the takeaway?

> ***CMB***: Cohen does not answer the question. There are three major reasons why conventional crops, and especially fruits and vegetables, contain many more residues, and much higher and riskier pesticide residues: (1) conventional farmers often apply a dozen or more synthetic pesticides per crop cycle, and often make multiple applications of several. Some pesticide applications are made relatively close to harvest, resulting in significant residues in or on food as it leaves the farmgate. Some synthetic pesticides are even registered for post-harvest use.
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> While organic farmers sometimes apply a few natural compounds on their fruit and vegetable crops, in most cases they do so much less frequently than nearby farms that are conventionally managed. The toxicity of organically approved pesticides is much lower on average compared to the pesticides applied on nearby conventional farms.
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> Substantial evidence published in peer-reviewed journals show that organic farming typically reduces pesticide dietary risks per unit of food harvested by an order of magnitude or more. The USDA Organic standards requires the review of all pesticides for their impacts on human

> health and the environment—including non-synthetic ones. Toxic botanical pesticides like nicotine, rotenone, and strychnine are banned from organic production. All synthetic pesticides used in organic production and handling are exempt from the requirement of a tolerance because of the absence of significant toxicity and/or dietary exposures. People who claim the pesticides used by organic farmers are as toxic as conventional pesticides, and pose comparable or even higher risks, simply do not know what they are talking about or choose to ignore reality.

COHEN: You're getting into mechanisms. Yeah. So many of these chemicals that have been identified, and this has been the research for the last 25 years in the endocrine disrupting chemical research world, which is very siloed because they've been attacked by American Chemical Council and many of the, obviously the big pharma, big pesticide groups, they are now worldwide in terms of their interaction with their research... [00:47:00] ... So I wanna give an idea when we diminish the dose, that because these endocrine disrupting chemicals work like hormones, they can have large physiologic effects, even at [00:48:00] low doses that previously were not designated as harmful.

Now we have a lot of information showing what's called, um, non-monotonic dose response, great papers on this...

DR. MIKE: ... what's that response?

COHEN: So basically when you think of the dose makes the poison... the more you're exposed to something, the more likely you're gonna have a reaction.

So instead of having this linear [00:49:00] response, you had a U... or an upside down U... You had the same response at the low levels as high... the idea is that the chemicals that are now mimicking human hormones, which have been physiologically conserved through evolution to do very big things with very small amounts. Thyroid hormone, insulin, growth and development, fertility hormones, um, development in utero to develop male or female genitalia, brain changes to, you know, basically turn into a male brain or a female brain.

Um, you know, uh, endocrine sensitive hormones that affect cancers... we now [00:50:00] understand that they can do more than we thought they could...

We don't always get smacked in the face by these chemicals, but we can measure them in blood and urine. And I'm not suggesting people go do this. I say everyone's contaminated until proven otherwise, it's 2025 and we love our

stuff. But the idea is we can start to remove some of these higher yield exposures by, you know, thinking about what we're consuming, thinking of our body as a sponge and a vessel.

> ***CMB***: Cohen saying "...everyone's contaminated until proven otherwise..." is questionable, and could be characterized as fearmongering.
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> A claim like this should, at least, be accompanied by a clear definition, or explanation, of what it means for a person to be "contaminated" with pesticides, and some evidence suggesting that this is, in fact, the case. Dr. Love challenges this and other blanket, broad statement at several points in the podcast.
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> It is true that virtually every contemporary American has pesticides in their bodies from birth to death, but we also have Vitamin C and proteins in our bodies. We don't say that we are "contaminated with Vitamin C or protein" for good reasons. Some of those reasons apply to pesticides as well.

COHEN: When you start to change behaviors, when people give up, you know, conventional foods and diets to incorporate more organic diet, they do have lower levels in their blood and urine where it's actually tested... we can make a, a, a distinct difference.

DR. MIKE: Mm-hmm. I'm still stuck on the why we're recommending the organic chemical [00:52:00] pesticides versus the synthetic ones.

COHEN: I will show you all the studies if you need me to...

LOVE: Maybe I can jump in because, um, because the National Organic Program was adopted in 1990 and it has restrictions on what type of chemicals you're allowed to use, what types of farming tools you're allowed to use.

Um, but it really is nothing more than a marketing ploy. There's actually no, um, criteria for nutrition or safety in the National Organic Program whatsoever. And so the USDA organic certification is pretty much just a label that was lobbied by National Organic Farmers Associations because they wanted an opportunity to legitimize their farming practices, to give the appearance of health.

> ***CMB***: Dr. Love is clearly not a supporter of organic farming. In that short statement, she also displays her ignorance of the organic standards, how

they were set, and their intent. The organic movement was started by those who sought to sustain the health of soil, plants, animals, humans, and the planet. She argues in the podcast that effort to define organic farming standards and practices, and to certify compliance with them, is just a marketing ploy not linked in any meaningful way to public health outcomes. Her statement is false and defamatory.

It is true that the legislative authorization for the USDA to set, codify, and enforce national standards for organic food and farming was triggered in part by the growing market demand for organic food. Congress saw the need for the USDA to establish uniform standards and enforce them because of the growing volume of organic food entering interstate commerce, international trade, and being processed or handled in federally regulated facilities. The organic premium also became an incentive for fraud. The OFPA was passed to promote truth-in-labeling so that consumers would understand what "organic" means, and trust that codified organic standards are followed on the farm and along food supply chains. The law passed with bipartisan support and was signed into law by a Republican president. Since passage in 1990, market research has confirmed that the USDA's "certified organic" label has gained both recognition and trust. It is a label that stands for a different way to grow food and raise animals that is better for the soil, environment, and farm animals, as well as people, farmers, and rural communities.

There is ample evidence that organic food and farming delivers on many of the widely accepted public benefits stemming from organic farming. But as Dr. Love points out, and Dr. Cohen acknowledges, the science and art of organic farming, as currently practiced, is far from perfect, and its impacts on the environment and human health are changing, hard to quantify, and not always positive. But taken as a whole, science has made clear that the benefits are real and meaningful.

Dr. Love has a right to her opinions and is among the most skillful and polished spokespeople that communicates the standard pesticide and biotech industry critiques and talking points on all-things-organic. However, she spreads disinformation throughout the podcast, all of which has been advanced -- and debunked -- in multiple venues.

LOVE: The healthism sheen, right. Ailey made a comment that it was about, you know, making this [organic food] accessible. It's not about having money. You don't need to be rich, but the reality is that [00:53:00] organic products cost

on average 50 to a hundred percent higher than their conventional counterparts, and that's pure profit.

If you actually look at the profit margin of conventional foods versus organic foods, uh, organic foods are 25 to 32% more profitable for the farming organizations. And we're talking big ag, right? Like we hear the phrase big Ag being demonized, like conventional farms a lot, but Stonyfield, um, Applegate, these are huge organic infrastructure.

> ***CMB***: Dr. Love's claim that organic food is 25% to 32% more profitable "for farming organizations" is hard to understand. She seems to be critiquing organic operations that have succeeded in scaling up production and lowering costs. Even that is not clear. "More profitable" compared to what? What data supports this statement? Published data and analyses on actual costs, returns, and profits across various farming operations tells a different story.
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> First, on the demand side, Love is correct that a premium is nearly always charged for an organic food product compared to a similar conventional food product in the same store. However, she overstates the magnitude of the price differential, especially for many whole, fresh fruits, vegetables, and grains. It is worth noting that there are the foods we hope people eat more of (both organic and conventional!).
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> The organic food price premium reflects consumer willingness to pay for enhanced quality attributes in organic food, coupled with other benefits arising from organic farming systems (healthier soil, more pollinators, avoidance of farmworker poisoning episodes, fewer fish and bird kills). The most unambiguous, and arguably the most significant benefit in terms of public health, is markedly reduced pesticide dietary risk from exposure to potentially harmful residues in or on food.
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> She also dismisses and/or does not mention other quality attributes embedded in organic products including lower doctor bills down the road, fewer sick days off work, reduced risk of cancer and other pesticide-related health outcomes, and longer life expectancy. Organic food also often results in more nutrition per ounce and calorie of food consumed.
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> Are the benefits of organic food and farming known and accurately reflected in price premiums? No one knows, and no one person can answer this question for other people. However, there is ample evidence

that conventional food prices do not reflect the full costs arising from the use of pesticides and other toxic substances.

Numerous studies on consumer willingness to pay for organic food use proxies to quantify the perceived benefits. Such studies are highly situation-specific. Willingness to pay premium prices clearly depends on the value people place on the attributes bound up in how food is grown. Baby food and milk are among the most studied, where the most vulnerable members of the population—infants and growing children—are the consumers and parents are making the choice to seek out organic brands. On aggregate, those who buy organic food generally feel the premium is a worthwhile investment in things they care about and value.

Dr. Love believes people have been misled and that there are few if any meaningful benefits stemming from paying more for organic food. Again, she is entitled to her opinion. It is true, however, that scientists and the organic community need to do a better job of quantifying and communicating the benefits of organic agriculture.

DR. LOVE: Organic farming is hundreds of billions of dollars a year.

DR. MIKE: So are you saying that there's no benefit to going [organic]...

LOVE: So, so not only is there no benefit, there's actually a potential detriment. So first of all, organic farming uses tons of pesticides. They're just naturally derived pesticides as opposed to ones that have, and...

***CMB***: Most pesticide-pounds applied on organic farms in the US are horticultural oils and sulfur. Both are applied mostly to protect fruits and vegetables from insects (mostly oils) and fungal plant diseases (sulfur). Both products are used in similar ways, at similar rates on nearby organic versus conventional farms. There are no known dietary risk concerns from such applications on either type of farm.

But when organic farmers are dealing with potentially damaging fungal pathogens, they mostly only apply sulfur or copper fungicides, whereas nearby conventional farmers will apply and rotate synthetic chemical fungicides with natural biopesticides like sulfur, copper, and various microorganism-based biopesticides. Organic farmers also are required to use preventive measures, cultural practices, and biological controls. When prevention-based practices are skillfully integrated in multi-tactic

> systems, organic farmers are able to markedly reduce reliance on pesticides compared to nearby conventional farmers.
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> Horticultural oils and sulfur are applied at much higher rates of active ingredient per acre than synthetic insecticides and fungicides (i.e. 5 pounds per acre per application, and often more), compared to active ingredient rates of less than 0.1 pound/acre and rarely more than 1 pound/acre for synthetic pesticides. This is why the weight of pesticides applied on organic fields is sometimes greater than on nearby conventional farms growing the same crops.

DR. MIKE: ...so what does that mean?

LOVE: I'm gonna tell you. Perfect. So naturally derived pesticides are chemicals that exist somewhere in the ether of nature, meaning they've been identified [00:54:00] existing somewhere on this planet and they have an anti-pest impact, right? So think about. A lot of plants try to deter predators, right? So they produce a lot of noxious things to prevent things from eating them, to prevent fungi from infecting them, and and so on and so forth.

So a lot of the, um, organic pesticides are chemicals that are produced by plants naturally, and they've been isolated, studied, and they're now produced by industrial chemical companies to be used as organic pesticides. Um, so these are merely chemicals that exist somewhere in nature. So, for example, pyrethrins are a class of organic pesticides that are used, or permitted in organic farming.

Um, and a synthetic or a semisynthetic derivative [of] the pyrethroids are approved to for use in conventional farming. Now, pyrethroids are actually more stable in ultraviolet lights, so they don't deteriorate as quickly, which means that a farm only needs to apply them once or [00:55:00] twice in a growing cycle, whereas pyrethrins are very unstable, so they need to be applied repeatedly to have the same pest control effect.

And, you know, farmers have to use pesticides. There's no, there's no way around it. We have 8.1 billion people on this planet. It's not your backyard, affluent garden. Like if we need to feed people when there are food deserts and, you know, malnutrition everywhere, pesticides are essential, right?

> ***CMB***: Dr. Love is correct about differences in the stability and environmental fate of natural, organically approved pyrethrin insecticides, in contrast to the many important synthetic pyrethroid insecticides used on conventional farms. And yes, the synthetic

pyrethroids have advantages as insecticides over natural pyrethrins. She is wrong that all farmers must use pesticides. Many organic farmers producing a diversity of crops manage to get through crop cycles without spraying any pesticides. Organic farmers that need to spray have a limited set of products to choose from; conventional farmers have a much wider array of products and mechanisms of action to choose from, and apply many pesticides routinely, every year.

The increased stability and longevity of synthetic pyrethroids also means that these pesticides are less likely to degrade by the time the food is sold. Natural pyrethrin residues are seldom detected in food. Synthetic pyrethroids are much more common as residues in food. Natural pyrethrin is exempt from tolerance in food by EPA. The EPA has established food tolerances for all synthetic pyrethroids based on the residues expected on food following legally sanctioned applications.

Dr. Love downplays the very significant differences in reliance on pesticides on organic versus conventional farms, and the even more significant differences in the adverse impacts of pesticide use on organic versus conventional farms.

Despite lack of data to quantify all the positive and negative impacts of pest management systems on organic farms versus nearby conventional farms, benefits stemming from organic farming are substantial. Benefits include a range of environmental and public health outcomes. Several studies and meta-analyses support that organic farming systems promote biodiversity, protect non-target species, and enhance wildlife.

The downsides of pest management on organic farms include occasional, catastrophic crop losses; often higher costs for effective biopesticide alternatives; the need for more in-field attention, and management focus and expertise; opportunity costs from the rotation of less profitable crops, cash revenue loss from the planting of beneficial habitat and other conservation practices,  and, dependence on a range of preventive practices that keep pest populations below economic thresholds.

The need for more in-field monitoring data and management attention, coupled with more preventive practices, adds to production costs, sometimes pushes downward attainable yields and crop quality, poses different environmental challenges (e.g., safe disposal of plastic row covers), and hence, can reduce crop profits per acre below what they otherwise could be.

> On many fruit and vegetable farms, the ability to control pests, the costs of pest management systems, and the loss of quality and yield, are the most significant and consequential drivers of differences in profits per acre on organic farms versus nearby conventional farms.
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> In grain and row crop production systems, differences in weed management systems and reliance on herbicides are typically the major driver of differences between organic farms (near-zero use of herbicides) and conventional farms (routine use of several).
>
> Prevention and proactive management all sorts of pests, diseases, and weeds is critical in organic production systems. Organic operations are required to develop an Organic System Plan that anticipates their production and pest challenges. The greatest challenges, and most costly setbacks on organic farms happen despite careful planning and best efforts. For example, I visited an organic farm in Florida that suffered a total loss of a 20-acre block of beautiful organic tomatoes within days of harvest on account of late blight, despite the farmer's yeoman and costly efforts to save the crop.

LOVE: And so we wanna use the fewest amount possible that have the most specificity, the fewest off target effects, and most cost effectiveness, right? Um, so those are actually two related chemicals [pyrethrins and synthetic pyrethroids]. One is natural, one is synthetic. They have very similar impact on their target pests. And of course pesticides have tropism, so an insecticide is not acting on people and herbicide like glyphosate is not acting on people. It humans don't even have the enzyme that glyphosate targets... [00:56:00] So a lot of the organic pesticides, because they're not legally permitted to be tweaked in order to improve the specificity, improve the stability, reduce the off-target effect, they actually are worse for the farmers because they have to use more of it to have the same desired effect.

They're often worse for the environment because they'll target non-target species. So for example, there are certain... insecticides that are used in organic farming to target aphids on soybean crops, but they also kill the natural predators of aphids, the insidious flower bug and the um, Asian lady beetle.

So, now you're killing what would normally kill the aphids on top of maybe killing some of the aphids. Now a synthetic version, or a conventional version of that [pyrethrins] has tweaked specificity, so it's not killing the insidious flower bug, um, but it is killing the aphids.

> ***CMB***: This comparative analysis by Dr. Love does not pass the laugh test. Her statement once again displays her ignorance and has little to do with reality on organic and conventional farms.

LOVE: On top of that, simply because a chemical is natural versus a chemical, being [00:57:00] synthetically altered doesn't mean it's better, safer, less impactful to the environment, more ecologically, less ecologically damaging, healthier.

Um, and in fact, decades of data have studied, um, health impacts from organic consumption versus conventional something. And there's no health benefit, there's no nutritional advantage. A lot of people cherry pick a study where they look at trace levels of certain micronutrients like phosphorus and so on, and that's not necessarily a reflection on organic versus conventional.

> ***CMB***: Love's dismissal of the well-documented health benefits of organic food adheres to core pesticide-industry talking points but not published science. A recent, published review paper describes the range of health benefits now associated with heightened consumption of organic food.
>
> The most consistent benefits in the literature are reduced risk of adverse birth outcomes, lower risk of cancer, decreased impacts on the microbiome, and less frequency and reduced severity of adverse brain and nervous system impacts. Evidence is also growing than lower exposures to some pesticides will lessen the risk of people getting onto, and moving along the metabolic syndrome continuum, including children as young as age four (see this important CHAMACOS paper that warrants heavy weight among those hoping that the MAHA movement will spark constructive change).
>
> Multiple, well-designed trials over the last 30 years have compared the nutritional quality of organic produce versus conventional produce. These studies have documented relatively consistent and meaningful enhancements in both food safety and nutritional quality in organic versus conventional foods.
>
> Among plant food crops, food harvested from organic farms have higher levels of several phytochemicals for two major reasons. First, plants on organic farms must fend largely for themselves in the face of pest pressure. On conventional farms, pesticide use reduces, and often largely

eliminates, pest pressure, and hence plants do not have to invest the energy and nutrients required to trigger an effective immune response.

Especially on organic fruit and vegetable farms, increased phenolics and total antioxidant capacity are consistently elevated 10% to 20% compared to produce harvested on nearby conventional farms on which pesticides have carried most of the load in managing pests.

The second driver of differences in nutrient density and nutritional quality arises from the much higher levels of nitrogen available to push plants to produce higher yields on conventional farms. More nitrogen drives plants to produce larger fruit and vegetables that contain increased levels of sugars and starch, but also as a result, lower concentrations of health-promoting, plant-produced phytonutrients and minerals.

This phenomenon was labeled the “dilution effect” in a seminal, but largely ignored 1981 paper published by Jarrell and Brady in *Advances in Agronomy*. The important and consistent impacts of the dilution effect has been addressed in a few research papers over the last 45 years (e.g., see Davis).

The dilution effect is an important, generic consequence of the heavy focus by plant breeders and farmers on increasing crop yields, as opposed to focus on enhancing crop nutritional quality, or food safety. It is also one of the consequences of modern agricultural systems that rarely receives much attention.

Unfortunately in general and across both plants and animals, successful efforts to increase yields, or production of meat, milk, or eggs per animal, come at the expense of food nutritional quality, and plant and animal health, and hence routine reliance on pesticides and animal drugs on conventionally managed farms and ranches.

The much larger pieces of fruit and vegetables harvested on conventionally managed fields, compared to produce from nearby organic fields, deliver fewer health-promoting plant phytochemicals per gram or ounce consumed, ***and*** per calorie ingested by people. These are some of the important benefits of organic farming that consistently results in enhanced nutritional quality per serving of food, and much lower pesticide and animal drug use and risk. These are also among the benefits that justify, at least to some degree, the price premium charged for organic food.

> We all understand why gasoline with higher octane ratings costs more per gallon. For the same reason, we need to acknowledge and accept the need to pay more per ounce, gram, or serving of nutritionally superior and safer produce, whether grown on a conventional or organic farm.

LOVE: It's [differences in organic vs. conventional food nutrient density] usually the soil or the ecosystem that it actually was growing in, right? Because they'll pull fields in Kansas, or they'll pull fields from Europe, and they'll try to compare the two. And those are not comparable sites, right? You have to compare within a region that has similar soil. So when you actually look at some of the data for organic pesticides versus conventional pesticides, there are a lot that are actually worse.

So for example, um, um, Ailey lives in New Jersey. Blueberry farming is big in New Jersey and in [00:58:00] blueberry farming there are a lot of different mildews and fungi that will kill blueberry plants. Um, there's something called mummy berry. There's something called anthraxnose. And if we wanna preserve the berry crop, you have to treat those berry bushes with fungicides. So a fungicide that is approved for use in New Jersey for organic blueberry farming is copper sulfate. Copper sulfate, ironically, is an inorganic chemical, but I'm not gonna get into that here. But it's approved for organic farming 'cause organic in the context of farming has nothing to do with actual chemistry.

Um, it's a marketing label for them to upcharge consumers and give them the appearance that they're healthier. So this copper sulfate is, has an LD-50, so 50% lethal dose of 300 milligrams per kilogram per body weight, right? So a lower lethal dose means the thing is toxic at a smaller dosage, right? The copper sulfate has to be applied to berry fields up to [00:59:00] six times during a growing season.

> ***CMB***: Toxicology's old adage is that "the dose makes the poison", but so does the timing of an exposure and the tissues exposed. Conflating applications rates with exposure levels is a rookie mistake. While mancozeb is applied on blueberries at a lower rate than copper fungicide, but Dr. Love does not mention that mancozeb is also more chronically toxic than copper-based fungicides. Mancozeb exposures are associated with a range of possible adverse human health outcomes, copper fungicides are not, and indeed, copper is an essential human nutrient for which the government has established a Recommended Daily Allowance.

LOVE: So we're talking spring through, you know, April, may, March through July, sometimes August, depending on the hybrid of berry that we're talking

about. It's gonna be applied at least six times during a growing cycle, and it has to be applied between, um, one and a half to four pounds of copper sulfate per acre has an LD-50 of, um, 300 milligrams per kilogram. A synthetic fungicide that's used in New Jersey blueberry farming is called mancozeb. It has an LD-50 of 8,000 milligrams per kilogram per body weight. So 8,000 versus 300. So a higher LD-50 means it's less toxic because that means an individual can be subjected to that much more of that substance before hitting that toxic threshold.

> ***CMB***: For most pesticides, EPA properly focuses on chronic exposures and risks, and not acute toxicity measured by LD-50s (the Lethal Dose killing 50% of test animals].
>
> Some pesticide proponents, and Dr. Love in this blueberry example, prefer to focus on acute risks, and comparisons of LD-50s, especially in cases where toxicology data show that even relatively low chronic exposures can damage DNA, disrupt the endocrine system, and/or increase risk of chronic diseases. Focusing on LD-50s essentially ignores nearly all the biological mechanisms through which pesticide exposures can impair reproduction, children's development, and raise the risks of chronic disease. In this particular example, mancozeb belongs to a family of fungicides known as ethylenedithiocarbamates (EBDCs). One of the common degradants of mancozeb and other EBDCs is ethylene thiourea (ETU). While IARC downgraded ETU from being a possible carcinogen to unclassified, it remains an on-going health concern as an endocrine disruptor and possible teratogen. Copper sulfate, on the other hand, has no evidence of such adverse chronic health effects.

LOVE: So that's 26.6 times less [acutely] toxic than the organic fungicide that's used on the berry crops down the road on the organic berry farm. On top [01:00:00] of that, Mancozeb, because it's been allowed to be chemically altered using what we know about nature, and what we know about science, to improve the specificity and improve the stability, only needs to be applied two, maybe three times in a growing season.

And it only needs to be applied at about 1.5 to three pounds per acre. So say we look at kind of the ends of application and we say we have a one acre farm. We are either applying mancozeb, or applying copper sulfate. You're going from, you know, anywhere from 26.6 times more toxic on the copper sulfate up to over a hundred fold times, more toxic if you look at the cumulative application of the entire crop season.

And so this notion that synthetic chemicals are automatically bad, that we want to reduce the exposure of them, and we're gonna use some sort of arbitrary blood test to look for conventional pesticides, but we're not gonna actually look at the [01:01:00] organic pesticides that are used, and ironically, because those are less regulated, they actually don't fall under the purview of the USDA pesticide residue report, which is why they're always left off.

> ***CMB***: Dr. Love's efforts to use this blueberry example as a blanket dismissal of the pest management and pesticide-risk benefits stemming from organic farming is, at the very least, unconvincing. Perhaps someday, someone will have the time and resources to fully explain why, but not today in response to this podcast.

LOVE: And that's why the Environmental Working Group never mentions them because they, the USD doesn't monitor them. They [USDA] don't regulate the safe thresholds. Whereas conventional pesticides, 99.9% of the time, every single, um, crop that is sampled, whether it's frozen, fresh, imported grown domestically, are below all of the safety thresholds for whatever pesticide we're using.

> ***CMB***: "Every single, um, crop that is sampled...are below all of the safety thresholds..." is not true . In this statement, Dr. Love is assuming that all residues in a given food are below published tolerances, and are hence "safe". This assumption is incorrect.
>
> Why? Not all tolerances are now set at safe levels. Every year when USDA pesticide residue data are released, dozens of food samples contain residues of pesticides at a level above what the EPA can defend as likely "safe", but below the applicable tolerance.
>
> EPA is supposed to set tolerances in accord with the "reasonable certainty of no harm" standard codified in federal law by the 1996 Food Quality Protection Act. But many tolerances still on the books pose risks in a single serving of food above the chronic dietary risk thresholds set by EPA.
>
> In addition, evidence is mounting that the chronic Reference Doses for several pesticides are now set too high, thereby allowing higher levels of dietary exposure to be regarded as presumably "safe". Glyphosate is an important contemporary example.

> Regulators around the world will almost certainly lower the chronic Reference Dose for glyphosate because of emerging data linking GBH exposures to adverse impacts on reproduction, cancer rates, the microbiome, and possibly other health endpoints. Fortunately, simple changes in the allowed uses of glyphosate-based herbicides, as set forth on product labels, can largely eliminate glyphosate from the food supply.
>
> Additional changes will be needed to lower risks to those applying GBHs or occupationally exposed to them. But the EPA did not even quantify handler and applicator exposures to glyphosate in the still ongoing reregistration review that started in 2007, so there is little to say about applicator exposures and risk, other than both Bayer/Monsanto and the EPA are not concerned about them.

DR. MIKE: Now, this LD-50 that you're talking about, is there a world where this U curve that was mentioned where it's a smaller dose perhaps can be more problematic?

LOVE: Great question. So this non-monotonic dose response is something that has been characterized, but it's not something that is a legitimate concern in the chemicals that Aley is talking about.

Um, and specifically for [01:02:00] some of these that are being touted as endocrine disrupting chemicals, because toxicologists do study the lower limits, right? That's how we have limits of detection on all of these assays. We know what these low limits are, those safety thresholds are assessed. Health impacts are also assessed at the low ends.

Like it's not like we say, oh, we're gonna cut it off at 10 parts per million. We're just gonna ignore everything below that 'cause it's probably not a problem. Because we have the most sensitive analytical chemistry equipment on the planet, we can detect things in parts per trillion, which for context is like one second of time in 31,700 years.

So these, the range of dose exposures are 100% studied.

> ***CMB***: Not true. Few pesticide active ingredients are tested at low doses in chronic feeding studies because EPA regulations require registrants to include a “Maximum Tolerated Dose” (MTD) in chronic feeding studies. MTDs can be very high in the case of pesticides lacking acute toxicity.

> As a result, the dose ranges in many toxicology studies are far above actual levels of human exposure, and do not reflect low-dose adverse impacts stemming from damage to DNA and disruption of normal physiological and metabolic processes.
>
> Plus, essentially no pesticide formulation has been tested at low doses, or indeed ***any dose***, in chronic feeding studies. Such exposures and risks are obviously not "100% studied".

LOVE: Now, the studies that she's [Cohen] referencing are studies where they looked at things like BPA in Petri dishes or in animal models. And none of those have actually been reproduced in humans whatsoever. There's actually no evidence of these sorts of chemicals that are being claimed to have this non-monotonic dose [01:03:00] response in humans.

And it's the exception, not the norm. There are very few outliers of chemicals that might have this effect...[endocrine disruptors are] like epitome of like fear mongering and risk perception gap, which is this belief that is created by people who scare people about synthetic chemicals versus natural chemicals, that cause them to unnecessarily fixate or fear fabricated risks, or risks that don't actually play a role, like singular food ingredients or singular pesticide residues.

But they're not looking at big picture things like preventive health and overall lifestyle habits...

LOVE: ... a central tenant of pseudoscience is that they say, oh well synthetic chemicals "bad", and I'm gonna lump all of these different chemicals...

COHEN: Well you're saying they're all "good".

LOVE: No...None of that actually...

COHEN: Well, you're saying that humans are exposed. it's no big deal. It's not that bad ...

DR. MIKE: Let's try to understand one another. What is the claim?

LOVE: Yeah. Didn't actually say any of that [all chemicals are safe]. So when you're talking about chemicals, you have to parse them out, right?

You can't say, oh, well this herbicide that acts on this plant enzyme is and, and BPA and parabens and you know, whatever other chemical, we're gonna lump

them all into the same category and say, well, we're just gonna add up all these levels.

This is exactly what the Environmental Working Group does when they create their education... EWG is one of the most prolific anti-science organizations on the planet. And they actually published an anti-vaccine study in the early two thousands, which claim that the chemicals and vaccines were causing autism.

> ***CMB***: The following discussion by Dr. Love of the EWG "Dirty Dozen" and "Clean-15" lists warrants close scrutiny, and many corrections and comments follow.
>
> Dr. Love has been a consistent, vocal critic of the Dirty Dozen and Clean-15, and EWG as an organization, for many years. Many times in the past, and again here in this Dr. Mike podcast, she sprinkles a little truth and accurate information over the top of a bushel of spin and unjustified, irrelevant, and/or misleading criticism.
>
> But before going through most of her points and criticisms, readers should be aware that the methodology and data supporting the 2025 EWG Dirty Dozen and Clean-15 lists are on the EWG website, along with the standard EWG appeal to readers to eat more fruits and vegetables, both organic and conventional.
>
> Here is the 2025 Dirty Dozen and Clean-15 landing page and the June 11, 2025 EWG report containing both lists:
> https://www.ewg.org/foodnews/summary.php
>
> At the end of the above primary report on the 2025 lists, EWG provides readers detailed information on the history of the Dirty Dozen, beginning with list #1 in 2004, along with other methodological details and information on pesticide dietary risks. Access these materials via this "More information" live-link list of items on the EWG website.
>
> ### More information
>
> Here are more resources from EWG's Shopper's Guide to Pesticides in Produce:
>
> - **EWG: 30 years of research on pesticides and children's health**
> - **Why does EWG release its Shopper's Guide each year?**
> - **Complete lists of all tested fruits and vegetables**
> - **Shopper's Guide FAQs**
> - **Methodology**

LOVE: Um, but what the EWG does is basically they say, okay, well these strawberries had five residues detected on them at parts per trillion, which each of them individually, because an herbicide is a very different chemical class than an [01:11:00] insecticide or a fungicide, and that means that the way your body interacts with it is gonna be wildly different because they all have different functional groups, they all have different chemical structures.

You can't just say, oh, well I ingested all these chemicals and therefore they're all gonna act synergistically because that's not how chemistry and biochemistry works at all. But what the EWG does is they say, okay, well this one was three parts per trillion. This one was 20 parts per trillion. This one was 40 parts per trillion.

They're all different classes of pesticides, and all of them are a thousand fold lower than the safety threshold, which is already very conservative for these conventional pesticides. But, but because there's three of them, or because there was four of them, we're just gonna say it's "dirty" because there's four different pesticide residues, even though all of them are well below safety thresholds and none of them actually pose a risk to human health whatsoever. We're gonna label that food as "dirty". But this other one [food sample] where there was only one pesticide residue detected, and it was still below the safety threshold, but it was a hundred fold below the safety threshold.

> ***CMB***: Over the years, EWG's ranking of conventionally grown foods has been largely based on the number of residues detected in the samples tested of a particular food, coupled with how many of the residues were known to pose certain types of risk (e.g., cancer, disruption of the nervous system). Hence, the food-by-food rankings reflected frequency of exposure to different pesticides, taking into account whether residues detected were known to pose specific types of risk.
>
> Over the years the EWG methodology has been criticized for not taking residue levels and pesticide toxicity into account. In generating the 2025 Dirty Dozen and Clean 15 rankings, EWG took steps toward doing so by adding two new metrics: (1) the "average total concentration of pesticides found on a single sample", and (2) "Overall toxicity of pesticides on a crop".
>
> The toxicity thresholds for each pesticide used by EWG were based on the EPA-set "No Observable Adverse Effect Level" for chronic dietary

> risks (and in some cases, acute risks in the absence of an EPA-set chronic Reference Dose).
>
> Accordingly, the 2025 Dirty Dozen and Clean 15 lists are primarily determined by a toxicity-adjusted accounting of the number of residues detected in the samples of a given food tested by the USDA. If pressed, even Dr. Love would likely acknowledge some improvement in the methods supporting the Dirty Dozen and Clean 15 lists in 2025

LOVE: Still [01:12:00] safe. Still [conventionally grown food is] totally safe, right? Um, but there was only one of them. That one's gonna be “clean” because there's just one chemical detected on it. That's their tactic when none of those foods are harmful at all whatsoever. And so they scare people, particularly lower income people, away from eating conventional produce, which is cheaper, perfectly nutritious, perfectly safe, and actually more ecologically beneficial because, um, organic farming yields lower food products per acre.

COHEN: So because it's expensive to maintain those [organic] standards...

LOVE: It's actually only 5% more expensive to grow, and it's 32% more profitable. So it's all profit margin.

> ***CMB***: These cost and profit estimates are meaningless without more detail and specificity, and likely do not reflect any actual, real-world examples.

DR. MIKE: Do you disagree with the EWG classification of them lumping in multiple, different chemicals and using that as a way of calling a food “dirty”...'cause I've heard of the term “Dirty Dozen”.

COHEN: Yeah. The Dirty Dozen and Clean 15. And I'm not here to represent an organization. I don't work with them....

DR. MIKE: Oh, you said that they're really great organization...you consulted with them. It's on your website.

COHEN: Well, I consult with them because I did [continuing education] [01:13:00] programs...

DR. MIKE: So you're a paid consultant with the EWG?

COHEN: No, no. Never paid... I'm not gonna nitpick whatever they have on their site. I have no control over it. What I'm saying is, I, their messaging is very clear that when we are exposed to chemicals, that we now know their physiology can be harmful to human health.

It's a great idea to think about not being exposed. The Dirty Dozen, Clean 15 is actually saying out of the conventional fruits and vegetables that are tested every year, by the [USDA's Pesticide Data Program [PDP]...

LOVE: ... they [EWG] use the USDA's reporting [of pesticide residue levels], which they [USDA] admit that the thresholds are all, 99.9% of the thresholds are well below [safety thresholds]...

> ***CMB***: Dr. Love is correct in pointing out that most residues detected by USDA in fruits and vegetables pose low- or very-low risks relative to existing, EPA-set chronic dietary exposure thresholds.
>
> For the numbers and percentages of both low- and high-risk residues in samples of food tested by the USDA in the last ~10 years, including organic versus conventional samples, and imported versus domestically grown samples, see the open-access "Missing the Mark" paper I published in the journal *Regulatory Toxicology and Pharmacology* in 2023.
>
> By "low" in reference to a pesticide residue in a serving of food, I am referring to a residue level well below the maximum concentration the EPA regards as safe in a serving of food consumed by a 4-year old child, and ***not*** the residue level in a serving of food relative to published tolerances.
>
> The pesticide Dietary Risk Index (DRI) system my team has built over the last 30 years, and which I use in my research on pesticide dietary risks, calculates dietary risk levels for any given food-pesticide combination, and compares risks across foods, across pesticides, by production system (conventional versus organic), and over time. It is how I group pesticide residues in "Very Low" to "Very High" risk zones along a pesticide dietary risk continuum.
>
> A residue in a food can be regarded as "low" when present at a level that is far below the maximum concentration regarded by EPA as "safe". A "High" residue is one approaching or exceeding the maximum concentration EPA regards as "safe".

Dr. Love bases many of her statements on the erroneous assertion that all residues below published tolerances are regarded as "safe" by EPA. This is not true.

Every year the USDA's pesticide residue testing program detects levels of some pesticides in an individual sample of a few foods that correspond to risks above the EPA's applicable dietary exposure threshold. ***In the majority of such cases, the residue level reported is below the applicable tolerance, and hence legal, but not necessarily "safe"***.

In testing conducted by USDA in 2016-2020, ~400 individual produce samples contained a residue of a pesticide associated with risks in excess of what EPA regards as "safe" under the standard set forth in the FQPA -- and from just one serving of a single food.

Such residues unequivocally cannot be regarded as "safe" based on existing law and EPA's current dietary risk assessment methods and policies. This is because the residue of a single pesticide in one serving of a food would expose a child to more of the pesticide than the child can "safely" ingest in a day.

Again, ***if tolerances were based on dietary risk levels***, it would be logical to assume such unsafe residue levels in various foods would be present at a level above the applicable tolerance.

But for the vast majority of the ~400 residues posing excessive risks, the residue levels were ***not above applicable tolerances***.

In testing conducted in 2011 through 2020, USDA ***reported ~820 residues higher than applicable tolerances***. About 230 pesticide-food combinations contained residues 5-fold or more greater than published tolerances. Some 80 residues were present at a level 20-fold or more higher than existing tolerances, and 8 residues were 100-fold or more above applicable tolerances.

Such residues must be really risky, presumably, ***if tolerances are based on actual risk levels***. But tolerances are based on the levels of residues remaining on harvested crops after a pesticide is applied at maximum rates, under circumstances likely to result in maximum residue levels.

> So it is not a big surprise that many of the food samples containing residues higher than applicable tolerances pose risks far below the applicable EPA safety threshold
>
> These are little known, but troubling realities about flaws in how we strive to keep pesticide residues in food at or below almost assuredly safe levels. It is why the Congress and public health community need to fix the laws and regulations governing the presence of pesticide residues in food so that: (1) legal tolerances sanction only safe uses of pesticides, and (2) food samples deemed adulterated because of the presence of residues over the applicable tolerance, or because of the absence of a tolerance, are not subject to disposal at a landfill when they actually pose low or very-low dietary risk.
>
> Dr. Love is either unaware of these facts or chose not share them with Dr. Mike's audience. But the bottom line is clear – the fact that most residues detected in fresh produce are below applicable tolerances does not mean all such residues are "safe" based on current EPA dietary risk assessment methods and policy.

LOVE: They [EWG] just pool, they just take the data that was already collected... [on] conventional fruits and [01:14:00] vegetables that are tested randomly throughout the United States. And ... what they mean by "dirty" is the higher residue they call... They use the phrase "contaminated" to scare people from eating...

DR. MIKE: But is it contaminated?

LOVE: It's not contaminated.

COHEN: ... I'm just saying that... the way they designate Dirty Dozen and Clean 15...[is] a way that they've been trying to help out the public in terms of... if you don't have access [to organic food], here are better choices. Typically, the Dirty Dozen are 12 of the produce that basically have risen to the top of having, in general, higher levels of pesticide residues on their surface.

It doesn't talk about the inside of the fruits. It's really on the surface.

> ***CMB***: Cohen's statement that "It [EWG's analysis] doesn't talk about the [residues] inside of fruits..." is incorrect. A significant share of the residues detected by USDA are inside fruits and vegetables, and are present as a result of the application of a "systemic" pesticide.

> Systemic pesticides work by moving into the inside of plants, where they come into contact with either viral or insect pests, and hopefully kill or control them sufficient to avoid significant economic losses.
>
> Neither USDA nor EWG distinguishes between residues inside food or on its surface in reporting and analyzing pesticide residues in or on food.

COHEN: And so most of the Dirty Dozen consists of those fruits and vegetables that have a skin. Mm-hmm. And you think that, you know, it's absorbent, so you're more likely to have some contaminant residue on the skin. Whereas the Clean 15 are [01:15:00] conventional choices that have lower levels, which may be better choices in the event that you don't have access to organic.

DR. MIKE: But if it's below the safety threshold, why do we concern ourselves with this below the safety threshold?

COHEN: Who's designating the safety threshold? ...The European...The FDA. The USDA. The EPA...Let's talk about lead for example...

DR. MIKE: Well, wait, let's finish about the pesticides... [discussion of who is, and should do pesticide safety testing]...

LOVE: We're not talking about the political appointees. We're talking about the scientists and toxicology experts...

COHEN: ...we're talking about the people in the industry... we have to be thinking about what is right for human health... [e.g.] It's third party academic testing. It's not, not within the government necessarily...the idea is that we have never known much about endocrine disrupting chemicals unless it was the studies of third party testing from academic centers using, um, NIH grants and such, right?

You do not require manufacturers in the United States for cosmetics, for food, for food industry chemicals to be tested for safety or toxicity in the products or, or for in humans before they go into the products that they're used. Okay. That's just a given. That's the United States market, right. So the only thing we're left to is things like the USDA organic, and or the data and science that comes from third party testing and academic centers and shared information around the world.

That is how we now know about endocrine disrupting chemicals. We also know about immune disrupting chemicals from some of the work that we now know can extrapolate into the immune system...

LOVE: But I want, I want the answer to the EWG, whether she [Cohen] agrees with that, that assessment of how they assess risk when they're using the USDA pesticides residue report, which as I mentioned doesn't include any of the organic pesticides.

So they're telling people that these are contaminated with conventional pesticides when they're not. They're all well below safety thresholds. And those safety thresholds have a human correction factor added to them....So they take the... no adverse effect level, which is determined by a variety of different types of in vivo and in vitro studies, and then they put a human exposure equivalent to this, which is usually at least a hundred fold to a thousand fold [01:19:00] multiplier to further reduce that threshold.

> ***CMB***: In the above comment, Dr. Love seems to imply that her standard for judging whether a sample of a food is "contaminated" by a pesticide is whether a residue is present at a level above the applicable safety threshold. This is a plausible basis to differentiate between a sample with a low-risk residue versus one with a higher-risk, and presumptively unacceptable residue.

DR. MIKE: So they'll see the risk ... it starts at level a thousand...

LOVE: Yep. And then they're gonna bring it down another thousand fold to make it extra conservative.

> ***CMB***: Dr. Love is not correct in asserting that the EPA applies another 1,000-fold safety factor on top of the standard 100-fold to 1,000-fold safety factor used to translate tox data from experimental animals to humans. I suspect Dr. Love did not mean to say EPA adds "another thousand fold" safety on top of the standard 100-1,000-fold safety factor.
>
> Most chronic dietary exposure thresholds for pesticides are set with a 100-fold safety factor applied to the NOAEL ("No Observable Adverse Effect Level"), not a 1,000-fold safety factor as Dr. Love asserts.
>
> The FQPA calls for up to a 10-fold added safety factor to protect pregnant women, infants, and children. When applied, the total safety factor is usually 1,000, but over the years since passage of the FQPA, the

> EPA has either never applied, reduced, or dropped the FQPA 10-X safety factor on most pesticide active ingredients. Dr. Love is almost certainly aware of this fact, but did not mention it.

LOVE: Okay. So you're saying that's your threshold for safety, which is... extra conservative to account for high risk individuals, right. Say pregnant, pregnant people, young children, elderly, et cetera. Right. And then these pesticide residue reports are saying that, well, 99.9% of all foods tested and all pesticides assessed are below those safety thresholds.

So there's no world in which those conventional produce items are contaminated or "dirty" and that language is intentionally fear mongering...

DR. MIKE: Well, let's not get to intentions. I'm curious..

LOVE: Well, when it comes to the EWG, it's intentional because their donors are large scale organic farms.

> ***CMB***: "Large scale organic farms" have never contributed even a small percentage of EWG annual expenditures, nor have organic food companies.
>
> Almost all EWG funding for its pesticide work comes from individual donations and foundations.

DR. MIKE: But I mean, just for us to understand here conceptually what's happening...you, you've described this concept by which you decide, uh, you've come to the conclusion that they're safe... Even though they're called contaminated. Do you [01:20:00] agree with that?

COHEN: ... I can't say that everything is safe or not safe. They should be identified by the chemicals, which we now know there's over a thousand... What I want people to think about is there are some things that we now know to be true about these chemicals that can be harmful to human health. We know that from epidemiologic studies... for instance, children that are exposed to phthalates... There's the CHAMACOS studies, for instance... a really interesting [pesticides-birth] cohort out of California.

They followed these mother and children pairs [01:21:00] for literally, I think 25 or 30 years now. So just like NHANES data that physicians need to rely on...

DR. MIKE: So what did those studies show?

COHEN: That ... the exposure to, to many of these chemicals has been on the rise. We're now expanding the list of chemicals that are being tested every two years because we have such a growth in chemistry in our environment...

DR. MIKE: ...hold on. You have to focus on a topic... When we talk about pesticides, we're talking about pesticides being unhealthy. Synthetic ones. And then I ask you a question like, epidemiologically, what happens if someone consumes this pesticide versus organic pesticide? And you say “There's studies” and then we move on to studies about heavy metals.

COHEN: ...The point is, is that human beings [01:23:00] as individuals are exposed to many chemicals over a lifetime. So it's, it's very hard to study humans individually. Sure. That's a given. Right. Of course... [linking a specific exposure to specific disease] is a very difficult thing to do because we are exposed by different things every day.

And it's not just absolutely from food, it's from drinking water, it's from cosmetics and personal care products. It's from feminine care products. Right? Sure...

> ***CMB***: Cohen could have summarized the growing body of published epidemiology results linking real-world pesticide exposures to preterm delivery and low birth weight, autism and ADHD, neural decline, cancer, and aspects of metabolic syndrome.
>
> Also important -- many high-quality studies have linked contemporary pesticide exposure levels to markers linked to DNA damage and/or epigenetic changes clearly associated with the promotion of disease processes. Other studies report evidence of pesticide-induced DNA damage, or adverse metabolic or microbiome impacts, undermining the efficacy of an individual’s immune-system response when aberrant cell growth starts to proliferate, or in the face of viral or bacterial infections.
>
> All epi studies, however, have to contend with a myriad of confounding factors that may also be contributing to whatever adverse health outcomes are being investigated. Epi research rarely delivers crystal clear associations, but is steadily connecting the dots between pesticide use and reproductive problems and disease outcomes.
>
> The overall message from epi research on pesticides in the last decade is that reducing the use of high-risk pesticides makes a lot of sense if the goal is to advance public health in America.

DR. MIKE: So I'm curious how we get from there, because there's a lot of things that are associated with..

COHEN: Yeah. How strong is that association? For example, we don't need a randomized controlled study to know that smoking is harmful because the association is so powerful... And that is really the motive here, is to really get people to think.

DR. MIKE: So that's interesting. Dr. Love, I think this is a good time for us to talk about it because I remember I did a, a short on black plastics. There was a big article that came out... I made a short about it. A lot of people made a short about it, but you were very outspoken about it. Is this precautionary measure that's being recommended not something you vibe with? And if so, why not?

LOVE: ... the precautionary principle is a, an approach [01:26:00] that certain organizations and political lobbyists or, you know, I mean, you see it in science as well, but basically it is kind of the difference between hazard and risk assessment... it's asking is there some grain of possibility that something could be dangerous?...

DR. MIKE: Is this like a qualitative versus quantitative?

LOVE: Exactly. Okay.

> ***CMB***: Dr. Love mischaracterizes and dismisses the precautionary principle. The precautionary principle is a way to deal with uncertainty when an activity is likely to harm human health or the environment. The proponent of an activity—in this case pesticide registrants—are required to demonstrate the absence of significant risks. The precautionary principle also takes a more conservative approach in managing risks in cases where adverse impacts are irreversible.
>
> At its core in the present context, the precautionary principle is about how much qualitative and quantitative data should be available, and properly analyzed, before the EPA approves the use of a new pesticide, or allows continued use of an already registered product.
>
> Dr. Love’s attempt to equate the precautionary principle with the differences between hazard assessment (how toxic a pesticide is) versus risk assessment (levels of exposure relative to hopefully safe levels) is misguided, incorrect, and not helpful.

LOVE: So the analogy is a shark in the water, right? A shark in a water, in the water in the ocean, and a shark attack is a [01:27:00] hazard. But if you're standing on the beach, there is zero risk that that hazard is gonna pose any harm to you. It's only once you're physically swimming in the water that now that hazard, the shark and the potential attack from it becomes a risk.

Mm-hmm. And even within that, there's. Nuance, right? How close are you swimming to that shark? How long are you in the water with that shark? What species of shark is it is in the depressive species... So precautionary principle, essentially co-ops, the hazard approach, and it says, well, if there's any hypothetical situation in which this exposure to this thing could be harmful, then we must try to avoid it at all costs.

But not only is that not realistic, it's not practical, and it's also very selective, right? The precautionary principle is often applied by organizations like the EWG, and they use it to apply to conventional pesticides, but they ignore the potential risks of all the organic [01:28:00] pesticides that are used like copper sulfate and all of these other substances that are used at much higher quantities than the conventional counterparts.

> ***CMB***: Love returns here to the "potential risks of all the organic pesticides...", risks that are extremely low for reasons already discussed, especially compared to the actual risks arising from the routine use of some synthetic chemical pesticides. She also ignores that the pesticides used in organic production have a long history of use and have been subject to greater scrutiny through the USDA Organic rulemaking process.
>
> Trying to stretch reality to support this point is beyond even Dr. Love's considerable communication skills and creative cherry picking of data, but you cannot fault Dr. Love for lack of effort or creativity (e.g., read on).

LOVE: And they [EWG] don't ever use the precautionary principle on those [pesticides approved for use on organic farms], right? And so when they [EWG] create these lists and they're scaring people away from conventional produce, well, they mislead people to believe that organic foods are pesticide free. In fact, if you look at survey-based studies with dieticians conducting the research, over 95% of people say that they...choose organic food even though it's double the price because they believe to it to be pesticide free, but it's not.

And that language is specifically done by organizations like the Environmental Working Group to scare people from conventional foods. And so the precautionary principle is not a viable path when you're a human... Because then you wouldn't drive a car, which has thousands of fold times higher risk than the parts per trillion of, you know, some [01:29:00] sort of pesticide, you know, malathion that might be on a food item, right?

Or, you know, going to the movie theater or mowing your lawn. All of these things have risk, right? So if you were to apply the precautionary principle, then you would be sitting paralyzed in a box because you wouldn't be able to do anything. The reality is you have to take a realistic risk-based approach to your life, and that's really where this risk perception gap comes into play, because this type of rhetoric scares people about things that are not the big picture, right? These tiny trace residues of chemicals that no one's saying that they're good.

No one's saying to drink, you know, a cup of pesticide.

> ***CMB***: Actually, Dr. Love's assertion that "No one's saying to drink... a cup of pesticide" is not true. Multiple people with non-Hodgkin lymphoma have sued Bayer/Monsanto for failure to warn about and mitigate the cancer risk accompanying exposures to Roundup. Many of these plaintiffs describe in their depositions being told something like "Roundup is safe enough to drink". Monsanto was well aware that such assurances were being made by people selling, promoting, or defending Roundup, yet did next to nothing to stop this dangerous myth from becoming common and accepted knowledge among many farmers and landscapers.
>
> This is one of the reasons some juries have awarded plaintiffs in the Roundup-NHL litigation large punitive damage awards. By law, such awards are supposed to punish defendants for egregious violations of law and/or dangerous and unethical business practices, like failing to inform people that Roundup is actually not safe enough to drink because it might damage a person's DNA, and increase the risk of cancer and other bad health outcomes.

LOVE: But the flip side or the flip argument is, well, these are bad, therefore you should eat these other pesticide, you know, these other foods. That's not the solution.

On top of that, none of the food products are doused with pesticides, right? [01:30:00] Pesticides are used at very specific parts of a growing cycle, and they degrade. They, you know, deteriorate. They're not, nobody's like spraying, finished produce with pesticides. And so these sorts of fixations are not actually looking at things that pose a real risk to health.

***CMB***: The above five lines share a lot of misinformation.

Yes, foods are not "doused with pesticides" in most cases. An exception occurs in potato processing plants. Chlorpropham is a plant growth regulator that is sprayed directly onto fresh potatoes to inhibit sprouting right before the spuds are packed into the bag consumers will select at a grocery store.

Whether this constitutes "dousing" is subject to debate. Orthophenyl phenol (OPP) is a fungicide that is impregnated in waxes used as fruit coatings. Various fungicides, such as captan, are still used in post-harvest wash water for fruits and vegetables. The fact that some fresh fruit and vegetables in processing plants go through a liquid wash containing fungicides to retard spoilage could be regarded as "dousing" by some people.

And by the way, in 2023 testing by the USDA's Pesticide Data Program, 90% of 650 samples of potatoes contained chlorpropham at an ***average*** residue level of over 3.2 parts per million. These data points make potatoes in 2023 the food tested by USDA that contained the highest average level of a pesticide residue, earning it number 12 on the EWG's Dirty Dozen list.

Potatoes did not rank higher under the EWG methodology because in 2023, USDA reported only an average of 1.9 residues per sample of domestically grown potatoes (a much lower average than most fruits and veggies). Plus, no other pesticide detected in potatoes accounted for appreciable risk based on the combination of the pesticide's residue level and toxicity.

In addition and based on EPA dietary risk assessment policies, chlorpropham on some potato samples posed extremely high risks well above what the EPA regards as "safe" under the FQPA. As a nation, we must hope that the EPA has set the chronic Reference Dose for chlorpropham at a level that indeed is over-protective and, dare I speak

the word, precautionary, because current risks are far too high in some of the potatoes consumed by the American public.

Back to Dr. Love's commentary. Yes, all pesticides degrade, but some do so very slowly and can "contaminate" food, or be present in food, a decade or more after they were sprayed on a field. Some pesticide formulations contain forever-chemicals as "inert" ingredients. Dr. Love stretches this legitimate point way beyond the breaking point.

Yes, most pesticides are applied before planting or during the growing cycle, but some are applied soon before harvest, or at some stage after harvest. Some fungicides can be applied to crops while workers are in the field harvesting. The practice causes occupational exposure, as well as higher levels of residues on the crop at retail. Dr. Love decided not to paint the whole picture during the Dr. Mike podcast. But late season applications, and pesticide use in packing houses and storage, are key and common reasons why some pesticide uses sometimes "...pose a real risk to health".

DR. MIKE: ... I'm a professional boxer. Most people will say, are you nuts? That's one of the riskiest things you can do. And they're right. 'cause the risk of that is immense. But I've [01:31:00] accepted those risks and I've understood those risks. Yeah. So I perceive that risk as acceptable to me.

Isn't it fair if someone says, I wanna remove as many chemicals and be sort of in this precautionary principle. Isn't that a reasonable approach or you don't find that to be the case?

LOVE: So if that is feasible in your lifestyle, but the solution is not buying organic because those are still covered in chemicals, right?

***CMB***: No, organic food is not "covered in chemicals", and indeed the vast majority of organic samples tested contains no detectable residues. When food labeled as "Organic" tests positive for levels of chemicals comparable to those found in conventionally grown crops, that is evidence of fraud or negligence, and such food cannot be sold, or regarded, as organic.

And "no", most conventionally grown food is also not "covered in chemicals". But most samples of conventionally grown fresh produce tested each year does contain multiple residues. On average in recent

> years, there have been three or more residues detected in leafy greens and soft-skinned produce.

LOVE: Like this, this is the false dichotomy, right? It's a fixation or a demonization of synthetic things over natural things without context... If you take vitamin C and you extract it from an orange or a green pepper, 'cause they have lots of vitamin C too... that vitamin C is going to be chemically identical to vitamin C that [01:32:00] is synthesized entirely in a laboratory. Your body does not care whether it came from a natural source or whether it was synthesized

COHEN: ..but it's required by the body to have vitamin C. It's not required to have glyphosate in your body....

LOVE: Not glyphosate is not in the body in any measurable amount.

> ***CMB***: Not true, glyphosate is present at measurable levels in the body of most Americans on most days. This is no longer debatable. The public health impacts remain hard to quantify and are clearly debatable.

COHEN: Well, it gets into the body from the food we eat...

LOVE: ... and it's in parts per trillion. In parts per trillion. I wanna do a little tutorial on glyphosate because it's used as the poster child.

Glyphosate is an herbicide and it acts on an enzyme called ESPS in plants. It is an enzyme that is used to synthesize specific amino acids that a plant needs because a plant photosynthesizes, right, it's not eating foods. So it needs to make its own amino acids so that it can grow and have structure. So those amino acids are used to create structural proteins for a plant... so let me be clear... Humans do not have this enzyme. Other animals do not have this enzyme. Insects don't have this enzyme. It is specific to plants because they're photosynthetic organisms. [01:33:00] Glyphosate binds to this enzyme and it prevents the production of these amino acids.

As a result, the plant wilts because it doesn't have these structural proteins and it dies. So it's used as a broad spectrum herbicide. It replaced other herbicides that were not broad spectrum, that targeted grasses or targeted broadleaf. And those herbicides were actually way worse for us, for our health, for the environment, for farmers who actually are the ones that are gonna be exposed to any of these things in a measurable amount.

So glyphosate is an herbicide and we've been able, or scientists, agricultural scientists, were able to take a different version of the enzyme that's in bacteria that is not impacted by glyphosate, and they put it in six different plant species that we grow in the US. That enzyme isn't impacted. So those plants that have the bacterial version, they can grow in the presence of glyphosate, while the weeds that would strangle those crops that are [01:34:00] essential to produce food can still grow...

Other herbicides like metalochlor or alachlor, which were several orders, magnitude higher toxicity than glyphosate. Glyphosate is much more safe. It's actually safer than the organic herbicides that are used in organic farming. Clove oil called eugenol, and 20% acetic acid. Those are twice as toxic as glyphosate...

> ***CMB***: Dr. Love's comparison of glyphosate risks to the few herbicides approved for use on organic farms, in the hope of exonerating GMO crops and today's excessive reliance on glyphosate-based herbicides, is ridiculous.

COHEN: But glyphosate is paired to genetically modified seed...it just needs multiple sprays... But what ended up happening after, you know, decades of now studying this, is that it was requiring more and more glyphosate spraying, um, because it [weeds] was becoming resistant.

So just like antibiotics become resistant, when they're exposed to, um, you know, when you're exposed to more and more of them, you become resistant...

LOVE: Well, it's saving farmers from having to use other herbicides that are worse...

DR. MIKE: What's the alternative?

LOVE: ... I wanna finish my thought about, about the glyphosate, because, because she brought it up and she opened the door, and I wanna address this misinformation that has been going on for 30, 50 years.

DR. MIKE: But what, what is the glyphosate misinformation?

LOVE: Oh, so the claims that glyphosate and GMOs are harmful, that it causes leaky gut, that it causes celiac disease, that it's causing cancer. I mean, glyphosate is the poster child for demonization of both conventional farming

and GMOs writ large, and usually by people who don't actually understand chemistry [01:37:00] or genetic engineering.

> ***CMB***: There are sound reasons for all the attention glyphosate and GMO crops has received. Among them is that most people on the planet now have glyphosate in their bodies almost every day. Since around 2005, glyphosate has become by far the most widely and heavily used pesticide in history, and by a factor of around three. A growing volume of high-quality, published studies link exposures to glyphosate-based herbicides to adverse health and reproductive outcomes.

DR. MIKE: We'll, we'll get right back to it. Do you agree with that description, that it's been blamed for all those things?

COHEN: Uh, I, I believe there's science behind what I'm saying in terms of being harmful...[Re glyphosate risks] there's plenty of information to look this up, like the IARC, the International Agency for Research on Cancer.

DR. MIKE: So this is, this is something that I actually spent some time looking into because I know that WHO and the IARC came to very different [01:38:00] conclusions when it comes to yes, their stances on whether or not...there is, uh, a cancer outcome [with glyphosate]... And they [IARC and EPA] came to different stances... my understanding is that the...EPA was looking at a different endpoint than the WHO/IARC. The EPA was not taking into consideration, uh, the multitude of chemicals that were used in addition to the glyphosate. So they [EPA] weren't using [testing] a mixture. They also were not looking at... how people get the chemical into their body as opposed to workers being exposed to it... Is that the correct understanding?

LOVE: No, it's not... So this compound is, as I mentioned, [01:39:00] they put a bacterial version of this enzyme into six different crop species. It's [the crops are] not impacted. There is an emergence of certain weeds that have developed resistance to glyphosate, as would happen to any chemical. It's not unique to glyphosate. This is not causing harm. It's also not leading to extraordinary excess use of glyphosate. In fact, the majority of excess use is by residential homeowners because they over apply glyphosate to control..

COHEN: ..which is banned now...

LOVE: It's not, it's not...it is objectively not banned for residential use...

DR. MIKE: We gotta Google this. This feels like it would be easy to Google ...

LOVE: ...the European Commission re, re-upped glyphosate's registration until 2033...I wanna finish. So glyphosate is more [01:40:00] cost effective, allows farmers to use safer herbicides in order to control weeds. It's only used at a specific growing cycle, and when people might be exposed to it, it would be on like a soy based product, usually something that had soy oil, or so on.

> ***CMB***: Again, Dr. Love mixes some accurate information into a lot of spin and factually incorrect information, but sorting it all out is "beyond the scope" of this critique of a Dr. Mike podcast.
>
> Most of the points made in the last few minutes of this 2 hour, 40 minute podcast were made and discussed earlier. Addressing the important regulatory, risk, and science issues raised in these last few minutes would require a deep dive into multiple weed patches. No doubt opportunities will arise to explore these issues in the future, since there is zero chance the scientific and public policy debates around glyphosate and GMOs are going away any time soon.
>
> But for now, read on and see if you agree with Dr. Mike's final judgement.

And the levels that people are exposed to that might be in these products, they're detected by urine, right? So urine is a waste product, which means that your body is excreting it like it's supposed to. And so they're finding things like 390 to 400 parts per trillion of glyphosate in urine samples. What ... people ... leave out is that... people who said that they eat organic food [have] ... the [same] levels...

So this is not uniquely because of conventional foods versus organic foods, and there's also no health impact of these levels because one, your body literally does not have this enzyme. There's [01:41:00] no plausible mechanism of action, especially at those levels...

Now, in the context of glyphosate, the president of the IARC, or at least the president at the time, a gentleman named Christopher Wilde, he actually omitted the largest epidemiological longitudinal study of farm workers in glyphosate exposure. 55,000 farm workers and over [01:42:00] 12,000 of their spouses tracked them for several decades. It's called the Agricultural Health Study. And they were looking at adverse health outcomes as a, as a result of being exposed to glyphosate for years as farm workers. And there was no relationship to glyphosate exposure and cancer outcomes.

This is why over 20 different scientific expert agencies around the world, this is not just EPA, this is European Food Safety Authority, health Canada, New Zealand, and Australian Food Safety Agency, Japan Health Safety Agency, France. Brazil, France, Germany, et cetera, European Commission. They have all definitively stated and repeatedly definitively state that glyphosate poses no risk to human health. Whether we're talking about farm workers who are exposed to higher rates of it, or trace, inconsequential exposures through food consumption... [01:43:00]

Glyphosate is probably one of the most studied chemistries on the planet because of misinformation from organizations like the EWG, like Moms Across America and other agencies that kind of paint themselves as these champions of health, but in reality are actually undermining 50 years of data.

And if you talk to farmers, this threat to their livelihood and also the threat to their safety 'cause they're the ones that are gonna have to switch to a worse herbicide if glyphosate gets banned. It's also gonna lead to billions of dollars in food cost, which is gonna be transferred to consumers.

Now, when we talk about genetic engineering, glyphosate frequently gets conflated with GMOs... But glyphosate and GMOs are not one and the same. We use genetic engineering for countless things... but when we think about genetic engineering, the same science that's used to create GMO crops, it's the same science that we used to create cell therapies for cancer... GMOs have actually reduced the amount of pesticides that we've been able to use collectively over the last 20 years. And it enables farmers to increase food yields because these sort of scientific tools are innovation that improve our health.

DR. MIKE: But we know that, but you're not against GMOs. Right?

COHEN: ... genetically [01:46:00] modified engineering in and of itself as a concept is quite remarkable... it's taking...genes from a  living organism and putting 'em into another living organism and putting it in a code that actually transforms that genetic [trait] for generations to follow...

DR. MIKE: So why do you [Cohen] have a problem with manmade chemical?

COHEN: Okay. There are people that prioritize perhaps getting their hair done versus getting a gym membership... My point is, is that I think people should be able to have the information to choose what they wanna use.

DR. MIKE: Got it. Healthier... I think that's the only real disagreement here. Yeah. Um, and my question is, uh, to you, Dr. Love... Is there a potential risk that we're not accounting for because of the length of exposure as opposed to the, the latency?

LOVE: ... it's a great question and it's a, it's a reason why there's a difference between a clinician and scientist, right? Scientists are the ones that conduct scientific studies and they ask all these questions, right?

That's why we look at, uh, or toxicologists, look at both chronic [02:02:00] and acute exposures when also setting all of these safety thresholds. So a chronic exposure assumes an exposure... every single day for the course of a human life. So all of these pesticides, any regulated chemical, and again, that excludes organic pesticides because they, uh, don't fall under the regulation...

DR. MIKE: ... I think my, like landscapers would send that [Material Safety Data Sheet on a pesticide] over before they [s[rayed a pesticide]...

COHEN: And so at the very top, you see an active ingredient that's 0.005% and you're like, oh, that's so [02:05:00] little. That's nothing. I don't even know the name of that compound... Then you look at the very bottom and you see inactive ingredients and it's basically 99.999 of what's left of that, of that spray.

Mm-hmm. And it's proprietary. So what I think we're missing here is... [what's actually in a formulated pesticide] ...

DR. MIKE: ... it's [the pesticide formulation] a secret... A private blend secret...there's proprietary blend.

COHEN: ... what we know about pesticides and the agricultural community is that they [pesticide manufacturers and the EPA] don't have to release all of the science to the public. That's a fact... Because there's no requirements to actually reveal the entire...constitution [chemical formulation] of those products 'cause of the proprietary blend... And I think that has to be weighed in here.

DR. MIKE: So in the [02:06:00] situation that Dr. Love is describing...where she's saying that the chronic amounts are tested, the doses are tested [do] you disagree that that exists?

COHEN: ...I disagree that we are being made aware of all of the science...

DR. MIKE: ... but she's [Love] saying that they [the studies] exist...where is this testing?

COHEN: Actually they're not. Well, where is the testing done within all of the toxicology?.. Where do people get the information that these, these levels are being tested at? Parts per million parts. Per trillion parts per, you mentioned the chronic, yeah. Tell me where that material is.

LOVE: All of the toxicology, regulatory agencies conduct all of these data... Now these materials [study results] are all available. You have to contact the regulatory agency. The issue becomes when there's this mentality that, well, we should have free access to this because what's gonna ... end up?...

DR. MIKE: ...Why wouldn't you want people to know that they...

LOVE: ... because only 28% of Americans are scientifically literate.

COHEN: That is ridiculous. You're saying they're too dumb to care what goes in their bodies...

LOVE:  I'm saying that because they have misunderstanding about chemistry and they've fallen for rhetoric.

COHEN: That’s for you to say, they have a misunderstanding of chemistry... humans should have a right to know what they're putting in their body.

LOVE: You wrote a book. You wrote a book that's based on avoiding synthetic chemicals...

COHEN: ... 'cause we don't know what’s in the pesticides... So I just want people to think not just about chemicals. But how do we fix our lifestyle to be back more like, you know, anthropologic, you know, early man, right. Or woman, how do we exercise? How do we move?... we are living longer, but we are also living pretty sick. We have, on average, six out of 10 people have chronic health conditions in this country.

DR. MIKE: Well that's why I think a good point for us to end on is to talk about the things we agree upon... exercise [is important]... decreasing of processed foods, getting more fiber in our diet...

LOVE: Everything has chemicals... Eating mostly organic foods and buying chemical free consumer products can be expensive...

DR. MIKE: [02:38:00] ... thank you both for your time. Appreciate it. And, uh, where can people follow you on social media?

COHEN: So, uh, under <thesmarthuman.com> is my website. I have courses, I have a bunch of stuff there...

DR. MIKE: Cool. How about yourself, Dr. Love?

LOVE: Um, my website is immunologic.org and my social handle is at Dr. Andrea Love.

DR. MIKE: Cool. Thank you. Ah, this was a tough one to moderate for sure. A lot of claims, a lot of terms, and definitely some drama after sitting through the discussion and then re-listening to it. I think the main issue I have with the entire detoxifying stance is that it often skips logical steps, which are really important.

For example, we don't have quality evidence proving that organic food is healthier yet Dr. Cohen throughout says that if we wanna be precautionary, we [02:39:00] should avoid conventional produce. Well, to be precautionary, you should do something that's proven to be safer and organic is not necessarily proven to be safer, so that idea doesn't quite come together.

Ultimately, while I agree making some simple swaps like getting rid of single use plastic, especially in the kitchen and washing your produce, could be reasonable, the many steps recommended throughout the book go too far for what we actually know about environmental chemicals, and therefore, in my opinion, it's bordering on fearmongering. I wanna thank both Dr. Cohen and Dr. Love for the spirited and nearly three hour discussion.