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CHILDREN, PESTICIDES, AND FOOD

Steven A. Kolmes*

My talk will focus on pesticide impacts on children and their special vulnerabilities. There is a report from the Environmental Working Group (EWG) that is probably the beginning of people paying very close attention to the issues of pesticides and children. If you go to the EWG website, you can read this report and a lot of other reports on human health. The report is called *Body Burden: The Pollution in Newborns.* Body Burden is an expression that means the burden of toxins that we all carry inside ourselves. This was a study done in 2004. No one had ever done a study of this scale before because it was extremely expensive. The researchers obtained consent from ten expectant mothers that at birth they would extract some blood from the umbilical cord of the newborn. This is blood that was in the baby’s circulation. They wanted to know at the moment of birth, to what extent we arrive with a burden of toxins from having gone through our gestation in this society. They tested for 413 different chemicals, which is why this study was very expensive. These were all non-standard tests. They were a little over 4,000 tests and they were spending a great deal of money per test for an analytical lab to do these difficult analyses. It was a massive commitment from this NGO to get this information. They looked for pesticides, flame retardants, grease proofings, and some other things.

What they found was, of the ten newborns, they averaged 200 chemicals in each baby out of the 413 tested. They picked the 413 as ones they thought they might detect. You need to realize that, in this country, there are roughly 75,000 industrial chemicals in use. The vast majority of these have never been tested for their impact on human health. When the Toxic Substance Control Act was passed in the 1970s, industry insisted that the 50,000 or so chemicals in current use be grandfathered in. Those chemicals were all grandfathered in as usable until it could be determined that they were dangerous later. Most of them have simply never been tested. When you look

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at EWG testing 413 out of about 75,000, this is a small sample of the chemicals they might have tested. They found 287 chemicals total in the babies. One hundred and eighty of them are carcinogens; 217 are neurotoxic; 208 cause birth defects. Those don’t add up to 287 because many chemicals have two or three of these effects. This was a shock to the whole environmental community, realizing how many of these toxins were already present at birth.

**Man 1:** I am a special education director. Back in the ‘90s we were looking at children with dyslexia, which is an illness that causes reading difficulties and some behavioral problems. And they found in their blood evidence that contaminants had been accumulated long before they ever got to school.

**SK:** There certainly has been much earlier work done, especially on lead. Lead has been known as a neurotoxin for a long time.

How do infants end up with all these chemicals in them? Before birth, they are passed through the umbilical cord; after birth, through breastfeeding. How much through the umbilical cord? At four months gestation, it’s seventy-five quarts of blood a day that pass through the umbilical cord. That’s a lot of exchange. At nine months, it’s three hundred quarts a day. There used to be a myth that the placenta was somehow a filter and it would remove toxins that were in circulation in Mom. That was simply wishful thinking. Most of what is in Mom’s circulation will very happily pass through into the infant’s circulation because that’s what the placenta is designed to do. It’s designed to pass things from Mom into the baby.

After birth, there are other reasons why infants continue to accumulate toxins. One is their hand-to-mouth behavior. They stick anything in their mouth. They stick their fingers up their nose. They stick their toys in their mouth. They stick their fingers in their friend’s mouth. It’s normal exploratory behavior, sensory-motor experimentation. But it provides a direct route through oral ingestion for anything that happens to be in their environment. Moreover, the most contaminated part of every room is the bottom six inches. Sitting in this room right now, you are in a much less toxic environment than a baby crawling on a floor. People bring things into the room on their shoes. Leaving your shoes at the outer door of your house is actually very smart. Toxic materials come in as dust, and where are they going to settle? They settle on the floor. Infants are living, as they crawl, in the most contaminated zone in the house, and the rest of us are walking around above much of the contamination. That’s the second problem.
Third, our foods are not as safe as we would like to think they are. It does not make sense to fight the regulators over the laws; they are just enforcing laws. But our environmental laws in this country are actually much weaker than what most Americans would offhand guess. I will give you a couple of examples. I have a couple of two-minute video clips to show you.

At first, we will look at apple juice. It turns out that a lot of the foods that children love are the most heavily pesticide-laden foods. As fate would have it, children love foods that are sweet such as apples and peaches and pears, as well as rice and things like that. Brussels sprouts don’t tend to have a heavy pesticide residue on them. Low pesticide loads on brussels sprouts have nothing to do with children. I know that from my own children for sure. We will watch a short video from Consumer Reports on arsenic.²

Zoe Hamilton limits how much juice she gives her daughters because she is concerned about the empty calories. But there are other serious reasons for concern. Consumer Reports tested twenty-eight apple juices and three grape juices purchased in the New York metropolitan area. Of the twenty-eight samples analyzed, 10 percent had arsenic levels that exceeded federal standards for bottled and municipal water.

The majority of the arsenic is inorganic form, a known carcinogen leading to skin, bladder, and lung cancer. And with twelve juices Consumer Reports tested, at least one sample contained lead levels that exceeded standards for bottled water. Our test was limited so we can’t draw any conclusion about any type or brand of juice. But the higher levels of arsenic and lead are troubling because many children drink a lot of juice and their small body size makes them particularly vulnerable.

One likely source of the contamination is pesticides containing arsenic that were used in agriculture. Even though most are now banned, they can remain in the soil. The advocacy arm of Consumer Reports is urging the Food and Drug Administration to set standards for juice.

We think the lead limit should be five parts per billion, the current standard for bottled water or even lower. And for arsenic, three parts per billion. That’s obtainable. Forty-one percent of the samples we tested met both of those levels.

The Juice Products Association told Consumer Reports, “We are committed to providing nutritious and safer juices, and we will comply with limits established by the Food and Drug Administration.” For now, Consumer Reports says the best advice for parents is to do what Zoe does and limit how much juice your children drink.

SK: There are a couple of messages in this video. Why is there arsenic in juice? Historically, DDT was bad for human health. There was no question of that. But the principle pesticide in use before DDT was lead arsenate. So why is there a lot of lead and arsenic in apple juice? Because apple orchards have been there long enough that they are pre-DDT and lead arsenate was getting sprayed in the apple orchards to control the pests. There is a lot of lead in the soil, and a lot of arsenic in the soil. Apple juice can come up full of a lot of both of those things. In this country, there are no standards set by the government for concentrations of either of those materials in juice.

Man 2: When the juice lobby or the representatives say that they abide by federal standards, are they lying because there are none?

SK: Yes, that’s true.

Man 3: What could be done about the soil? Is there anything to get the lead out of the soil?

SK: No. Heavy metals are extremely difficult to deal with. If you discover you have a heavy metal contamination, you should not be growing anything for human consumption.

Woman 1: What about organic farms? What if they were on land that was previously . . . ? Would we know?

SK: We would not. What we know about organic farming is that it is transitioned from conventional farming over a period of some years. During this period, pesticides cannot be used but production is not organic. What we know is only that, from the beginning of transitional production until now, no pesticides were used. We don’t know what was used sixty years ago. And it is a serious problem because even organic food can have pesticides in it. It’s just that none is contemporarily being applied. Consumer Reports’ advice is
to limit how much juice you give your child. But another approach to this might be to say, it would be worth trying to lobby for standards for arsenic in juice so that when these companies say they abide by federal standards, there are standards they must abide by.

If you go to the Consumer Reports website, you can find a complete list of the arsenic concentrations in all the juice samples that they took. But it’s not really scientifically valid. They only did it at one point in time. It might be wildly different at other points in time.

The situation is worse actually for rice. Children love rice. It turns out the most unhealthy thing you can eat is brown rice because brown rice, which we have all been stuffing down our children for years, turns out to have the highest arsenic levels out there. So here is another two-minute video on arsenic levels in rice, which is more interesting than listening to me talk the whole time, I think.

Many of the foods we in our families eat every day are made with rice. The trouble is some contain relatively high levels of arsenic. What’s more, our recent analysis here at Consumer Reports shows just how easily a child can eat what we think is too much arsenic, in some common foods like hot rice cereal and rice pasta. The good news is that some rices contain less arsenic than others. There are also alternative grains you can substitute. We’ve been listening to your concerns and questions since our initial reports. Now we’re here with answers about what you need to know.

Where does arsenic come from and where is it found? Arsenic is a naturally occurring element in the environment. But people have a long history of adding it to things like pesticides and poultry feed.


That’s just one of the ways arsenic gets into our soil and water. Then there are certain types of crops like rice that absorb arsenic more readily. Aside from rice itself, rice syrup and rice flour, for example, are used in a variety of foods like pasta, crackers, cereals, cake, brownie, and muffin mixes. Many of them are labeled gluten-free because so many gluten-free products contain rice.

What are the health effects of arsenic? Regular exposure to inorganic arsenic can cause a variety of cancers including lung and bladder. It’s also associated with cancers of the kidneys, liver, and prostate. Arsenic can also contribute to other health problems like diabetes and cardiovascular disease. And studies have found that it can cause reproductive problems and compromise the immune system. The USA Rice Federation says study shows that including a variety of brands of rice provides measurable health benefits that outweigh the potential risk associated with exposure to trace levels of arsenic. We believe those levels do carry a risk.

Why is this such a big deal for children? Because kids weigh less and are exposed to more arsenic per pound in the foods they eat. For example, just one serving of rice pasta can put a child over the weekly guideline we at Consumer Reports set for maximum arsenic consumption. Two cups of the rice drink would be the same. For a baby, three meals of infant rice cereal a day would put them over the limit in just two days. In fact, the Food and Drug Administration says that parents should consider options other than rice cereal for a child’s first solid food. This is why we think kids should rarely eat foods like rice pasta, rice milk, rice cakes, and hot and cold rice cereals.

What about adults? For adults, two servings of most rices or hot rice cereal would put you at your weekly limit for arsenic. How can I reduce my exposure to arsenic in grains? Not all rices have the same levels of arsenic. With our greatest research on which ones are the lowest, we’ve come up with a points system for adults and children to help navigate your way around these foods, which you can find on our website, consumerreports.org. If you’re a sushi lover, the good news is sushi rice in the United States has the lowest levels of arsenic compared with other rices. White basmati from India, Pakistan, and California was also low. Brown rice has 80 percent more arsenic on average than white. That’s because arsenic accumulates in the grains’ outer layers, which are removed to make the white rice. There are other brown rice choices like brown basmati from India,
Pakistan, and California. We also tested the number of other grains and found several with lower levels of arsenic, like amaranth, millet, and quinoa. These are great alternatives to rice, and it’s important to vary the grains you eat.

What’s the bottom line? Because there are so few regulations when it comes to arsenic in our food, here at Consumer Reports we want to give you the best information you need to make the best food choices for you and your family. For our entire chart on how to limit your exposure to arsenic in rice food and to learn about other grain alternatives, go to consumerreports.org.

SK: That is just two of the things that you would not think of as being a problem. But it’s also two things for which there are no standards that are being tested.

What makes children susceptible? One is that in an infant, all the tissues in their body are growing. Pretty much everyone knows someone who has gotten cancer. We develop cancers in parts of our body where the cells are rapidly dividing. The cells that line your lungs are always sloughing off. The cells that line your intestines and your stomach are always sloughing off and being replaced. Those are rapidly dividing tissues and so if a mutation produces a cancer cell there, it will really take off. It is rare to hear of anyone getting elbow cancer because the elbow cells are not dividing. In children, it’s everything that is dividing. So, one source of danger for them is that their bodies are comprised entirely of rapidly dividing tissues.

They also have an immature blood-brain barrier. In adults, your body establishes the blood-brain barrier, which is a tremendously effective structure that prevents strange chemicals in your circulation from crossing into your central nervous system. In fact, it causes a problem sometimes when someone has brain cancer. It is really hard to get the chemotherapy to work in the brain because the blood-brain barrier stops it. Well, children have an immature blood-brain barrier. Things go right through into their central nervous system. They also have reduced levels of mixed function oxidases in their liver. Those are the enzymes your body uses to wipe out toxins. Adults have more than children do. And children weigh less and this makes them have higher proportional dietary exposures.
Consider the information available from the website called Beyond Pesticides. They have compiled records of scientific papers about different kinds of cancers. Go to the website and look at the part about brain cancer in children, because pediatric brain cancer has become an epidemic. Each of those little paragraphs you will see is a summary of one scientific article linking childhood brain cancer to pesticide exposure. This is certainly worst for people who work on farms or live near farms. If you’re a farmworker and you’re spraying pesticides, you’re exposed and probably your children are exposed. If you live near a farm, then you get pesticide drift. But actually it turns out that even household pesticide use is a problem. During five years preceding a child’s birth, when the mother was exposed to pesticides in the home, then later the brain cancer risk for her child goes up. Even if your child is not going to be born for three, four, five years, pesticides are extremely toxic and we use them far too casually. You can go to that website and look at the depressing studies.

One of the ways a lot of people get exposed is lawn care products. People have their lawn sprayed. And the people who come in to spray your lawn spray to kill everything except grass—everything that might happen to show up in your lawn because you’re going to complain if your lawn doesn’t look beautiful, green, and so forth. If you ever see one of these companies spray, they’ll put up those little signs all over the lawn. These signs say, “This area has been chemically treated. Keep pets and children off.” And you are supposed to keep the signs up for twenty-four hours. This speaks of a heartwarming and naïve belief in the pesticide fairy who will come down in the middle of the night and remove the toxins from your lawn. The sad thing is that there is no pesticide fairy and when you take the signs off your lawn, it is still toxic. Children who grow up in the households where their lawns are treated have higher rates of leukemia.

**Woman 2:** I grew up spending my summers on a lake in Wisconsin. Every year, they would spray the lake to get rid of the seaweed so that you could swim in it. They would have signs up for days. Do the toxins just stay in there?

**SK:** The concentration diminishes over time, but certainly they are still there in lower doses.

**Woman 3:** How long would you say it takes a pesticide or a herbicide to degrade?

**SK:** It depends entirely on the chemical nature of the pesticide. DDT, which has been banned for half a century, is still out there. It has degraded to DDE. DDE is quite toxic, linked to breast cancer and other things. We don’t know how long DDT lasts because it’s still there. It’s been sixty years. Others of them like the organophosphates actually have a relatively short residual life span. So, it depends precisely on what material it is and what the weather is like, how much rain there is.

**Woman 4:** The clip talked about organic arsenic and non-organic arsenic. So the arsenic you can pull from nature is the organic one. Do those have a lower time frame?

**SK:** Arsenic lasts for a very long time. And pretty good evidence exists that your body does a conversion of inorganic to organic by itself.

**Man 4:** Is there anyone who likes gardening or working with their lawn? There is research being done that is showing that the use of pesticides for home gardening is contributing to the reduction of the bee population. And so if you have a concern about what is happening in the environment in regards to the bee population, that’s another reason to stop using pesticides for your home garden. Most of them are being shown to contribute to bee death.

**SK:** Especially the neonics. The neonicotinoids like dicofol look to be particularly linked at this point to killing off honey bees. Everyone thought dicofol was an okay pesticide for a long time because it breaks down pretty quickly in sunlight. It turns out that it wasn’t true. It is peculiarly toxic to honey bees. You should avoid using any neonic pesticide, any neonicotinoids.

**Woman 5:** Are those pesticides you plant with a plant?

**SK:** Great question. There are different ways pesticides are applied. Some you spray on the leaves. But there are also seed treatment pesticides. For instance, cantaloupe seeds are frequently treated with dicofol while they are seeds. As the cantaloupe plant grows, it spreads out the pesticide that was originally in the seed. Sometimes this chemical is sprayed as an adult plant, and sometimes it’s applied as a seed treatment. There are a wide variety of applications for the same pesticides.
Man 5: I haven’t found workers at Home Depot or Lowe’s who are very aware of this, but if you go to Portland Nursery or Seven Dees they have gardeners who can explain non-pesticide ways to treat your plants that will prevent pests from devouring them.

SK: There are things like dormant oil that are not toxic and can be sprayed on. If they are scale insects, there is very light oil you can spray that clogs up their breathing tubes so they can’t establish themselves. There are alternatives out there. Seven Dees is great. Portland Nursery is great.

Also if you do use pesticides, it’s a really good idea to take your clothes all off and wash them right away if you are going to be near children.

This website shows you a series of PET scans, including ones of young human brains at a series of ages.⁷ PET scans are non-invasive scans that show you where energy is being consumed. Any place that is lit up orange is an area of very high energy use. And you can see three weeks, four months, six and a half months, and nine months. Different parts of the brain are lighting up. What that means is that that’s where the connections are getting built as the nervous system develops. The reason it’s moving around is that your brain builds itself sequentially. It does this and then it does that, and then it does that. This means, given that there’s a porous blood-barrier, if an infant gets exposed to a neurotoxin, the impact of that neurotoxin depends on exactly when it happened. The process of brain development going on at that instant is what would get disrupted, and once you’ve passed that point you never go back and reestablish those connections anymore. There’s a kind of randomness here. An exposure at three months may be completely different to the child’s mental capacities than exposure at six months. Obviously, the best thing you can do is limit exposure overall. Alteration in brain development is generally irreversible. Once that’s happened, it’s there. The brain is going to have diminished function in some sense.

The figures in this article show autism trends in the United States (http://www.ncbi.nlm.nih.gov/pubmed/25189402).⁸ The numbers (see


Figures 1 and 2) were low in the early part of the graph because of poor diagnostic recognition of autism back in the 1970s. By 2000, we could recognize autism just fine. And people working in the field of environment toxicology are confident that the rising rates are because of various environmental contaminants.

Also, a new study came out very recently involving 970 children in Northern California. The bottom line is that the closer the mother lives to a farm, the higher the rate of autism.

The whole autism and vaccination debate was based on one scientific paper about twenty years old, since retracted by the journal. There was a whole series of authors on that paper. All but one of the authors on it have reevaluated and decided they were wrong. The remaining author has been accused of data fabrication. It is the most debunked piece of science that has ever existed. And yet, there is this idea out there that vaccines cause autism. There is not a scientist in the country that believes that, but it got out in the popular press and people are very protective of their children. Autism is a very emotional thing. Frankly, if you’re a parent and your child is found to be autistic, you want someone to blame. And you’re going to find someone to blame if you can and people jump onto vaccinations. Autism is not caused by vaccination and yet measles kills children. That’s pretty straightforward.

Why is this link between autism and pesticides not in the popular press? Well, because most people live in cities so this higher autism rate if you live next to a farm doesn’t resonate with a lot of people. Most of the people living in these areas are agricultural folks. They’re farm workers, or they own a farm. They’re probably not too happy about what they know about the pesticide exposure, but they’re making a living. And it’s not a risk to the general population. It’s to folks who get sprayed.

**Woman 6:** What about mercury in vaccinations? I remember you talking about mercury in food.

**SK:** There is no evidence that the amount of mercury in vaccinations has any effect on autism whatsoever. However, there is certainly a growing body of concern regarding heavy metal exposure in diet, whether it’s arsenic, lead, mercury, or a combination of those three things. Now you are talking about a much more substantial exposure to heavy metals than in a vaccination.

**Man 6:** It’s much different in vaccines. The mercury in a vaccine is not by itself. It is a part of something else that helps the vaccine be effective against whatever you are trying to kill.
SK: It’s bound up in thimerosal, and so it’s quite a different situation. However, you are right to be thinking about dietary heavy metals impacts. No one can point to just one thing and say, “This is what causes autism,” because it’s not just one thing. It’s a lot of things that contribute together.

Man 7: There is genetics, too. Some children are more susceptible than others.

SK: That’s the way for virtually all human diseases. You probably all know some ninety-year-old person who smokes cigarettes and coughs constantly and laughs and says, “I’ve smoked two packs a day for seventy years and it never hurt me, therefore it is not dangerous.” For every human trait, whether it be height or weight or hair color, there’s a varying range of phenotypic variability. Some people are great at DNA repair. If you’re great at DNA repair, you probably can smoke cigarettes for sixty years. Some people are really bad at DNA repair. If you want to find out which you are, take up smoking. In a little while you’ll know which one you are. That same range of susceptibility applies to things like heavy metals and autism. The problem with these is that populations look like bell curves; you honestly don’t know where you sit on the curve. The safest thing to do is to assume you are pretty susceptible.

Man 8: You have talked about pesticides washing out of the lawn and suggested washing your clothes after applying pesticides. So we’re talking about sending those down somewhere. I assume that one of your concerns about pesticides has nothing to do with human health but downstream fish and birds.

SK: This is true. Pesticides are not removed by sewage treatment plants, and salmon are extraordinarily sensitive to pesticides. Pesticides disrupt salmon reproductive synchronization. They disrupt their homing ability. In fact, even minute doses of pesticides seem to mess up their sense of smell in general. Despite that, I’d rather someone who has children washed their clothes after using pesticides. However, I’d rather you didn’t use pesticides if you possibly can get away without using them.

Fertilizers, pesticides—salmon are very sensitive organisms. If you have bugs in your house, there are things you can do other than toxic chemicals. You can buy food-grade diatomaceous earth. That works fine. It can’t be the diatomaceous earth you get in a craft store, but the food-grade material is like microscopic sand with sharp little points. If you put it on the floor, it abrades the insects underneath and it will kill them off. There are things you can do; there are alternatives.
Woman 7: We eat a lot of salmon. Is it all right to eat Alaska salmon?

SK: There is a huge difference in toxin concentration between wild caught and farmed salmon. Farmed salmon is actually not very healthy for you. Wild caught salmon is much healthier. Farmed salmon are fed salmon chow, Purina salmon chow, basically. It’s made of ground-up little, tiny fish. So you can picture it. They’re going to go catch these fish and grind them up for the salmon chow. Obviously they want to make it as cheap as possible, so they take the boat out as short a distance as possible. They fish as close to shore as they can because it uses less diesel fuel and it takes less time. If you think of where the pollution is entering the ocean, the pollution in the inshore area of the ocean is much higher than if you go out another ten, fifteen miles, so the salmon chow is made out of little fish collected in the most polluted part of the ocean. The salmon concentrate those pollutants. Wild caught salmon, on the other hand, are feeding five hundred miles offshore in water that is much cleaner. It’s day and night when you look at the concentrations of toxins in wild caught and in farmed salmon. Farmed salmon aren’t even pink; they dye them pink.

Woman 8: So are there labeling laws for farmed salmon versus wild caught?

SK: If it’s wild caught, it will say it because it will cost more. Trust me, anyone who is selling you wild caught salmon will indicate if they are “wild caught” or “line caught,” because they’re going to be charging you premium price and they want you to know that you’re buying a product that costs more for a reason.

Woman 9: Is Atlantic salmon farmed and Alaskan wild?

Man 9: Yes, it is. Some of the farmed salmon have escaped and are now creating runs in Canada and Alaska. When you go out fishing there, you’ve got the limits of how many salmon you can catch. But if you catch an Atlantic salmon, it doesn’t count against the limit.

SK: If we were having this conversation in Connecticut, there are wild Atlantic salmon although the number is small. There are a lot of wild Atlantic salmon left in Scandinavia. There are some up in the Atlantic provinces of Canada. They are limited populations. If you’re buying farmed salmon, it’s Atlantic salmon. I only know of one company that tries farming Pacific salmon and it doesn’t work well. And they try selling it at a premium, but Pacific salmon do not do well in salmon farms. It’s 99.99 percent Atlantic salmon.
Man 9: The problem they’ve had in Canada with the Atlantic salmon was that those escaped ones tend to run pacific salmon out and cause them to go extinct in those streams. And that’s one of the reasons there are no limits on Atlantic salmon caught.

SK: In fact, Alaska paid a bounty on them. There are Atlantic salmon showing up in every river on Vancouver Island. And the Canadians aren’t paying a bounty. But if you went up to Alaska and brought in an Atlantic salmon, they paid you because the Atlantic salmon are competing with the native species. That’s a really serious issue. A more frightening issue is that the FDA is in the process of licensing genetically modified Atlantic salmon that grow twice as fast as wild fish. If those things escaped, they would out-compete everything.

Here are some things you can do. Some of you are students. You’re on student budgets. Not all foods are likely to have pesticides on them. One resource is the Environmental Working Group’s “Dirty Dozen” and “Clean Fifteen” lists. There are some foods that are far more likely to have pesticides on them, so those are the ones you should buy organic. For the sake of the farmworkers, you should buy everything organic if you have buckets of money. But students don’t normally have buckets of money.

The Environmental Working Group website\(^9\) shows the list of the “Dirty Dozen”—these are the foods most frequently contaminated with pesticides. Remember I said that it’s the foods children love that tend to be the most pesticide-laden? They are apples, peaches, nectarines, strawberries, grapes, celery, spinach, and so on. These are the most contaminated foods.

There is also a list of the “Clean Fifteen”—foods that are least often found to contain pesticide residues.\(^{10}\) So, avocados; for the sake of the people who work in the field, buy organic. But if you don’t have a lot of money, don’t waste your money buying organic avocados. Use it on apples. This is a tool that is useful. If you go to this Environmental Working Group website and click “full list,” there is a much more extensive list of foods ordered from top to bottom—the lowest number is most heavily pesticide exposed. The highest number is least pesticide exposed. So this is actually a very useful tool for looking at things you can practically do to protect yourself or your children. And if you are a pre-reproductive woman, there’s no difference from


protecting yourself and protecting your children because you are going to accumulate it if you eat it.

The General Accounting Office (GAO) is a non-partisan government agency whose job is 100 percent to audit the operations of other government agencies. They’re the watchdog. I’ve never heard anyone suggest that their work isn’t absolutely top of the line. There is a recent GAO account of FDA and USDA food safety, which can be accessed for free online.\textsuperscript{11} In 2012, the Food and Drug Administration tested less than one tenth of 1 percent of imported shipments. You need to realize that we don’t test our imported foods for pesticides. You often hear the call for smaller government. This is smaller government. We don’t do much inspection in slaughterhouses for bacteria anymore. Government is supposed to get smaller, taxes lower. We don’t fund USDA inspectors at the border. If you’re buying food from overseas, you have to presume it is entirely untested. Other countries have different pesticide laws than we do. You might be cautious when you buy things, and look at where they are coming from. And ask yourself if it is a country whose reputation is one that would make you really happy to eat its food or not. We just don’t test it.

A brand new report, the statewide water quality toxics assessment report for Oregon, can be accessed online.\textsuperscript{12} The Oregon Department of Environmental Quality conducted it. Most surface water in the United States has never been tested for pesticides, flat out. No one has ever done it. The Oregon Department of Environmental Quality decided it was important to test the waters in the state. And this is what they found: there are lots of pesticides in the Willamette River. This suggests, in terms of eating fish, you should be a little cautious about eating fish from this basin. It’s going to have pesticides in it. It also depends how you cook it. This quickly gets to social justice issues because who is out there catching fish to consume? It’s not the folks who can go to New Seasons and buy the Alaskan cod fillets. It’s the people who don’t have much money who want some fish to eat.

Unfortunately, there are also some significant differences depending on the cuisine background you have, in terms of your pesticides exposure. Most


\textsuperscript{12} State of Oregon Department of Environmental Quality, Statewide Water Quality Toxics Assessment Report (April 2015), accessed February 2, 2016, \url{http://www.deq.state.or.us/lab/wqm/docs/WQToxicsAssessmentReport.pdf}.
pesticide in fish is in the subcutaneous fat, the fat right under the skin. Pesticides are mostly fat-soluble. If you take a fish and you fillet it before you cook it, you will have removed most of the pesticides, or at least a healthy portion of any pesticide dose. If you are like me, you like Asian fish cooked with the head and skin on, and if there’s pesticide in that fish you’re going to get it, because when you cook the fish you are melting the subcutaneous fat which is going to spread the pesticide like gravy over all the meat before you eat it. If it is fish from contaminated water, then you need to be very careful and you are much, much safer if you eat only fillets and never whole-cooked fish. In general, fish fillets are safer than fish with the skin on. If you’re eating fish from Alaska, it’s not the same kind of issue as with the fish from around here.

An NRDC report available online shows another example of how random health impacts of toxic exposures can be. These are atrazine levels. It is a corn herbicide, and is the most commonly used herbicide. Here in the United States, we love our atrazine. Atrazine has hormonal effects. It disrupts male organ development in various animals. Atrazine is applied several times in a growing season. It is sprayed for a short period of time and so there are brief periods after spraying that there is a lot of atrazine in the surface waters near farms. In the report Figure 2 is the water in Nashville, Illinois. You can see the atrazine spraying spikes over the growing season. The red line on the graph is the atrazine level in the surface water. The blue line on the graph is the atrazine level in drinking water. As you can see, Nashville, Illinois has a good water treatment plant. If you’re in Nashville, Illinois, and you’re drinking city tap water, you’re okay in terms of avoiding atrazine exposure because they have an effective filtration system. Figure 3 is the water in Blanchester, Ohio. Blanchester, Ohio has a filtration system that managed to concentrate the atrazine in the drinking water even more than the spikes in the surrounding surface water, so the blue on this graph is higher than the red one. That means you’d be safer in that town when atrazine has been sprayed in the area to go out and stick your face in the pond and drink, because your tap water has more atrazine than the surface water. How do you know which of those towns you live in in terms of water quality? You don’t. An unpredictable element of exposure exists.

And don’t think your bottled water is much different. Dasani comes right out of the rather polluted Willamette River. It’s pulled out at West Linn, Oregon, treated and bottled. You have to educate yourself about this. Bottled water, by the way, is generally less safe than tap water because it’s a largely

unregulated industry. You can go out into the bathroom, fill plastic bottles up at the sink, seal them, slap a label on them, and sell them. Multnomah Biblical Seminary Springs Water, right? That would be perfectly legal if you did it cleanly. If you are going to drink bottled water, I always tell people to go for a name brand that has some real equity in its name. Don’t go for a fly-by-night, cheap brand that has no equity in its brand name because God knows what you are getting. And certainly God is the only one who knows what you’re getting because nobody is examining it to test and see what’s in it.

I want to make sure I leave this with the recognition that we do need to grow a lot of food. The planet is not getting bigger. There are more of us. There are reasons why people are trying to push high productivity on farms, although as I said in the other session, we also are feeding most of the grain we produce to cattle or into processes to make biofuels.

**Man 10:** We’re also consuming it and the rest of the world is consuming it at the same rate. How would this be affected if we distributed wealth more equitably around the world? Would people still starve or would there be plenty of food?

**SK:** There’s plenty of food. There’s no question.

**Man 11:** There’s another source of food coming out that wasn’t talked about. Insects are coming on as food. One quarter of the people in the world today are eating insects and they already have a product out on the market. It is cricket flour. It’s just the case of, are you taken back by it so much that you don’t want to try it?

**SK:** Part of the issue is also what we are to do about the uneven distribution of food. We have inadvertently done a lot of harm that way. Let’s say there’s a drought in Ethiopia and they show starving children on television. We load up ships with grain and send it. That’s what we do—we put lots of food on ships and send it. In some ways, that’s a good thing. When it arrives there, it feeds people. However, according to the law of supply and demand, a massive influx of free food means that if you’re a farmer in that country, you can’t sell your crop for anything. We therefore potentially also drive into bankruptcy all the local agriculture. When the giant ships of free American food show up, the people who have an investment in growing fields of crops now have an unsellable commodity. One of the issues of unequal distribution of food is that we can’t just ship it. The only way to get around the unequal distribution of food is to promote agricultural development in other places. Because if all we do is ship our surplus food around the world, then all we
ultimately do is completely disincentivize investment in agricultural development in other countries.

**Man 12:** But we’re also buying their food. We’re having their food shipped to us.

**SK:** Not much. A little. When you look at the flow of food around the world, the United States ships approximately at this time one hundred and thirteen million metric tons of grain overseas. We import about twenty million metric tons of food. We’re exporting at about a five-to-one ratio over our imports. Yes, we do import, but the balance between our imports and our exports is dramatically uneven. I’m not an economist. I don’t have an answer to this one. When you see pictures of starving babies, you should send food, right? But there’s got to be another way to do it. You have to do more than that so that other people end up with enough. I’ll close with that. That’s the current situation of persistent hunger in the world.

The number of people according to the Food and Agriculture Organization of the United Nations (FAO) who do not meet their minimum daily caloric value for food: In sub-Saharan Africa, there are 234 million people who aren’t getting their basic food requirements; in the Asian Pacific region, there are 537 million people without enough food. So we haven’t solved the food problem.

**Man 13:** In the original study with the ten babies that they measured and found all the toxins, did they go on to see what impact they had on those infants?

**SK:** No, they didn’t follow up on that. What we know is that rates of autism are soaring. Rates of childhood brain cancer are much, much higher than they used to be. Rates of childhood leukemia are much, much higher than they used to be. It’s hard to get a cause-effect relationship when you think of all the different things a child is exposed to. I haven’t talked about this at all, but there is no program that tests chemicals in combination. So, even when things are tested, you take atrazine and you test atrazine. But you don’t take atrazine and test it with the addition of dicofol or with some other compound. So, since children are being exposed to hundreds of things at once, it’s very difficult to backtrack and find the causality. People who do pediatric oncology and people interested in childhood neural development all say that they believe firmly that the soaring rates of those problems are associated with toxin exposure.
Woman 12: Children in cities might not be exposed to agricultural pesticides as much, but what about toxins in the home, like cleaning products?

SK: I’ve only been talking about pesticides here. It turns out that everything I was saying about cancer rates and autism are also found in increasing numbers as air pollution gets worse. So when things such as polycyclic aromatic hydrocarbons (PAH) concentrations from truck and car exhaust go up, autism rates go up. Inner city children are being barraged with pollution. Air pollution has very similar impacts to pesticides. Also, if you are living in a city in a building that is old and buggy, you’re probably getting exposed to pesticides that way. A lot of old city structures have neighborhoods fed by lead water pipes. So there’s often fairly heavy metal exposure through drinking water.

Man 11: I was reading a study the other day on people living in the vicinity of truck stops. They found that their kids have a much higher autism rate than other locations in the cities.

SK: In that example, we are sure of one thing: polycyclic aromatic hydrocarbons from diesel exhaust causes autism or promotes autism. But, there are lots of other air pollutants that may be involved as well. There is no perfectly safe place. You just have to know the risks.

Woman 12: What do you do about air pollution or drinking water?

SK: As for air pollution, all you can do is try not to live too terribly close to a major highway. You don’t want to live next to an uphill grade on I-5. You don’t want to live next to a truck stop. You don’t want to be living near Precision Castparts, which has been reported to be one of the worst polluters in the country. You try to avoid that kind of point source. For water, you could get yourself something like an activated charcoal filter and put it on your tap. Activated charcoal will remove a lot of contaminants, but only if you install and use the filter according to the manufacturer’s instructions and keep changing the cartridges fairly often.

One of the worst routes of exposure to toxic substances is through personal care products. You can go to the Environment Working Group website. They have a database called “Skin Deep” and they rate all the personal care products in the United States. Think about things you put on your skin when you shower. When you shower you get your skin hot, and your pores all open up. Transdermal penetration of the chemicals from shower gel is really high. You can reduce harmful exposure by buying products where you recognize
all the ingredients in the label. So read the label and, if you don’t recognize the ingredients, don’t buy it.

**Woman 13:** Can’t they hide a certain amount from the label based on trade secrets?

**SK:** They can. There are certain circumstances in which there is proprietary information that they can hide. But they can’t hide all of it. In general, if you see a whole long list of chemicals, you shouldn’t buy the product. Go to the “Skin Deep” database. There are lots of things you can do with that information. Some of the substances present in personal care products can be hidden. They don’t have to list formaldehyde. It’s a known human carcinogen. It’s in your personal care products, but it’s not listed for various reasons I can’t go into. You’ll never know about that one. On the other hand, laurel sulfates are right there on the label. What is that ingredient anyway? If you don’t know, don’t spread it on your head. If it says, “fragrance,” don’t buy it. Artificial fragrances are almost all estrogenic. They give you a little hormone boost and it’s not good for you. If the label says fragrance, you shouldn’t purchase that material. Buy things you understand. If the label doesn’t have strange things on it, it’s probably pretty good for you.

**Woman 14:** I like to eat apples. Should I not feed my children apples unless they are organic?

**SK:** If you can afford it, I would try to avoid that. If you can’t do that, I would peel them. But even peeling them is not going to do any good for arsenic because the arsenic is going to be in the flesh of the apple. Apples are at the very top of the “Dirty Dozen.” If there was one food you were going to buy organic, I would buy apples. And for milk, the lower the fat concentration of the milk, the less contamination it has because most contaminants are fat soluble. Whole milk has more contaminants in it than 2 percent, and 2 percent has more than 1 percent, and 1 percent has more than skim. So you go for the lowest fat milk you can tolerate even though it starts tasting like white water.

Thank you. You’ve been very patient.