

Lyn Patrick, ND: The Burden of Organophosphates and Glyphosate

Interview by Craig Gustafson

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Lyn Patrick, ND, has been in private practice in Arizona and Colorado since graduating from Bastyr University in 1984. She is currently president of the Naturopathic Academy of Environmental Medicine and faculty for the American College for Advancement in Medicine (ACAM) chelation training program and the Metabolic Medical Institute Fellowship. She speaks internationally on the subject of environmental medicine, endocrine disruption, metals toxicity, and nonalcoholic fatty liver disease. Previously, Dr Patrick acted as contributing editor for Alternative Medicine Review, a peer-reviewed PubMed-indexed integrative medical journal.

Integrative Medicine: A Clinician's Journal (IMCJ): On the last day of the Environmental Health Symposium, you will be speaking on toxicant load and, in particular, organophosphate pesticides. What is the scope of the issue with organophosphate pesticides?

Dr Patrick: The reason that we are specifically focusing on organophosphate pesticides is that the source of the body burden for the majority of people in the United States is diet. I'm talking about nonoccupationally exposed men, women, and children. In the literature, I have paid particular attention to studies that came out of the University of Washington by Cynthia Curl, PhD; currently at Boise State University, she is one of the main researchers in this area. In a pediatric study, 2 groups of children were examined, when their dietary exposure to organophosphates was avoided or eliminated. In other words, these groups of kids were switched from a conventionally grown diet to a diet that was 100% organically grown fruits and vegetables.

IMCJ: That's an interesting way to go about it, rather than examining what happens when a cohort is exposed to a pesticide, remove the exposure, and observe what happens to clean eaters.

Dr Patrick: Right. We already have significant amounts of information about the effects of organophosphate

pesticides, both in nonoccupationally exposed adults, as well as occupationally exposed adults. The new information that is coming out about organophosphate pesticides in the general population shows that not only do the pesticides act as neurotoxins—we have known this from the occupational literature for a very long time—but we know now that they have other toxicity related to endocrine disruption.

IMCJ: Can body burden be altered by intervention?

Dr Patrick: We know that organophosphate pesticides, for the most part, are metabolized and eliminated through the urine. In other words, we do not store them in our fat tissue, like organochlorine pesticides accumulate in the body. The way we measure them is basically through the urine. They're constantly being eliminated through the urine, and they do their damage on the way through the body when they are in the systemic circulation, the bloodstream. What Dr Curl was able to identify and document is that the levels of organophosphate pesticides dropped to almost nondetectable limits within about 48 hours.¹

What they measured were dimethyl alkylphosphate and diethyl alkylphosphate, or DAPs, the metabolites of 2 organophosphate pesticides, not the pesticides themselves. Also fascinating was, and probably the most important part of the study, that when these groups of kids were reintroduced to organophosphates by returning to conventional diets—a little healthier than the standard American diet, but still conventionally grown produce—their levels rose back to the pre-elimination levels within 72 hours. We have a pretty good demonstration, here, that both elimination and reintroduction happen very quickly and that this is probably the best evidence we have that diet is a significant contributor to organophosphate body burden for most men, women, and children, and that exposure can be avoided.

Organophosphate pesticides are linked to learning disabilities and impediments to children's intellectual

growth. So, we are looking at far-ranging and future consequences. I'm focusing on children here because there has been a tremendous amount of research done, not only in kids whose parents are agricultural workers and who have proximal exposure based on their residence—they live near the fields—but also Curl's research, looking at kids who consume conventionally grown fruits and vegetables.

IMCJ: I remember one specific point last summer where I was watching my son play baseball, and he was out in center field. Beyond the center field fence was a marsh, and I could see a helicopter go back and forth, spraying for mosquitoes, and was thinking about the exposure to the kids in the park.

Dr Patrick: Right. Unfortunately, this is a political issue. It is a policy issue with this kind of pesticide use, and it is beyond kind of the scope of our discussion, but yes, that kind of exposure, even with those particular chemicals, pyrethroids, which are considered "safe," there is a body of literature looking at their effects on respiratory function and allergies. There are some interesting relationships with pyrethroids and the immune system as well.

Those kinds of reactions are not benign, because they can lead to more serious respiratory complications, like asthma, and we now know that 1 in every 5 children in the United States has a serious medical condition—ADHD; ADD; respiratory problems, like asthma; or a learning disability that can be serious, like being on the autism spectrum. That's 20% of our children. I think the literature on organophosphates, which I will review at the conference, is really important for that reason. I know that the physicians who are going to be there want a way to have a concise conversation with their patients about the necessity for switching from a conventionally grown diet to an organic diet—particularly pediatricians.

In 2016, when we had our first big Environmental Health Symposium Conference, we invited Gilles-Éric Séralini, PhD, who is a researcher at the University of Caen in France and has published some of the most compelling literature on the toxicity of Roundup. Roundup is not a conventional organophosphate, but I will be talking a little bit about some of the new literature on Roundup, because of the toxicity of some of its inert ingredients. Dr Séralini just published a new paper this month on the contamination of Roundup by metals, specifically arsenic.²

So, this category of organophosphate pesticides can be expanded, now. If not chemically, we can expand the conversation to include pesticides containing glyphosate, like Roundup, because it is the most commonly sprayed pesticide in the world. That reality also leads to expanding the conversation about conventionally grown food, because nonorganic food is also sprayed with Roundup-like pesticides as a desiccant to prevent the food from

being overcome by fungus. It dries out the crops, allowing an earlier, more efficient, and more complete harvest, so a lot of beans and grains are sprayed with Roundup preharvest to prevent them from molding in the field.

IMCJ: I have looked up and read through Monsanto's directions for doing that.

Dr Patrick: They're pretty specific, I know. I had to send that brochure out to a couple of doctors, friends of mine, who were unwilling to admit that there is a pretty significant marketing audience that Monsanto has created for non-GMO crops. These are things like garbanzo beans, grains, and oats that are used in a lot of gluten-free food. Monsanto makes the case that they need to be sprayed with Roundup preharvest to prevent problems at harvest.

IMCJ: Have there been any reports of organic diets resolving clinically diagnosed conditions?

Dr Patrick: In 2016, when we invited Dr Séralini to come from France to the conference in San Diego, we also had a public forum at the end of the conference. A couple of clinicians attended. One, a pediatrician, Michelle Perro, MD, talked about her strategy for treating her pediatric patients by putting them on organic diets. She saw visible improvement in a majority of the health conditions that she saw in her pediatric population—and has documented this in her charts—simply by changing the diet of these children.

As a result, the families of these children were also changing their diets, because it was easier to serve 100% organic than to make separate meals. She talked about specific cases that she had seen resolved, not only in her pediatric population, but in the adult population—the kids' parents who had also started to eat organic food. She has a private practice in San Francisco. It was very impactful for the doctors in the audience to actually see that this could be a major intervention, not restricted to the pediatric population, but for everybody.

Getting back to the Roundup part of this conversation, the exposure through diet is becoming stronger, more significant. People are exposed to not only the glyphosate, but residue of the inert ingredients and the metals that I am going to talk about in my lecture. This is becoming more of an issue, because of the current agricultural practices. So, I am going to review what the body burden looks like based on the Centers for Disease Control database. It does not currently measure glyphosate as one of the many pesticides monitored in the US population for both children and adults, but we can extrapolate. There are some independent research organizations that are creating databases. I, myself, have had my urine glyphosate levels measured, because even though I eat an organic diet, I live next door to a park that's owned by the city I live in and crews have been spraying Roundup. We just got them to

stop through a citizen-based initiative, but historically that has been my exposure—a park that is about a sixteenth of a mile from my house.

IMCJ: Did you notice a measurable exposure, and did it drop when they stopped?

Dr Patrick: Well, here's the thing. There is so little research on glyphosate. We assume—and Dr Crinnion has just recently published a little review on this—that glyphosate is not stored in the human body, that it does its damage on the way through, just like organophosphate pesticides, but we do not have absolute proof of that. I think, at this point in time, it is the correct assumption that glyphosate levels in the urine coincide with current exposure through food and water versus substances like an organochlorine pesticide or a metal, which we store in the body—in the fat tissue, like organochlorine pesticides, or in the organ tissue, like metals.

This is a little circuitous, but to answer your question, yes. We think that glyphosate containing herbicides do reflect current exposure. I did see a difference in my urine glyphosate levels between the historical exposure a year ago and the current exposure a year after we made the agreement to stop spraying. Now, is that related to the drop in use that is adjacent to my property? We can probably make an assumption, but it may be that I've been a lot more consistent about my diet as well. I do not eat out in restaurants that do not serve organic food, which means that I don't eat out anymore. Because I live in rural Colorado, we don't have access to those kinds of restaurants.

I'll review that literature in my talk, as well, and that's the reason I'm bringing this up. We have to expand the conversation about organophosphate pesticides now to include glyphosate-containing herbicides, even though they are not chemically thought of as organophosphate pesticides.

We are now in a whole different universe, when looking at the toxicity of—not just what we know about glyphosate, but as Dr Séralini pointed out when he spoke in 2016—the compounds that are chemically labeled “inert” and therefore free from any kind of regulatory review. They are 10 000 times more toxic than glyphosate on a cell-toxicity basis, according to Dr Séralini. He has published this data, it is in the medical literature, and he reviewed that data when he spoke in 2016. For those of us who were at that conference we now have a broadened understanding and a perspective on the toxicity of glyphosate-containing herbicides. Again, glyphosate is the most commonly used herbicide by volume and weight in the world.

IMCJ: What else will you cover in your discussion?

Dr Patrick: I am going to talk about what the action step is. I'm going to review the literature, but then discuss what

the action step is for us, not only as providers of health care, but as educators. If we stick to the Hippocratic Oath, our main rule, how do we educate our patients not only about organically grown food, but about this whole issue with exposure to glyphosate-containing herbicides? That is a separate but equally important issue, and I'm going to be addressing that by talking about how a clinician goes about actually implementing that educational step. Because, as you know, there is an economic aspect to eating organic food, as well as just a practical aspect to doing it.

Nobody really thinks about the food they eat when they go out to eat at a restaurant. There are many gluten-free products that parents choose for their children, who either have celiac disease or gluten intolerance, that are not organically grown. Unfortunately, many of these gluten-free foods are grain based. And conventional grains, if the desiccants are used on them—particularly oats—are heavily sprayed with glyphosate-containing herbicide as a desiccant. I am going to supply the educational materials that will make discussing this possible for clinicians.

It's an interesting time we're in, where we find ourselves wondering, “How can I have an impact? Should I run for office? Should I write a book? How am I really going to throw a pebble in the pond and create the biggest ripples?” I think that everyone has to answer that question for themselves, but certainly at some point we have to become the educators for our communities, because we are the experts. Not just our patients, but our communities look to us for guidance in these areas. It is our hope that by educating a group of health care providers—I know this is Dr Pizzorno's goal as well—to create an empowered community that can not only take personal action, but collective action as well.

We may not be able to run for office, but we can certainly educate our community members that are running for office, because this is a political issue. It is a local political issue. The city of Irvine, California, now has banned pesticides within the city limits, and there are many towns that have done this through citizen-based initiatives.

IMCJ: Backing up a little bit, does your protocol for glyphosate exposure address the chelation aspect of glyphosate?

Dr Patrick: Glyphosate, as a chemical, has the ability to chelate certain minerals out of the soil, and that is one of the mechanisms by which it acts as a pesticide, through what is called the *shikimate pathway*, which is a specific pathway not found in humans, but found in bacteria. The plants are prevented from taking up these specific minerals that glyphosate chelates, and that is documented in the agricultural literature. There is a lack of information, meaning we do not have any good research on how this

happens in human systems. What we do know is that there may be—and again, not enough research to document it—but some small studies that show that plants in which glyphosate is used during the growing season cannot take up these specific minerals, these trace minerals.

IMCJ: My understanding is that it will lock up certain minerals for a range of time that is strikingly similar to the length of the growing season.

Dr Patrick: Correct. So, there is a concern there about lack of availability in the diet of these minerals from plants that have been grown using GMOs, RoundupReady, or Roundup-resistant technology or where Roundup-containing herbicides are used as desiccants. That is an acknowledged and documented problem with glyphosate. It acts as a chelating agent and it does not chelate toxic metals. It chelates trace minerals.

For more information about the 2018 Environmental Health Symposium, visit <http://environmetalhealthsymposium.com/>.

References

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