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PRESENTATION TO THE COUNCIL OF LANARK HIGHLANDS TOWNSHIP REGARDING A PROPOSED ROADSIDE SPRAY PROGRAM FOR CONTROL OF WILD PARSNIP

Introduction

I have been a general practitioner in practice since 1973, with a particular interest in treatment of complex chronic illness. There are many chronic medical conditions, such as chronic fatigue syndrome, fibromyalgia, extreme allergic hypersensitivity, autism, and neurodegenerative diseases that have no adequate treatment using conventional single problem/single drug methods. Instead a much more meticulous approach is required, using a systems biology approach to identify and address the multiple underlying factors causing the illness in the first place. For the past 20 years, I have focused on the biomedical treatment of autism, learning from leading clinicians and researchers in the United States on how to apply the most recent scientific discoveries in attempting to reverse this condition. It has been rewarding to see a significant number of these children become neurotypically normal, in spite of initial predictions that they would end up requiring lifelong care in a group home or institution. At the same time, working with these children and learning what it takes to get them better has taught me a lot about chronic illness and the role of environmental contaminants as a significant contributing factor to such conditions.

We live in an information age, and new medical information is growing in leaps and bounds, and thanks to the Internet, this information travels around the world at the speed of light. However, medicine is inherently a very conservative profession, and it can take years for new and valuable information to become incorporated into mainstream medical practice. Regulatory bodies lag even farther behind, and it often takes them decades to catch up with what has emerged in the newest scientific literature. This time lag can present great frustration to an increasingly informed general public that is looking for answers for what can be described as a frightening epidemic of epidemics: diabetes, cancer, autism, ADD, dementia, mood and behaviour disorders, Lyme disease and its co-infections are all threatening to overwhelm our medical system. It is in this context that you are facing a groundswell of opposition to the proposed herbicide spray program for the control of wild parsnip, and are being asked to review more current scientific evidence that calls for extreme caution in considering such a program.

Traditional Toxicological Injury Model

The toxicity data used as evidence that the Clearview herbicide is safe is summarized in the US National Library of Medicine Toxicology data network. This toxicity data is based on a traditional toxicology injury model: looking for the effects of acute or relatively short-term, high-dose exposure to a single agent. Such methods look for specific genetic damage (mutational changes), visible signs of injury or death of laboratory animals, tissue damage visible under the microscope, measurements of rates of excretion in laboratory animals, and measurements of rates of breakdown in water & soil. That sounds like a lot of careful scrutiny, but there is now a wealth of scientific research indicating that this model fails to measure extremely low-level persistent residues and more subtle evidence of damage. A growing number of scientists are stating that model of assessment is inadequate and outdated in terms of determining long-term toxicological effects, and that a totally different approach to toxicology is required if we are going to address the rising tide of chronic disease.

Low-Level Exposure Over Time Can Have Subtle Effects:The Science of Persistent Organic Pollutants (POPs)

POPs are chemicals which persist in the environment in very low concentrations, but as they are bio-concentrated, and as they move their way up the food chain, they get into our food supply and ultimately are delivered to human beings, where they are stored in body tissues. Many of them are difficult to metabolize, and so they sit, stored in body tissues, sometimes for years or even decades, exerting their subtly disruptive effects over a period of years.

Detecting the presence of such low-level contaminants is not an easy process. Chemical manufacturers are not required to divulge to the public or government health officials the methods used to detect their chemicals. At the same time, detecting their presence requires very specialized and expensive equipment to measure extremely low levels of such compounds. Few labs are equipped with the machines and expertise to run the tests or the funding to develop the methods. Laboratories have yet to develop methods to test human tissues for the vast majority of chemicals on the market, and the few tests that labs are able to conduct are expensive. Nevertheless, the technology is becoming more available, allowing research indicating that though present at very low levels, these persistent pollutants have adverse effects on health in much more subtle ways than the traditional toxicological injury model accounts for.

We now know that these POPs play significant roles in disrupting cellular chemistry in multiple ways, such as interfering with cell signalling, cellular enzyme function, and genetic expression. They cause imbalances in immune system function (allergic sensitivity, resistance to infection, development and spread of malignant tumors, development of autoimmune diseases). They can cause mitochondrial poisoning, thereby adversely affecting tissue and organ function. They are endocrine disruptors, and interfere with hormone regulation, so leading to precocious puberty, infertility in both men and women, endometriosis, breast & prostate cancer. They increase production of free radicals and pro-inflammatory responses. They can cause neuro-immune activation (brain inflammation). They disrupt the function of glutathione, the body's main detoxifier, and so make it even more difficult for the body to contend with an increasing burden of environmental contaminants. All of these processes eventually produce a variety of different diseases based on an individual person's genetics. Some of the medical conditions that result include heart disease, diabetes, obesity, cancer, autism, ADD, neurodegenerative diseases, such as Parkinson's and dementia.

Look at the example of the people of Cambodia exposed to defoliant herbicides during the Vietnam War. These were and still are lean and highly physically active people with little exposure to the refined foods of modern commerce. We would expect there to be very low prevalence of type 2 diabetes in this population. However, the research being done shows that decades after the end of the Vietnam War, there is rising epidemic of type 2 diabetes and heart disease in Cambodia, and this has been directly related to their levels in fat tissues of these persistent organic pollutants.

We are now living in a chemical soup, a potpourri of heavy metals and industrial chemicals

U.S. industries manufacture and import approximately 75,000 chemicals, 3,000 of them at over a million pounds per year. Very few of them have been adequately tested for safety. In 1976, US federal law essentially deemed 63,000 existing chemicals "safe as used" the day the law was passed, subjecting them to no safety scrutiny. A striking illustration of this chemical proliferation is the evidence that our children are poisoned even before they are born. A study spearheaded by the US Environmental Working Group was the first study ever done on the cord blood of newborns. It tested for levels of 413 industrial chemicals and pollutants in umbilical cord blood from 10 babies born in August and September of 2004 in U.S. hospitals. They found an average of 200 industrial chemicals in each newborn. Had they tested for more than 413 such chemicals, they would almost certainly have detected far more than 287, but testing

umbilical cord blood for industrial chemicals is expensive and technically challenging. As it is, laboratory costs for the cord blood analyses reported here were $10,000 per baby tested.

There are many sources for environmental contaminants, including production of plastics, industrial bleaching, breakdown products of Teflon, Scotchgard, fabric and carpet protectors, food wrap coatings, flame retardants in furniture and children's sleepwear, wood preservatives, paints and varnishes, machine lubricating oils, pollutants from burning gasoline and incineration of plastics & other garbage, and agricultural use of chemicals. Some of these widespread environmental contaminants persistent at low levels in our environment include: insecticides (organophosphates & pyrethroid metabolites), phthalates, polybrominated diphenyl ethers (PBDEs), polychlorinated biphenyls, polybrominated dibenzo-p-dioxins and dibenzofurans (PBDD/Fs) in e -waste plastic, bisphenol A; a veritable alphabet soup of chemical compounds: PCBs, PAHs, PFCs, PVCs, PCDD**.** Some of these compounds, though banned, persist in the environment for decades, and are still around. Add to this the heavy metals, including lead, mercury, cadmium, arsenic, which will potentiate the toxic effect of persistent organic pollutants.

What relevance does this have to initiating a roadside spray program using Clearview? The point is that the program is adding more toxic material to an already toxic environment.

Toxic Effect of Herbicides increased in the Presence of Complex Mixtures- additive or synergistic toxicity

Most agricultural herbicides are applied with so-called "inert ingredients" that are often toxic, and yet because they are considered proprietary, their characteristics do not have to be disclosed. Add this to the fact that the herbicides are introduced into an environment already contaminated with a potpourri of industrial chemicals, and we have a recipe for toxicity the goes far beyond simple additive effects: synergistic effects, in which one plus one equals five or even 50. We also know that such mixtures can cause damaging health effects that were not even anticipated based on simple studies of individual chemicals. The Halifax Project, a collaboration of over 300 scientists, provides multiple review papers (cited in the journal *Carcinogenesis* noted below) documenting the hazards of low-level mixtures of chemical pollutants, and calling regulatory agencies take a more thorough scientific and protective approach to low-level contaminants, acknowledging and addressing what we already know regarding mixtures.

David R. Jacobs, PhD, Mayo Professor of Public Health at the Division of Epidemiology and Community Health, summarizing what is now known about the proliferation of multiple low-level environmental contaminants stated, "If we have a chemical that is noxious to one form of life, then it also is going to do some kind or other of subtle damage to you."

Susceptibility to environmental toxicity much greater for unborn children, infants and the elderly
There are many individuals with impaired ability to detoxify and eliminate environmental contaminants, and others with immune dysregulation, including significant allergic hypersensitivity. These are the canaries in the coal mine, the ones who are most susceptible to adverse effects from a herbicide spray program. There is plenty of evidence that infants and young children face much higher risks for harm. The US Environmental Protection Agency has suggested that babies are 10-65 times more vulnerable to the effect of carcinogens than adults.

What precautions will a spray program take to notify young women who could be pregnant or who have young children at home? What precautions will be taken to protect the elderly and the hypersensitive?

Parallel with the controversy over hazards related to tobacco smoke

We have faced a similar issue regarding toxicity before, and the differences in opinion have real parallels: smoking. Tobacco does not kill quickly, it is a very slow poison. As a result, almost 30 years passed from the time medical pioneers first tried to convince the establishment that smoking caused most cases of lung cancer until the link was generally accepted. It took even longer to acknowledge the hazards associated with secondhand tobacco smoke. Over those 30 years, while the link between lung cancer and smoking was still being hotly contested by the medical establishment, over 4 million people died in North America from a preventable cause of death. "There is no evidence" was the battle cry of the pro-tobacco lobby, until the accumulated research became undeniable. Are we going through the same process now? Are we being told "no evidence of harm" because of lack of adequate research as opposed to an accurate assessment of long term risk?

There are safer & practical solutions

Dr. Peter Carrington wrote a letter to the Lanark County Counsellors, a copy of which has been provided to you. He points out that there are methods safer and more effective than what he terms a "traumatic, costly and ultimately unsuccessful herbicide application regime that will not arm your citizens against toxic plants any more than they have been already." He points out that as an established weed, wild parsnip has a seed bank much more extensive than anyone could afford to spray. These are words from the toxic plant resource person at Michigan State University, a person who likely knows more about wild parsnip than any person present at this meeting.

For comparison, there are far more people severely affected by poison ivy then there are who have been severely affected by wild parsnip. To consider a widespread spray program for poison ivy would be considered folly.

In summary, though we do not know exactly how this would play out, you can be certain that conducting a roadside spray program throughout Lanark Highlands Township will add more chemical straw to the populations camel's back. In various ways this will eventually add to the total burden of chronic disease of the people of this township.

You are facing an upsurge of opposition to the spray program as more and more people become aware of what is being planned. We respectfully ask for a moratorium on proceeding with this proposed roadside spray program, to give time for more careful consideration of safer & practical ways of addressing the problems associated with Wild Parsnip.

REFERENCES

Data used as evidence that the Clearview herbicide is safe:

(NB-all this data and its conclusions are based on the traditional toxicological injury model, now considered an inadequate assessment of long-term risk.)

US National Library of Medicine, Toxicology data network: Aminopyralid

US National Library of Medicine, Toxicology data network: Metsulfuron-Methyl

Special Review of Aminopyralid: Decision for Consultation, Health Canada Re-evaluation Note, REV2014-01

Pest Management Regulatory Agency, 24 April 2014- Regulatory Note Aminopyralid REG2007-01

Some references pointing out the hazards of chronic low dose exposure to chemical mixtures and persistent organic pollutants:

Burns, P, et al: Comments to US EPA, Office of Pesticide Programs on the Draft Pesticide Cumulative Risk Assessment Framework for Screening Analysis (EPA-HQ-OPP-2015-0422)

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Review articles cited in this series:
-Mechanisms of environmental chemicals that enable the cancer hallmark of evasion of growth suppression
-Disruptive chemicals, senescence and immortality
-The potential for chemical mixtures from the environment to enable the cancer hallmark of sustained proliferative signalling
-Causes of genome instability: the effect of low dose chemical exposures in modern society
-Disruptive environmental chemicals and cellular mechanisms that confer resistance to cell death
-Chemical compounds from anthropogenic environment and immune evasion mechanisms: potential interactions
-The impact of low-dose carcinogens and environmental disruptors on tissue invasion and metastasis
-The effect of environmental chemicals on the tumor microenvironment
-Assessing the carcinogenic potential of low-dose exposures to chemical mixtures in the environment: focus on the cancer hallmark of tumor angiogenesis
-Metabolic reprogramming and dysregulated metabolism: cause, consequence and/or enabler of environmental carcinogenesis?
-Environmental immune disruptors, inflammation and cancer risk
-Assessing the carcinogenic potential of low-dose exposures to chemical mixtures in the environment: the challenge ahead

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