

Why Doctors Support a Ban on Cosmetic Pesticides

Firstly I would like to thank you, the B.C. Special Committee on Cosmetic Pesticides for this opportunity to discuss with you the proposed law to ban the use and sale of cosmetic pesticides in B.C. I would also like to congratulate the B.C. government for considering this extremely health-protective action which will help to ensure that children in this province have the same health benefits as children in Quebec, Ontario and other provinces that have passed legislation that assures that their children are not exposed to these toxins unnecessarily. After my talk, I hope you will realize that this is a huge step forward in public health to help to reduce the rate of many illnesses caused by pesticides, including childhood cancer, which has increased dramatically in past years, partly due to pesticide use.

I have been a family doctor in Ontario for 25 years and presently am a professor in the Department of Family Medicine at Queen's University in Kingston, Ontario. I have been on the Environmental Health Committee of the Ontario College of Family Physicians for over 10 years. I am also on the Board of Directors of Canadian Association of Physicians for the Environment, and of Physicians for Global Survival. I believe passionately that the environment plays a key role in human health. I think it is my role as a physician to protect the environment because it is a major issue in preventive medicine, and in maintenance of our children's health.

I understand that polls indicate that a majority of British Columbians support this legislation, similar to citizens of other provinces. Certainly in Ontario, where the law was implemented in 2009, the recent election resulted in the Liberal government being re-elected. Ontarians clearly support their pesticide ban law, and in fact it was not an election issue at all. After this ban, concentrations of some of these pesticides have dropped as much as 97% in some urban Ontario streams and waterways. The Ontario ban has improved some businesses that deal in organic lawn products, and in Halifax, in response to the municipal ban, landscaping and lawn care businesses grew by 53%, similar to Toronto after its municipal by-law was implemented. In addition, health care costs of pesticide-related diseases such as cancer will decrease, as the benefits of laws banning pesticides are manifested in less disease. This will decrease the financial burden of a system that will be increasingly strained by an aging population.

But I am really here to describe to you the reasons why I believe that a province-wide ban on cosmetic pesticides is absolutely necessary, to protect the health of British Columbians, especially children. In 2004, I co-authored a review of the medical literature looking at the human health effects of pesticides for the Ontario College of Family Physicians, the association of family doctors in Ontario representing over 9000 family doctors. This was a systematic review, meaning that the studies were chosen in a non-biased systematic standardized method. We looked at over a hundred studies and found that there was very strong evidence that pesticides cause birth defects, infertility, neurological diseases such as Parkinson's Disease, and a number of cancers. The alarming thing we found was that rates of childhood cancers including leukemia, lymphoma and brain tumours were increased with typical home and garden use of

pesticides during, after and even before pregnancy. Again, this means that children are developing cancer due to home use of pesticides. More recent studies have corroborated this, and include exposure not just to infants and children, and pregnant women, but fathers as well. This is why the proposed legislation in B.C. is so important. It will ensure that children will not develop cancer because of use of pesticides in their homes and gardens.

The powerpoint presentation that I understand you have in front of you is a short synopsis of our findings. I'll briefly summarize the results. We looked at a total of 165 scientific studies, 109 of them dealing with cancer. Some were just on children, some on adults, looking at both occupational and household use of pesticides. Some of the studies on children were looking at whether parental exposure, both mothers and fathers, both occupational and home use of pesticides, caused an increase in cancer in their children.

We found that most of the studies on all types of cancer, for both children and adults were positive, meaning that they showed that pesticide exposure was associated with an increase in cancer risk. One particular study (Kristensen, 1996) looking at the children of Norwegian farmers found an increase in brain tumours in their children, with higher exposure causing higher risk. This finding has been replicated in many other studies. It is not known whether the men were bringing home pesticide residues on their clothing to expose their children or pregnant wives, or if there was some sperm damage which caused cancer in the child.

All studies on kidney cancer were positive. Similar to the above study on fathers, a large study (Fear, 1998) found an elevated risk of kidney cancer in children whose fathers were employed in agriculture.

All 8 studies on prostate cancer were positive. A very detailed methodologically sound study on pesticide applicators in the U.S. (Alavanja, 20030) showed a significant elevation in risk of prostate cancer, especially with methyl bromide, a fumigant for rodents and insects, particularly in men with a family history of prostate cancer.

The most compelling studies were those on leukemia in children. Repeatedly, the studies were consistent in showing higher rates of leukemia in children whose mothers were exposed to pesticides, usually in the home, especially during pregnancy. This is consistent with many theories that suggest that childhood cancer is due to a prenatal insult.

One very high quality study (Ma, 2002) showed elevated rates of childhood leukemia in all exposure windows (pre-conception, pregnancy, and years 1, 2 and 3 of life), especially during pregnancy. Again this shows the importance of protecting pregnant women from household and garden use of pesticides.

Another very important study was a Canadian study (Infante-Rivard, 1999) which showed increases in leukemia risk with parental use of pesticides in the home. Authors also studied a sub-group that metabolizes pesticides slowly (estimated at 40% of the

population in Montreal in this study), where the risk of developing leukemia was even higher, as much as 5-fold. This indicates that a large sector of the population may be at particular risk when exposed to pesticides.

Studies on Non-Hodgkin Lymphoma (NHL), a type of cancer of lymph nodes were as convincing and consistent as the leukemia studies. Most of the studies were positive, meaning that people exposed to pesticides had a greater risk of getting this type of cancer. Elevated rates of NHL have been found in golf course superintendants, farmers in Canada (increasing risk with # of acres sprayed), and also children who lived in homes where pesticides were used.

The studies on neurologic function consistently showed impacts of pesticides on a number of measures. There is rapid development of nerves in children under age 6, which means we should be extremely cautious of the potential neurotoxins they are exposed to. One of the slides shows drawings done by children with exposure to pesticides compared to others without exposure. The exposed group clearly has suffered neurological damage, meaning pesticides have damaged the children's brains and nervous system. In addition, studies on Parkinson's Disease, a serious degenerative neurological disease, has shown that people who metabolize pesticides slowly are more likely to develop Parkinson's Disease with exposure to pesticides.

Further slides describe the positive findings of studies on birth defects including heart, nervous system and facial defects. Other studies show positive associations with low birth weight (this is important because it is a significant determinant of health problems in childhood and later in life), miscarriage, stillbirth and chromosomal aberrations. Chromosomal aberrations are damage to chromosomes by some insult to the cells, and these are known to cause cancer, birth defects and genetic disease.

I'd like to describe a few more recent studies on the subject of pesticides and childhood cancer that have been published since our original review. One study published in 2006 in the journal, *Paediatrics & Child Health* called "Pesticide assessment: Protecting public health on the home turf," focuses attention on 2,4-dichlorophenoxyacetic acid (2,4-D), which is the herbicide most commonly used to kill weeds in grass. The authors of the study conclude "the balance of epidemiological research suggests that 2,4-D can be persuasively linked to cancers, neurological impairment and reproductive problems."

Another study (Vinson, 2011) pooled results of 40 studies in a meta-analysis (where results of a number of studies are combined to increase numbers and strengthen the results). It found that the risk of a child developing lymphoma or leukemia increased significantly when the mother was exposed to pesticides during pregnancy. The risk of brain cancer was correlated with paternal exposure before and after birth. Importantly this exposure was due to household exposure which is the type of exposure that would be banned with a province-wide law as is being proposed in B.C. This underlines the importance of protecting pregnant women and men of child-bearing age from the deleterious effects of pesticides in order to protect the fetus and young child.

Another meta-analysis (Bailey, 2010) looking at home use of pesticides found an increased risk of childhood leukemia with pest control treatments during pregnancy and early childhood years. Authors concluded that residential pesticide use during pregnancy and early childhood is associated with childhood leukemia.

All of these studies are consistent with previous medical literature and with our conclusions from the Ontario College of Family Physicians' review.

One more extremely important study I would like to tell you about was done in 2004 in New York City, looking at birth weight and exposure to insecticides. Remember that low birth weight babies have higher risk for many health problems later in life. A ban of insecticide use was enforced in 2001 in New York City. Babies born before the ban was enforced had higher levels of pesticides (measured in the umbilical cord blood) and lower birth weights. Babies born after the ban had substantially lower concentrations of pesticides in their umbilical cords, and no depression of fetal growth. This is strong evidence that bans on pesticides, such as the one proposed in B.C., are already health protective, with measurable improvements in children's health.

As you can see by briefly perusing it, the evidence is clear that pesticides cause many serious and fatal illnesses and unnecessary use should be banned. It is well known that children are more vulnerable to the toxic effects of pesticides. They eat and drink more per kilogram of weight, they play on or near the ground, giving them more exposure, and small children put things in their mouths, increasing their ingestion of pesticides indoors and outdoors. Remember that exposures to pregnant women affect the women as well as the growing fetus. If the fetus is female, she has developed eggs in her ovaries that will in adulthood be her own children. So a pregnant woman's exposure not only exposes her and her fetus, but her grandchildren as well. This is why we need to be extremely careful with protecting the health of pregnant women, as exposures during pregnancy affect generations to come. By implementing a province-wide ban on at least the cosmetic non-essential use of pesticides, B.C.'s children would at least have the health protection enjoyed by other children across the country living in provinces that enforce such a law.

I represent over 9000 family doctors in Ontario. Doctors are an unbiased group of professionals whose job is to keep people healthy. We do not have any financial interest in banning pesticides, and our goal is to improve the health of our patients, and all Canadian citizens. The best way to do this is through preventive medicine.

This proposed legislation is an excellent way to protect the health of B.C.'s children. I urge you to support a law banning the use and sale of non-essential pesticides, based on Ontario's law which is the most health-protective in North America.

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Pesticides and Health

For B.C. Special
Committee on
Cosmetic Pesticides
By Cathy Vakil M.D.

Systematic Review of the Human Health Effects of Pesticides, 2004

- See <http://www.cfpc.ca/english/ocfp/communications/publications/default.asp?s=1#EnvironmentHealth>, click on Pesticides Literature Review
- Cancer, dermatological, neurological, reproductive, genotoxic, immunological

Background, Methodology of the Review

- primary, peer-reviewed, human, 1992-2003, excluding organochlorines, English/French/Spanish/Portuguese
- PreMedline, Medline, CancerLit, LILACS
- Review articles, select which health effects to study (gaps in literature, burden of illness)
- MeSH headings, abstracts

- 109 cancer - lung, breast, colorectal, pancreas, non-Hodgkin's lymphoma, leukemia, brain, prostate, stomach, ovary, kidney, testicular
- 156 non-cancer - genotoxic/immunotoxic, dermatologic, neurotoxic, reproductive

Brain cancer

- 5 cohort, 5 case-control, 1 ecological
- All positive

LM, Bye AS, Sundheim L.
International Journal of Cancer.
1996

- 323,292 offspring of Norwegian farmholders
- Increased risk was found for brain tumours, in particular non-astrocytic neuroepithelial tumours
- dose-response relationship

Breast Cancer

- 6 studies
- decreased breast ca. in farming women with increase in certain subsets (present in fields when spraying, no protective clothing)
- more benign breast disease on mammograms
- Increase with triazine class of herbicides

Kidney cancer

- 6/6 positive
- Fear NT, Roman E, Reeves G, Pannett B. Childhood cancer and paternal employment in agriculture: the role of pesticides. *British Journal of Cancer*. 1998 – 167,703 children of men exposed to pesticides, PMR 1.59 (CI 1.18-2.15)

Lung cancer

- 2/4 studies controlled for smoking
- Both positive

Pancreatic cancer

- 3/3 positive
- 1 controlled for smoking

Prostate cancer

- 8/8 positive
- Alavanja et al, Use of agricultural pesticides and prostate cancer risk in the agricultural health study cohort. *American Journal of Epidemiology*. 2003; **157**(9):800–14 - 55,000 pesticide applicators, increase in prostate cancer, esp. with methyl bromide, esp. with family history

Leukemia

- 14/16 positive
- Ma X, Buffler PA, Gunier RB, Dahl G, Smith MT, Reinier K, Reynolds P. Critical windows of exposure to household pesticides and risk of childhood leukemia. *Environ Health Perspec* 2002;110:955–960
- Increase with exposure to insecticides in all time periods esp. pregnancy

Infante-Rivard, 1999

- Parental use of insecticides and herbicides in the garden and on indoor plants
- Mothers exposed during pregnancy
- RR increased up to 5.5 if child has 1 of 3 common poor metabolizer mutations

Non-Hodgkin's Lymphoma

- Cohort studies: 11 (9 positive association, 3 with statistical significance, 2 negative)
- Case-control studies: 14 (12 positive association, 8 with statistical significance, 2 negative)
- Ecological: 2 (2 positive association)

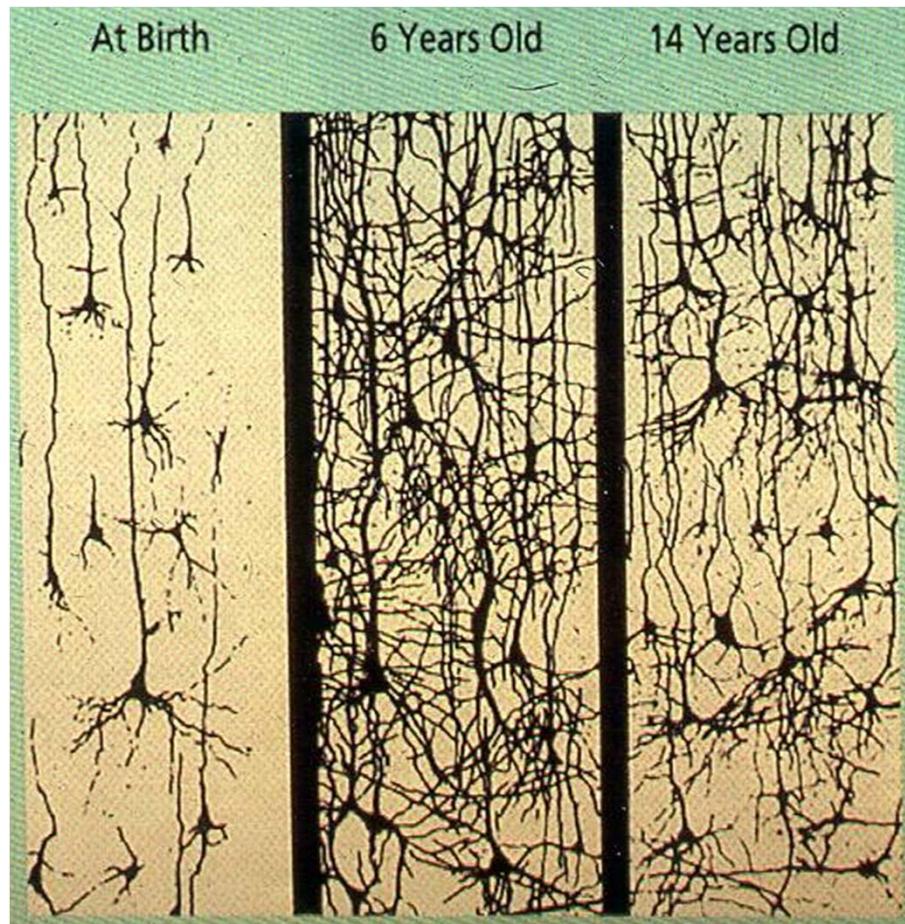
NHL studies

- 155,000 farmers in Canadian prairies, RR 2.11 (CI 1.1-3.9), increased NHL with # acres sprayed
- Golf course superintendents
- Increased in children where pesticides used most days, used for professional exterminations, children had direct post-natal exposure and parents had occupational exposure

Neurotoxicity

- 39/41 positive for one or more neurologic abnormalities
- only 2 studies on children

Synaptic density



(Drawings supplied by H.T. Chugani)

- Wide variety of neurological measures: nerve conduction, power, vibration, reflexes, memory, tremor, postural sway
- Consistent evidence of pesticide impacts on nervous system
- Insecticides, fungicides, herbicides

- Children's drawings from 2 Mexican villages
- Guillette, EHP 1998

Drawings of a Person

by Yaqui children (by age and gender)



54 mos. girl

Foothills
(pesticide-free)



60 mos. girl

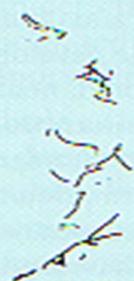


55 mos. girl



71 mos. boy

Valley
(pesticide-exposed)



54 mos. girl



71 mos. girl



53 mos. girl



71 mos. girl

Congenital Malformations

- **Positive findings for:**
- Any birth defect
- Limb reduction defects
- Urogenital defects
- CNS defects
- Orofacial, eye anomalies, heart defects

Risk of severe heart defect with maternal pesticide exposure

n=1832

Loffredo 2001

- **Relative Risk of Transposition of the great arteries with:**

- Insecticide exposure RR= 1.5
- 1st trimester pesticides RR= 2.0
- Any maternal exposure RR= 2.8
- Rodenticide exposure RR= 4.7

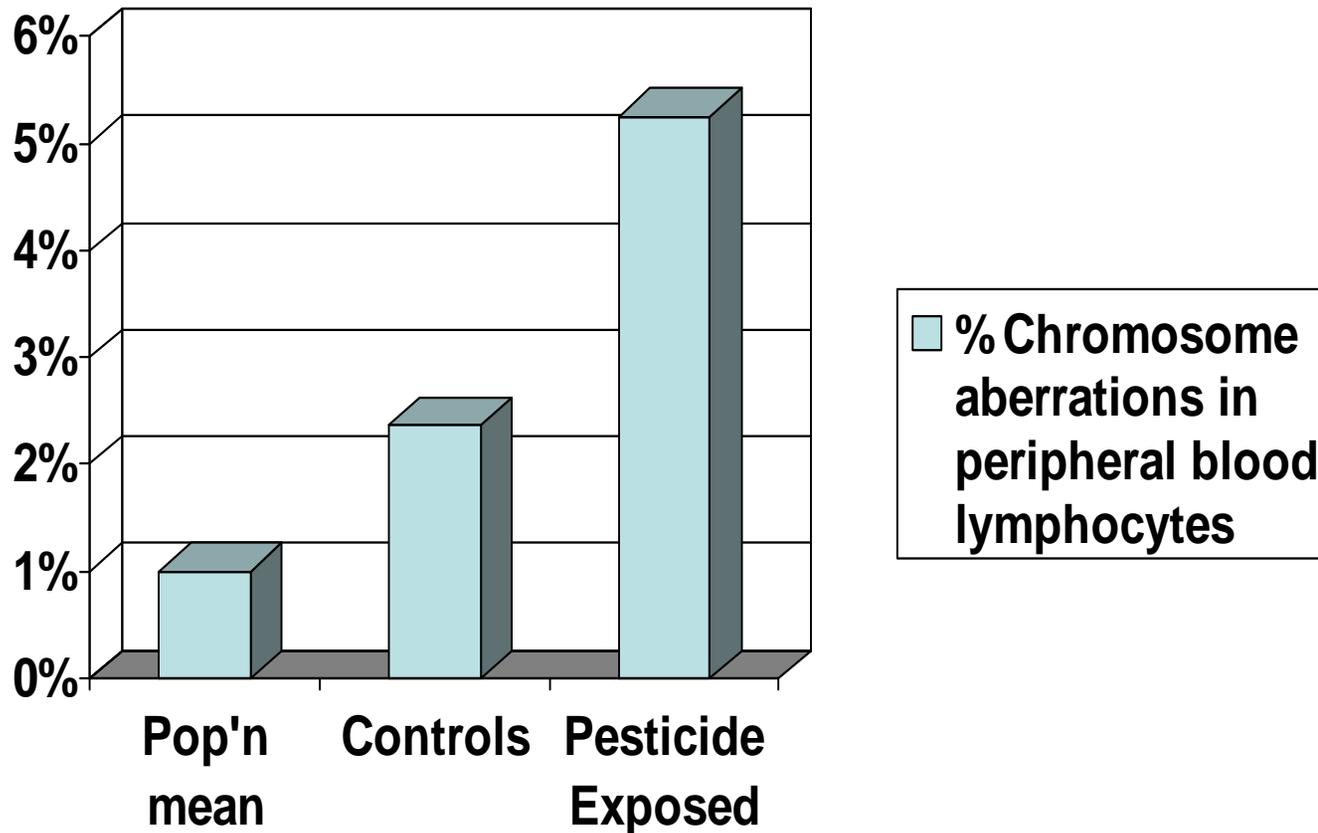
Altered Growth

- Includes low birth weight, prematurity, intrauterine growth retardation (IUGR)
- Important determinant of health problems in 1st yr of life and development of chronic health problems in later life (D Barker et al 2003)
- 7/10 papers showed positive association, 1 herbicides, 1 pyrethroids, 1 chlorpyrifos

Fetal Death

- Includes spontaneous abortion, fetal death, stillbirth, neonatal death
- 9/11 studies showed an association with pesticide exposure
- results point to critical windows for exposure to pesticides

Percent of chromosome aberrations for 500 control and 529 exposed subjects (14 genotoxicity studies)



Response

- Public
- Industry
- Government
- Health professionals
- Policy change

