Prepared Statement of Dr. Bruce Lanphear

Testimony in Support of SB 853
March 26, 2019

Members of the Committee:

Thank you for the opportunity to testify. My name is Bruce Lanphear. I am a physician and a professor in Health Sciences at Simon Fraser University and a Clinician Scientist at BC Children's Hospital Research Institute in Vancouver, British Columbia.

I have studied the impact of toxic chemicals, like lead and OP pesticides, on children's brain development for over 20 years. I have also served on numerous scientific committees on environmental health issues impacting children, including the Executive Council on Environmental Health for the American Academy of Pediatrics. I am the current President of the International Society for Children's Health and the Environment, which promotes high-quality research and advocates to protect children from toxic chemicals.

I am here to urge you to support SB 853 that will prohibit the use of chlorpyrifos in Oregon and protect children from this toxic chemical.

One in six American children has a developmental problem, from a subtle learning disability to overt behavioral disorders, such as ADHD, anxiety and autism (Boyle, 2011; Lanphear, 2015). These brain-based disorders can seriously impair a child's ability to succeed in school, reduce their lifetime earnings and diminish their ability to contribute to society.

Over the past 30 years, we have learned that toxic chemicals, like lead, PCBs and organophosphate pesticides, are risk factors for these brain-based disorders (Lanphear, 2015).

We have learned that toxic chemicals, like chlorpyrifos, can substantially impact brain development and radically alter children's life trajectory. Some toxic effects may not become manifest until years after exposures occur (Hertz-Picciotto, 2018).

Studies have consistently – if not universally – shown that OP pesticides and chlorpyrifos are toxic, even at very low levels (Hertz-Picciotto, 2018).

In one systematic review, the adverse effects of OP pesticides on learning and behavioral problems in children were observed in all but one of the 27 studies, especially for exposures that occur during brain development (Gonzalez-Alzaga, 2013).

Studies have shown that children who are exposed to chlorpyrifos are at greater risk for developing IQ deficits and ADHD; there is emerging evidence that chlorpyrifos exposure during fetal development increases the risk for autism (Hertz-Picciotto, 2018; von Ehrenstein, 2019).

The toxicity of early-life exposure to chlorpyrifos on neurodevelopmental end points has been confirmed in experimental animal studies (US EPA, 2014; Slotkin, 2005).

How could this happen? Chlorpyrifos and other OP pesticides were licensed for use as insecticides before requirements to evaluate them for human toxicity and ecologic impacts were established (Hertz-Picciotto, 2018).

When I was trained in medicine 30 years ago, I was taught that low-level exposures to toxic chemicals were safe or innocuous. Over the past 20 years we have learned that there is no threshold or safe level for some of the most well-studied toxic chemicals, like lead and organophosphate pesticides (Lanphear, 2015).

We have also learned that the developing brain is usually more vulnerable to toxic chemicals.

Brain cells grow rapidly during fetal development and early childhood, and rapidly growing cells are more vulnerable to toxic chemicals. Indeed, this is the same principle used to treat how cancer patients: cancer patients are given toxic chemicals with the hope that the fast-growing cells – cancer cells – will preferentially uptake the poisons and die.

Over 80% of pregnant women and children are regularly exposed to organophosphate pesticides, mostly from food. Children who live on or near farms and golf courses are often more heavily exposed to chlorpyrifos and other pesticides (Hertz-Picciotto, 2018).

The chemical industry has tried to assure us that concentrations of these toxic chemicals are too small to cause harm. But that is misleading. Chemicals can be toxic, even at very low levels.

University of California scientists reported that, as the level of organophosphate pesticides in pregnant women increased from 10 to 75 ppb, the IQ scores of their children dropped by about 5 points (Bouchard, 2011).

This is tragic for a child, but it is devastating at a population level. If we shifted an entire six-year birth cohort of American children IQ by 5 points, it would result in a 50% increase in the number of American children who have an IQ below 70 points, from 6 million to 9.4 million. There would be a corresponding decrease in the number of children that are gifted, from 6 million to 2.4 million (Lanphear, 2015).

The impact of OP pesticide exposure adds up: David Bellinger estimated a loss of 16 million IQ points for a six-year birth cohort of US children from OP pesticide exposures (Bellinger, 2012). The cost of not protecting children from chlorpyrifos is substantial. For each IQ point lost, a child's lifetime earnings will decrease by about $15,000.

In summary, the science is clear and consistent: chlorpyrifos is putting the health of our children at risk for brain-based disorders that can have lifelong impacts and diminish their opportunity to thrive.

References

1. Bellinger DC. A strategy for comparing the contributions of environmental chemicals and other risk factors to neurodevelopmental of children. Environ Health Persp 2012;120:501-507.
2. Bouchard MF, Chevrier J, Harley KG, et al. Prenatal exposure to organophosphate pesticides and IQ in 7-Year old children. Environ Health Perspect 2011;119:1189-1195.
3. Boyle CA, Boulet S, Schieve LA, et al. 1994. Trends in the prevalence of developmental disabilities in US children. Pediatrics 127:1034-1042.
4. Chen J, Kumar M, Chan W, Berkowitz G, Wetmur JG. 2003. Increased influence of genetic variation on PON1 activity in neonates. Environ Health Perspect 111: 1403-1409.
5. Gonzalez-Alzaga B, Lacasana M, Aguilar-Garduno C, et al. A systematic review of neurodevelopmental effects of prenatal and postnatal organophosphate pesticide exposure. Toxicol Letter 2014;230:104-121.
6. Hertz-Picciotto I, Sass JB, Engel S, et al. Organophosphate exposures during pregnancy and child neurodevelopment: Recommendations for essential policy reform. PLoS Medicine 2018;15(10):e1002761.
7. U.S. EPA. EPA Revised Human Health Risk Assessment on Chlorpyrifos. December 2014. Docket ID EPA-HQ-OPP-2008-0850. Available from: http://www.epa.gov/ingredients-used-pesticide-products/revised-human-health-risk-assessment-chlorpyrifos
8. Von Ehrenstein OS, Ling C, Cui X, et al. Prenatal and infant exposure to ambient pesticides and autism spectrum disorder in children: population based, case-control study. BMJ 2019; 364 doi.ort/10.1136/bmj.1962
9. Slotkin TA, Seidler FJ. The alterations in CNS serotonergic mechanisms caused by neonatal chlorpyrifos exposure are permanent. Developmental Brain Res 2005;158:115-119.