



Position Statement in support of SB 300 Prohibiting Chlorpyrifos

February 11, 2020

My name is Michael Ichniowski, MD, and I am a pediatrician and Chairperson of the Environmental Health Committee of the MDAAP and a member of the Maryland State Medical Society. This written testimony is presented on behalf of these organizations.

The Maryland Chapter of the American Academy of Pediatrics (MDAAP) is an organization of physicians who provide health care to the children of Maryland and advocate on their behalf in matters concerning their health and well-being. MDAAP, like its parent organization, the American Academy of Pediatrics, supports the prohibition of chlorpyrifos, as proposed for the State of Maryland in SB 300. The Maryland State Medical Society also supports this bill.

In considering toxic exposures in children, it is extremely important to be aware of their increased susceptibility to adverse effects by virtue of their ongoing physical and neurological development. Any substance that interferes with these developmental processes can result in lasting and potentially irreversible harm to children. Children are at increased risk because of their smaller size, which results in a higher dose of the toxic substance relative to their body weight. Exposures in pregnant women can affect the growing fetus during the critical times of organ formation, brain development and early growth. Infants and toddlers play and explore at ground level, and their increased hand-to-mouth behavior results in a much greater potential for ingestion of toxic substances in their environment.

The pesticide, chlorpyrifos, is a nerve agent that works by interfering with acetylcholinesterase, an enzyme present throughout the human nervous system. Blocking this enzyme prevents the breakdown of acetylcholine; the resulting increase of this neurotransmitter at nerve endings results in excessive stimulation of the nerves to which they connect, and also the target muscles and organs of these nerves. Acute poisoning from chlorpyrifos by this mechanism has been well-known for decades. However, additional mechanisms of neurotoxicity also play a role, as adverse effects have been observed in association with far lower levels than those that produce significant inhibition of acetylcholinesterase. These lower-dose toxic effects are of particular concern with in utero exposures. The fetal brain, which has to undergo tremendous growth and development prior to birth, can receive an enormous dose of a toxic chemical relative to its small size from such prenatal exposures. **EPA scientists concluded that there was no safe level of exposure to chlorpyrifos.**

Chlorpyrifos can be absorbed by oral ingestion, through inhalation or directly through the skin. Ingestion can occur from residues of this chemical on treated crops, which include many fruits, vegetables and nuts, and also through drinking water from watersheds in which chlorpyrifos is used. Inhalation can occur from aerial spraying of this pesticide, which can drift and settle well beyond

targeted areas. It can cause both acute poisoning from a single toxic exposure as well as cumulative toxicity from chronic exposure to much smaller amounts. Because of health concerns associated with household use of chlorpyrifos, its sale for residential use was prohibited by the Environmental Protection Agency (EPA), effective December 31, 2001. An extensive review of the evidence of toxicity from agricultural use, particularly in children and in infants born to exposed mothers, led the EPA to recommend a total ban on the use of chlorpyrifos to become effective in April, 2016. A further analysis and report by the EPA in November, 2016, showed risks from dietary exposures and drinking water, which supported the EPA's original proposal.¹ Unfortunately, this proposal to revoke all tolerances for chlorpyrifos, based on the EPA's own analysis and review of available studies, was overturned by its Administrator in March, 2017.

A number of published studies have demonstrated associations between increased exposure to chlorpyrifos and adverse neurodevelopmental effects. The Columbia Center for Children's Environmental Health (CCCEH) of Columbia University in New York City followed a group of inner-city children with prenatal exposure to chlorpyrifos and compared children with higher and lower levels of chlorpyrifos in cord blood at birth. **At age 3, the children with higher levels had a 2.4 times greater risk of mental delay; a 4.9 times greater risk of psychomotor delay; a 6.5 times risk of attention deficit/hyperactivity disorder (ADHD); an 11.26 times risk of attention disorders; and a 5.39 times risk of pervasive developmental disorder, a group of disorders that includes autism-spectrum disorders.**² Continued follow-up of this group at age 7 found decreases in Full-Scale IQ and the Working Memory Index subtest in association with increasing levels of cord blood chlorpyrifos levels,³ which demonstrates the lasting effect from prenatal exposures.

Another group of children in an agricultural community in the Salinas Valley in California was followed for a number of years and evaluated for possible neurotoxicity in association with prenatal and postnatal exposures to organophosphate pesticides. **Prenatal levels of urinary excretion products were associated with significant increased risk of attention problems and ADHD at age 5 and with lower scores for full-scale IQ and on scores for working memory, processing speed, verbal comprehension and perceptual reasoning in this cohort at age 7.**^{4,5} Another study conducted in California evaluated neurodevelopmental disorders and prenatal residence in proximity to agricultural pesticide application. **Pregnant women living within 1.5 kilometers of an agricultural application of chlorpyrifos during the second trimester were found to have a 3.3 times increased risk of their children having an autism spectrum disorder.**⁶ This shows that chlorpyrifos can have effects almost 1 mile from where it was applied.

Another study from California, published in the British Medical Journal in March, 2019, looked specifically at agricultural exposures to several pesticides, including chlorpyrifos, and evaluated pesticide use within 2 kilometers of each subject's residence. **The authors found a 27% increase in autism spectrum disorders with intellectual disability from fetal exposures to chlorpyrifos, and a 31% increase from exposures during the first year of life.**⁷

EPA estimates of median or typical exposures to chlorpyrifos are likely 5 times greater than its proposed level of "safe" intake for pregnant women and infants, and up to 11 to 15 times greater for toddlers and older children.⁸ The nation's Food Quality Protection Act (FQPA) directs the EPA to revoke permitted pesticide residue levels, or tolerances, when those levels are determined no longer to be safe. The FQPA further requires an additional tenfold safety factor be applied for potential prenatal and childhood toxicity compared to adults in considering pesticide safety. Under the FQPA, "safe" means that "there is reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and other exposures for which there is reliable

information.”⁹

The prevalence of autism and ADHD continues to rise each year, and these disorders have lasting adverse impacts on children and their families, as well as affecting the quality of their lives. These families bear the costs of increased medical services, including more doctor and specialist visits, long-term medications and therapy services. These children also require increased educational services at a cost to taxpayers throughout the state.

The growing body of evidence of chlorpyrifos toxicity led the EPA to propose revoking all tolerances for this pesticide in 2015 and again in 2016, and the evidence continues to grow. The EPA Administrator’s decision not to finalize this revocation continues to put children at unnecessary risk of substantial and irreversible neurodevelopmental injury. **As past AAP President, Dr. Fernando Stein, wrote in an opinion letter to the New York Times in November, 2017, “Pediatricians are alarmed by the EPA’s recent decision to allow the continued use of chlorpyrifos...This chemical is unambiguously dangerous and should be banned from use.”** Through SB 300, Maryland has the opportunity to protect its youngest citizens by banning the use of chlorpyrifos here. Regulation that allows continued use of chlorpyrifos will not eliminate the risk to Maryland’s children; only a complete ban on its use will achieve this. MDAAP, along with the Maryland State Medical Society (Med-Chi), respectfully request a favorable report for this bill.

References

¹ US Environmental Protection Administration, *Chlorpyrifos: Revised Human Health Risk Assessment for Registration Review*, EPA-HQ-OPP-2015-0653-0454 (Nov. 3, 2016).

² Rauh, VA, et al. Impact of prenatal chlorpyrifos exposure on neurodevelopment in the first 3 years of life among inner city children. *Pediatrics*. Dec. 2006; 118 (6): e1845-e1859.

³ Rauh, VA, et al. Seven-year neurodevelopmental scores and prenatal exposure to chlorpyrifos, a common agricultural pesticide. *Environmental Health Perspectives*. Aug. 2011; 119 (8): 1196-1201.

⁴ Marks, AR, et al. Organophosphate pesticide exposure and attention in young Mexican-American children: The CHAMACOS Study. *Environmental Health Perspectives*. Dec. 2010; 118 (12): 1768-1774.

⁵ Bouchard, MF, et al. Prenatal exposure to organophosphate pesticides and IQ in 7-year-old children. *Environmental Health Perspectives*. Aug. 2011; 119 (8):1189-1195.

⁶ Shelton, JF, et al. Neurodevelopmental disorders and prenatal residential proximity to agricultural pesticides: The CHARGE Study. *Environmental Health Perspectives*. Oct. 2014; 122 (10): 1103-1109.

⁷ von Ehrenstein, OS, et al. Prenatal and infant exposure to ambient pesticides and autism spectrum disorder in children: population based case-control study. *BMJ* 2019; 364:I962

⁸ US Environmental Protection Administration, *Chlorpyrifos Acute and Steady State Dietary (Food Only) Exposure Analysis to Support Registration Review*, EPA-HQ-OPP-2008-0850-0197 (Nov. 18, 2014).

⁹ 21 U.S.C. Sec. 346a(b)(2)(C).