How Washington Can Protect Farm Workers – and Children – from Harmful Toxins

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Organophosphates are chemical compounds commonly used in insecticides, herbicides, and flame retardants. The chemical structure of organophosphates interferes with an enzyme that is essential for the functioning of muscle neurons – which is why these compounds have been used in insecticides and chemical weapons like nerve agents.

Research from the University of Washington Superfund Research Program suggests that there is high variability in individual susceptibility to organophosphates. Policymakers and others who are interested in protecting Washington's farm workers, the livelihoods of those who depend on those workers, and children's health across the state should consider legislation banning pesticides that contain organophosphates. There are healthier, safer, and more effective options.

THE RISE, USE, AND ECONOMIC RISKS OF ORGANOPHOSOPHATES

Organophosphates were originally developed by Nazi scientists during World War II. Eventually they were used as nerve agents in chemical warfare. At the end of World War II, American soldiers seized scientific data from Nazi scientists and, by 1965, had begun applying organophosphate pesticides to crops in the United States.

Chlorpyrifos, diazinon, and parathion are organophosphates commonly used as insecticides. Chlorpyrifos is routinely applied by air to Washington crops like apples, wheat, and strawberries.

Land mammals – like humans, livestock, pets, and other wildlife – have a gene that allows them to produce a protein that accelerates break down of the toxic metabolites of certain organophosphates. Humans with higher levels of this protein can withstand low levels of exposure without immediate health effects – which is one reason that the insecticides originally received approval for use on and around food. A second important reason is that all of the safety testing was carried out using the much less toxic parent compounds of the organophosphate insecticides.

In studies on the effects of these compounds, researchers removed the ability to produce this protein from lab mice and then exposed them to organophosphate insecticides. The mice without the protein died after they were exposed to a small amount – an amount that did not kill normal mice. This is important because some adults and all children under the age of two have very low levels of this protein.

Beyond humans, these pesticides harm marine mammals, fish, amphibians, and birds – none of which produce the protective protein. According to a U.S. Fish and Wildlife report finalized in August of 2017, organophosphates are so toxic that they 'jeopardize the continued existence' of more than 1,200 endangered birds, fish, and other animals and plants. However, the Department of the Interior, which oversees the Fish and Wildlife Service, blocked the release of this report and

set a new process in motion, which is intended to apply a narrower standard to determine the risks of pesticides.

THE DANGER TO HUMANS AND HISTORY OF REGULATION

In humans, the protein that protects against organophosphates is not produced in high levels until the age of two, meaning fetuses, babies, and young children are especially susceptible to the powerful neurotoxic effects of these compounds. Even adults have a large variability in the amount of this enzyme in their blood. Exposure early in life has been associated with lower IQ, memory impairment, and learning disabilities. In 1995, Dow Chemical Company, then responsible for production and safety testing of organophosphate pesticides, was fined $876,000 for harm caused. In 2000, Dow discontinued the residential use of chlorpyrifos.

In 2007, a lawsuit was brought against the U.S. Environmental Protection Agency (EPA) by the Pesticide Action Network North America and the Natural Resources Defense Council. As a result, the U.S. Court of Appeals for the Ninth Circuit issued an order asking the EPA to ban chlorpyrifos. In 2014, the EPA released a human health risk assessment showing undisputed evidence of harm, including the finding that there is no safe level of use of chlorpyrifos on food. In November of 2016, Obama's EPA administration announced plans to phase out chlorpyrifos.

In 2017, EPA Administrator Scott Pruitt announced that the EPA would reverse its decision on the phaseout of organophosphate pesticides, claiming the need for further study. In August of 2018, the Ninth Circuit Court of Appeals ordered the EPA to enforce the ban, citing indisputable evidence of human harm. In September of 2018, the EPA appealed this decision and now has until July 19, 2019 to demonstrate the need for further study.

WAYS FORWARD

The good news is bans on organophosphate pesticides such as chlorpyrifos can come from outside the EPA. In March of 2019, several U.S. senators introduced legislation to ban the use of chlorpyrifos, citing not only its harmful effects on developing children, but also its threat to endangered species.

States can also create their own regulations. In May of 2019, the California Environmental Agency announced the ban of chlorpyrifos and Governor Newsom proposed $5.7 million in new funding to support the transition to safer pesticide alternatives. While a working group investigates safer alternative pesticides, a ban has been put in place on aerial spraying, requirements have been made for quarter-mile buffer zones around areas of application, and use of chlorpyrifos is limited to crop-pest combinations that lack alternatives.

Similar local regulations could also be enacted in Washington State and would considerably improve the safety of farmworkers and their families.

Read more in Hofmann JN, Keifer MC, Furlong CE, et al. Serum cholinesterase inhibition in relation to paraoxonase-1 (PON1) status among organophosphate-exposed agricultural pesticide handlers. Environ Health Perspect. 2009;117:1402-8.
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