



# BEYOND PESTICIDES

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October 2, 2017

Human Health Assessment Branch  
Department of Pesticide Regulation  
California Environmental Protection Agency  
1001 I Street, P.O. Box 4015  
Sacramento, CA 95812-4015

## **Re: Chlorpyrifos Human Health Risk Assessment and Mitigation. Draft Evaluation of Chlorpyrifos as a Toxic Air Contaminant.**

Beyond Pesticides is writing on behalf of our California membership requesting the California Department of Pesticide Regulation (CDPR) revoke state registrations of the organophosphate chlorpyrifos. Beyond Pesticides is a national not-for-profit organization that works to advance improved protections from pesticides and alternative pest management strategies that reduce or eliminate a reliance on toxic pesticides. Agriculture is important to the California economy, and chlorpyrifos is used on a variety of crops grown in the state including almonds, cotton and citrus where over one million pounds of the chemical is used annually.<sup>1</sup> However, there have been several recent incidents involving chlorpyrifos drift after field applications that have put nearby workers and communities at risk, and recent air monitoring data reveal that chlorpyrifos residues are more than 18 times higher than federal levels of concern.<sup>2</sup> Additionally, chlorpyrifos has the potential to contaminate surface and ground waters further putting public health at risk.<sup>3</sup>

Chlorpyrifos is a cholinesterase inhibitor that binds irreversibly to the active site of an essential enzyme for normal nerve impulse transmission, acetylcholine esterase (AChE), inactivating the enzyme. The scientific evidence of the neurotoxic dangers associated with chlorpyrifos exposure is extensive and consistent. California's recent assessment finds "potential health risks" for children and women of childbearing age from aggregate chlorpyrifos exposures, including spray drift.<sup>4</sup> We are calling on CDPR to recognize chlorpyrifos as a highly

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<sup>1</sup> CDPR. 2017. Draft Evaluation of Chlorpyrifos as a Toxic Air Contaminant: Risk Characterization of Spray Drift, Dietary, and Aggregate Exposures to Residential Bystanders. Human Health Assessment Branch. Sacramento, CA

<sup>2</sup> CDPR. 2017. AIR MONITORING NETWORK RESULTS FOR 2016. Environmental Monitoring Branch. Sacramento, CA.

<sup>3</sup> USEPA. 2016. Chlorpyrifos: Revised Human Health Risk Assessment for Registration Review. Office of Chemical Safety and Pollution Prevention. Washington DC.

<sup>4</sup> CDPR. 2017. Draft Evaluation of Chlorpyrifos as a Toxic Air Contaminant: Risk Characterization of Spray Drift, Dietary, and Aggregate Exposures to Residential Bystanders. Human Health Assessment Branch. Sacramento, CA

toxic air contaminant and neurological and developmental agent, and phase-out this organophosphate chemical from use in the state, given available alternatives.

Chlorpyrifos has been under scrutiny for decades as a result of its high potential to elicit adverse neurological effects. The U.S. Environmental Protection Agency's (EPA) most recent assessment, which incorporated recommendations from the final report of a Scientific Advisory Panel (SAP), states there is "sufficient evidence that there are neurodevelopmental effects occurring at chlorpyrifos exposure levels below that required for AChE inhibition,"<sup>5</sup> and that EPA's current approach for evaluating chlorpyrifos' neurological impact is "not sufficiently health protective."<sup>6</sup> To come to this conclusion, EPA scientists rigorously reviewed data from the Columbia Children's Center for Environmental Health (CCCEH) study at Columbia University, which provided important information on the neurological outcomes of children exposed to chlorpyrifos. The study finds that children exposed to high levels of chlorpyrifos have mental development delays, attention problems, attention-deficit/hyperactivity disorder problems, and pervasive developmental disorders at three years of age.<sup>7</sup> Concentrations of chlorpyrifos in umbilical cord blood also corresponds to a decrease in the psychomotor development and a decrease in the mental development in three year olds.<sup>8</sup> A similar 2012 study finds that children with high exposure levels of chlorpyrifos have changes to the brain, including enlargement of superior temporal, posterior middle temporal, and inferior postcentral gyri bilaterally, and enlarged superior frontal gyrus, gyrus rectus, cuneus, and precuneus along the mesial wall of the right hemisphere.<sup>9</sup>

As a result of the CCCEH data, EPA retained the 10X Food Quality Protection Act (FQPA) Safety Factor for all populations including infants, children and women of childbearing age while it continued its review. The 2016 SAP agreed with the overall conclusion of the CCCEH study—that there is *an association between chlorpyrifos prenatal exposure and neurodevelopmental outcomes in children*, even though the panel did not believe there is enough data on the relationship between cord blood concentrations at birth to exposures at and around the time of chlorpyrifos application to support its use in quantitative risk assessment.

EPA also reviewed select points of departure (PoD) and their use in the quantitative risk assessment. The agency determined that there is evidence that chlorpyrifos has effects below the level at which 10% red blood cell acetylcholinesterase (AChE) inhibition is observed. Data has shown that the means by which chlorpyrifos alters neuronal function is outside of, and

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<sup>5</sup> USEPA. 2016. Chlorpyrifos: Revised Human Health Risk Assessment for Registration Review. Office of Chemical Safety and Pollution Prevention. Washington DC.

<sup>6</sup> Ibid

<sup>7</sup> Rauh VA. 2006. Impact of prenatal chlorpyrifos exposure on neurodevelopment in the first 3 years of life among inner-city children. *Pediatrics*. 118(6):e1845-59.

<sup>8</sup> Lovasi, GS, et al. 2011. Chlorpyrifos Exposure and Urban Residential Environment Characteristics as Determinants of Early Childhood Neurodevelopment. *Am J Public Health*; 101(1):63-70.

<sup>9</sup> Rauh VA, Perera FP, Horton MK, et al. 2012. Brain anomalies in children exposed prenatally to a common organophosphate pesticide. *Proc Natl Acad Sci U S A*. 109(20):7871-6.

unrelated to, the classical cholinesterase mechanism.<sup>10,11,12</sup> However, regardless of the potential for multiple pathways of toxicity, the agency noted there remains high confidence in the current available and quantifiable evidence of neurological impact. EPA also stated that its revised analysis indicates “expected residues of chlorpyrifos on most individual food crops exceed the health-based ‘reasonable certainty of no harm’ safety standard under the Federal Food, Drug, and Cosmetic Act (FFDCA).” Additionally, the agency also points out that “risk from the potential aggregate exposure does not meet the FFDCA safety standard.”

Independent epidemiological data identifies subpopulations that are disproportionately affected by chlorpyrifos exposures. Low-income African-American and Latino families, including farmworker families, continue to suffer the most, and this disproportionate impact creates environmental justice. The UC Berkeley CHAMACOS team, studying organophosphate impacts on women and children in the Salinas Valley, CA, found that every 522 pounds of combined organophosphate pesticide applications within one kilometer of a pregnant woman’s home correlates with a two point IQ loss in her children at seven years old.<sup>13</sup> A 2014 study conducted by the UC Davis Mind Institute found that pregnant women who lived within a mile of agricultural fields where chlorpyrifos was sprayed experienced a chance of giving birth to a child with autism that is more than triple the chances of women not so exposed.<sup>14</sup> Data such as these illustrate the impact chlorpyrifos and other pesticides have on agricultural communities that are often low-income and minority communities.

In light of the overwhelming evidence of chlorpyrifos’ danger to children and vulnerable communities, action must be taken to further restrict the use of this chemical. In 2015 EPA, in response to a legal petition and its own findings, proposed to revoke all tolerances of chlorpyrifos.<sup>15</sup> The SAP meeting which followed reiterated the need for the agency’s action. Unfortunately, under industry and political pressure, EPA rescinded its proposal in early 2017, despite the advice of EPA’s own scientists and the academic and medical community.

California now stands at a pivotal moment to take the lead in light of federal shortcomings, and take decisive action against this neurotoxic agent. Hundreds of our California members have already voiced opposition to the continued use of chlorpyrifos.<sup>16</sup> CDPR’s own assessment identifies risks to children and women and childbearing age, consistent with EPA’s and independent findings. Further, we believe it is inappropriate for the state to attempt to

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<sup>10</sup> Lee I, Eriksson P, Fredriksson A, et al. 2015. Developmental neurotoxic effects of two pesticides: Behavior and biomolecular studies on chlorpyrifos and carbaryl. *Toxicol Appl Pharmacol.* 288(3):429-38.

<sup>11</sup> Androutsopoulos VP, Hernandez AF, Liesivuori J, Tsatsakis AM. 2013. A mechanistic overview of health associated effects of low levels of organochlorine and organophosphorous pesticides. *Toxicology.* 307:89-94.

<sup>12</sup> Meijer M, Hamers T, Westerink RH. 2014. Acute disturbance of calcium homeostasis in PC12 cells as a novel mechanism of action for (sub)micromolar concentrations of organophosphate insecticides. *Neurotoxicology.* 43:110-6.

<sup>13</sup> Gunier, RB, Bradman A, Harley K, et al. 2016. Prenatal Residential Proximity to Agricultural Pesticide Use and IQ in 7-Year-Old Children. *Environ Health Perspect* DOI: 10.1289/EHP504

<sup>14</sup> Shelton, JF, Geraghty, E et al. 2014. Neurodevelopmental Disorders and Prenatal Residential Proximity to Agricultural Pesticides: The CHARGE Study. *Environ Health Perspect*; DOI:10.1289/ehp.1307044.

<sup>15</sup> FR Notice. EPA-HQ-OPP-2015-0653; FRL-9954-65. Chlorpyrifos; Tolerance Revocations; Notice of Data Availability and Request for Comment. November 17, 2016.

<sup>16</sup> See attachment: Appendix A

further mitigate continued use of this chemical (additional buffer zones, use deletions, application restrictions, etc.) to allow the retention of a subset of existing chlorpyrifos uses.

Chlorpyrifos is an incredibly neurotoxic organophosphate that has no place in modern agriculture as it poses dangers to farmworkers, farm families, especially vulnerable children,<sup>17</sup> and others living near agricultural areas.<sup>18</sup> There are alternatives available for farmers and other users in California that present less risk, and ensure that there is no disruption in food production and practices. We urge the state to quickly move forward to restrict this dangerous chemical.

Sincerely,

A handwritten signature in blue ink, appearing to read 'NH', is positioned above the printed name.

Nichelle Harriott  
Science and Regulatory Director

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<sup>17</sup> Beamer, PI, et al. 2009 Farmworker children's residential non-dietary exposure estimates from micro-level activity time series. *Environ Int* ;35(8):1202-9.

<sup>18</sup> Harnly, ME, et al. 2009. Pesticides in dust from homes in an agricultural area. *Environ Sci Technol*;43(23):8767-74.