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**To:** [Exhibits HAGLU](#)  
**Cc:** [Peter Spencer](#); [Mitchell Turker](#)  
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As scientists that study the toxicity of chemical compounds, including neurotoxic compounds, we write to highlight the evidence for chlorpyrifos toxicity and to encourage the committee to support legislation banning the use of chlorpyrifos in the state of Oregon.

As reviewed comprehensively by the Environmental Protection Agency in 2015 and 2016 [1-3], the animal evidence for neurotoxicity of chlorpyrifos at very low doses is conclusive, and the human observational evidence is highly compelling. We highlight seminal papers in the animal [4] and human population [5, 6] literature here. In particular, this subject was addressed in a concrete fashion in an updated 2018 academic review of the scientific literature [7] concluded that "compelling evidence indicates that prenatal exposure at low levels is putting children at risk for cognitive and behavioral deficits and for neurodevelopmental disorders". Phase-out of OP pesticides particularly chlorpyrifos, was recommended [8]. As a result, the EPA proposed a national ban on chlorpyrifos, which implementation is pending a court decision.

We concur with the EPA's recommendation, based on our scientific knowledge, and, in one case, on professional publication on the topic. Notably, one of the undersigned (P.S.) participated in a comprehensive biomedical review [9] of the toxicology of chlorpyrifos.

1. EPA 2015. Proposal to revoke all food residue tolerances for chlorpyrifos (October). EPA-HQ-OPP-2015-0653. [www.epa.gov/ingredients-used-pesticide-products/proposal-revoke-chlorpyrifos-food-residue-tolerances](http://www.epa.gov/ingredients-used-pesticide-products/proposal-revoke-chlorpyrifos-food-residue-tolerances)
2. EPA 2016. Chlorpyrifos: Revised human health risk assessment for registration review (November). EPA-HQOPP-2015-0653-0402. <https://www.epa.gov/pesticides/updated-human-health-risk-analyses-chlorpyrifos>
3. EPA SAP 2016. FIFRA Scientific Advisory Panel. Chlorpyrifos: Analysis of Biomonitoring Data (April). EPA-HQ-OPP2016-0062. <https://www.epa.gov/sap/meeting-materials-april-19-21-2016-scientific-advisory-panel>
4. Aldridge JE, Levin ED, Seidler FJ, Slotkin TA. Developmental exposure of rats to chlorpyrifos leads to behavioral alterations in adulthood, involving serotonergic mechanisms and resembling animal models of depression. *Environ Health Perspect.* 2005 May;113(5):527-31.
5. Bouchard MF, Chevrier J, Harley KG, Kogut K, Vedar M, Calderon N, Trujillo C, Johnson C, Bradman A, Barr DB, Eskenazi B., Prenatal exposure to organophosphate pesticides and IQ in 7-year-old children. *Environ Health Perspect.* 2011 119(8): 1189-95.
6. Engel SM, Bradman A, Wolff MS, Rauh VA, Harley KG, Yang JH, Hoepner LA, Barr DB, Yolton K, Vedar MG, Xu Y, Hornung RW, Wetmur JG, Chen J, Holland NT, Perera FP, Whyatt RM, Lanphear BP, Eskenazi B., Prenatal organophosphorus pesticide exposure and child neurodevelopment at 24 months: an analysis of four birth cohorts. *Environ Health*

Perspect, 2015 Sep 29.

7. Hertz-Picciotto I, Sass JB, Engel S, Bennett DH, Bradman A, Eskenazi B, Lanphear B, Whyatt R. Organophosphate exposures during pregnancy and child neurodevelopment: Recommendations for essential policy reforms. *PLoS Med.* 2018 Oct 24;15(10):e1002671. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6200179/>

8. Shelton JF, Geraghty EM, Tancredi DJ, Delwiche LD, Schmidt RJ, Ritz B, et al. Neurodevelopmental disorders and prenatal residential proximity to agricultural pesticides: the CHARGE study. *Environ Health Perspect.* 2014;122(10):1103–  
9. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6200179/>

9. Eaton DL, Daroff RB, Autrup H, Bridges J, Buffler P, Costa LG, Coyle J, McKhann G, Mobley WC, Nadel L, Neubert D, Schulte-Hermann R, **Spencer PS**. Review of the toxicology of chlorpyrifos with an emphasis on human exposure and neurodevelopment. *Crit Rev Toxicol.* 2008;38 Suppl 2:1-125. <https://www.ncbi.nlm.nih.gov/pubmed/18726789>

Signed:

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