

NON-ACUTE PESTICIDE EXPOSURE & CHILD HEALTH

A pesticide is any substance or mixture of substances intended for preventing, destroying, or mitigating any pest. Children and pregnant women are uniquely vulnerable to toxic effects from exposure to pesticides. Some of the widely used pesticides of concern in the United States include the herbicide glyphosate, organophosphate insecticides (e.g., chlorpyrifos, malathion), carbamate insecticides (e.g., carbaryl, propoxur), neonicotinoid insecticides (e.g., imidacloprid, thiamethoxam), and pyrethroid insecticides (e.g., permethrin, cypermethrin). Chronic or repeated low-dose exposures are common. There is growing evidence on the relationship between this non-acute pesticide exposure in early life and adverse neurocognitive and neurobehavioral outcomes (ADHD, autism) in children. Additional associated morbidities include cancer (brain tumors, leukemia) and adverse birth outcomes (reduced intrauterine growth, preterm birth, congenital anomalies, fetal death).

Risk Identification as Part of Routine History Taking

Questions about pesticide use can inform potential for risk

Does anyone in your

home work with

pesticides?

Do you use or store pesticides anywhere in or around your home?

Risk Reduction Based on Patient Risk & Concerns

Primary care providers are well-positioned to provide anticipatory guidance so that patients and families can limit pesticide exposure to prevent adverse health outcomes.

Many states require health care providers to report confirmed and suspected pesticide exposure. Find out if this is a requirement in your state -- and who to report to -- here.

After reporting, consider contacting your local <u>PEHSU</u> for consultation on pediatric pesticide exposure cases.



Do you live near an area frequently treated with pesticides?





PESTICIDE EXPOSURE	WHAT WE KNOW
FROM DIET	 The AAP recommends choosing organic prod reduce childhood pesticide exposure, but em high in fruits & vegetables (either conventiona grown) is most important for children's health & availability are factors. Organic diets are associated with significant r excretion of several pesticide metabolites and in children and adults.
IN HOMES, SCHOOLS & DAYCARES	 Most U.S. homes have measurable levels of inservential may serve as a source of exposure to occupoung children. Results achieved by using chemical pesticides temporary, and repeated treatments are usuall Nontoxic or low-toxicity pest control methods a common pest problems. Many exposures result from inappropriate pest law. Reading pesticide product labels can help appropriate product and use it safely.
AGRICULTURAL WORKERS & COMMUNITIES	 Children living in close proximity to agricultura someone who works in agriculture, or working themselves are at risk of higher exposures. State and federal labor laws limit the age at whagricultural work and what duties they may be Studies have observed adverse neurobehaviora agricultural workers. State pesticide regulatory agencies address condrift. If a patient/family comes to you with this or agency so they can help.
PREGNANCY	 Evidence suggests that a particularly sensitive pesticides toxicity is during fetal development. exposures to pesticides in pregnancy with increancer as well as adverse neurocognitive and min childhood. There is also some evidence suggincrease adverse birth outcomes (reduced feta birth, birth defects, and spontaneous abortion) Some occupations that have a greater potential pesticides include agricultural workers, vetering handlers, landscapers, and air crews.

WHAT TO TELL PATIENTS & FAMILIES

duce as a way to phasizes that a diet ally or organically h when cost reductions in urinary d parent compounds	 Choose organic when possible, but not of fresh produce. Wash produce under running water – Scrub firm fruits & vegetables. Throw away outer layers of leafy veget Trim skin and fat from poultry, fish & r Here are links to the Environmental W consumers decide which organic prod <u>Clean Fifteen</u> <u>Dirty Dozen</u>
ecticides on the floors cupants, particularly alone are generally ly required. are available for all ticide use. The label is the consumers choose the	 Learn about the basics of Integrated F <u>Citizen's Guide to Pest Control and Pes</u> specific problem management can be <u>IPM</u> site. Keep pesticides out of reach and/or in original containers with labels intact, f containers. Remove children, pets, and toys prior return until the amount of time specific Keep children away from pets after ap until dried, or as advised on label. If hiring a pest control company, only the name, ingredients, and toxicity of
al areas, living with i in agricultural settings hich children can begin e tasked with. al outcomes in adolescent oncerns regarding pesticide concern, notify your state	 Close windows and stay indoors if pesadjacent fields. Know the name, associated warnings, you may work with, and know where the Change out of work clothes and shoes entering the home. Wash contaminated work clothes septime to a point take children into fields where the Under federal youth employment law age (may be older in certain states) are loading, and applying pesticides.
exposure period for . Studies have linked higher reased risk of pediatric neurobehavioral outcomes gesting pesticides may al growth, premature). al risk for exposure to hary workers and animal	 If you work with pesticides, talk to you accommodations can be made to min If you cannot completely avoid working them directly, wear proper personal perfollow pesticide label instructions and Follow guidance outlined in previous sexposure from the diet and in the hore

not at the expense of a diet rich in a variety

– don't soak or dunk.

etables. meats. Working Group's (EWG) lists that may help oduce to consider purchasing.

Pest Management (IPM) on the EPA's <u>Pesticide Safety</u>. Information on pestbe found at the <u>University of California</u>

n a locked cabinet/shed, keep in , never reuse or repurpose old

r to indoor application, and do not cified on label. applying flea-control medication

y hire one that is state licensed. Ask for of products they may use.

esticides are being sprayed on

s, and instruction for use for pesticides e to find this information at work. es before getting into the car and/or

parately from the rest of the laundry. re pesticides have been applied. <u>NS</u>, children and teens \leq 16 years of are prohibited from handling, mixing,

our employer about what inimize or avoid exposure. ing with pesticides, avoid applying protective equipment (PPE), and d workplace safety protocols closely. s sections on how to reduce pesticide ome.

- https://doi.org/10.1542/peds.2012-2758.
- https://doi.org/10.1542/peds.2012-2579
- 2019;171:568-575. doi: <u>https://doi.org/10.1016/j.envres.2019.01.024.</u>
- Environ Sci Technol. 2009;43(12):4294-4300. doi:10.1021/es8030243.
- https://doi.org/10.1016/j.ijheh.2019.06.001
- 241. <u>https://doi-org.offcampus.lib.washington.edu/10.1038/s41390-018-0200-z</u>.
- 8. Reproductive health and the workplace. cdc.gov. <u>20pregnancy</u>. Updated October 28, 2019. Accessed November 3, 2020.

This material was supported by the American Academy of Pediatrics (AAP) and funded (in part) by the cooperative agreement award number 5 NU61TS000296-02-00 from the Agency for Toxic Substances and Disease Registry (ATSDR).

The U.S. Environmental Protection Agency (EPA) supports the PEHSU by providing partial funding to ATSDR under Inter-Agency Agreement number DW-75-95877701. Neither EPA nor ATSDR endorse the purchase of any commercial products or services mentioned in PEHSU publications.



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References

1. Roberts JR, Karr CJ; Council on Environmental Health. Pesticide Exposure in Children. Pediatrics. 2012;130(6):e1765-e1788. doi:

2. Forman J, Silverstein J. Organic Foods: Health and Environmental Advantages and Disadvantages. Pediatrics. 2012;130(5):e1406-e1415. DOI:

3. Hyland C, Bradman A, Gerona R, et al. Organic diet intervention significantly reduces urinary pesticide levels in U.S. children and adults. Environ Res.

4. Stout DM 2nd, Bradham KD, Egeghy PP, et al. American Healthy Homes Survey: a national study of residential pesticides measured from floor wipes.

5. Eckerman DA, Gimenes LS, de Souza RC, Galvão PR, Sarcinelli PN, Chrisman JR. Age related effects of pesticide exposure on neurobehavioral performance of adolescent farm workers in Brazil. Neurotoxicol Teratol. 2007;29(1):164-175. doi:10.1016/j.ntt.2006.09.028 6. Suarez-Lopez JR, Hood N, Suarez-Torres J, Gahagan S, Gunnar M, Lopez-Paredes D. Associations of acetylcholinesterase activity with depression and anxiety symptoms among adolescents growing up near pesticide spray sites. Int J Hyg Environ Health. 2019;222(7):981-990.

7. Roberts JR, Dawley EH, Reigart JR. Children's low-level pesticide exposure and associations with autism and ADHD: a review. Pediatr Res. 2019;(85)234-

https://www.cdc.gov/niosh/topics/repro/pesticides.html#:~:text=Exposure%20to%20pesticides%20could%20increase,exposure%20for%20a%20healthier%

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Acknowledgements





deohs.washington.edu/pehsu/ pesticideresources.org/med