Pesticides: Benefits and Risks, Especially to Children.

- David O. Carpenter, MD
- Institute for Health and the Environment
- University at Albany

Characteristics of Pesticides

- Responsible use of pesticides allows for increased agricultural productivity, and reduces risk of human diseases caused by vectors such as mosquitos.
- Many older pesticides originally assumed to be safe are still persistent both in the environment and in the human body, and have caused significant human disease. Most of these are no longer used.
- However many of the hundreds of modern pesticides contaminate our food supply, drinking water and air. Thus we are all exposed to a mixture of pesticides every day.

Risks of Pesticides:

- Chemicals that kill bugs and plants are likely to also cause harm to humans.
- Children, because their bodies are growly and developing, are exceptionally vulnerable to exposure to hazardous chemicals. Children cannot metabolize pesticides rapidly, so they accumulate more than in an adult. Early life exposure can result in life-long disabilities.
- There are other groups of people with exceptional vulnerability, including the very old, the disabled and the poor and often minority populations.
- Excessive pesticide use also has dangerous ecologic impacts, as for example, causing loss of insect pollinators like bees.

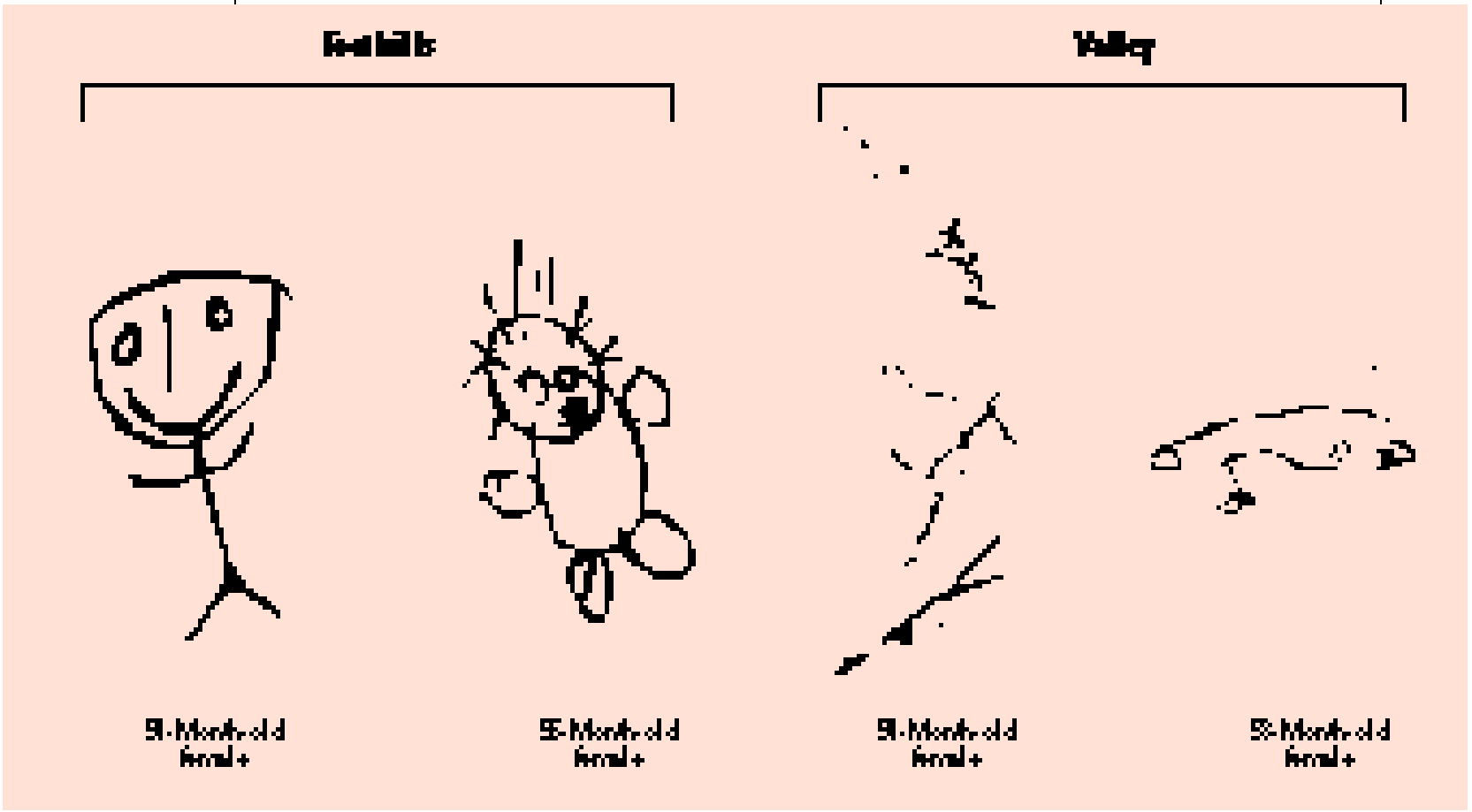
How do Pesticides Act?

- Many block the enzyme that breaks down acetylcholine, the chemical that allows our muscles to work, leading to spasms and seizures.
- Others block ion channels that are responsible for nerve conduction or the ion channels activated by neurotransmitters in insects and people. These act at the level of the brain and the peripheral nervous system in both insects and humans.
- Herbicides work against plant metabolism, which has less in common with humans than insecticides have. However herbicides can still cause human disease, especially by impacting the hormone systems.

Health Effects of Pesticides

- Herbicides, insecticides, fungicides and fumigants have all been found to have harmful effects on children's cognitive and neurobehavioral development.
- A study of urban minorities showed reduced birth weight and length in infant in relation of pesticide levels in umbilical cord blood.
- Many pesticides alter sex hormones, which can alter fertility in adults including decreasing sperm count and motility and affect sexual development in children,.
- In a study of the general US adult population published in the Journal of the American Medical Association (Bao et al., 2020) environmental exposure to pyrethroid insecticides increased rates of death from all causes and from cardiovascular disease.

Drawings of 4-year old Yaqui children who live in the foothills as compared to the valley where they are exposed to pesticides in Sonora, Mexico. From Guillette et al., 1998.



Adjusted* Odds Ratios and 95% Confidence Intervals for Childhood Acute Lymphoblastic Leukemia in Relation with Maternal Frequency of Use† of Pesticides in the Garden, the Yard, and on Interior Plants

Type of Pesticides	Controls (N)	Cases (N)	OR	95% CI
Herbicides				
No exposure	417	369	1.00	
1–5 times	66	112	1.83	1.31–2.57
>5 times	2	6	3.72	0.72–19.06
Plant insecticides				
No exposure	444	412	1.00	
1–5 times	34	60	1.89	1.20–2.97
>5 times	3	12	4.01	1.12–14.32
Products against trees				
No exposure	451	425	1.00	
1–5 times	36	56	1.65	1.07–2.54
>5 times	2	6	3.27	0.64–16.69
Repellents and sprays against outdoor insects				
No exposure	427	443	1.00	
1–5 times	24	16	0.47	0.21–1.05
>5 times	15	17	1.06	0.52–2.13

*Adjusted for maternal age and maternal level of schooling; Cases and controls are matched for age, sex, and geographical region.
†Exposure of the mother from 1 month before pregnancy to the end of pregnancy.

Summary and Conclusions:

- Careful use of pesticides benefits human kind but also poses harm to human health, especially to children.
- Pesticides, when they are used, should be chosen to be less persistent, less toxic to humans and less harmful to the environment.
- Pesticide use in the indoor environment is especially dangerous. Pesticides sprayed under the counter do not stay there but slowly evaporate and are inhaled.
- Pesticides should never be used in schools, day care facilities or other places where children spend time! There are other ways in which to control pests in a safe fashion.