



## PESTICIDES: A RISK TO HEALTH

Pesticides are synthetic chemicals that are designed to kill living organisms. Produced mainly from coal, gas and oil, they represent an under-recognized but ubiquitous environmental exposure and an important but insufficiently appreciated cause of disease, disability and premature death.

Cumulative exposure to pesticides is strongly linked to risk of immunosuppression, endocrine disruption, and cancer.

### GBPSR advocates for:

- *The utilization of non-chemical alternatives to pesticides.* Effective alternatives to synthetic petrochemical pesticides include plant-derived products, microbial pesticides and biosolarization.
- *Decreasing children's exposure to pesticides particularly near schools and child care centers.* Banning pesticide application near schools and updating standards for use near children safeguards children's health, promotes social justice, and protects our common home.
- *Banning the use of PFAS, benzene and other carcinogenic chemicals in pesticides.*

## WHAT ARE PESTICIDES

According to the [EPA](#), pesticides are defined as “chemicals used to destroy or control weeds (herbicides), insect pests (insecticides), rodent pests (rodenticides), or fungi (fungicides).” They may be grouped by class, use, the type of pest they target, or place of use.

The most common pesticide chemical classes include the pyrethroids (permethrin, deltamethrin), organophosphates ([glyphosate](#), chlorpyrifos, parathion), carbamates (aldicarb, 2,4 D), organochlorines (DDT, dieldrin), and neonicotinoids (imidacloprid, clothianidin).

## HOW PESTICIDES HARM HEALTH

The US population is heavily exposed to pesticides. According to EPA estimates, [over 1.1 billion pounds of pesticide are applied annually](#).

This is a concern, because many herbicides and virtually all insecticides are neurotoxic. Most pesticides either bind at nerve receptors or lead to disruption of proper neurotransmitter functioning. In insects, this leads to repetitive firing of nerves, causing death from paralysis and loss of motor coordination in insects.

Since humans and other vertebrates use similar mechanisms of intracellular communication in their nervous systems, effects are not infrequently seen in non-target species. Neurotoxicity from pesticides in humans can include increased salivation, tremors, seizures, behavior problems and – at high levels of exposure–death; the organophosphate pesticide chlorpyrifos is linked to the development of Parkinson’s disease.

Moreover, since nerve receptors also exist on heart cells, environmental exposure to pesticides has been associated with negative effects on the heart, including irregular heart rhythms, heart attack and increased risk of death from all causes in the US general adult population.

Pesticides also bind neuroendocrine receptors: known adverse effects on the endocrine system include estrogen-like effects, such as mammary gland enlargement in men, decreased sperm count, and elevated blood sugar levels.

## PESTICIDE ADDITIVES INCREASE TOXICITY

Pesticides are often combined with carcinogenic solvents like benzene, which is associated with childhood leukemia. Other additives include the PFAS chemicals, which are linked to kidney cancer and many other negative health outcomes; and piperonyl butoxide, a P450 inhibitor that has the potential to interfere with the efficacy of hundreds of medications that are metabolized through this pathway. Since some pesticides are also broken down through the P450 pathway, this means that these additives may impair the ability to metabolize pesticides, potentially leading to increased blood levels and increased toxicity.

## **INEQUITABLE USE**

Many petrochemical pesticides are heavily used and disposed of in urban and low income communities, an additional negative health burden on populations who are already disproportionately exposed to air, water and soil pollution at levels well above the state average. The use of pesticides is therefore an important equity issue.

## **HARMING HEALTH WHILE KILLING NON-TARGET SPECIES**

Many pesticides are applied via aerial spraying. Massachusetts sprays pesticides on millions of acres each year; yet less than 0.1% of the total amount of pesticides applied reaches the target pests. Much drifts into non-target areas and waterways, often resulting in unrecognized human exposures, and the death of many non-target species including butterflies, bees, dragonflies and other beneficent insects.

## **RISK TO PEDIATRIC HEALTH**

The scientific community has known for decades that pesticides pose important risks to pediatric health. Thanks to the work of the National Academy of Sciences' Committee on Pesticides in the Diets of Infants and Children, we know that children are uniquely vulnerable to pesticides – much more so than adults. The NASEM report outlines four principles that explain why:

- 1. Children have greater exposure to toxic chemicals than adults and absorb more pesticides relative to their body weight;**
- 2. Their metabolic pathways are immature so they are [less able to metabolize and excrete harmful chemicals](#);**
- 3. They are undergoing rapid growth and development;**
- 4. Children have more time than adults to develop chronic diseases that may be triggered by harmful exposures.**

More than ten years ago, the [American Academy of Pediatrics \(AAP\) called for](#) governments to reduce children's exposure to pesticides, writing that

scientific evidence “demonstrates associations between early life exposure to pesticides and pediatric cancers, decreased cognitive function, and behavioral problems.” Prenatal exposure is particularly harmful.

This is a concern in Massachusetts because the spraying of pesticides is allowed at schools and child care centers. Cumulative exposure to pesticides is strongly linked to risk of immunosuppression, endocrine disruption, and multiple cancers. Yet pesticides may be used on any outdoor landscapes including schools, “to maintain quality appearance” or under the guise of protecting student “safety.”

Protecting the health of today’s children will protect the health of tomorrow’s adults. Decreasing toxic exposures to pesticides will improve health and allow everyone to be a productive member of our Commonwealth.

## References

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**GBPSR pesticide testimony:** <https://gbpsr.org/wp-content/uploads/sites/3/2023/06/2023-Pesticide-Testimony-GBPSR.pdf>

**Link to Massachusetts Medical Society summary of health effects of pesticides article:** <https://www.massmed.org/health-effects-pesticides/>

**PESTICIDES: risks to climate**

<https://www.pan-uk.org/pesticides-and-the-climate-crisis/>