

# Children and Pesticides

## Don't Mix

### Children are especially vulnerable to pesticides

- The National Academy of Sciences reports that children are more susceptible to chemicals than adults and estimates that 50% of lifetime pesticide exposure occurs during the first five years of life.<sup>1</sup>
- EPA concurs that children take in more pesticides relative to body weight than adults and have developing organ systems that are more vulnerable and less able to detoxify toxic chemicals.<sup>2</sup>
- Infants crawling behavior and proximity to the floor account for a greater potential than adults for dermal and inhalation exposure to contaminants on carpets, floors, lawns, and soil.<sup>3</sup>
- Children with developmental delays and those younger than six years are at increased risk of ingesting pesticides through nonfood items, such as soil.<sup>4</sup>
- Pre-natal exposure to the herbicide atrazine are associated with fetal growth restriction and small head circumference and fetal growth restriction.<sup>5</sup>
- A 2010 analysis observed that women who use pesticides in their homes or yards were two times more likely to have children with neural tube defects than women without these reported exposures.<sup>6</sup>
- Studies find that pesticides such as the weedkiller 2,4-D pass from mother to child through umbilical cord blood and breast milk.<sup>7</sup>
- Consistent observations have led investigators to conclude that chronic low-dose exposure to certain pesticides might pose a hazard to the health and development of children.<sup>8</sup>
- The World Health Organization (WHO) cites that over 30% of the global burden of disease in children can be attributed to environmental factors, including pesticides.<sup>9</sup>
- A 2010 meta-analysis of 15 studies on residential pesticide use and childhood leukemia finds an association with exposure during pregnancy, as well as to insecticides and herbicides. An association is also found for exposure to insecticides during childhood.<sup>11</sup>
- A 2013 study suggests that preconception pesticide exposure, and possibly exposure during pregnancy, is associated with an increased risk of childhood brain tumors.<sup>12</sup>
- According to a 2015 study, living in agricultural regions is linked to increased leukemia and central nervous system cancers in children.<sup>13</sup>
- A meta-analysis study by scientists at the Harvard University's School of Public Health finds that children's exposure to pesticides in and around the home results in an increased risk of developing certain childhood cancers. Authors found that cancer risks were connected most closely to the type of pesticide used and the location where it was applied.<sup>14</sup>
- The probability of an effect such as cancer, which requires a period of time to develop after exposure, is enhanced if exposure occurs early in life.<sup>15</sup>
- A study published in the *Journal of the National Cancer Institute* finds that household and garden pesticide use can in-

### Children, cancer and pesticides

- In 2015, WHO found that there was sufficient evidence of carcinogenicity in experimental organisms to classify glyphosate, the active ingredient in the most popular lawncare brand (Roundup) as "probably carcinogenic to humans" (Group 2A). WHO also found that 2,4-D- found in many 'weed and feed' products- is possibly carcinogenic.<sup>10</sup>

### Commonly Used Chemicals

Chemical	Common Use	Health Effects
2,4-D	Lawns	c, ed, r, n, kl, si, bd
Dicamba	Lawns	r, n, kl, si, bd
Fipronil	Indoor/outdoor baits, pet care	c, ed, n, kl, si
Glyphosate	Lawns	c, r, n, kl, si
Permethrin	Mosquitoes, head lice, garden	c, ed, r, n, kl, si

**Key:** Birth/developmental defects=bd; Kidney/liver damage=kl; Sensitizer/irritant=si; Cancer=c; Neurotoxicity=n; Endocrine Disruption=ed; Reproductive effects=r

### Alternatives

Reduce exposure to toxic chemicals by adopting sound organic or integrated pest management (IPM) practices that use cultural, mechanical and biological methods of control and least-toxic chemicals only as a last resort. An organic diet limits children's pesticide exposure and toxic body burden.

**Studies show children’s developing organs create “early windows of great vulnerability” during which exposure to pesticides can cause great damage.**



crease the risk of childhood leukemia as much as seven-fold.<sup>16</sup>

- Studies show that children living in households where pesticides are used suffer elevated rates of leukemia, brain cancer and soft tissue sarcoma.<sup>17</sup>
- Pesticides can increase susceptibility to certain cancers by breaking down the immune system’s surveillance against cancer cells. Infants and children, the aged and the chronically ill are at greatest risk from chemically-induced immune suppression.<sup>18</sup>
- A study published by the American Cancer Society finds an increased risk for non-Hodgkin’s lymphoma (NHL) in people exposed to common herbicides and fungicides, particularly the weedkiller mecoprop (MCPP). People exposed to glyphosate (Roundup®) are 2.7 times more likely to develop NHL.<sup>19</sup>
- 75 out of all 99 human studies done on lymphoma and pesticides find a link between the two.<sup>20</sup>
- Four peer-reviewed studies demonstrate the ability of glyphosate-containing herbicides to cause genetic damage to DNA (mutagenicity), even at very low concentration levels.<sup>21</sup>
- A 2007 study published in *Environmental Health Perspectives* finds that children born to mothers living in households with pesticide use during pregnancy had over twice as much risk of getting cancer, specifically acute leukemia (AL) or non-Hodgkin lymphoma (NHL).<sup>22</sup>
- A 2007 Canadian report shows that a greater environmental risk exists for boys, specifically when it comes to cancer, asthma, learning and behavioral disorders, birth defects and testicular dysgenesis syndrome.<sup>23</sup>

**Children, asthma and pesticides**

- Researchers find that pesticides may increase the risk of developing asthma, exacerbate a previous asthmatic condition or even trigger asthma attacks by increasing bronchial hyper-responsiveness.<sup>24</sup>

- One 2015 farmworker study found an association between early-life exposure to OPs and respiratory symptoms consistent with possible asthma in childhood.<sup>25</sup>
- A 2012 study concluded that prenatal PBO exposure was associated with childhood cough in inner city children.<sup>26</sup>
- A 2004 study finds that young infants and toddlers exposed to herbicides (weedkillers) within their first year of life are 4.5 times more likely to develop asthma by the age of five, and almost 2.5 times more likely when exposed to insecticides.<sup>27</sup>
- EPA material safety data sheets for the common herbicides 2,4-D, mecoprop, dicamba, (often combined as Trimec®) and glyphosate (Roundup®) list them as respiratory irritants that can cause irritation to skin and mucous membranes, chest burning, coughing, nausea and vomiting.

**Children, learning and developmental disorders and pesticides**

- Roughly one in six children in the U.S. has one or more developmental disability, ranging from a learning disability to a serious behavioral or emotional disorder.<sup>28</sup>
- Scientists believe that the amount of toxic chemicals in the environment that cause developmental and neurological damage are contributing to the rise of physical and mental effects being found in children.<sup>29</sup>
- According to researchers at the University of California-Berkeley School of Public Health, exposure to pesticides while in the womb may increase the odds that a child will have attention deficit hyperactivity disorder (ADHD).<sup>30</sup>
- Studies show children’s developing organs create “early windows of great vulnerability” during which exposure to pesticides can cause great damage.<sup>31</sup>
- Lawn pesticide products containing herbicides and fertilizers

(such as “weed and feed” products) tested on mice show increased risk of infertility, miscarriage and birth defects at very low dosages.<sup>32</sup>

- Results from a CHARGE study finds that agricultural exposures to organophosphates at some point during gestation was associated with a 60% increased risk for autism higher for third-trimester exposures, and second-trimester chlorpyrifos applications. Similarly, children of mothers residing near pyrethroid insecticide applications just before conception or during third trimester were at greater risk for both autism and developmental delay.<sup>33</sup>
- Researchers at the Cincinnati Children’s Hospital Medical Center found an association between increasing pyrethroid pesticide exposure and ADHD which they conclude may be stronger for symptoms seen in boys compared to girls.<sup>34</sup>
- Additional studies on lawn pesticide product formulations show effects on learning ability, aggressiveness, memory, motor skills and immune system function.<sup>35</sup>
- A 2002 study finds children born to parents exposed to glyphosate (Roundup®) show a higher incidence of attention deficit disorder and hyperactivity.<sup>36</sup>
- A study of 210,723 live births in Minnesota farming communities finds children of pesticide applicators have significantly higher rates of birth defects than the average population.<sup>37</sup>
- In a 2004–2005 review of 2,4-D, EPA finds that, “there is a concern for endocrine disruption.”<sup>38</sup>
- Biomonitoring testing in Canada finds residues of lawn pesticides, such as 2,4-D and mecoprop, in 15 percent of children tested, ages three to seven, whose parents had recently applied the lawn chemicals. Breakdown products of organophosphate insecticides are present in 98.7 percent of children tested.<sup>40</sup>
- Scientific studies show that 2,4-D applied to lawns drifts and is tracked indoors where it settles in dust, air and surfaces and may remain for up to a year in carpets.<sup>41</sup>
- One 2014 analysis of 129 preschool children, ages 20 to 66 months, found that children were exposed to indoor concentrations of pyrethroids, organophosphates and organochlorines pesticides which were detected in soil, dust and indoor air.<sup>42</sup>
- Samples from 120 Cape Cod homes, where elevated incidence of breast, colorectal, lung, and prostate cancers are reported, find high indoor air and dust concentrations of carbaryl, permethrin, and 2,4-D.<sup>43</sup>
- A study published in *Environmental Health Perspectives* found that children who eat a conventional diet of food produced with chemical-intensive practices carry residues of organophosphate pesticides that are reduced or eliminated when they switch to an organic diet.<sup>44</sup>
- Scientists at the California Department of Public Health found that 28% of the mothers studied who lived near fields in the Central Valley, which were sprayed with organochlorines, such as endosulfan and dicofol, have children with autism.<sup>45</sup>

## Pesticide accumulation and drift

- Children ages 6-11 nationwide have significantly higher levels of pesticide residues in their bodies than all other age categories.<sup>39</sup>
- A 2005 study published in the *Journal of the American Medical Association* found that students and school employees are being poisoned by pesticide use at schools and from drift off of neighboring farmlands.<sup>46</sup>

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## Endnotes

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