Icahn School of Medicine at Mount Sinai

Children's Environmental Health Center
Department of Environmental Medicine and Public Health

Icahn School of Medicine at Mount Sinai
One Gustave L. Levy Place, Box 1217
New York, NY 10029-6574

July 27, 2021

Re: An Ordinance Prohibiting the Use and Application of Non-Organic Substances on City-Owned Properties

To the Members of the Stamford Board of Representatives,

I am an assistant professor of Environmental Medicine and Public Health at the Icahn School of Medicine at Mount Sinai. As a public health professional who studies the impacts of low level chemical exposures on children's health, I advocate against the use of synthetic pesticides for the reasons outlined below. I strongly support the passage of the ordinance Prohibiting the Use and Application of Non-Organic Substances on City-Owned Properties in Stamford.

Children are uniquely vulnerable to the health effects of pesticide exposure. Children are exposed to pesticides through contact with grass, soil, and other surfaces. Unintentional exposure can result from drift from spray applications and by tracking residues indoors on shoes and strollers.

The Centers for Disease Control and Prevention has found that children age 6-11 have higher levels of common pesticides in their bodies than adults[1]. This is due to their age-appropriate hand-to-mouth behaviors, closer proximity to the ground, and higher breathing rates, all of which place young children at increased risk for pesticide exposures compared with adults[2].

Children's vulnerability to chemical pesticides is further magnified by the rapid growth and development of their nervous systems and other bodily organs as well as by their immature detoxification mechanisms, which make it difficult to break down and excrete pesticides. These factors place infants and children at increased risk for harmful effects of pesticide exposures, which may be permanent and irreversible[3]. Additionally, because of their young age, children have more future years of life and thus more time to develop chronic diseases that may be triggered by early environmental exposures.

Pesticides can pass from mother to fetus during pregnancy and breastfeeding. The exquisite vulnerability of the fetus to pesticide exposures is highlighted by recent studies showing associations between pesticide exposure during pregnancy and increased risk of autism, learning disabilities, and childhood cancers [4-6].

Health effects of pesticide exposure are well documented. Acute exposure to pesticides can lead to asthma exacerbations, cough, shortness of breath, nausea, vomiting, eye irritation, and headaches[7]. Pesticide exposure early in life is associated with increased risk of certain cancers[8-10], birth defects[11, 12], reproductive defects[13,14], asthma[15, 16], and cognitive and behavioral problems[17-22]. Notably, the exposure levels measured in these studies are similar to those detected in the general public, indicating that even low levels of exposure from household use can be detrimental.

Several lines of evidence support the toxicity of specific pesticides commonly applied for cosmetic purposes. Of particular concern is the non-selective broadleaf herbicide glyphosate, the active ingredient in RoundUp and most heavily used herbicide in the United States. Laboratory studies demonstrate the ability of glyphosate to promote

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the growth of breast cancer cells, suggesting that it may disrupt hormonal signaling and contribute to breast cancer risk[23,24]. Recent studies in rodents and humans also find that glyphosate exposure during pregnancy impacts testosterone signaling and reproductive development in girls[25,26]. In humans, studies show associations between glyphosate exposure and spontaneous abortion and certain cancers in occupational settings[27-29]. Three recent epidemiological studies support a link between glyphosate exposure and risk of Non-Hodgkin lymphoma, with increased risk of up to 43% in workers who apply the chemical[31-33].

Based on these findings, the International Agency for Research on Cancer (IARC), a world authority on cancer risk factors, classifies glyphosate as a probable human carcinogen[33]. In July of 2017, the state of California added glyphosate to the Proposition 65 list of chemicals known to cause cancer or developmental toxicity[34]. The few studies that have measured glyphosate exposure in humans show that glyphosate body burden parallels the increase in usage over time, however more studies are needed to more accurately assess glyphosate exposure in the US population[35]. Importantly, the majority of studies to date have assessed the health impacts of glyphosate exposure on adults. Further research is needed to determine safe exposure levels in children, who are overall more sensitive to environmental exposures.

Due to concerns about toxicity, many communities are replacing glyphosate with herbicides that may be equally or more harmful to human health. One example is 2,4-D, a known neurotoxin widely used on municipal and residential properties. In addition to nervous system toxicity, 2,4-D is classified as an endocrine disruptor, respiratory irritant, possible human carcinogen, and is linked to increased risk of some cancers in agricultural workers[36]. Formulations that contain 2,4-D along with additional active ingredients are increasingly common and include products such as Weed B Gon, GameOn, and Enlist Duo. These combination pesticides are particularly concerning given the potential for active ingredients to have additive or synergistic effect on health.

Unfortunately, the common practice of allowing 24 or even 72 hours to pass before allowing play on fields where pesticides have been applied is not sufficiently protective. For example, the half-life (the time it takes for an amount of pesticide to decrease by half) of 2,4-D in soil is 10 days[37]. The half-life of glyphosate is 47 days, however some studies estimate it to be as long as 197 days[38]. Given the propensity of children to play in soil, and the fact that pesticide half-life can be lengthened by temperature and weather conditions, soil microbial content, and pesticide formulation, it is difficult to accurately predict when safe play can resume.

Finally, greater than 95% of most synthetic pesticide formulations consist of "inert" ingredients. Most toxicity studies, including those conducted by the EPA, include only the pesticide active ingredient and do not account for potential health impacts of the final formulation. Studies suggest that "inactive" pesticide additives, such as the synergist piperonyl butoxide, may in fact be more toxic than the active ingredient[39,40]. Recent studies in rodents find that the complete RoundUp formulation is more toxic than the active ingredient glyphosate alone, suggesting that inactive ingredients enhance the glyphosate toxicity or are toxic on their own[25]. Because inert ingredients are not listed on the label and testing to assess safety is minimal, the health effects of these compounds are difficult to evaluate[41].

Health hazards of pesticide exposure can be prevented. The adverse health effects that result from pesticide exposures are highly preventable. Increasingly, municipalities are taking steps to limit the use of pesticides on

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public property, citing concerns over public health and ecological impacts. Policy changes in pesticide regulations have successfully reduced exposures among the population. A municipal ban on cosmetic herbicides resulted in an 80% reduction in levels of the three most common pesticides in urban streams in Ontario[42,43]. The USEPA ban on residential uses of chlorpyrifos, a neurotoxic organophosphate insecticide, resulted in a ten-fold reduction in maternal and umbilical blood levels in New York City residents[44].

A 2005 analysis calculated that pesticide use in the U.S. results in $10 billion in total damages annually, of which an estimated $1.1 billion could be accounted for by impacts on public health[45]. These indirect costs greatly outweigh the expense of integrated pest management and other non-toxic lawn care methods.

Conclusion Residents of Stamford, and particularly children, are at risk for pesticide exposures at parks, playing fields, playgrounds, and other public areas where pesticides are routinely applied—a risk that could easily be mitigated by restricting the use of synthetic pesticides in favor of organic solutions proven to be safe and effective. I urge you to take steps to protect the health of your constituents by eliminating synthetic pesticide use on Stamford public properties.

Sincerely,

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CHILDREN'S ENVIRONMENTAL HEALTH CENTER at the MOUNT SINAI INSTITUTE FOR EXPOSOMIC RESEARCH

FACT SHEET

Pesticides

Pesticides repel or kill unwanted pests such as insects (insecticides), rodents (rodenticides), fungi (fungicides), and weeds (herbicides). All pesticides have the potential to be toxic to humans. Pesticides sold in the United States must be registered with the Environmental Protection Agency (EPA).

HOW ARE WE EXPOSED TO PESTICIDES?

We come into contact with pesticides through plants, soil, air, and food. Outdoor pesticides are tracked into our homes on shoes, strollers, and the bodies of children who run and play in pesticide treated areas. How a pesticide is applied can greatly affect the risk of exposure to people during and after application.

- Sprays: Aerosol sprays may be directly applied to a target or more broadly distributed using a "fogger" or "bomb". All of these products increase the risk of inhalational exposures. The use of foggers and bombs is not recommended as they can be particularly dangerous. Exposures via the skin can also occur from contact with sprayed surfaces. Spraying is almost always associated with pesticide drift, the dispersal of pesticides in the air beyond the target site. This means that what your neighbors apply to their lawn will likely add to your family's pesticide exposure.
- Granular pesticides are typically applied to the soil surface to target pre-emergent weeds or sprinkled around areas of pest infestations. Exposure to these products is most likely via ingestion or through the skin.
- Stationary bait traps contain pesticides in a solid or granular form. Bait traps should always be kept out of reach of children and pets to avoid accidental ingestion and contact.

WHO IS MOST AT RISK?

- Children are at highest risk for exposure due to their proximity to the ground where pesticides settle and their age-appropriate hand-to-mouth behaviors. Their higher breathing rates also increase risk of exposure compared with adults.
- Fetuses: Pregnancy is one of the most vulnerable windows for exposure to pesticides. Studies show that exposures in-utero are associated with cognitive, behavioral, and respiratory problems during childhood and beyond.
- Agricultural workers and their families as well as individuals living in agricultural areas experience higher exposures than the general public. Farming communities have higher rates of certain cancers including leukemia, non-Hodgkin's leukemia and lymphoma, soft tissue sarcoma, and skin, lip, stomach, brain, and prostate cancers.

WHAT ARE THE HEALTH EFFECTS OF PESTICIDES?

Health risks differ depending on the chemicals in a product and whether the exposure is acute (brief, typically high dose) or chronic (occurring over a long period of time, typically low dose). Acute exposures are most common in agricultural workers or poisonings. Chronic exposures to low doses of pesticides are more common due to consumer practices and household use.

- Nervous System Effects: Many classes of pesticide exert their effects by damaging the nervous system of a pest. Due to similarities across species, these pesticides have also been shown to be toxic to the nervous system of humans.

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- Hormonal System Effects: Several pesticides are classified as Endocrine Disrupting Chemicals (EDCs) due to their potential to interfere with hormones in the body. Disruption of hormonal systems can impair the development and normal functioning of the reproductive system as well as the nervous system, particularly when exposure occurs early in life.
- Cancer: Some pesticides have been shown to have the potential to cause cancer in laboratory and animal studies. For instance, glyphosate, the active ingredient in some pesticides is classified as a probable human carcinogen by the World Health Organization.
- Respiratory Effects: Exposure to some pesticides during pregnancy has been shown to increase the risk of wheezing and asthma in children. Both chronic and acute occupational exposures to pesticides are associated with impaired lung function, asthma, and other respiratory diseases.

HOW CAN I REDUCE MY EXPOSURE TO PESTICIDES?

- Practice organic lawn care.
- Utilize integrated pest management (IPM) methods that eliminate or reduce the need for synthetic lawn and garden chemicals.
- Aerate your lawn to allow for healthy root growth.
- Nourish soil with organic compost since nutrient-rich soil reduces pest infestations.
- Choose native plants that thrive in your zone.
- Grow your own organic produce.
- Eliminate standing water that attracts mosquitos.
- Encourage friends and neighbors to reduce the use of pesticides. Pesticides can cross property lines.

IF PESTICIDES MUST BE USED:

- Never apply pesticides in the presence of children; always avoid areas where they play. Keep children and pets indoors during active spraying.
- Choose the least toxic pesticides. The EPA requires one of three "signal" words on all pesticide labels. In order from least toxic to most toxic, they are: 1) Caution, 2) Warning, 3) Danger.
- Avoid application of pesticides where pesticide run off could enter ponds, streams, drinking water sources, or other bodies of water.
- Hire a licensed professional applicator. If you live in an apartment building, ensure that your landlord is using one.
- Never use a pesticide without an EPA registration number on the label. Unregistered pesticides are sold illegally in the U.S. and may be extremely toxic.
- Target insects at the larval stage using larvicides, which can be more effective and less toxic to humans than spraying mature insects.
- Never use a pesticide in a way other than as instructed on the label. Follow directions closely and utilize recommended personal protective equipment such as gloves, goggles, and face masks.
- Never store pesticides within reach of children.
- Never pour pesticides down the drain. Always dispose of them according to directions found on their labels.
- Never store pesticides in containers other than the ones in which they are sold.

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This material was developed through the Mount Sinai Children's Environmental Health Center (www.cehcenter.org) and Transdisciplinary Center on Early Environmental Exposures (tceee.icahn.mssm.edu, NIEHS grant P30ES023515). As part of the Institute for Exposomic Research, we translate and connect our science to supporters and communities committed to ensuring a healthier future for all. To learn more about the Institute's research, visit icahn.mssm.edu/exposomics.

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Pesticides

CHILDREN'S ENVIRONMENTAL HEALTH CENTER at the
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Pesticides are substances used to control unwanted pests such as insects, weeds, fungi and rodents.

Who is most at risk?

Fetuses

Children

Agricultural Workers and Their Families

How are we exposed?

Inhalation Exposure

Pesticides that are sprayed into the air or that accumulate in dust can be breathed in

Oral Exposure

Pesticides contaminate food and water and are ingested

Dermal Exposure

Small amounts of pesticides may enter the body through skin

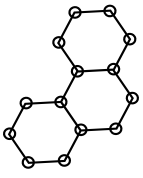
What are the health risks?

Nervous System Effects

Pesticides interfere with how brain cells signal and are linked to cognitive and behavior problems.

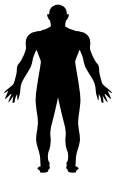
Hormonal System Effects

Pesticides interfere with hormones in the body that control important functions like development and reproduction.



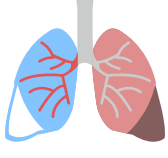
Cancer

Laboratory experiments and studies of farm workers show that some pesticides have the potential to cause cancer.



Respiratory Effects

Exposure to pesticides during pregnancy increases the risk of asthma and wheeze in children. Long term and high dose pesticide exposure can cause respiratory problems.



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10 Tips to Reduce Your Pesticide Exposure Now

1. Practice organic lawn care.

2. Utilize integrated pest management (IPM) methods that eliminate or reduce the need for synthetic lawn and garden chemicals.

3. Aerate your lawn to allow for healthy root growth.

4. Choose native plants that thrive in your zone.

5. Grown your own organic produce.

6. Eliminate standing water that attracts mosquitos.

7. Nourish soil with organic compost since nutrient-rich soil reduces pest infestations.

8. Leave shoes, strollers, and luggage at the door.

9. Encourage friends and neighbors to reduce the use of pesticides. Pesticides can cross property lines.

10. Wash hands after playing outdoors and before eating.

To take action in your community, remember to
support legislation to restrict pesticide use in public spaces!

This material was developed through the Mount Sinai Children's Environmental Health Center (www.cehcenter.org) and Transdisciplinary Center on Early Environmental Exposures (tceee.icahn.mssm.edu, NIEHS grant P30ES023515). As part of the Institute for Exposomic Research, we translate and connect our science to supporters and communities committed to ensuring a healthier future for all. To learn more about the Institute's research, visit icahn.mssm.edu/exposomics.

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CHILDREN'S ENVIRONMENTAL HEALTH CENTER at the MOUNT SINAI INSTITUTE FOR EXPOSOMIC RESEARCH FACT SHEET

Glyphosate

Glyphosate is a weed killer, or herbicide. It is the most extensively used pesticide in the world today for both residential and agricultural purposes.

HOW ARE WE EXPOSED TO GLYPHOSATE?

Glyphosate is often applied to lawns and gardens, and can contaminate plants, soil, air, and food. Glyphosate can be inhaled or ingested.

Glyphosate used on lawns and in parks can be tracked into homes on shoes or strollers that have had contact with glyphosate-treated surfaces. Residues of glyphosate are detected on some produce as well as in processed foods.

WHAT ARE THE HEALTH EFFECTS OF GLYPHOSATE?

Children and fetuses are most vulnerable to pesticide exposures due to their developing organ systems and differences in the way they metabolize toxins. In addition, developmentally normal hand-to-mouth behavior, close proximity to the ground where pesticides settle, and high respiratory rates result in higher exposures in children compared with adults.

- Cancer: Glyphosate is classified by the World Health Organization's International Agency for Research on Cancer (IARC) as probably carcinogenic to humans based on strong evidence that it causes cancer in laboratory animals and some evidence that it increases cancer risk in humans.
- Hormone Disruption: Studies have shown that glyphosate is an Endocrine Disrupting Chemical (EDC), meaning that it interferes with hormones in the body. EDCs can interfere with the development of the brain as well as the function of organ systems, such as the nervous and reproductive systems.
- Birth Defects: Elevated rates of birth defects have been observed in animals fed with glyphosate-treated crops and in farming communities in areas where large quantities of glyphosate are used. Further research is needed to examine the link between glyphosate and birth defects.
- Nervous System Toxicity: Laboratory studies suggest that glyphosate is toxic to the nervous system.
- Antibiotic Resistance: Glyphosate has the potential to make bacteria less sensitive to antibiotics.

HOW CAN I REDUCE MY EXPOSURE TO GLYPHOSATE?

- Avoid using weed killers that list glyphosate as the active ingredient.
- Leave shoes, strollers, and wheeled luggage by the door in your home.
- Wash your hands before eating and after spending time outdoors.
- Choose GMO-free foods labeled USDA Organic or Non-GMO Project Verfied.
- Advocate for glyphosate bans in public spaces in your community.
- Encourage neighbors to avoid use of glyphosate-containing products.

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