

History and Use of Glyphosate

Glyphosate, first registered for use in the United States in 1974, is an herbicide widely used to kill broadleaf weeds and grasses and regulate the growth of certain plants.^{1,2} It is employed in agriculture, forestry, in lawn and garden maintenance, and for weed control in industrial areas.¹

The use of glyphosate has skyrocketed since 1997, after crops genetically modified to tolerate glyphosate were first introduced.³ The broad usage has led to questions of whether glyphosate remains present in the food we eat and water we drink, as well as whether it is safe for humans to consume.

Because glyphosate binds so tightly to soil particles after use, it is believed to be prevented from entering groundwater.⁴ However, this may not be the case. During a 2002 study of waterways in nine Midwestern states, glyphosate was detected in 36% of the 154 samples taken, although the highest measured concentration was still well below the maximum contaminant level (set by the Environmental Protection Agency) of 700 micrograms per liter.³ And in one study of an agricultural community in Mexico, glyphosate was detected in both groundwater and bottled water.⁵

Due to its lack of quick degradation in plants, glyphosate residue could be present in the food supply.⁴ In tests performed by researchers and consumer watch groups, glyphosate has been detected in a number of foods, including bread, honey, oat-based cereals, granolas, and snack bars.^{6,7}

Common means of glyphosate exposure

Pure glyphosate is said to be low in toxicity, but it is often mixed with other ingredients that can make the resulting product more toxic.¹ Directions for applying glyphosate usually caution users to wear gloves and eye protection to avoid skin and eye irritation and to be careful not to breathe the compound to protect against nose and throat irritation.¹

Although it isn't easy for glyphosate to pass through the skin into the body, it is possible to ingest glyphosate by breathing it in while spraying or by eating or smoking after applying, without first washing your hands.¹ When absorbed or ingested, most glyphosate tends to remain unchanged and leaves the body pretty quickly in urine or excrement.¹ Despite that, swallowing glyphosate-containing products can result in nausea, vomiting, diarrhea, and burns in the mouth and throat.¹ Intentional ingestion has resulted in fatalities in some cases.¹

Because glyphosate products often contain additional chemicals, it can be hard to determine whether glyphosate alone is responsible for the adverse symptoms observed when humans come into contact with it.⁸ For instance, some studies suggest that the surfactant polyoxyethyleneamine used with glyphosate is more toxic than glyphosate alone.⁸

Agency opinions and glyphosate research

Consensus on risks associated with glyphosate exposure has been tough to pin down. In April 2019, the US Environmental Protection Agency stated it “continues to find [glyphosate] poses no risk to public health when used as labeled and that it is not a carcinogen.”² This follows a similar declaration

by the European Food Safety Authority in 2015 that glyphosate is unlikely to be a carcinogen in humans.⁹

By contrast, the World Health Organization's International Agency for Research on Cancer (IARC) stated in March 2015 that it had analyzed the results of over 1,000 studies and determined that glyphosate was possibly carcinogenic to humans.¹⁰ In an updated monograph released one year later, the IARC attributed the difference between its statement and the findings of other agencies to the source material, noting that most regulatory agencies reviewed nonpublic industry data from toxicological studies.¹⁰

Still, research into glyphosate's possible carcinogenic effects continues. A recent analysis of human epidemiological studies confirmed a link between glyphosate exposure and an increased risk for non-Hodgkin's lymphoma.¹¹ And in another lab study, glyphosate was shown to stimulate the growth of a certain type of hormone-dependent breast cancer in cells by acting on estrogen receptors, indicating it may be an endocrine disruptor.¹²

Researchers are also investigating glyphosate's impact on the human reproductive system. In one study, exposure to glyphosate-based herbicides below the toxicity threshold decreased the activity of aromatase, a key enzyme in balancing sex hormones.¹³ Another study in prepubertal male rats showed a decrease in testosterone levels in those given soy milk supplemented with glyphosate.¹⁴ And results of a study in pregnant mice indicate that glyphosate can cause the ovaries to fail and interfere with secretion of hormones.¹⁵

There have been cases of accidental exposure to concentrated glyphosate solutions causing neurological lesions, suggesting glyphosate could be neurotoxic in high doses.¹⁶ In a model of the blood-brain barrier, researchers observed that a high dose of glyphosate resulted in neurological damage and altered metabolism of glucose.¹⁶

Glyphosate and antibiotic resistance

Recent research has uncovered a worrisome link between glyphosate use and the growing problem of antibiotic resistance.^{17,18} It is believed the use of glyphosate is leading to changes in microbiome composition and, as a result, increases in resistance to critical antibiotics.¹⁷ Researchers note that when bacteria are exposed to non-antibiotic chemicals such as herbicides, they can be inclined to develop resistance to antibiotics more rapidly: in some cases, 100,000 times faster.¹⁸

Looking to avoid glyphosate? The Detox Project offers **Glyphosate Residue Free** and **Gold Standard Detox** certification to bring a new era of transparency to the food and supplement industries.

Carolyn Gretton is an experienced copywriter for the health and wellness industry. She understands the ins and outs of crafting effective web content and combines those skills with a passion for products that transform people's health. Looking for someone to tell your story? Contact carolyn@healthylivingcopywriting.com .

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