

# Infographic: Global Regulatory, Health Research Agencies on Whether Glyphosate Causes Cancer

By ACSH Staff — March 28, 2019



Courtesy GLP [1]

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Read the original article [here](#) [1].

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Does glyphosate—the world’s most heavily-used herbicide—pose serious harm to humans? Is it carcinogenic? Those issues are of both legal and scientific debate.

In two court cases—one decided [in mid-March](#) [4] and the other [last year](#) [5]—juries have ruled that glyphosate, sold in non-generic form under the trade name Roundup and made by Monsanto (now a division of Bayer), caused the cancer of workers who applied the herbicide. Neither case addressed the issue of whether glyphosate might cause harm to humans exposed to parts per billion or parts per trillion traces of the pesticide found in foods.

## **Courts do not determine scientific fact**

Of course, a jury decision, while significant, is not a substitute for scientific research. Juries have also gotten science wrong, most infamously the decision in the ‘[Scopes Monkey Trial](#)’ [6] in which high school teacher John Scopes was found guilty of teaching evolution, which creationists contended was not scientifically supported.

Cases like these that revolve around the question of whether a particular chemical is the cause of cancer or another illness are not science. They rely on lay juries attempting to make sense of complicated and often contradictory medical studies and expert opinions. Science rarely renders

absolute 'verdicts'; it addresses probabilities. It's been shown time and again that when juries are asked to evaluate studies that conclude 'substance x is unlikely to cause cancer', they almost always assume the worst, that because the study did not definitively conclude it 'does not' or 'could not cause cancer'.

But no scientists writing a reputable study would ever use the kind of absolute statements that would put a jury at ease. Hence, when jurors have even slight doubts, they frequently rule against a chemical and its manufacturer, and for an aggrieved (and often fatally ill) plaintiff, even when the evidence is slim or close to nonexistent.



For example, just last year, a Missouri

jury [awarded \\$4.69 billion](#) [7] to women with ovarian cancer they claimed was caused by Johnson & Johnson baby powder. In April, 2018, the company was ordered to pay [\\$117 million](#) [8] to a New Jersey man with mesothelioma, and [\\$25.7 million](#) [9] to a Los Angeles woman with the same cancer.

As [Popular Science has reported](#) [10], the company is appealing those verdicts, and for good reason: They don't appear to comport with the science.

Medical studies on the relationship between ovarian cancer and talcum powder use on the genitals are not at all definitive, with none showing a strong association and most showing no association at all. The National Cancer Institute [says](#) [11] the evidence is not strong enough to conclude that talcum powder causes ovarian cancer, and the [American Cancer Society notes](#) [12] that any existing risk is likely small, and that research is ongoing.

What the legal system considers enough evidence to establish that exposures causes illness is different from the standards of science—and trying to fit the two together can be hazardous. Which brings us back to the controversy over glyphosate.

### **What do regulators and investigatory agencies conclude?**

Even though extensive research has been done on glyphosate, there remains intense debate [online](#) [13] and [in the media](#) [14] about whether the herbicide poses a health threat to agricultural workers or the general public as a result of residues in food.

More than a dozen regulatory and research agencies have conducted [long-term studies](#) [15], [reviews](#) [16] and [assessments](#) [17] to determine whether glyphosate, when used as labeled, increases the risk of certain cancers. They are unanimous in one finding: There is no evidence that glyphosate poses any harm to consumers worried about trace residues in their food. Despite many

blogs by anti-biotechnology advocacy groups touting ‘studies’ (usually not very scientific, such as [here, most recently](#) [18]) finding glyphosate in beer or cereal at the parts per billion or parts per trillion level, or finding traces of glyphosate in blood or urine, there is no scientific study that suggests those trace residues pose any threat to humans.

The Genetic Literacy Project summarized and analyzed the findings of the world’s top regulatory and research organizations in a [GMO FAQ posted here on our GMO FAQ section](#) [19]. To date, every regulatory agency that has evaluated glyphosate has concluded that it is safe if used according to label specifications and does not increase cancer risk, particularly if glyphosate residue is found on food, including produce.

**What do global regulatory and research agencies conclude about the health impact of GLYPHOSATE?**

Agency	Year	Conclusion
EPA (United States Environmental Protection Agency)	2017	"Human health risk assessment concludes that glyphosate is not likely to be carcinogenic to humans... [and] neither meaningful risks to human health when the product is used according to the pesticide label"
EPA Office of Pesticide Programs	2017	"The strong support for... suggestive evidence of carcinogenic potential... based on the weight of evidence... from small, non-statistically significant changes... were contradicted by studies of equal or higher quality. The strongest support is for 'not likely to be carcinogenic to humans'."
NTP (National Toxicology Program)	1982	"Little evidence of toxicity, and there was no evidence of glyphosate causing damage to DNA"
Health Canada	2017	"Products containing glyphosate do not present unacceptable risks to human health in the environment when used according to the revised product label directions... Risks to [occupational] handlers are not of concern for all scenarios"
Health Canada	2018	"No pesticide regulatory authority in the world currently considers glyphosate to be a cancer risk to humans at the levels at which humans are currently exposed"
ECHA (European Chemicals Agency)	2017	"Based on the epidemiological data as well as on data from long-term studies in rats and mice, taking a weight of evidence approach, no based classification for carcinogenicity is warranted"
EFSA (European Food Safety Authority)	2015	"Glyphosate is unlikely to be genotoxic or to pose a carcinogenic threat to humans... No clear epidemiological data or evidence from animal studies demonstrated causality between exposure to glyphosate and the development of cancer in humans"
ANSES (Agence Nationale de Sécurité Sanitaire)	2016	"A great deal of evidence of carcinogenicity in animals and humans is considered to be relatively limited and does not allow for a 'A' or 'B' classification [known or suspected carcinogen for humans]"
BfR (Bundesinstitut für Risikobewertung)	2016	"Available data do not show carcinogenic or mutagenic properties of glyphosate nor that glyphosate leads to fertility, reproduction or embryonal/fetal development in laboratory animals"
Federal Department of Home Affairs, Swiss Federal Food Safety and Inspection Office (FSM)	2018	"Residues of glyphosate in the foods investigated do not represent a risk of cancer"
Australian Government, Australian Pesticides and Veterinary Medicines Authority	2016	"Glyphosate does not pose a carcinogenic risk to humans... Products containing glyphosate are safe to use as per the label instructions"
Environmental Protection Authority (New Zealand)	2016	"Likely to be carcinogenic to humans or genotoxic [damaging to genetic material or DNA] and should not be classified as a mutagen or carcinogen"
ANVISA (Agência Nacional de Vigilância Sanitária)	2019	"No evidence to indicate that the herbicide glyphosate is carcinogenic"
Food Safety Commission of Japan	2016	"No neurotoxicity, carcinogenicity, reproductive toxicity, teratogenicity, and genotoxicity"
Rural Development Administration (Korea)	2017	"Epidemiological studies on glyphosate... found no cancer link"
World Health Organization, Food and Agriculture Organization of the United Nations	2016	"Glyphosate is unlikely to be genotoxic at anticipated dietary exposures. Glyphosate is unlikely to pose a carcinogenic risk to humans from exposure through the diet"
World Health Organization, Drinking-water quality guidelines	2004	"Under usual conditions, the presence of glyphosate and AMPA [amino methyl phosphonic acid], glyphosate's primary metabolite in drinking water does not represent a hazard to human health"
World Health Organization, International Programme on Chemical Safety	1986	"Available data on occupational exposure for workers applying Roundup indicate exposure levels far below the 'NOAEL' [no-observed adverse effect levels] from the relevant animal experiments"
<b>Longitudinal Study</b> - How glyphosate impacts the DNA pesticide application sites		
Agricultural Health Study	2018	"No association was apparent between glyphosate and any solid tumors or lymphoid neoplasms overall, including non-Hodgkin's lymphoma and its subtypes... some evidence of increased risk of AMI [acute myocardial infarction] among the highest exposed group that requires confirmation"
<b>Hazard Assessment</b> - What is the potential to occur harm, regardless of dose or exposure?		
International Agency for Research on Cancer	2015	"Limited evidence in humans for the carcinogenicity of glyphosate... Evidence in humans is from studies of exposures, mostly agricultural (it is not from dietary exposure)... A positive association has been observed for non-Hodgkin lymphoma... There is 'limited evidence that exposure to glyphosate or glyphosate-based formulations is genotoxic'... IARC placed glyphosate in the hazard category 'Group 2A, probably carcinogenic to humans' along with red meat, hot beverages, and working as a barber. The evidence on carcinogenicity was less robust than for agents such as bacon, salted fish, oral contraceptives and wine."

[20] The infographic (click on it to get a bigger version)

summarizes the conclusions of the most prominent agencies. The global consensus is concisely expressed by Health Canada, the oversight agency that most recently issued a re-review of the controversial pesticide: “No pesticide regulatory authority in the world currently considers

glyphosate to be a cancer risk to humans at the levels at which humans are currently exposed,” Health Canada [wrote in January 2019](#) [21].

In addition to the many assessments and evaluations, a large and long-term study known as the [Agricultural Health Study](#) [22] has monitored the incidence rate of multiple cancers in 54,251 pesticide applicators, including 44,932 who had handled glyphosate since 1993. The study found no association between glyphosate and any solid tumors or lymphoid malignancies overall. The data is ambiguous in workers exposed at very high levels.

The only outlier is the [International Agency for Research on Cancer](#) [23] (IARC), which does not look at the risk posed by a particular chemical. Rather, it examines hazard—whether a substance might cause cancer at any exposure rate or dose, even unrealistically high ones. In 2015, IARC put it in the category “[probably carcinogenic to humans](#) [24],” along with red meat and hot beverages. But there was less evidence of carcinogenicity than the agency found for bacon, salted fish, oral contraceptives and wine, among many examples.

Over more than 40 years, the agency has assessed approximately 1,000 substances and activities, ranging from arsenic and beer and coffee to sunbathing and hairdressing. It has found only one agent or activity that was “probably not” likely to cause cancer in humans. Under a hazard designation, almost any substance can be judged toxic, even water, if the dose is extreme and the exposure time is long enough. The hazard-risk distinction is almost totally absent from the popular and media discussion of whether glyphosate might pose any serious danger.

IARC is a sub-agency [within the World Health Organization of the United Nations](#) [25]. Its ‘hazard’ conclusion that glyphosate should be in the category “probably carcinogenic” has been used to support [proposed bans](#) [26] on glyphosate and was the central piece of evidence in the two recent trials. Three other WHO agencies including WHO itself performed risk assessments on glyphosate and repudiated IARC’s findings, but their far more comprehensive analyses are usually ignored in media accounts or not even considered by juries.

In the [infographic provided, using this link](#) [27], we summarize all the most respected research. Click on the bolded conclusions to take you to the document issued by the regulatory or research agency.

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**Source URL:** <https://www.acsh.org/news/2019/03/28/infographic-global-regulatory-health-research-agencies-whether-glyphosate-causes-cancer-13913>

#### Links

[1] <https://geneticliteracyproject.org/2019/03/26/infographic-global-regulatory-and-health-research-agencies-on-whether-glyphosate-causes-cancer/>

[2] <https://geneticliteracyproject.org/writer/kayleen-schreiber/>

[3] <https://geneticliteracyproject.org/source/genetic-literacy-project/>

[4] <https://geneticliteracyproject.org/2019/03/20/glyphosate-on-trial-second-jury-says-bayers-roundup-weed-killer-is-carcinogenic/>

[5] <https://geneticliteracyproject.org/2018/10/23/judge-upholds-landmark-glyphosate-cancer-verdict-cuts->

punitive-damages-84-to-39-million/

[6] <https://www.history.com/this-day-in-history/monkey-trial-begins>

[7] <https://www.nytimes.com/2018/07/12/business/johnson-johnson-talcum-powder.html>

[8] <https://www.reuters.com/article/us-johnson-johnson-cancer-lawsuit/jj-imerys-unit-must-pay-117-million-in-nj-asbestos-cancer-case-idUSKBN1HI2ZD>

[9] <https://www.usatoday.com/story/money/business/2018/05/25/california-jury-recommends-25-m-johnson-johnson-lawsuit/643855002/>

[10] <https://www.popsci.com/jury-verdict-science-cancer#page-2>

[11] [https://www.cancer.gov/types/ovarian/hp/ovarian-prevention-pdq#link/\\_220\\_toc](https://www.cancer.gov/types/ovarian/hp/ovarian-prevention-pdq#link/_220_toc)

[12] <https://www.cancer.org/cancer/cancer-causes/talcum-powder-and-cancer.html>

[13] <https://youtu.be/3IP2Xb5r0U>

[14] <https://www.cbsnews.com/news/glyphosate-roundup-chemical-found-in-childrens-breakfast-foods/>

[15] <https://academic.oup.com/jnci/article-abstract/110/5/509/4590280?redirectedFrom=fulltext>

[16] <https://www.epa.gov/pesticides/epa-releases-draft-risk-assessments-glyphosate>

[17] <https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2015.4302>

[18] <https://www.ewg.org/childrenshealth/glyphosateincereal/#.W3YbKy3Myen>

[19] <https://gmo.geneticliteracyproject.org/FAQ/is-glyphosate-roundup-dangerous/>

[20] [https://geneticliteracyproject.org/wp-content/uploads/2019/03/GlyphosateInfographic\\_GLP.pdf](https://geneticliteracyproject.org/wp-content/uploads/2019/03/GlyphosateInfographic_GLP.pdf)

[21] <https://geneticliteracyproject.org/2019/01/14/monsanto-roundup-controversy-glyphosate-unlikely-to-pose-cancer-risk-canada-confirms/>

[22] <https://academic.oup.com/jnci/article/110/5/509/4590280>

[23] <https://www.iarc.fr/>

[24] <https://monographs.iarc.fr/list-of-classifications-volumes/>

[25] <https://geneticliteracyproject.org/glp-facts/iarc-international-agency-research-cancer-glyphosate-determination-world-consensus/>

[26] <https://www.reuters.com/article/us-france-agriculture-glyphosate/france-suggests-glyphosate-exit-could-be-even-slower-than-planned-idUSKCN1Q41S0>

[27] [https://geneticliteracyproject.org/wp-content/uploads/2019/03/GlyphosateInfographic\\_GLP-1.pdf](https://geneticliteracyproject.org/wp-content/uploads/2019/03/GlyphosateInfographic_GLP-1.pdf)