Glyphosate can harm pregnant women living near farms? Carelessly-written article based on the same authors’ more sober academic study shows how misinformation metastasizes

Scientists claim in a popular article that glyphosate poses “health concerns”—but what do the data actually say?

Glyphosate is the world’s most used herbicide. That distinction places it firmly in the crosshairs of those that seek to remove safe and effective chemistry from the hands of farmers. And it’s consumers worldwide who in the end will be most hurt by anti-biotechnology advocacy groups that target the weedkiller as a proxy for genetically engineered crop.

We need not look further than court case after court case in which lay juries, not scientists or physicians, have been tasked with determining if this relatively benign herbicide used safely for half a century causes non-Hodgkin’s Lymphoma as activist critics contend. In numerous cases, juries have sided with plaintiffs even though the global consensus holds otherwise.

The best scientific analysis to date, focusing on more than 54,000 high-exposure farmers who applied glyphosate regularly over decades—the USDA’s Agricultural Health Study—showed no non-Hodgkin’s Lymphoma association.

There have been thousands of studies of glyphosate and only a handful, mostly conducted by outspoken critics of glyphosate and published in obscure or pay-for-play journals, claim to show an association between the herbicide and cancer. And an independent review showed the claimed connection derived from mashing together data sets that were not appropriate to combine, and generated a misleading outcome that grabbed headlines. No wonder the public discussion is pockmarked with negative perceptions.

Despite attempts by glyphosate critics to pressure politicians to ban the herbicide, scientific sanity has so far prevailed. Just last month, after authorizing yet another evaluation that stretched to more than 11,000
pages and concluded there is no unusual risk from application or dietary exposure, the European Union re-approved glyphosate for 10 more years.
1. Why has the Commission renewed the approval of glyphosate?

As required by EU legislation on pesticides, and in accordance with the Comitology rules, in the absence of a qualified majority of the Member States in the Committee, the Commission was legally obliged to take a decision before the expiry of the current approval (2023). The Commission, based on the assessment of the latest available scientific data, including the impact of glyphosate on the health of humans, wildlife, and the environment, and which did not identify critical areas where the use of glyphosate would prevent a renewal of approval, therefore adopted Implementing Regulation to renew the approval of glyphosate subject to certain conditions and restrictions (see Q5).
These results comport well with the findings of almost two dozen independent international regulatory bodies over more than a decade of careful assessment. As Health Canada summarized in its review of the herbicide in 2019, “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.”
How false information on the alleged dangers of glyphosate metastasizes

Despite these unanimous conclusions, the public and social media conversation is muddied with misinformation. The latest incident arose last week with the publication of an article in The Conversation titled “Glyphosate, the active ingredient in the weedkiller Roundup, is showing up in pregnant women living near farm fields – that raises health cancer”.

Glyphosate, the active ingredient in the weedkiller Roundup, is showing up in pregnant women living near farm fields – that raises health concerns

Published: December 6, 2023 8:27am EST

The journalistic article was written by two of the eight authors of a July academic paper examining the presence of trace amounts of glyphosate-based herbicides in pregnant women living near farm fields.
Bizarrely dubbed a “Research Brief”, the piece was echoed in the media by a strategically timed, well-oiled glyphosate attack campaign. The coordinator was Carey Gillam, a former Reuters journalist, who was displaced from her position at the news service 8 years ago after widespread allegations of biased reporting about glyphosate. After a stint at the organic-industry funded anti-crop biotech front group US Right to Know, she began writing an anti-glyphosate attack blog last year for the Environmental Working Group, which is largely funded by donations from the organic industry and trial lawyers who have made billions of dollars litigating the alleged dangers of glyphosate.

Gillam placed articles on her EWG website, the UK The Guardian and the Society of Environmental Journalists webpage coordinated to come out the same day as the release of The Conversation summary piece. Advocacy sites on the web and the discussion site Reddit all simplistically hyping Gillam’s line. This propaganda onslaught added fuel to the ‘confusion inferno’ and serves as a textbook example of how data can be misrepresented and mainstreamed.

**Examining the data through the lens of science and not ideology**

Ironically, and media hype aside, rather than uncovering health threats to vulnerable women from glyphosate, the hyped study results actually show the opposite: that exposure levels are infinitesimally small and represent a testament to how the herbicide is safely used.

The Conversation article is a synthesis of a study by Curl et al. published last week in Environmental Health Perspectives, a favorite depository for papers produced by longtime critics of crop biotechnology. EHN is notoriously known for a 2015 article, “IARC Monographs: 40 Years of Evaluating Carcinogenic Hazards to Humans,” which insinuated that scientists who criticized the only agency to claim that glyphosate poses a cancer threat—the International Association for Research in Cancer (IARC) — had venal motives.

The academic piece analyzed urine glyphosate levels in 22 pregnant women living within 0.5 km (about 0.3 miles) of a likely agricultural field in southern Idaho where glyphosate might have been applied, and 18 others that lived further away. Urine samples were drawn throughout the growing season, including time points apparently coincident with glyphosate application, and analyzed for detection of glyphosate. As a water-soluble molecule, glyphosate is rapidly removed from the body and analysis of urine serves as a reasonable proxy for exposure.

Curl et al. claimed that glyphosate was detectable in 66% of samples. What does that mean? Today’s analytical methods can detect glyphosate at amazingly small concentrations. In this work, the Limit of Detection (LOD) was 0.1 micrograms per liter, or 100 parts per trillion. That’s equivalent to 1 minute 40 seconds in 32,000 years. It’s pretty amazing that something that rare can even be identified. Bravo science.

While it may seem strange to find any herbicide residue in urine, modern detection methods are so good that some amount of just about any environmental chemical might be found in all of us—almost always at extremely low trace levels. And urine measures are poor proxies for understanding the impact of a
chemical on human health. The dose makes the poison (and in this case it was infinitesimally low, and the fact that a chemical is found in urine means that it is exactly where it should be, outside the body.

Moreover, the researchers did not report A Limit of Quantitation (LOQ), which is the range of concentrations that a given chemical may be precisely quantified. This is a strange oversight as showing that something is present at the edge of nothing is very different from saying precisely how much is there at the edge of nothing.

There were other perplexing aspects of the study. Assuming that its data are accurate, approximately 154 to 228 parts per trillion (between 2 minutes 24 seconds and 3 minutes 48 seconds in 32,000 years) were detected on average. The 228 parts per trillion were found in samples obtained during spray season in women living close to farms (it was unclear if the farms actually were sprayed with glyphosate, as 14% of crops on the nearby acreage, including onion and mint, were not glyphosate-tolerant and 35% of alleged agricultural land closest to the residence were reported as “none”, meaning no glyphosate traces were found (see Table 2 in the original article). In other words, there is no reason to assume glyphosate was even used on roughly half of the acres.

The other half of the farms grew corn, sugar beets and alfalfa, three crops that may be glyphosate tolerant but are not always, especially alfalfa. The materials and methods section noted “spray season” as May 1 to August 15, but did not note if spraying was actually observed or performed. All curious assumptions.

This is a modification of Figure 4 from Curl et al, showing the data from the test. Black lines in the box and whisker plot represent the median from each group, showing minor differences. Gray boxes represent the range where half of samples are found during apparent spray season, white boxes from non-spray season. Red and blue arrows were added for this piece to underscore the slight differences and provide a relative time analogy. The green arrow shows the limit of detection. For scale, the purple arrow shows the concentration of herbicide applied in the field—about 600 miles away. Statistical significance does not mean biological significance.
This is a modification of Figure 4 from Curl et al, showing the data from the test. Black lines in the box and whisker plot represent the median from each group, showing minor differences. Gray boxes represent the range where half of samples are found during apparent spray season, white boxes from non-spray season. Red and blue arrows were added for this piece to underscore the slight differences and provide a relative time analogy. The green arrow shows the limit of detection. For scale, the purple arrow shows the concentration of herbicide applied in the field—about 600 miles away. Statistical significance does not mean biological significance.

How would an objective scientist assess the data?

Glyphosate was detected in the urine of pregnant women at (probably) the same level near or far from farms. The level may have slightly increased during the apparent spray season, as one might expect as a
certain amount of the chemical may travel as aerosolized drift. The levels detected were orders of
magnitude below demonstrated physiological risk. In sum, the words in the title — “raises health
concerns” — are wholly unwarranted. And curiously, that characterization doesn’t accurately represent the
data or commentary in the original academic article.

More importantly, The Conversation piece shows how results that infer zero to low risk can be
transformed to imply profound danger. The authors of the article cite studies associating urine glyphosate
levels with lower gestational time during pregnancy. Indeed, this research has been done, and a
correlation has been observed between urine glyphosate concentration and minor deviations in gestation
time. The differences observed might translate to a couple of days at the most, and the data come from
small experimental cohorts with potentially confounding variables and limitations that the cited study’s
authors clearly recognize.

The same work reported that no differences were seen in head circumference or birth weight with urinary
glyphosate levels, so while gestation time might be slightly shorter, it did not affect physical attributes of
the newborn. A second study shows very small differences in urinary concentrations in pregnant women
(e.g., 220 ppt vs 270 ppt) that translate to a percent or two of the European Union’s strict allowable daily
intake. In other words, the evidence that the glyphosate has any meaningful impact is extremely thin.

The authors state that there is no consensus that glyphosate is safe-as-used, citing a lone article by
Charles Benbrook, an economist who has made a living bashing genetically engineered crops and their
associated chemicals. That’s a dubious proclamation considering that 3,000+ studies and more than
280 scientific institutions across the world have found GE crops safe. Genetically engineered crops
represent 90-some percent of US corn, canola, soy and cotton acreage, and no health consequences
have been found in humans or animals over 30 years of use. The fact that these authors cite this dubious
claim and also state that random jury decisions constitute a scientific authority is not just bad scholarship,
it is cynical disinformation.

The authors conclude with an argument from ignorance, disingenuously writing “What still isn’t known”. In
fact, we know quite a bit after 50 years and thousands of papers and dozens of regulatory assessments.
Even their study shows that in spray season, the levels of exposure are far below strict international
exposure levels. Even occupational exposure levels have marginal, if any, associations with increased
negative health risks. All of this we know.

**Consequences of misrepresenting science**

What do we make of the odd choices by the authors to frame such flimsy evidence in such a polemical
way? To impute certain risk based on a smattering of small studies is irresponsible at best. To infer some
sort of association of glyphosate with cancer ignores a robust scientific consensus that has not identified
epidemiological or molecular evidence to support hard cancer conclusions.

In the eight years since the International Association for Research in Cancer produced a hazard-based
assessment of the literature classifying glyphosate as a “probable carcinogen”, no research study — not
one — has shown persuasive links to cancer or any other health malady at from micro-traces in our food.
And despite enormous pressure from politicized advocacy groups which have made an opposition to glyphosate their signature issue and major fund-raising tool, regulators around the globe continue to approve its safe use.

Spreading hyperbolic interpretations of published data is dangerous to agriculture and the public. Widely implemented agricultural chemistries are central to farm productivity. It also fans doubt about an oversight process that is widely acknowledged as independent and effective. Regulators pore over data, independent labs exert checks and balances, and payday-seeking attorneys scan the literature for anything that may be distorted into a claim of evidence.

So why would The Conversation, a source with a sound reputation feature a clearly biased article that conjures fear, uncertainty and doubt around a paper that otherwise shows exposure levels are extremely low, even close to farm fields where glyphosate is used?

I understand the pressure to promote one’s research, and I understand that claims of poisoned fetuses get headlines and clicks. But scholars have a professional and moral responsibility to keep interpretations within the data and not infer risk from jury decisions. In the days where trust in science languishes, the public relies on academic scientists to help decipher and contextualize the evidence. In cases like this in which the data show no particular risk and yet the authors grossly exaggerate the findings with claims of ‘health concerns’, carelessly written articles do nothing more than scare the public, irrevocably breaking the already fragile public trust of science.

Kevin M. Folta is a professor, keynote speaker and podcast host. Follow Professor Folta on Twitter @kevinfoita