

Glyphosate traces in breast milk? Weedkiller causes neurological disorders? How activists leverage social media to distort science and spread bogus health concerns

hocking accounts of health dangers selectively presented from peer-reviewed science articles regularly invade Twitter. It's the stock-in-trade of technology rejectionists who purvey fear, uncertainty and doubt.

Consider two hot-off-the-press papers that recently blew up, stoking new concerns about the dangers of glyphosate, the active ingredient in the herbicide Roundup and dozens of other generic weed control products.

Both were targeted by US Right to Know, an activist group founded by the organic industry, which is openly dedicated to destroying conventional agriculture and biotechnology. [\[Read GLP Profile\]](#) Gary Ruskin, one of its directors took to Twitter to wildly misrepresent what these papers actually said and concluded.

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Why are Ruskin and USRTK targeting glyphosate?

Ruskin's goal has never been scientific precision – not when it comes to discussing [food](#), [farming](#) or, more recently, the origins of COVID- 19, about which USRTK [embraces far-right memes](#). What is his disinformation strategy? Creating a frenzy online with the hopes that it will spill over to the mainstream media is his stock-in-trade.

Ruskin starts by cooking up a shocking title about obscure research and sharing his framing of a study that fits with his ideological bias, knowing his already-rapt loyal readership won't critically read it before embracing his central points: glyphosate is killing people, and corporations and the government are suppressing this cold truth.

Demonizing glyphosate, a weedkiller paired with numerous genetically modified crops, has been the fund-raising tool of choice by activists since 2015 when a then-obscure UN sub-agency, the International Agency for Research on Cancer (IARC) [classified the substance as a "probably carcinogenic"](#) hazard to applicators — a category it shared with bacon, salted fish, oral contraceptives and wine.

It was a “hazard” study, so it [did not address how the substance affects people in real-world usage](#). It also did not conclude that micro-traces of glyphosate in our food have any impact on human health. But the fragmentary conclusions have since provided a platform for USRTK and other anti-GMO groups to frighten the public, and potentially affect policy.

Nineteen other independent global oversight groups—all of them reviewing real-world risk rather than theoretical hazard—examined the same data and additional two-to-three thousand studies and came to a more benign conclusion. As Health Canada, the Canadian government’s independent health agency, [recently noted \(2019\)](#) after twice reviewing IARCS claims that glyphosate might cause cancer (to applicators):

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.

Literally thousands of studies and every major chemical oversight agency in the world—20 of them—that has reviewed the extensive data on glyphosate have concluded that it does not pose a cancer risk. [[See interactive GLP chart of independent research organizations that have issued reports on glyphosate](#)] That’s confirmed by [robust epidemiological](#) and molecular/mechanistic research, including a government-financed [study released earlier this year](#) by the European Chemical Agency (ECHA) that concluded:

Based on the available scientific evidence, ECHA’s Committee for Risk Assessment (RAC) also concludes that classifying glyphosate as a carcinogenic, mutagenic or reprotoxic substance is not justified.

But thousands of studies and independent conclusions have now put a dent in USRTK’s ideology. To reinforce the prejudices of their followers, folks sworn to end the use of this critical agricultural tool need to move the goal posts. Where can they create maximum fear? In this latest instance, Ruskin focused on breast milk and brains, two scary sequestration spots, as a specter of adulterated infant feed and devastating neurological disease.

What is the scientific consensus on the presence and potential danger of glyphosate in breast milk?

Claims that glyphosate pollutes breast milk and the brain have circulated on the Internet for years. [Friends of the Earth Europe](#) and Mom’s Across America launched an Internet campaign in 2014 based on an informal test they funded that found minute traces of glyphosate in breast milk and urine.

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It caused the anticipated furor, with the story circulated even in such nominally mainstream blogs as [Civil Eats](#). But it wasn't science.

The results were challenged in a comprehensive [study](#) led by Washington State University scientist and lactation expert, Michelle McGuire, who found no evidence that glyphosate accumulates in breast milk. Activists criticized the study—three Monsanto employees were co-authors. But McGuire’s team had merely confirmed previous independent studies.

The clearly misleading claims prompted actual lactation scientists to [devise intricate strategies](#) for glyphosate detection in complicated solutions like human milk. Upon validation and implementation of proper, high-resolution methods, [no glyphosate could be detected](#) in human milk.

Two subsequent papers by German researchers, including a report by scientists affiliated with the independent German Federal Institute for Risk Assessment (BfR) —which does risk assessments for the European Commission —published additional research in 2016 found no traces of glyphosate.

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Lots of likes and retweets, but do the data really say what USRTK wants you to believe they say?

What’s new in the two new papers being hyped by activists? A [July 2022 paper](#) in the *Brazilian Journal of Medical and Biological Research* starts with what reads more like verifying a conclusion rather than testing a hypothesis: “The aim of this study was to verify the presence of glyphosate in breast milk.” Surprise, they find what they are looking for.

The authors do not cite the previous rigorous analytical work that contradicts their hypothesis. Instead, they use a commercial kit not intended for use in assessing human milk. Camiccaia et al. (2022) conclude that a broad demographic of lactating women in their study were “contaminated” with glyphosate.

Let’s look at their methods.

The commercial kit they used is marketed by Abraxis. It has been demonstrated to be useful in detecting glyphosate in water (and in some cases urine) to [0.05 parts per billion \(ppb\) with a high-confidence quantitation range around 0.5 ppb](#). That's a half second in 32 years — a level so small that it would not endanger any human — so this is a very sensitive test. But sensitive tests demand careful attention to factors that can affect detection. The assay is only as good as its controls.

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The authors used this assay with breast milk, not water. Breast milk is a complicated matrix of hundreds of compounds — a healthy dose of lipids, carbohydrates, and proteins needed for infant nutrition. The assay is known as a competitive ELISA (Enzyme-linked immunoassay is a commonly used laboratory test used to detect antibodies in the blood). Any molecule that interferes with a choreography of molecular interactions in the assay could produce a false positive signal. The proper demonstration would have been to start with breast milk with zero detection, then add glyphosate in known amounts to define the limitations of the assay.

There were other technical curiosities about how the authors calculated quantity. The authors were contacted for clarification, and they responded that they would provide answers later this month, after August 18, 2022.

The results indicate that out of sixty-seven women, *all of them* tested positive for glyphosate. The women came from urban and farming backgrounds, varied significantly in education, were racially diverse, and held a variety of occupations. Oddly, almost all groups were found to have an exact level of glyphosate with an average close to 1.50 ppb. Again, that's equivalent to 1.5 seconds in 32 years; describing it as a trace is overly generous. None of the women tested negative. None.

If none tested negative, how do we know the assay isn't just reporting a slight false positive? These assays are exquisitely sensitive and prone to false positives when used with complex mixtures. Without a sample showing "no glyphosate detection", it is impossible to determine if the reported positives are *bona fide* detection events or cross-reaction with some other component of human milk.

Another interpretation of the data might be that these scientists are very careful and do highly reproducible work, as evidenced by the fact that they get the same "detection" across all samples tested. They likely defined the background for the assay, the cross-reaction with milk components, not actual detection of glyphosate.

The authors go on to estimate what childhood exposure would be if their numbers were correct. They appropriately conclude that the cumulative dose of exposure over time "does not represent a toxic accumulation". At reported levels there would be *no toxic effect* assuming it even accumulates in the body. However, there is robust research that shows that glyphosate is expelled from the body rapidly in urine and stools, and [does not accumulate](#).

And here's the kicker: Even with their questionable methodology and motivations, to their credit, they did not infer undue risk from the levels reported. But that did not matter to Gary Ruskin who misrepresented the study, and his legion of followers who retweeted his post.

Glyphosate in brains?

Let's look at the second paper — a July 28, 2022 study by [Winstone et al.](#) on the potential effects of glyphosate on the brain. It is a high-quality paper with reasonable experiments and reliable results.

The researchers fed mice glyphosate and then measured amounts in the brain, plasma and urine. Glyphosate was detected in the brain, and the more mice they fed, the more was detected. They showed

that the levels used could induce accumulation of proteins associated with neurological disease, and evidence of gene expression indicative of inflammation and neurological issues.

Is that a smoking gun? The authors allude to that possibility, concluding: "...exposure to this herbicide may have detrimental outcomes regarding the health of the general population."

However, the smoking gun is really the carnage of a biochemical nuclear warhead. The results come from experiments in which mice were fed pure glyphosate at 125, 250 or 500 micrograms per kilogram body weight over 14 days. Mice and micrograms are hard to interpret; this is equivalent to a 100 kg (220 lb.) human downing 50 grams (the weight of two slices of bread) of pure glyphosate every day for 14 days.

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[Note: Glyphosate is used in controlled, limited amounts. Fifty grams is the amount sprayed over a 3000 square feet (~300 square meters) of crops once or twice in a growing season.] In other words, there is zero relevance for the amounts used in this study to reach any conclusion about realistic human exposure.

Glyphosate is considered low toxicity at levels used in farming and at the micro-trace levels found in food. However, massive, unrealistic doses used in some studies, sometimes with the intention of demonstrating its 'potential for harm' have been [shown to have physiological effects](#), especially after chronic consumption. After half a month of pounding mice with huge doses, it would be shocking if there wasn't some glyphosate detected in all tissues, evidence of cytotoxicity, and gene expression patterns consistent with a sick mouse. No surprise that is exactly what the authors found.

What did Ruskin and anti-biotech activists not tweet about this study? That the results show that humans faced no likely harm, even at mega-doses.

The lowest (massive) dose (125 ug/L) has only minor effects compared to control mice not consuming glyphosate. This is equivalent to the 100 kg person consuming 12.5 g of pure glyphosate (about the weight of a AAA battery) per day for 14 days – far more than what any human would consume. Yet: Negligible effects.

The authors appropriately acknowledge their results are based on high doses, and properly conclude that the data are only a starting point to look more closely at individual genes, etc. But they recklessly speculate on connections to neurological disease, as that was not measured. Moreover, the amounts used to induce neuroinflammation in their study were far beyond any occupational or consumer exposure.

Note that they use the speculation-inflaming word “may” ten times in the article to imply a possible link to Alzheimer's and other neurological diseases. However, this speculative connection seemed much more concrete in [other media treatments of this research](#), which are more likely to be read by the average consumer than the dense research article.

What can we learn from this latest social media 'event'?

Merchants of doubt challenging agricultural chemical safety don't know the science, but they expertly understand the triggers that drive public concern. Scientific claims are only as sound as their methods and the quality of the data. Also, key is how scientists discuss the limitations of the research and how far their results are interpreted.

These limitations, which literally define careful science, often do not play well in the media or on social media. Nerdy details when presented by more careful scientists or science journalists get eye rolls rather than tens of thousands of clicks when compared to the shocking conclusions in article titles hyped on Twitter postings.

What can readers do who genuinely want to know what's trustworthy science versus what is manipulative ideology?

There is a high-profit disinformation industry reliant on agents of deception — US Right to Know and Gary Ruskin in this case — that exploit poor quality studies, over-interpret relatively good ones, or circulate predatory reviews to manipulate public opinion. Their goal: to stoke fears of modern agriculture, genetics and associated products.

The focus of the science consumer should be to critically question all claims, letting the chips fall where the science lands.

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