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# Glyphosate Weedkiller a Primary Cause of Kidney Damage

Analysis by Dr. Joseph Mercola | January 28, 2020

## STORY AT-A-GLANCE

- Research published in Environmental Pollution identified glyphosate in the urine of 11.1% of the infants and young children they tested, and this rose to 30% among newborns
- Significant bioaccumulation of glyphosate has been documented in the kidney, an organ with known susceptibility to glyphosate
- Glyphosate-induced kidney toxicity has been associated with disturbances in the expression of genes associated with fibrosis, necrosis and mitochondrial membrane dysfunction
- Glyphosate exposure may be associated with the epidemic of chronic kidney disease of unknown origin in farmworkers in Central America, Sri Lanka and central India
- Consumption of glyphosate-contaminated water may contribute to chronic kidney disease by facilitating the transport of heavy metals such as arsenic and cadmium into the kidneys

Application of glyphosate, the active ingredient in Roundup herbicide, is unprecedented in scale, and we haven't even reached the tip of the iceberg when it comes to understanding its far-reaching environmental and human health effects. Since genetically engineered (GE) "Roundup Ready" crops, which are tolerant of glyphosate, were introduced, global usage of glyphosate rose nearly fifteenfold.[1]

Usage is so pervasive that researchers have stated, "no pesticide has come remotely close to such intensive and widespread use" in the U.S., and this is likely the case globally as well.[2] Cancer has emerged as one of the leading health risks of glyphosate, and approximately 42,700 U.S. lawsuits from individuals alleging that glyphosate caused them to develop cancer have already been filed.[3]

However, other chronic diseases have also been linked to the chemical, including kidney disease. In January 2020, research published in Environmental Pollution identified glyphosate in the urine of 11.1% of the infants and young children they tested, and this rose to 30% among newborns.[4]

Despite the detectable levels of glyphosate, the study did not find an association between low-level glyphosate exposure and markers of kidney injury, but the researchers noted the study was limited by a small sample size and, "The lack of evident renal toxicity in association with glyphosate exposure in young children does not exclude a potential adverse impact of longer term exposure to the pesticide."[5]

The researchers further noted, "Further studies of larger sample size are indicated to better understand putative deleterious effects of the herbicide after different levels of exposure."[6]

## Glyphosate's Link to Kidney Damage

Significant bioaccumulation of glyphosate has been documented in the kidney, an organ with known susceptibility to glyphosate. Glyphosate-induced kidney toxicity has been associated with disturbances in the expression of genes associated with fibrosis, necrosis and mitochondrial membrane dysfunction.[7]

Further, as noted by the Environmental Pollution study researchers, "Previous studies have associated glyphosate exposure with changes in renal function, kidney injury, and chronic kidney disease of unknown etiology. There is growing evidence linking glyphosate exposure with the epidemic of chronic kidney disease of unknown origin in farmworkers in Central America, Sri Lanka and central India."[8]

Dr. Sarath Gunatilake, professor of health science at the University of California and Channa Jayasumana, Ph.D., a faculty member of Medicine and Allied Sciences at the Rajarata University of Sri Lanka, have published papers linking glyphosate exposure to chronic kidney disease of unknown etiology (CKDu) in Sri Lankan farmers.[9]

In 2014, they hypothesized that consumption of glyphosate-contaminated water may contribute to chronic kidney disease by facilitating the transport of heavy metals such as arsenic and cadmium into the kidneys.[10] Sri Lankan Agricultural Nephropathy (SAN), a form of chronic kidney disease among paddy farmers that was first reported in 1994, has become the most debilitating public health issue in parts of Sri Lanka.

## Glyphosate May Be a Primary Cause of Kidney Disease

In 2015, Gunatilake and colleagues noted that people living in areas with endemic SAN are exposed to multiple heavy metals and glyphosate, adding further support that the condition is toxicological in origin:[11]

> *"Although we could not localize a single nephrotoxin as the culprit for SAN, multiple heavy metals and glyphosates may play a role in the pathogenesis. Heavy metals excessively present in the urine samples of patients with SAN are capable of causing damage to kidneys. Synergistic effects of multiple heavy metals and agrochemicals may be nephrotoxic."*

In another 2015 study published by the team, it was found that people who drank water from wells where glyphosate and heavy metal concentrations are higher had a fivefold increased risk of CKDu.[12] In 2019, researchers again named agricultural chemicals, including glyphosate and paraquat, as possible primary factors in CKDu, noting:[13]

> *" … [G]lyphosate causes insidious harm through its action as an amino acid analogue of glycine, and … this interferes with natural protective mechanisms against other exposures.*
>
> *Glyphosate's synergistic health effects in combination with exposure to other pollutants, in particular paraquat, and physical labor in the ubiquitous high temperatures of lowland tropical regions, could result in renal damage consistent with CKDu in Sri Lanka."*

## Controversy Over Scientific Freedom and Responsibility Award

Gunatilake and Jayasumana's research linking glyphosate to chronic kidney disease was so significant that they received notable recognition from the American Association for the Advancement of Science (AAAS), the world's largest scientific society and publisher of several journals, including Science.

Since 1980, AAAS has presented an annual award for Scientific Freedom and Responsibility to "scientists, engineers or their organizations, whose exemplary actions have demonstrated scientific freedom and responsibility in challenging circumstances."

As noted by AAAS, "Some awardees have risked their freedom and even physical safety by their actions, while others have been honored for their advocacy and their leadership."[14] In 2019, AAAS was slated to present the Scientific Freedom and Responsibility to Gunatilake and Jayasumana, who certainly faced their share of adversity in speaking out against glyphosate.

An AAAS press release even noted that the researchers "faced death threats and claims of research misconduct while working to determine the cause of a kidney disease epidemic that has claimed tens of thousands of lives in their home country of Sri Lanka and around the world. Ultimately, their advocacy led to the culprit, an herbicide called glyphosate, being banned in several affected countries."[15]

Jessica Wyndham, director of the AAAS Scientific Responsibility, Human Rights and Law Program, further noted, "To right a wrong when significant financial interests are at stake and the power imbalance between industry and individual is at play takes the unique combination of scientific rigor, professional persistence and acceptance of personal risk demonstrated by the two scientists recognized by this year's award."[16]

The award announcement was met with significant backlash from industry, however, leading AAAS to backtrack and retract the award, stating they agree to "taking steps to reassess the 2019 Award for Scientific Freedom and Responsibility, after concerns were voiced by scientists and members. This award will not be presented … as originally planned while we further evaluate the award selection."[17]

## Science Prevails, Glyphosate Scientists Awarded After All

After implementing a lengthy peer review to evaluate the 2019 award, AAAS decided their original decision was the right one after all and have now formally listed Gunatilake and Jayasumaa as the recipients of the 2019 Scientific Freedom and Responsibility award, noting the scientists "investigated a possible connection between glyphosate and chronic kidney disease under challenging circumstances."[18]

The wording is notably different, however, from AAAS' original description,[19] which has since been taken down but once referred to the researchers as "public health researchers who battled powerful corporate interests to uncover the deadly effects of industrial herbicides."[20]

Jayasumana had suspected that industry had negatively influenced the AAAS initially, but with their research vindicated, he told Monga Bay, "Science has prevailed. That's why, after certain groups opposed our selection and undermined our professional work, the research work has been upheld as credible."[21]

## Glyphosate's Link to Chronic Disease


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Gunatilake and Jayasumaa are not alone in their findings that glyphosate is capable of causing chronic disease. A number of animal studies have linked glyphosate to liver damage, for instance, including one that dates back to 1979, which showed the chemical could disrupt mitochondria in rat livers.

While the actual study is behind a paywall — meaning you have to pay to read it — it is referenced and duplicated in a 2015 study that affirmed that chronic exposure to the chemical "can result in liver and kidney damage."[22,23]

Glyphosate is also known to trigger the production of reactive oxygen species, leading to oxidative stress. As noted in Scientific Reports, "Elevation in oxidative stress markers is detected in rat liver and kidney after subchronic exposure to GBH [glyphosate-based herbicides] at the United States permitted glyphosate concentration of 700 µg/L in drinking water."[24,25]

Researchers from King's College London also showed an "ultra-low dose" of glyphosate-based herbicides was damaging.[26]

Stephanie Seneff, a senior research scientist at the Massachusetts Institute of Technology (MIT), has also been studying glyphosate for years and determined that the increase in glyphosate usage in the U.S., as well as in Canada, is extremely well correlated with the concurrent increase in the incidence of multiple diseases, including breast cancer, pancreatic cancer, kidney cancer, thyroid cancer, liver cancer, bladder cancer and myeloid leukemia.[27]

Research scientist Anthony Samsel is one of Seneff's co-authors, and together they've suggested that one of the ways glyphosate is harmful is via disruption of glycine homeostasis. Glyphosate has a glycine molecule as part of its structure (hence the "gly" in glyphosate). Glycine is a very common amino acid your body uses to make proteins.

Samsel and Seneff believe your body can substitute glyphosate and its metabolite aminomethylphosphonic acid (AMPA) into peptides and proteins, which results in damaged peptides and proteins being produced.

Glycine also plays a role in quenching inflammation, as explained in "Glycine Quells Oxidative Damage by Inhibiting NOX Superoxide Production and Boosting NADPH," and is used up in the detoxification process. As a result of glyphosate toxicity, many of us may not have enough glycine for efficient detoxification.

## How to Detox Glyphosate

Glyphosate residues are found in many foods, including genetically engineered crops and non-GE grains, such as oats. One of the best ways to avoid exposure is to eat organic or biodynamically grown food, and invest in a good water filtration system for your home to lower exposure that may occur via drinking water. You'll also want to avoid using glyphosate-based products around your home, garden or workplace.

If you're interested, the Health Research Institute (HRI) in Iowa developed the glyphosate urine test kit, which will allow you to determine your own exposure to this toxic herbicide. They're also in the process of doing hair testing for glyphosate, which is a better test for long-term exposure.

If it turns out that you have measurable levels of glyphosate in your body, Seneff recommends consuming organic, unpasteurized apple cider vinegar, as it contains acetobacter, which can break down glyphosate. She also suggests eating garlic and cruciferous vegetables, which are good sources of sulfur.

Glycine supplementation may also be a good option to help detoxify glyphosate, as to eliminate glyphosate, you need to saturate your body with glycine.

Dr. Dietrich Klinghardt, who is a specialist in metal toxicity and its connection to chronic infections, recommends taking 1 teaspoon (4 grams) of glycine powder twice a day for a few weeks and then lower the dose to one-fourth teaspoon (1 gram) twice a day. This forces the glyphosate out of your system, allowing it to be eliminated through your urine.

I personally have been taking 1 gram twice a day for some time now. Glycine is inexpensive and tastes sweet. Ideally it is best to take it around the time you are eating food that might be contaminated with glyphosate, of which, unfortunately, there are many.

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