

Glyphosate and GM Crops: Health Implications

By Stephanie Seneff

What is glyphosate?

Glyphosate is the active ingredient in *Roundup*, an herbicide first introduced by Monsanto to control weeds in food crops in the mid-seventies. Roundup is the most widely used herbicide in modern agriculture, due to its perceived low toxicity to humans. Its use has more than quadrupled between 1995 and 2010. To make it easier for farmers to apply this herbicide, *Genetically modified crops* that are resistant to glyphosate, the so-called *Roundup-Ready* crops, were introduced in the late nineties so that glyphosate could be sprayed indiscriminately on the field to kill the weeds without killing the crops. These were wildly successful: today, well over 90% of the corn, soy, sugar beets, and canola grown in North America are Roundup-Ready.

Is Glyphosate Safe?

Monsanto assures the public that glyphosate is safe for humans, because it kills the weeds by inhibiting the first *enzyme* in the *Shikimate Pathway*, a pathway that human cells do not have. However, the microbes that live in the human body, which outnumber our own cells ten-fold, *do* have this pathway. These microbes use the Shikimate Pathway to synthesize the so-called *aromatic amino acids* – tyrosine, tryptophan, and phenylalanine. Human cells can't synthesize these important molecules precisely because we don't have the pathway. Humans rely on the microbes to produce these aromatic amino acids, which are precursors for all the neurotransmitters: serotonin, melatonin, dopamine and adrenaline, as well as thyroid hormone, the essential vitamin, folate, and the tanning protein, melanin. As a consequence, deficiencies in these aromatic amino acids can lead to catastrophic biological effects, and could help explain the rapid increase in modern diseases in the US over the last two decades.

Glyphosate and Modern Diseases

Figure 1 plots the prevalence of 6-year olds with autism, together with the amount of glyphosate applied over the previous four years to corn and soy crops in the US, covering the time period from 1995 to 2010. The extremely high correlation between the two plots suggests that glyphosate may be the single strongest factor contributing to this epidemic. In fact, many of the known biomarkers for autism – disrupted gut bacteria, impaired immune function, serotonin/melatonin/methionine deficiency, etc., can be explained by glyphosate's known effects on biological systems. Nancy Swanson, et al. have produced many similar plots, suggesting a linkage between glyphosate and the recent increase in many other diseases, such as Alzheimer's, high blood

pressure, inflammatory bowel disease, and many others. In the past few years, causal relationships between glyphosate use and some of these diseases have emerged based on animal studies. Glyphosate has been detected in human breast milk, as well as in soy-based formula, suggesting early life exposure of children to this toxic chemical.

What Can Be Done?

There is no doubt in my mind that the previously held beliefs that glyphosate and the Roundup-Ready crops are safe is deeply flawed. We simply cannot sit on our hands and allow agrochemical companies to continue poisoning our children and their children. Here are a few things that we can and must do:

- Contact our elected officials to express our concerns about the use of toxic chemicals in food crops, and demand legislation to protect the earth and her inhabitants. This could include:
 - Labeling foods with GMOs,
 - Declaring a moratorium on the use of poisonous herbicides and insecticides until we have convincing evidence that they are safe.
- Contact relevant government agencies to demand that adequate funding be provided for large-scale and longitudinal studies on the effects of toxic chemicals on human and environmental health, free from the influence of agrochemical corporations with clear financial interests.
- Become an advocate and organize among ourselves.
- Buy organic and vote with your pocket book!

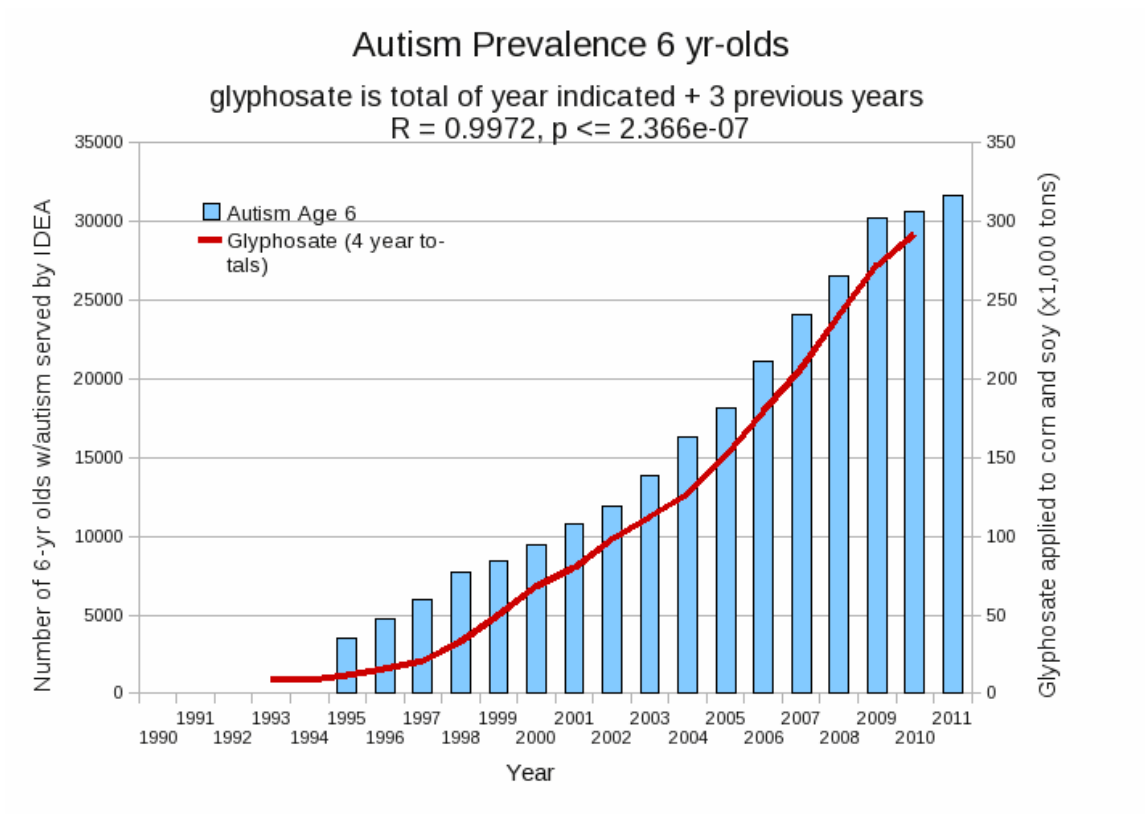


Figure 1: Plots of autism rate (data provided by the US Department of Education) and the use of Glyphosate in corn and soy (data provided by the US Department of Agriculture) in the US between 2005 and 2011. Plot by Nancy Swanson used with permission.

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ORIGINAL PAPER

Genetically engineered crops, glyphosate and the deterioration of health in the United States of America

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