Impact of Glyphosate: Possible Modes of Action

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US Health Status

• US makes up 5% of the world’s population but consumes more than 50% of the world’s pharmaceutical drugs
  – Spends more on health care than Japan, France, China, UK, Italy, Canada, Brazil, Spain, and Australia, combined

• US ranks last or near last among developed nations on infant mortality and life expectancy

• Americans also suffer from more chronic illnesses

• US consumes 25% of the world supply of glyphosate
Roundup and GMO Crops

GMO Roundup-Ready corn, soy, canola, sugar beets cotton, tobacco and alfalfa

What is glyphosate?
This is the new childhood in America:

1 in 3 is overweight
1 in 6 has learning disabilities
1 in 9 has asthma
1 in 10 has ADHD
1 in 12 has food allergies
1 in 20 has seizures
1 in 54 males has autism
1 in 45! autism

50% (half) of all children have chronic illness or are overweight.

This is the NEW NORMAL in our country.

Are you concerned yet?!
Because if you’re not, then you are not paying attention!
A Frightening Trend*

Exponential Growth!

Almost 1.5% of US children are now diagnosed with autism, according to data from 11 regions in the United States.

1 in 5,000
1 in 2,500
1 in 500
1 in 166
1 in 150
1 in 110
1 in 68

12 years

Percentage of children with Autism in the US

- Percentage of children with Autism in the US is projected to reach 50% by 2032.

- The exponential growth is depicted on the graph with the data points and the trend line.

- The graph shows the percentage on the y-axis and the years on the x-axis.

- The data points are marked in blue diamonds, with the trend line in red.

- The trend line indicates a sharp increase towards 2032, where the percentage will exceed 50%.
Percentage of children with Autism in the US

A linear extension of the trend line says that 1 in 2 children born in 2032 will end up on the autism spectrum. (80% of the boys)
Autism Prevalence: 6 year olds*

* Figure 15, Seneff et al., Agricultural Sciences, 2015, 6, 42-70
Glyphosate and Autism: Some Biological Mechanisms

• Disruption of gut microbes\textsuperscript{1}
  – Children with autism suffer from many digestive issues
• Disruption of sulfur metabolism, glutathione deficiency, impaired methylation pathways\textsuperscript{1}
• Metal chelation (especially manganese)\textsuperscript{2}
  – Manganese deficiency leads to impaired mitochondrial function and glutamate toxicity in the brain
• Inhibition of pituitary release of thyroid stimulating hormone \(\rightarrow\) hypothyroidism\textsuperscript{3}
  – Moms with hypothyroidism have 4-fold increased risk to autism in the fetus

“Glyphosate Now the Most-Used Agricultural Chemical Ever”*
By Douglas Main, Feb 2, 2016 Newsweek

- Glyphosate usage has increased 50-fold since 1996, when GMO glyphosate-resistant crops were introduced in the US.
- Today, 50 times more glyphosate is allowed by the EPA on corn grain than in 1996.
- Half of the American farmers' fields have weeds that are resistant to glyphosate.
- New GMO crops offer dual resistance to glyphosate & 2-4,D → Enlist Duo

*www.newsweek.com/glyphosate-now-most-used-agricultural-chemical-ever-422419
Bait and Switch

• All of the formulations use glyphosate salts
• All of Monsanto’s early studies on animal toxicity of glyphosate used “Technical glyphosate”
• The salts are far more toxic because they increase water solubility and uptake by the cells

*http://farmwars.info/?p=14610&cpage=1#comment-167131

1. Propionate, hydrochloride, sodium, potassium salts, etc.
Growth of GM Corn, Soy and Cotton in US, 1996-2012*

Study of glyphosate and AMPA (breakdown product) residues in soy crops*

Another claim of Monsanto's has been that residue levels of up to 5.6 mg/kg in GM-soy represent "...extreme levels, and far higher than those typically found" (Monsanto 1999).

www.greenmedinfo.com/blog/how-extreme-levels-roundup-food-became-industry-normal
Glyphosate and Celiac Disease

Glyphosate and Celiac Disease*

Wheat, sugar cane, peanuts, barley and legumes are now often sprayed with glyphosate right before harvest as a desiccant/ripeners.

Inhibition of Cytochrome P450 (CYP) Enzymes in the Liver*

Study in rats on 2,4-D, clofibrate, MCPA, and glyphosate

Inhibition of Cytochrome P450 (CYP) Enzymes in the Liver*

CYPs are necessary for bile acid production, vitamin D activation, and detoxing other toxic chemicals.
Glyphosate is an endocrine disruptor that promotes breast cancer*

- Low and environmentally relevant concentrations of glyphosate possess estrogenic activity
- Glyphosate caused human hormone-dependent breast cancer cells to proliferate at concentrations of parts per trillion

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In March, 2015, the World Health Organization declared glyphosate a “probable carcinogen”
Figure 22, J. Hoy et al. Poult Fish Wildl Sci 2015, 3:1
Data from Swanson et al., Journal of Organic Systems, 9(2), 2014

Diabetes

Death from obesity

Death from Dementia

Thyroid cancer
The Only Way Forward....
Summary

• The US spends much more on health care than any other country
  – Is our excessive use of glyphosate the cause?
• Our children today suffer from many chronic diseases
• The exponential growth of autism is alarming
  – Glyphosate’s known toxicological effects align well with the complex symptoms of autism
• Glyphosate is an endocrine disruptor and carcinogen
• Glyphosate is likely the reason for the epidemic in gluten intolerance
• Many diseases are rising in frequency exactly in step with the rise in the use of glyphosate on core crops
• Sustainable organic agriculture is the only path forward