

Impact of Glyphosate: Possible Modes of Action

Stephanie Seneff

CSAIL, MIT

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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!

tism

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!

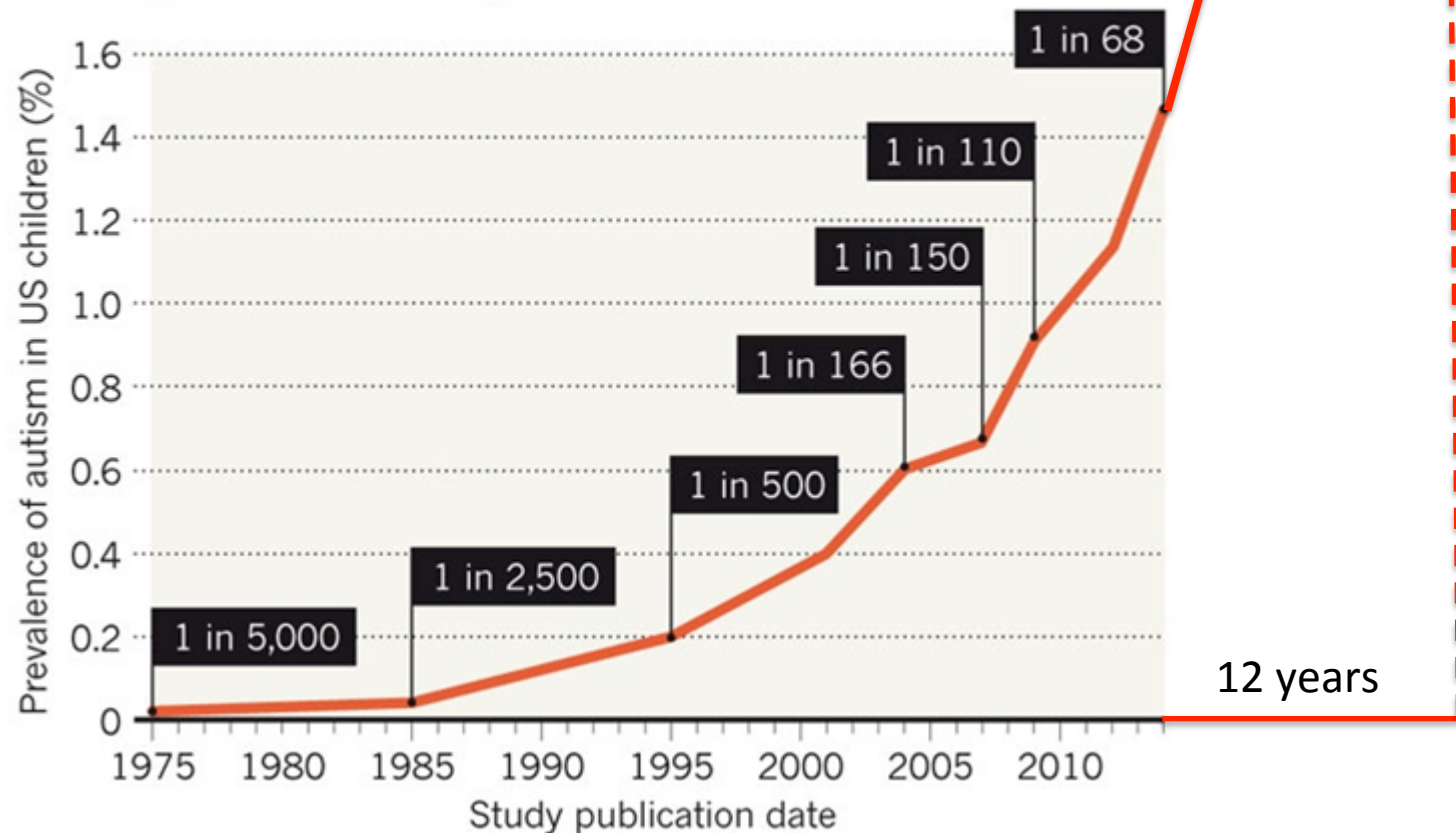


A Frightening Trend*



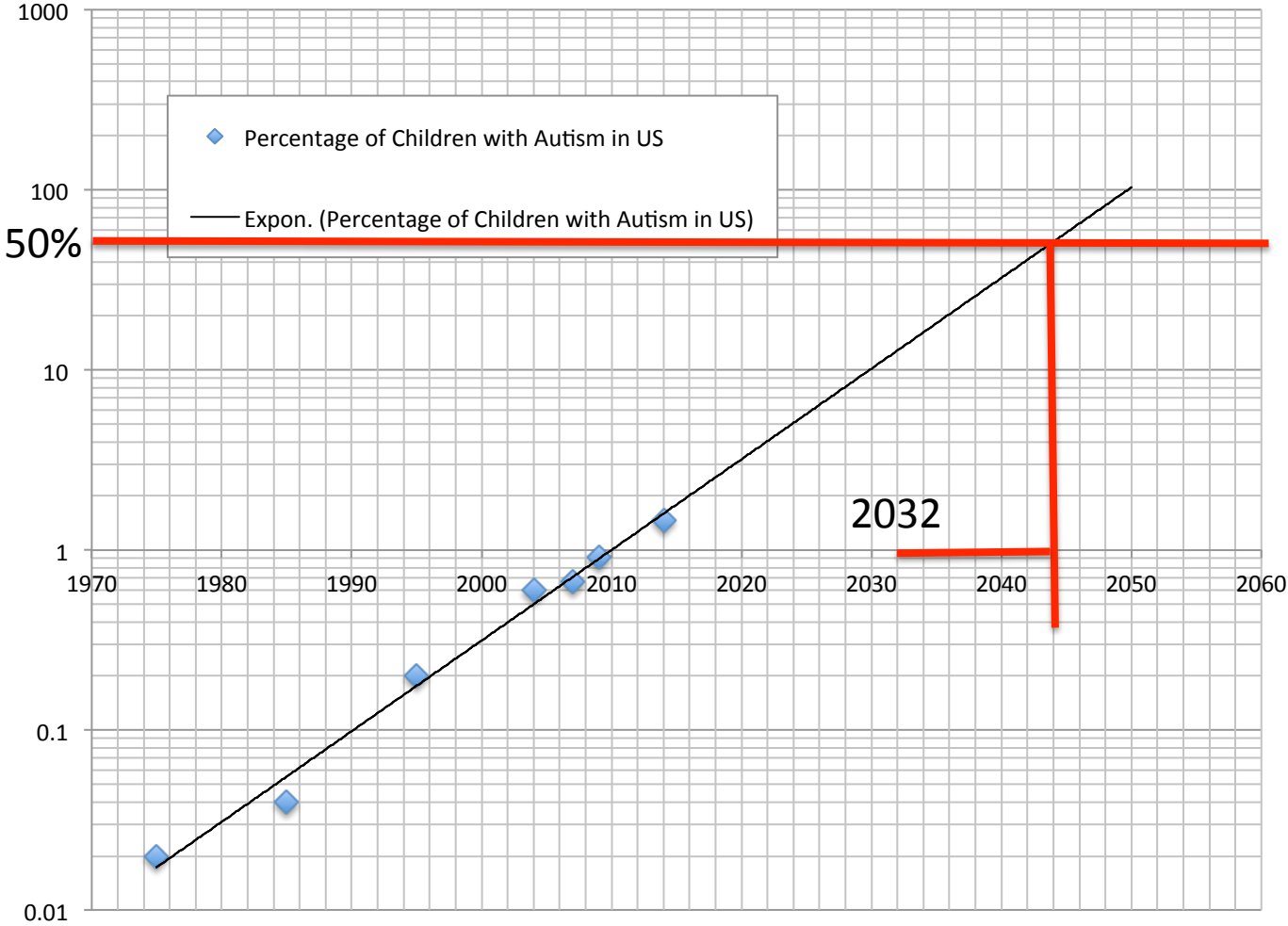
Exponential Growth!

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

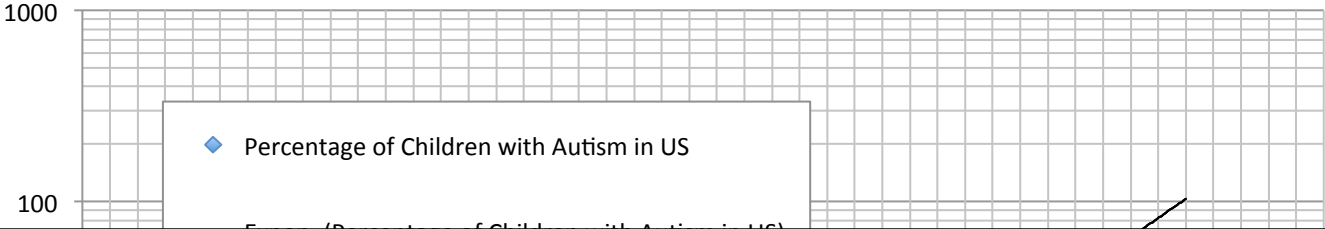


*K. Weintraub, Nature 479, Nov. 3 2011, 22-24.

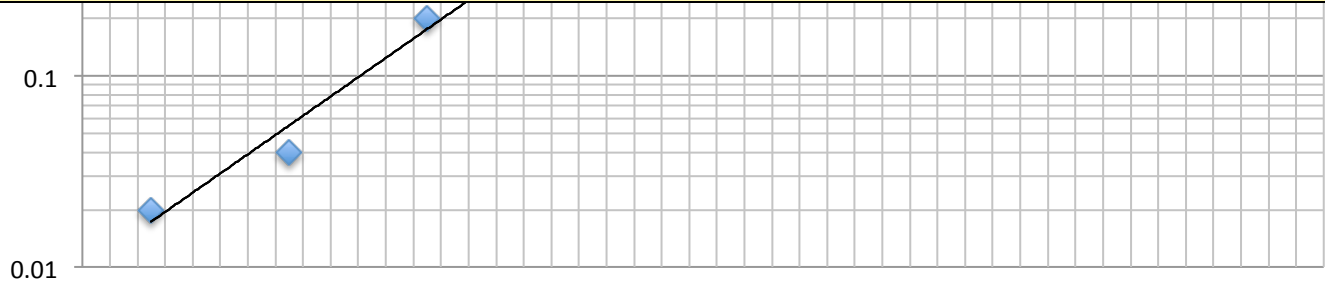
Percentage of children with Autism in the US



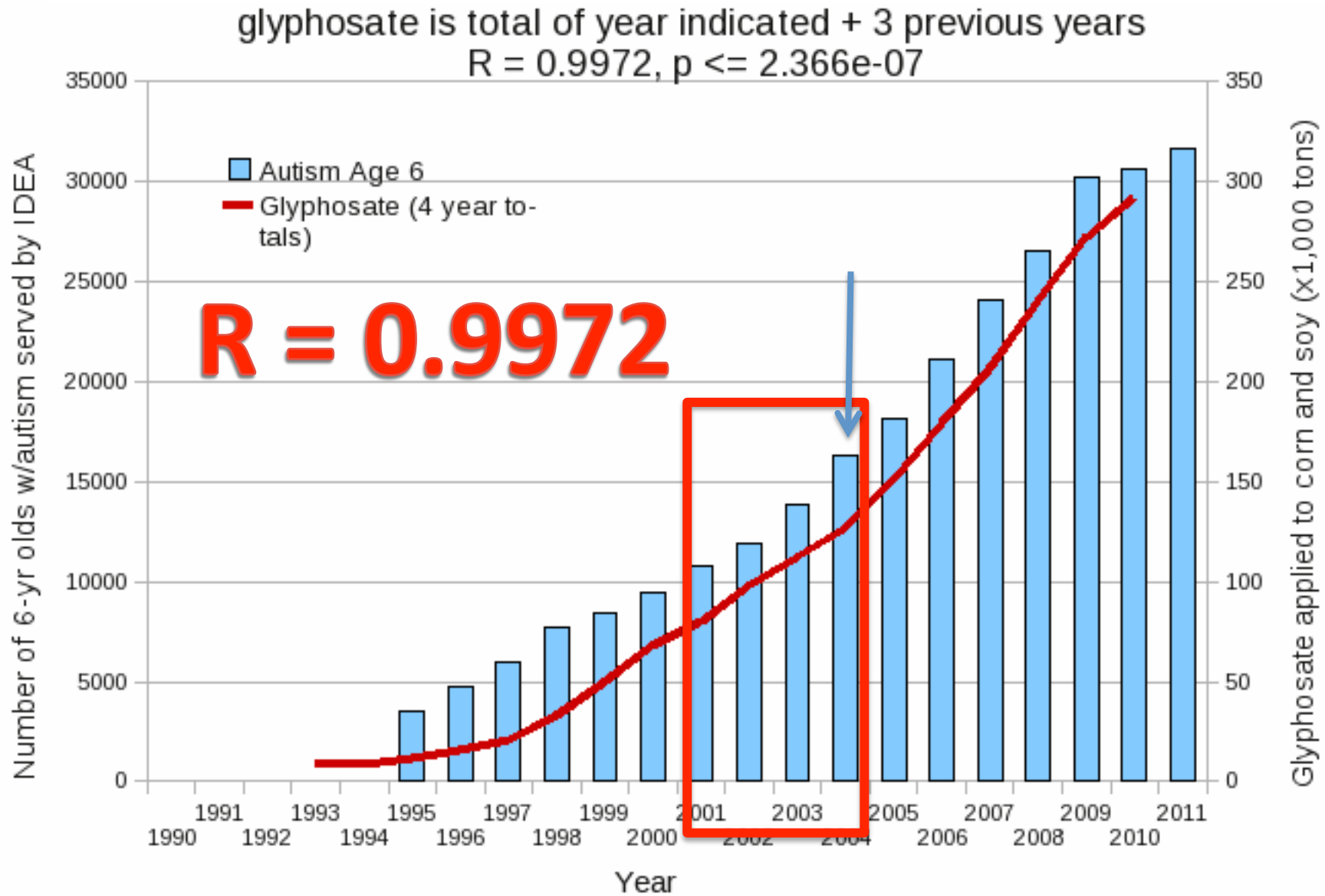
Percentage of children with Autism in the US



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 microbes¹
 - Children with autism suffer from many digestive issues
- Disruption of sulfur metabolism, glutathione deficiency, impaired methylation pathways¹
- Metal chelation (especially manganese)²
 - Manganese deficiency leads to impaired mitochondrial function and glutamate toxicity in the brain
- Inhibition of pituitary release of thyroid stimulating hormone → hypothyroidism³
 - Moms with hypothyroidism have 4-fold increased risk to autism in the fetus

1. Samsel and Seneff, Entropy 2013;15(4):1416-1463.

2. Samsel and Seneff, Surg Neurol Int. 2015;6:45.

3. Beecham and Seneff, Journal of Autism 2016;3:1.

“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*¹
- 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*

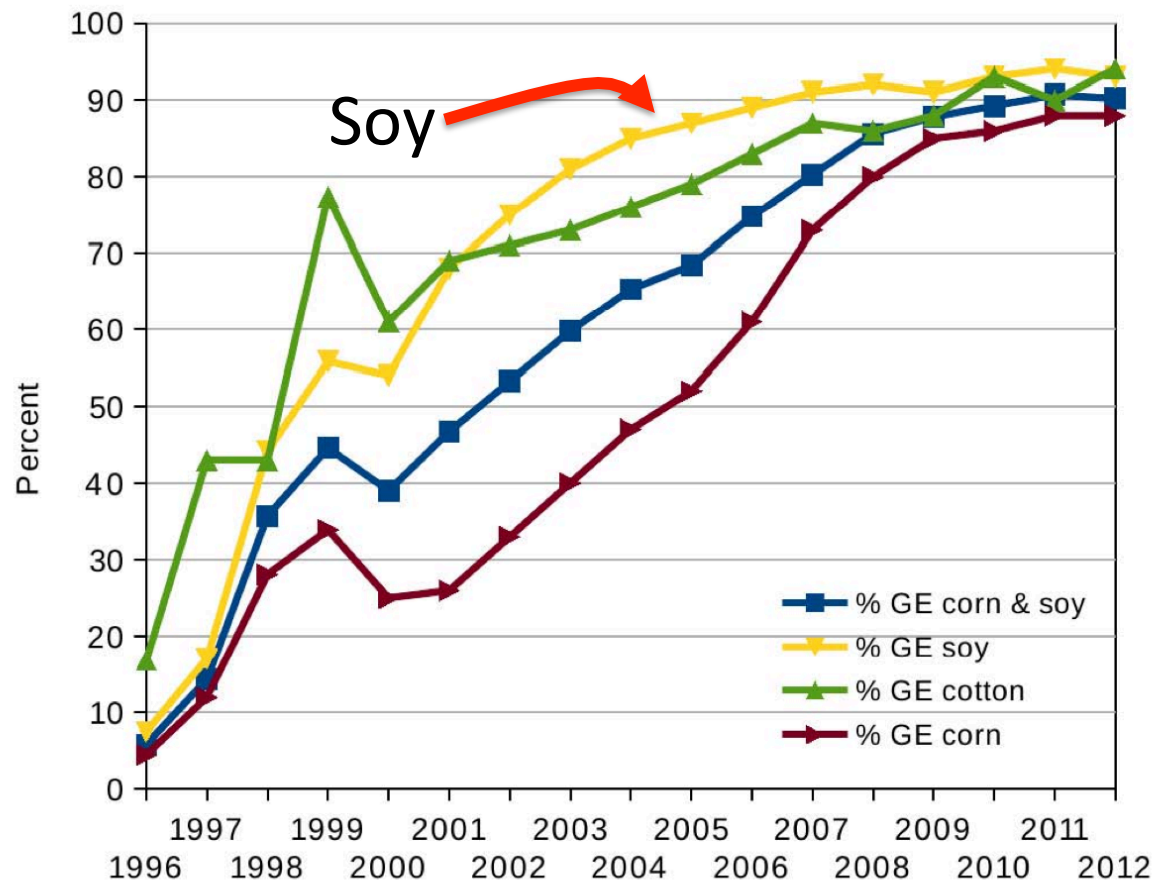
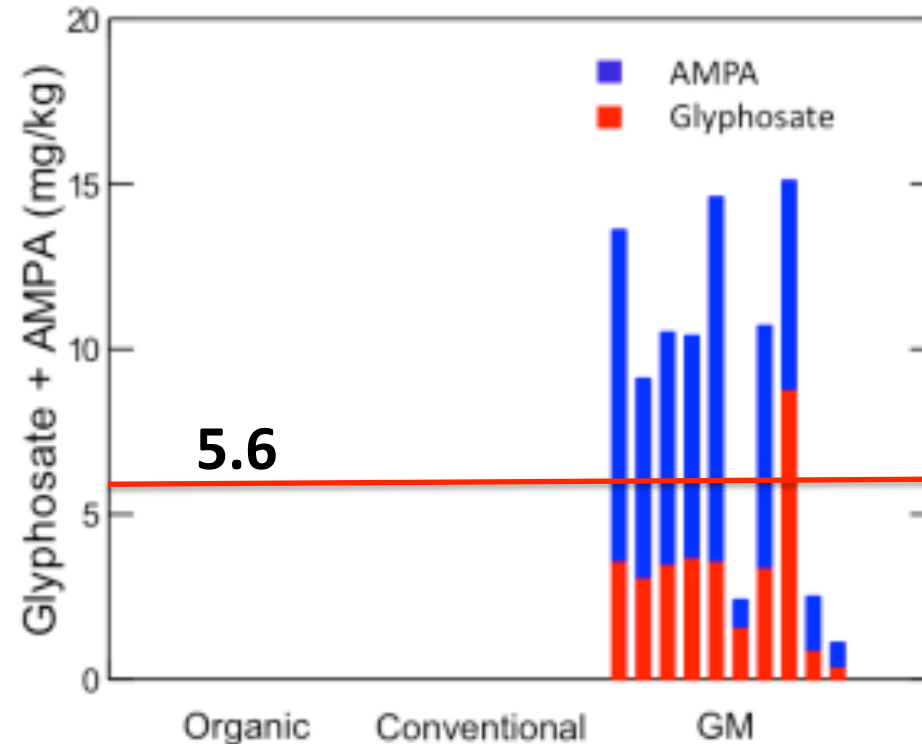


Figure 1. Adoption of GE crops in US.

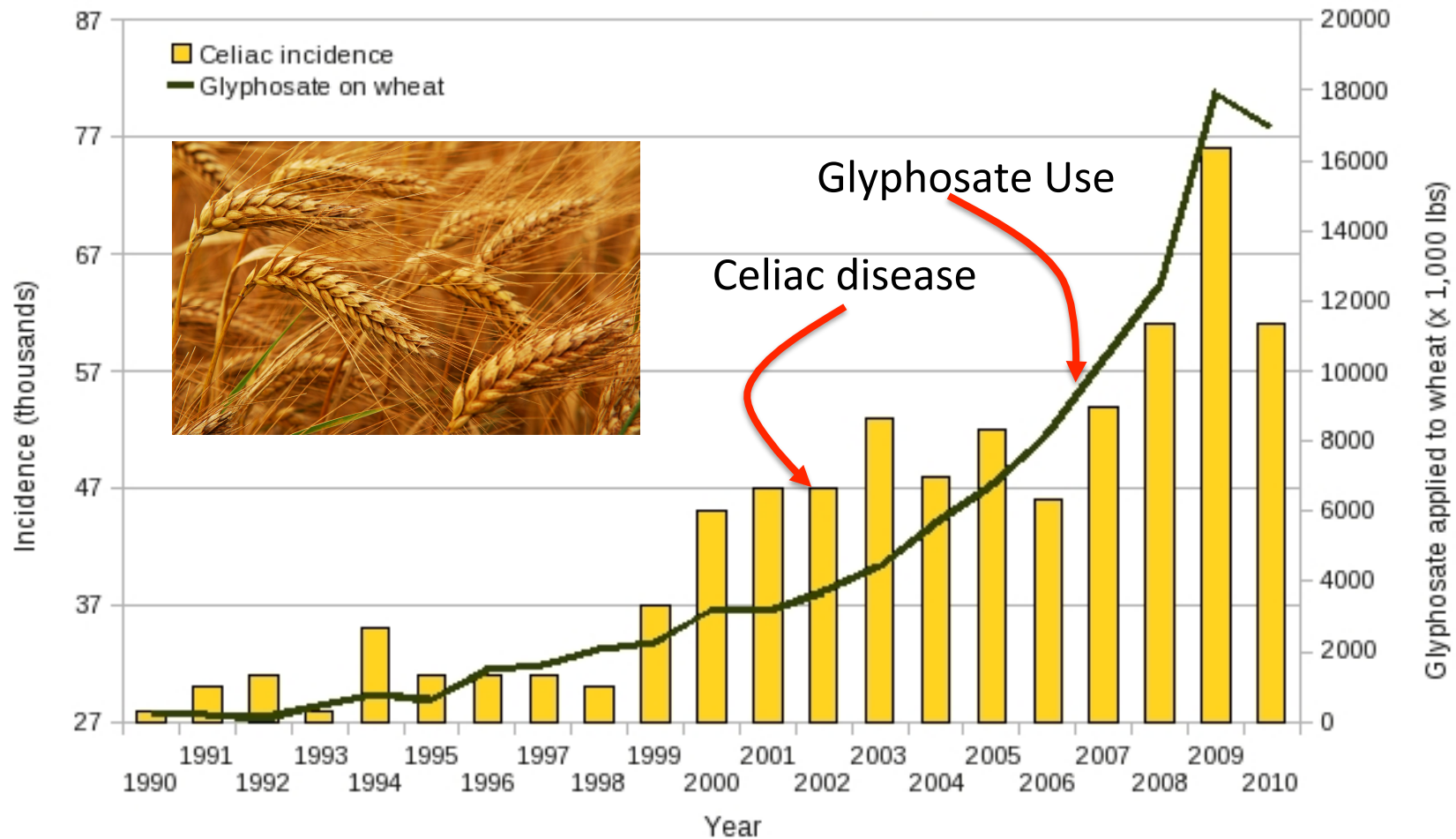
*N. Swanson et al., Journal of Organic Systems, 9(2), 2014, 6-37.

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).

Glyphosate and Celiac Disease*

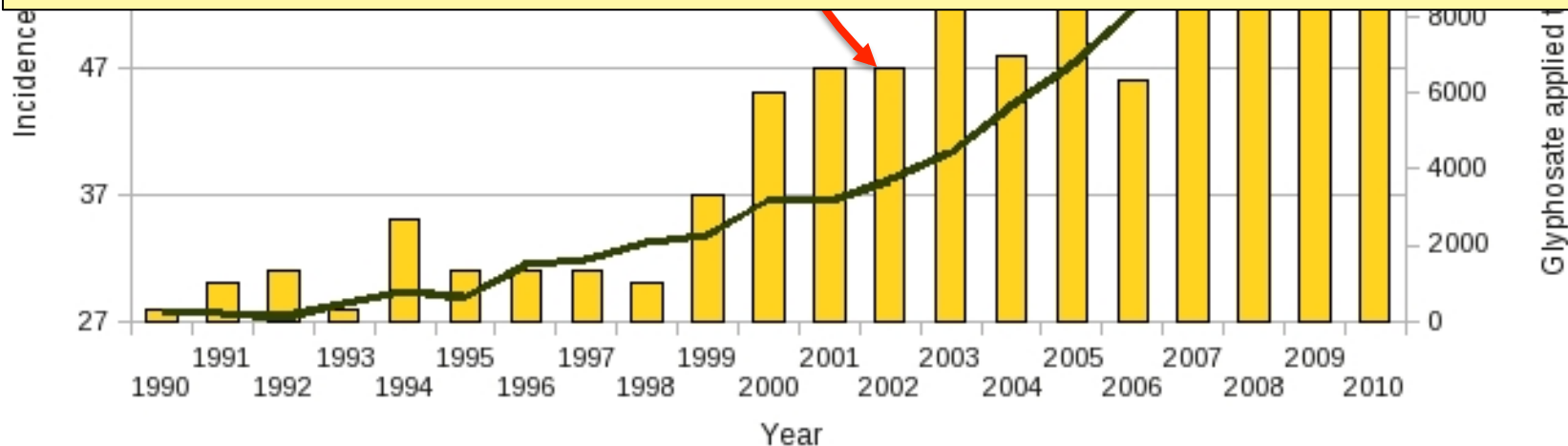


*Samsel and Seneff, Interdiscip Toxicol. 2013;6(4): 159–184.

Glyphosate and Celiac Disease*

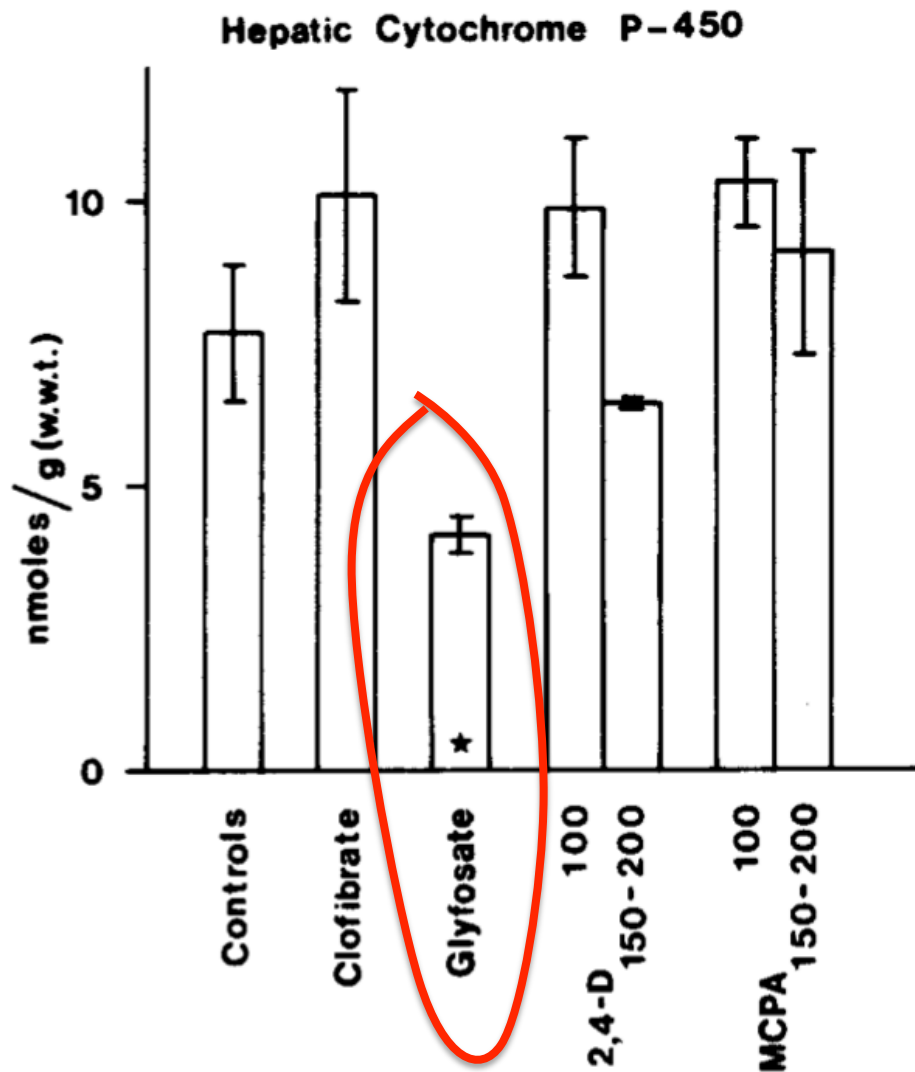


Wheat, sugar cane, peanuts, barley and legumes are now often sprayed with glyphosate right before harvest as a desiccant/ripeners



*Samsel and Seneff, Interdiscip Toxicol. 2013;6(4): 159–184.

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



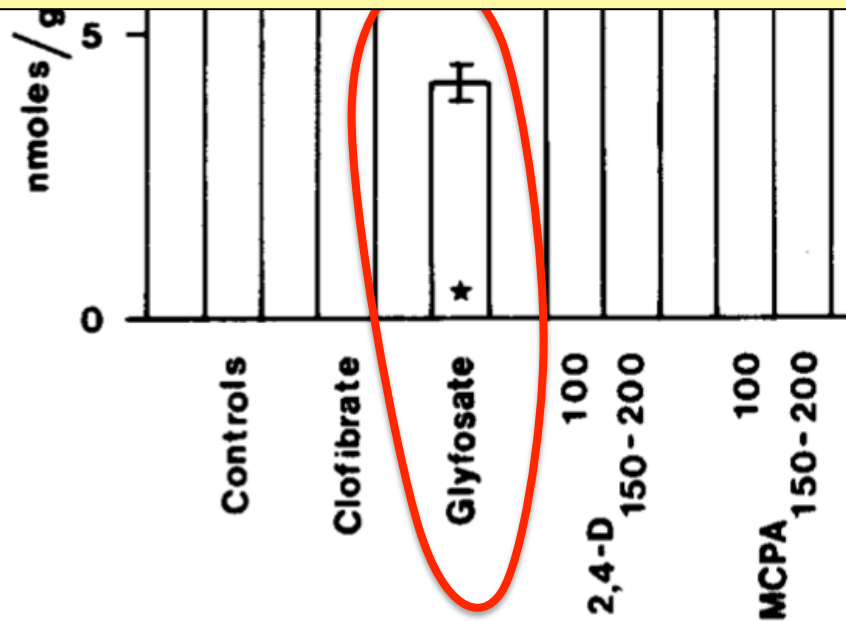
Study in rats on
2,4-D, clofibrate,
MCPA, and
glyphosate

*E Hetanen et al., Acta Pharmacol.
Et Toxicol. 1983, 53, 103-112.

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

Hepatic Cytochrome P-450

CYPs are necessary for bile acid production, vitamin D activation, and detoxing other toxic chemicals



macol.
Et Toxicol. 1983, 53, 103-112.

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*



* S. Thongprakaisang et al., Food Chem Toxicol. 2013 Jun 8. S0278-6915(13)00363-3.

Glyphosate is an endocrine disruptor that promotes breast cancer*

- Low and environmentally

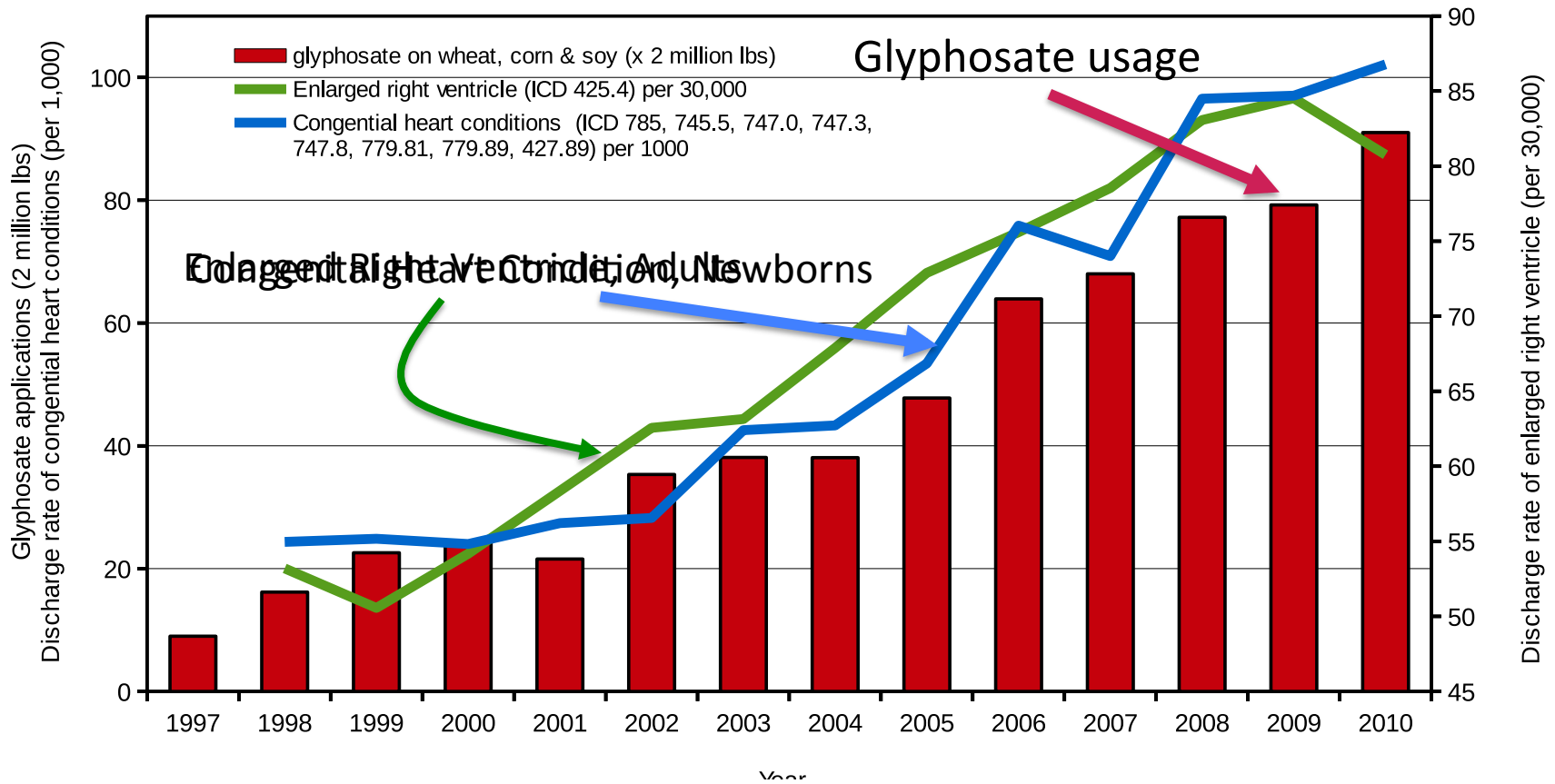
In March, 2015, the World Health Organization declared glyphosate a “probable carcinogen”

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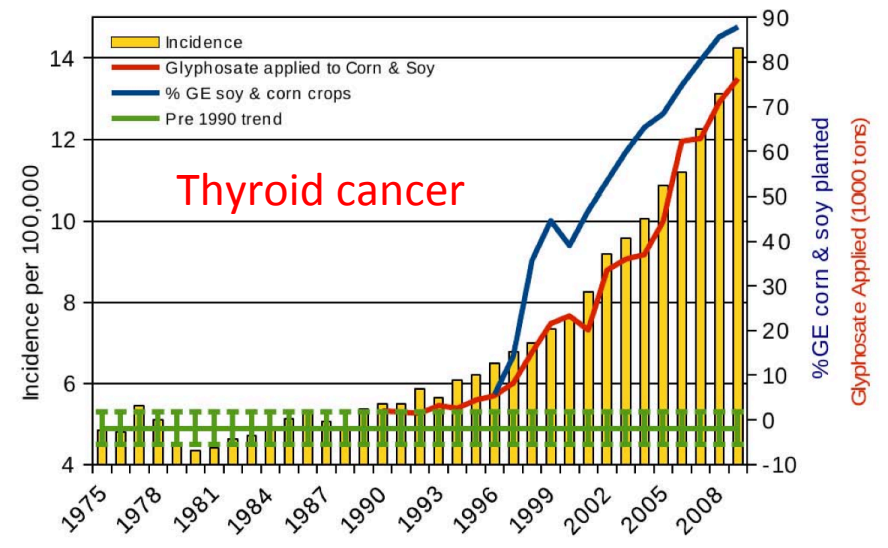
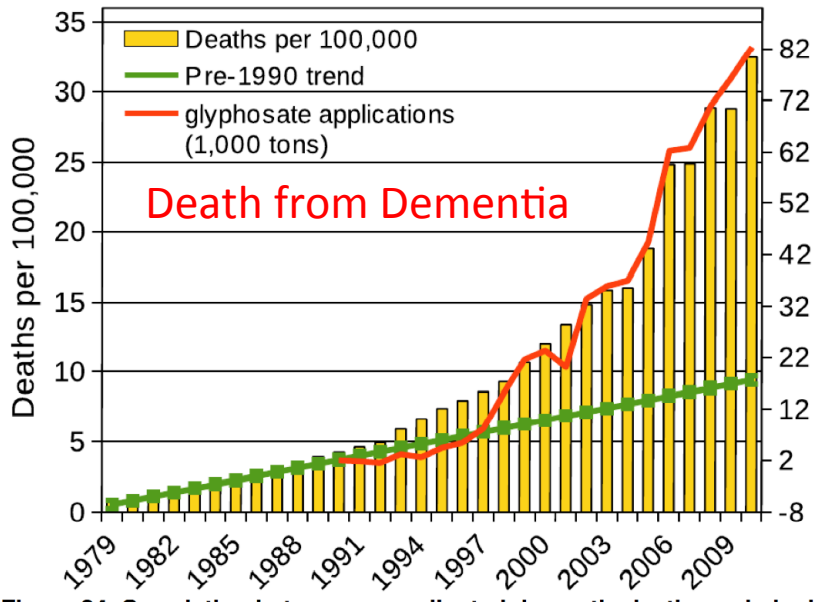
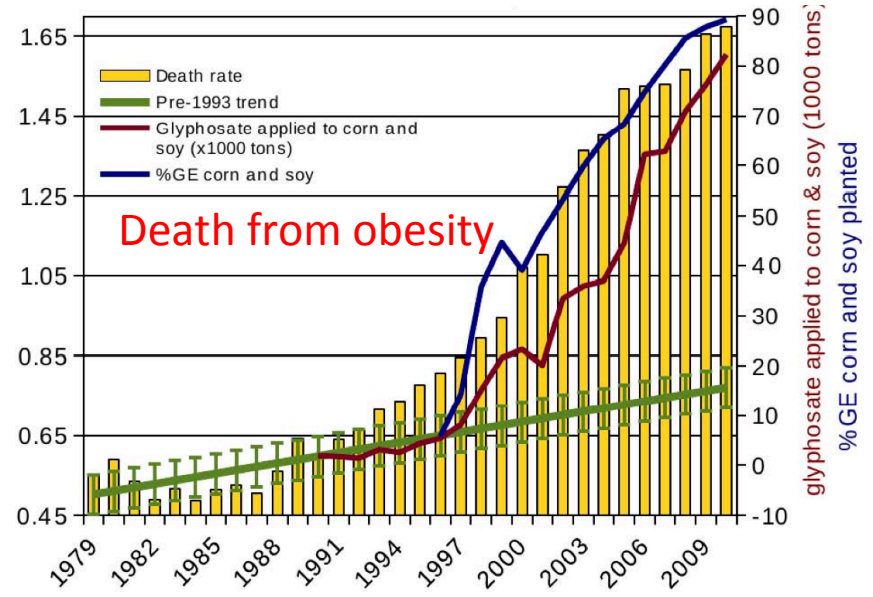
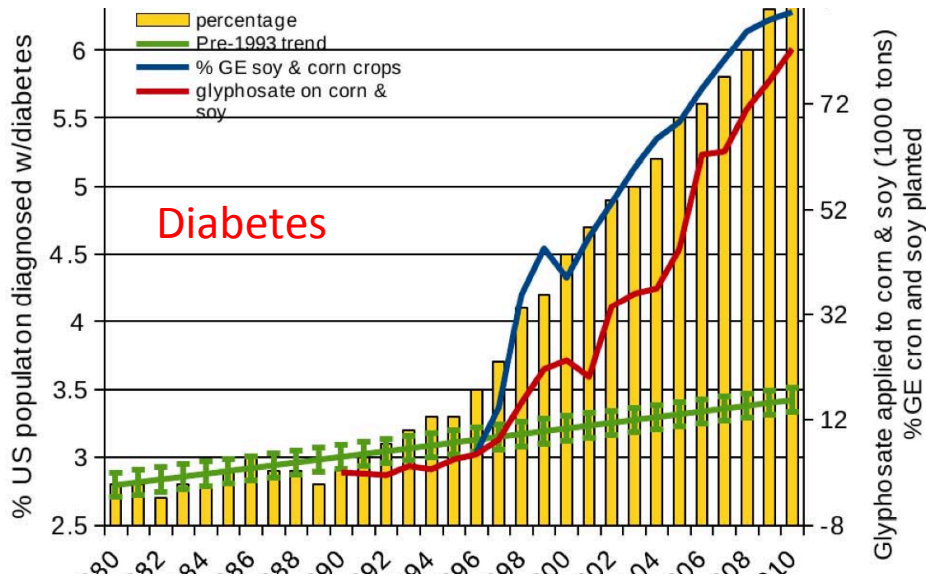
* S. Thongprakaisang et al., Food Chem Toxicol. 2013 Jun 8. S0278-6915(13)00363-3.

Glyphosate and Heart Disease*



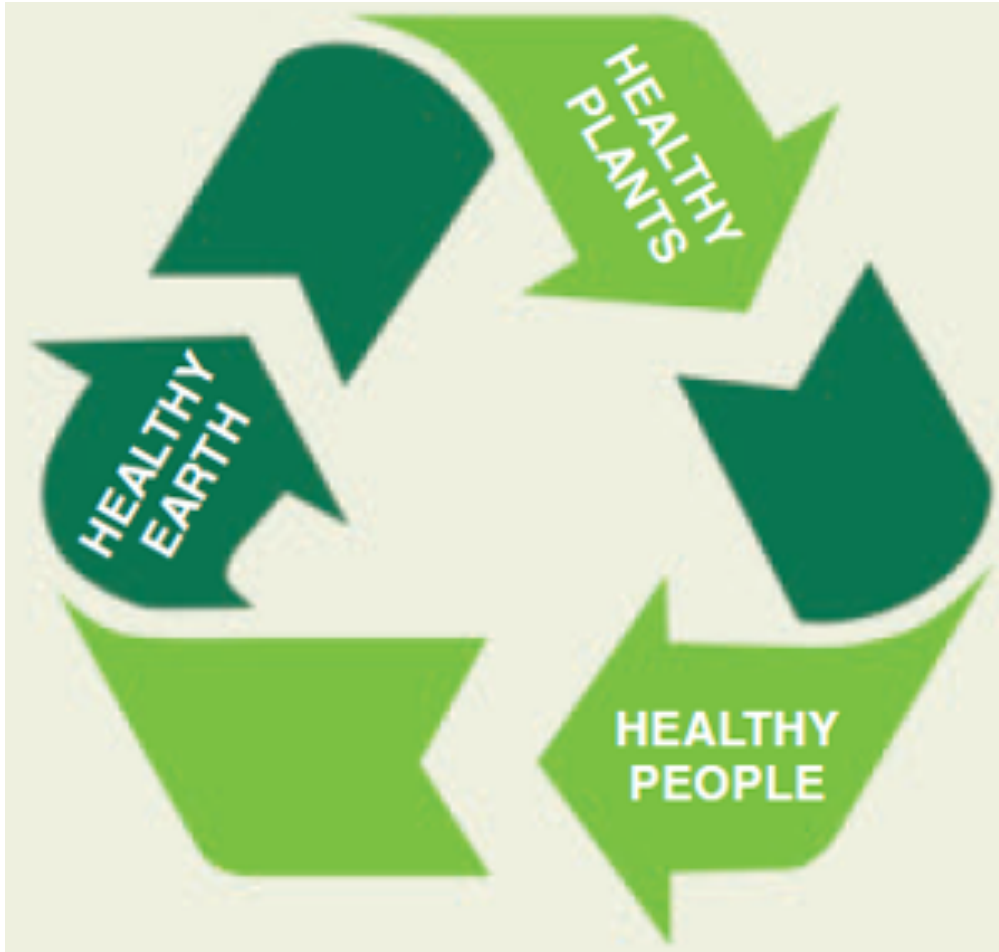
* Figure 22, J. Hoy et al. Poult Fish Wildl Sci 2015, 3:1

Data from Swanson et al., Journal of Organic Systems, 9(2), 2014



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