

The Many Faces of Glyphosate

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GLYPHOSATE



Outline

- Introduction
- Autism and Mitochondrial Impairment
- Glyphosate and Folic Acid
- Glyphosate and Vaccines
- Impaired Thyroid Function
- Low Manganese in Autism
- Endocrine Disruption
- Nancy Swanson's Paper

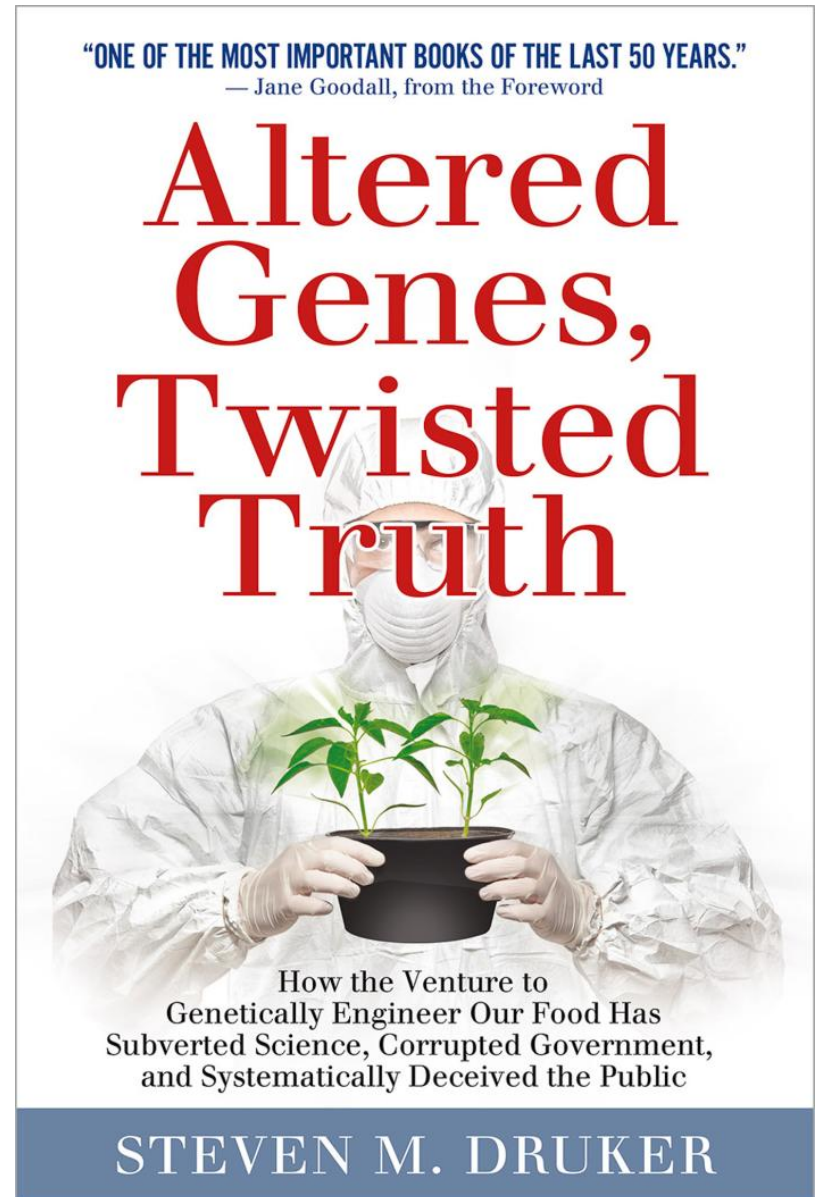
Introduction

US Health Status

- US makes up 5% of the world's population but consumes more than 50% of the world's pharmaceutical drugs
- We spend 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
- We also suffer from more chronic illnesses
- *We consume 25% of the world supply of glyphosate*

New Book!

- Genetic engineering is recklessly subjecting our health and the health of the environment to unacceptable risks.
 - Not based on sound science, but rather on evasion of the standards of science.
- For over 30 years, esteemed institutions have systematically contorted the truth to conceal the risks.

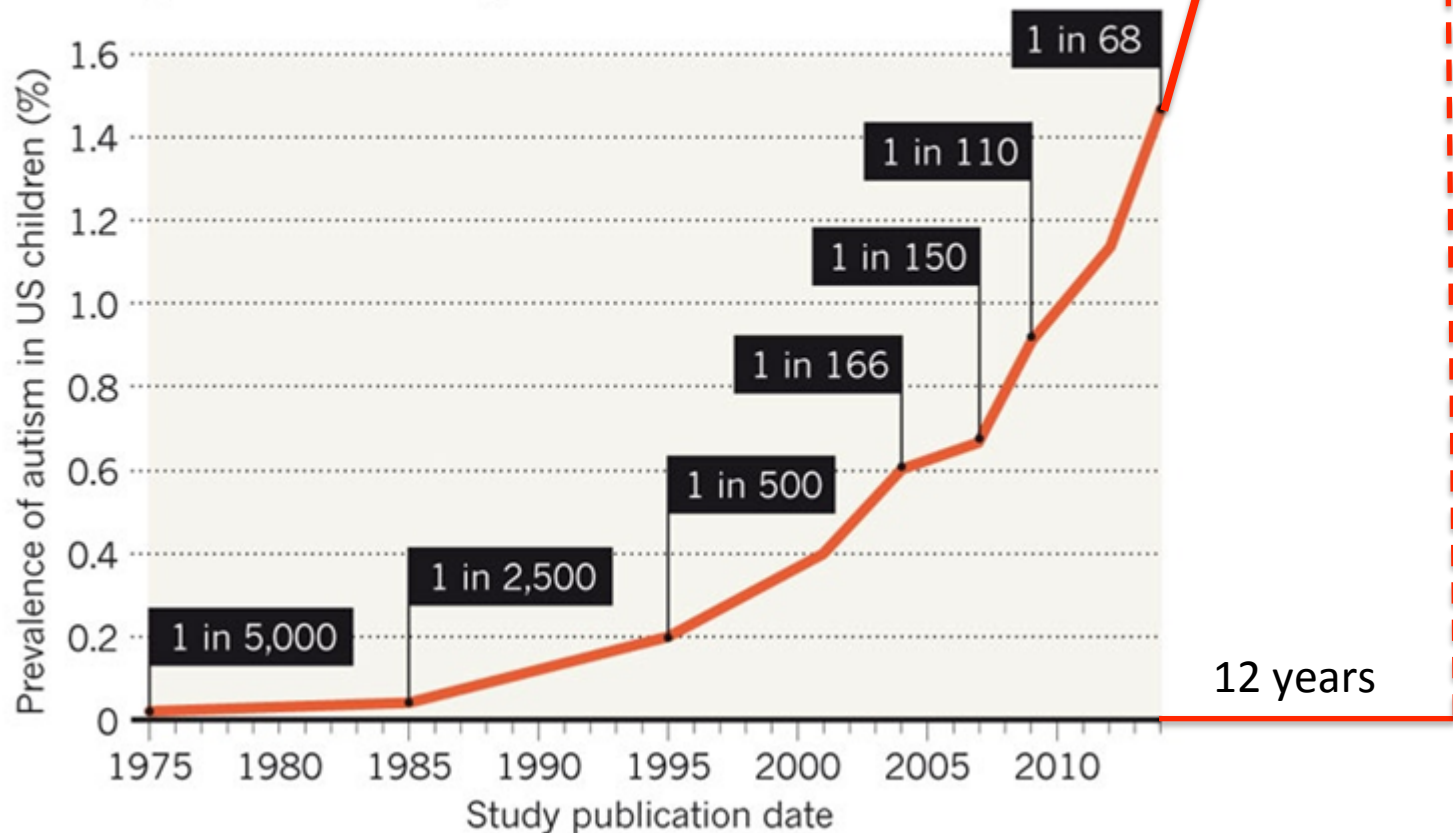


A Frightening Trend*



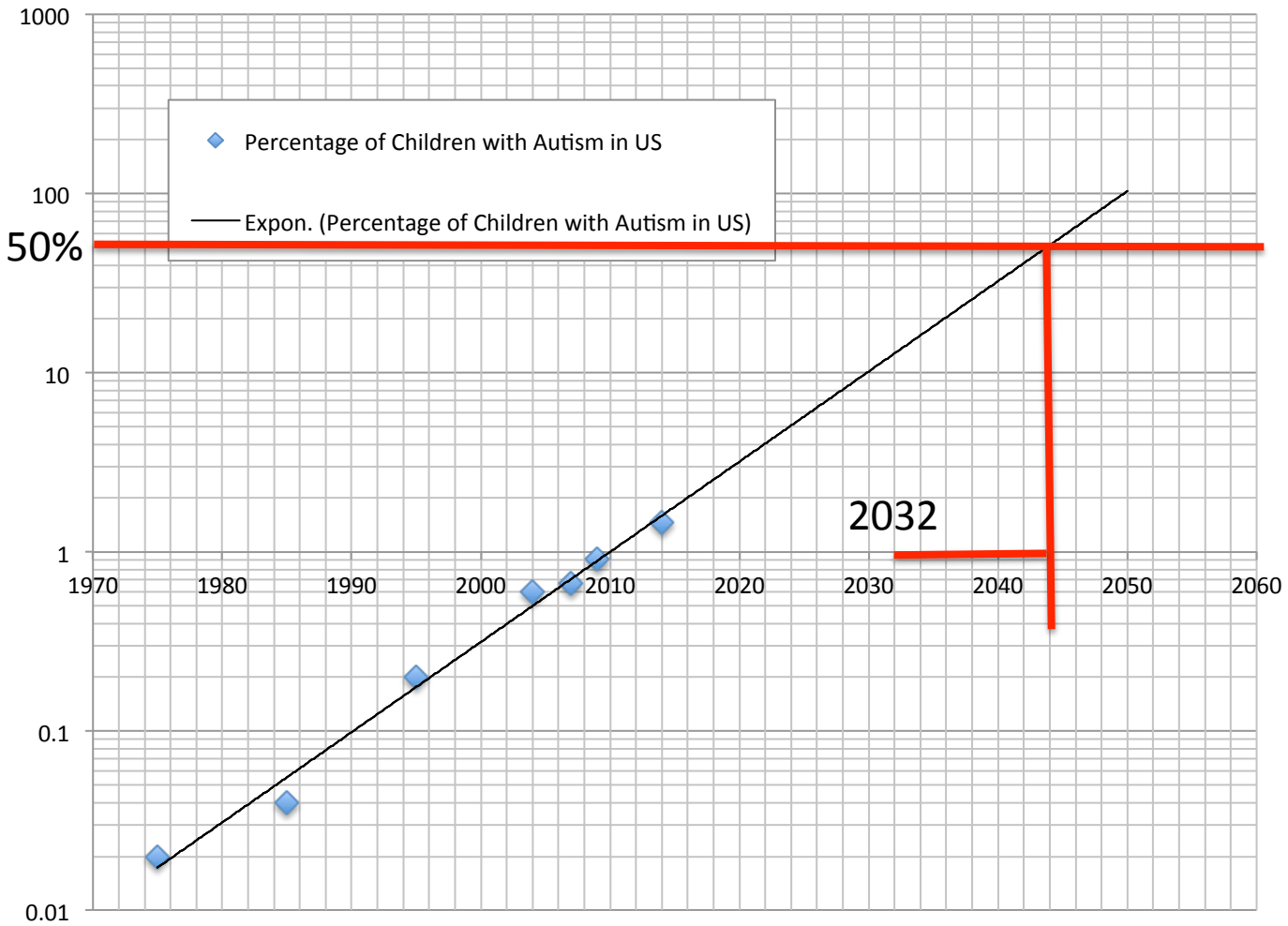
AUTISM DIAGNOSES RISING

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

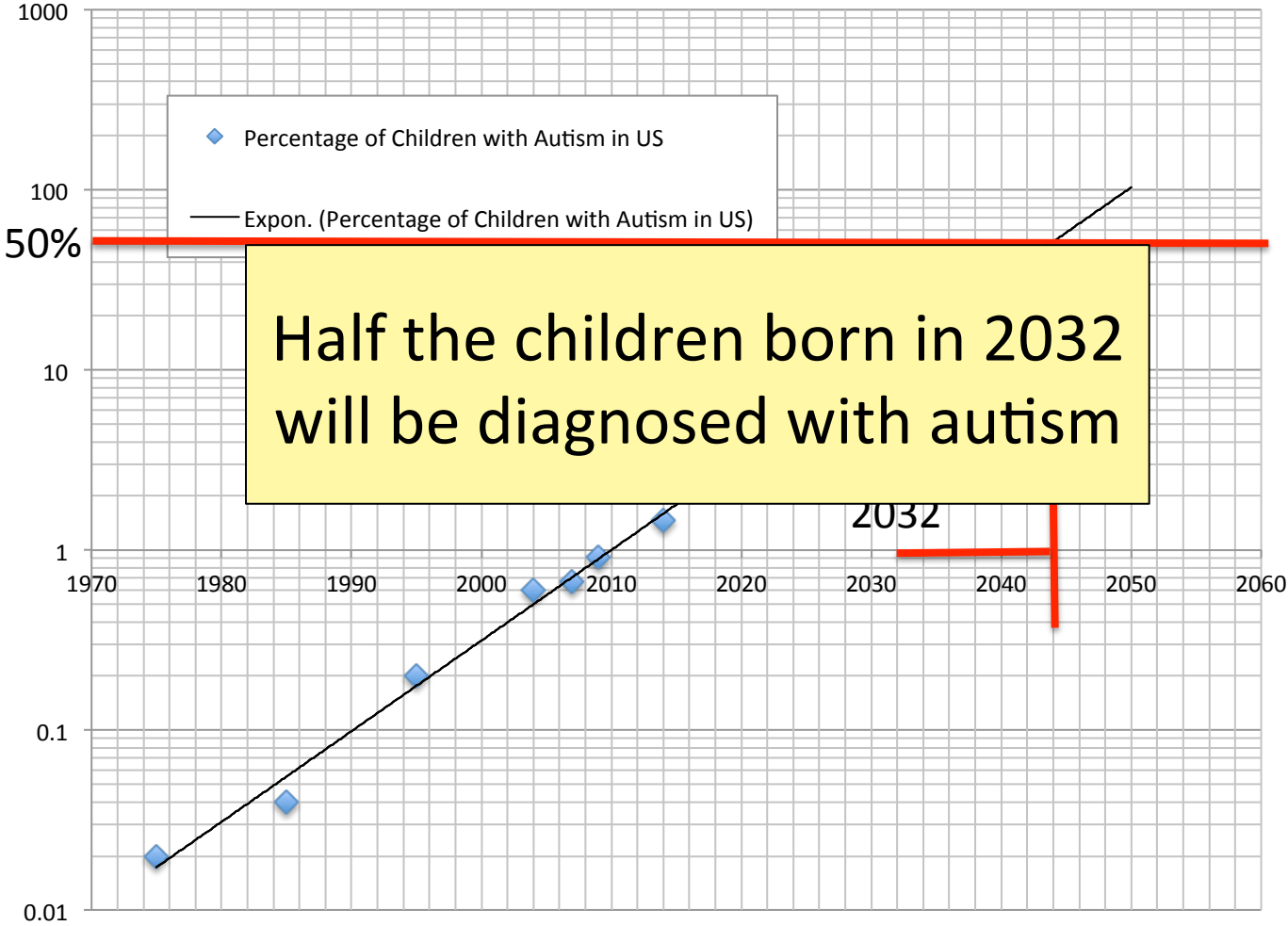


*K. Weintraub, Nature 479, Nov. 3 2011, 22-24.

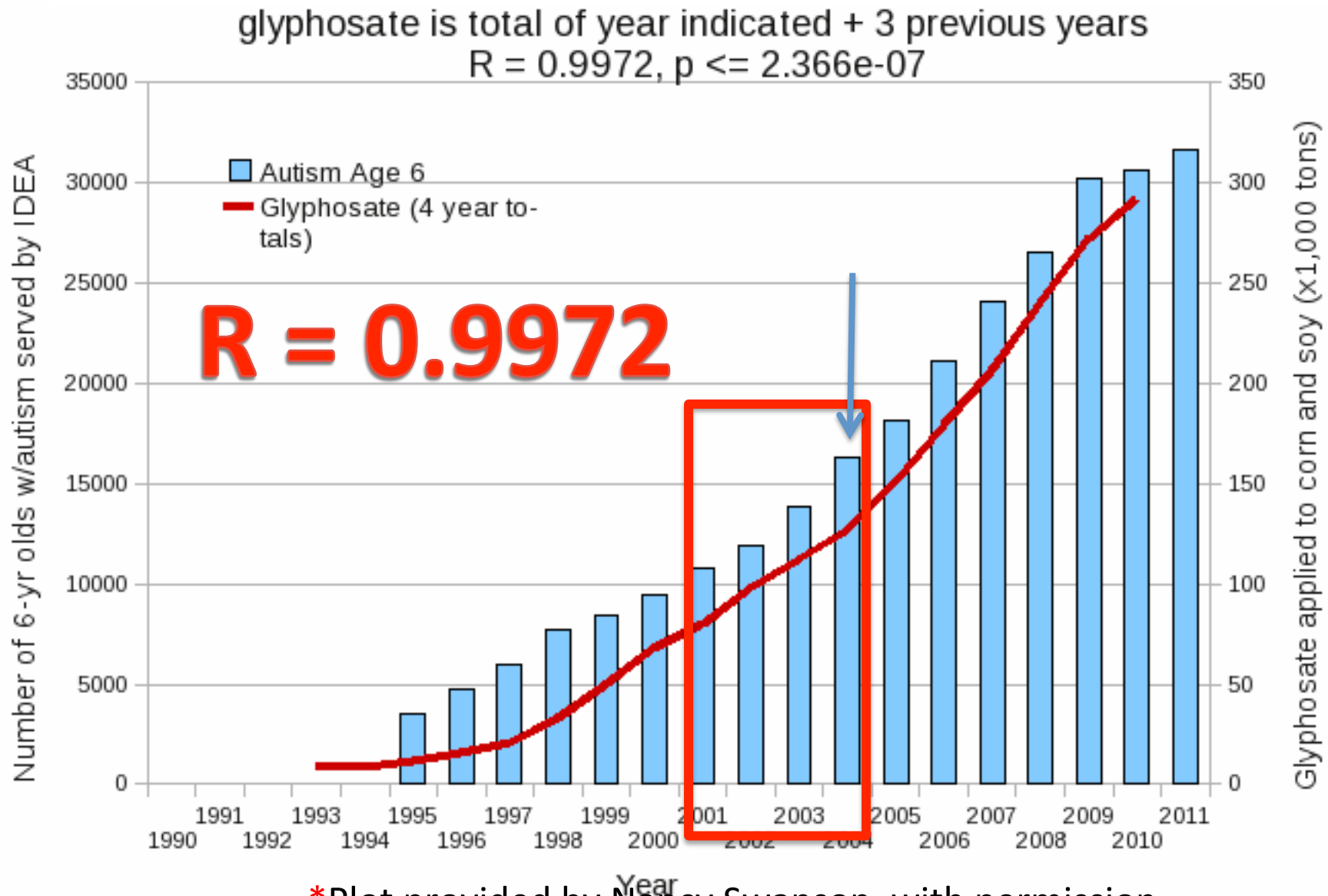
Percentage of children with Autism in the US



Percentage of children with Autism in the US



Autism Prevalence: 6 year olds



* Plot provided by Nancy Swanson, with permission

Data sources: autism: US Department of Education; Glyphosate: US Department of Agriculture

Main Toxic Effects of Glyphosate*

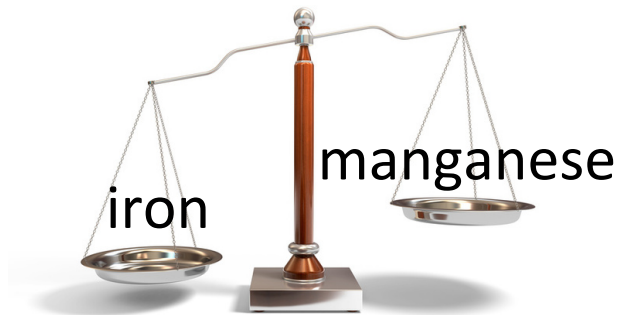
- Kills beneficial gut bacteria and allows pathogens to overgrow
- Interferes with function of cytochrome P450 (CYP) enzymes
- Chelates important minerals (iron, cobalt, manganese, etc.)
- Interferes with synthesis of aromatic amino acids and methionine
 - Leads to shortages in critical neurotransmitters
- Disrupts sulfate synthesis and sulfate transport

**Samsel and Seneff, Entropy 2013, 15, 1416-1463*

Nutrients, Hormones and Neurotransmitters Disrupted by Glyphosate

- Folate, vitamin K, vitamin A, vitamin D, cobalamin
- Aromatic amino acids, methionine
- Iron, manganese, cobalt, selenium, zinc, sulfur
- Serotonin, melatonin, dopamine, epinephrine
- Melanin (skin tanning agent), thyroid hormone
- NAD, glutathione (antioxidant defenses)

Balancing the Scales



Autism

Alzheimer's



ADHD

Parkinson's

Glyphosate disrupts the body's ability to distribute the minerals safely: Everybody walks a tight rope between deficiency and toxicity

Autism and Mitochondrial Impairment

Autism and Mitochondrial Impairment*

- Mitochondrial impairment is a key feature of autism, especially in the brain
 - Impaired detox of glutamate by astrocytes (requires manganese)
 - Excess stimulation of NMDA receptors in neurons
- Glyphosate excites NMDA receptors and prevents glutamate metabolism

*Dayan Goodenowe and Elodie Pastural , Chapter 4

[.intechopen.com/books/autism-a-neurodevelopmental-journey-from-genes-to-behaviour/
the-biochemical-basis-of-autistic-behavior-and-pathology](https://www.intechopen.com/books/autism-a-neurodevelopmental-journey-from-genes-to-behaviour/the-biochemical-basis-of-autistic-behavior-and-pathology)

Mitochondria are Key!

“Damage to mitochondria is now understood to play a role in the pathogenesis of a wide range of seemingly unrelated disorders such as schizophrenia, bipolar disease, dementia, Alzheimer's disease, epilepsy, migraine headaches, strokes, neuropathic pain, Parkinson's disease, ataxia, transient ischemic attack, cardiomyopathy, coronary artery disease, chronic fatigue syndrome, fibromyalgia, retinitis pigmentosa, diabetes, hepatitis C, and primary biliary cirrhosis.”*

*J Neustadt and SR Pieczenik, Molecular Nutrition and Food Research 2008;52:780-788

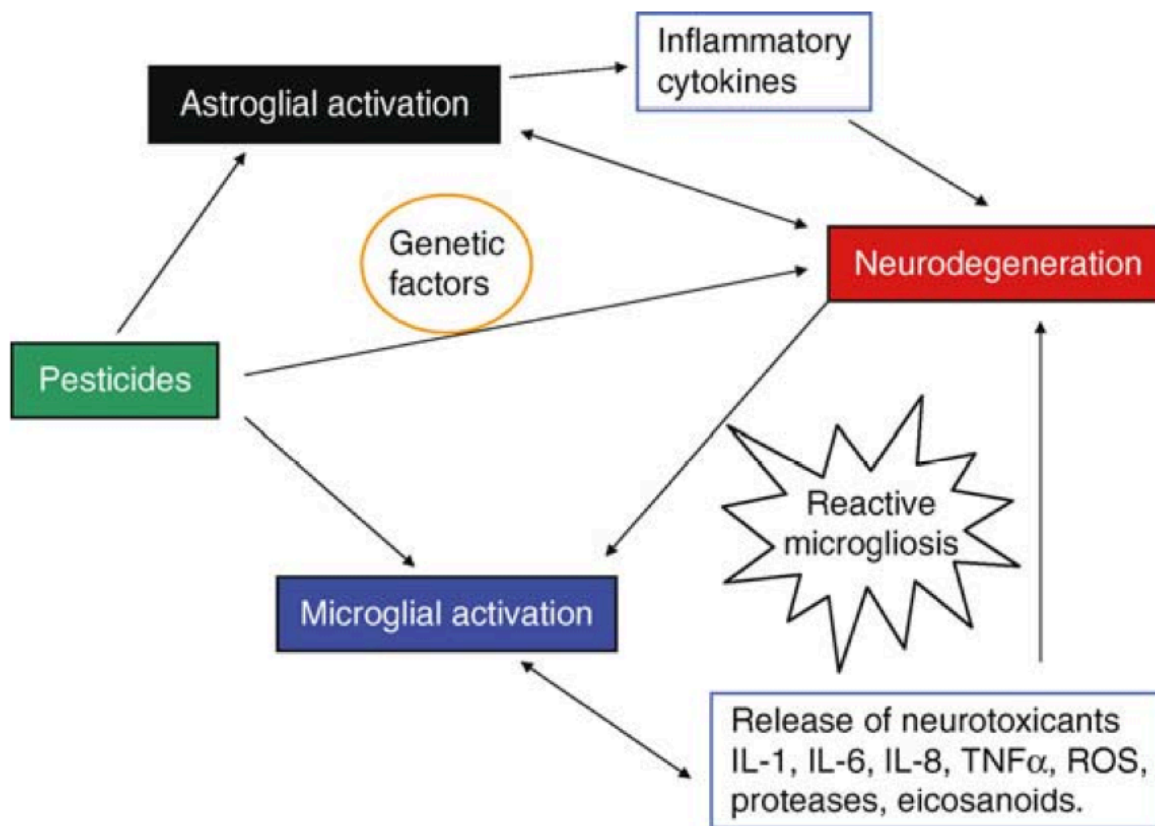
Mitochondria are Key!

Many of these conditions are going up in prevalence in step with glyphosate usage on corn and soy crops

Alzheimer's disease, epilepsy, migraine headaches, strokes, neuropathic pain, Parkinson's disease,

Glyphosate makes manganese unavailable to mitochondria, and they need manganese to protect them from oxidative damage

Pesticides and Neuroinflammatory Response*



*Figure 1 , HR Dhaini, Encyclopedia of Neuroscience, Chapter 14, Springer Berlin Heidelberg., D, Hirokawa N, Windhorst U, Ed. pp.2734-2739

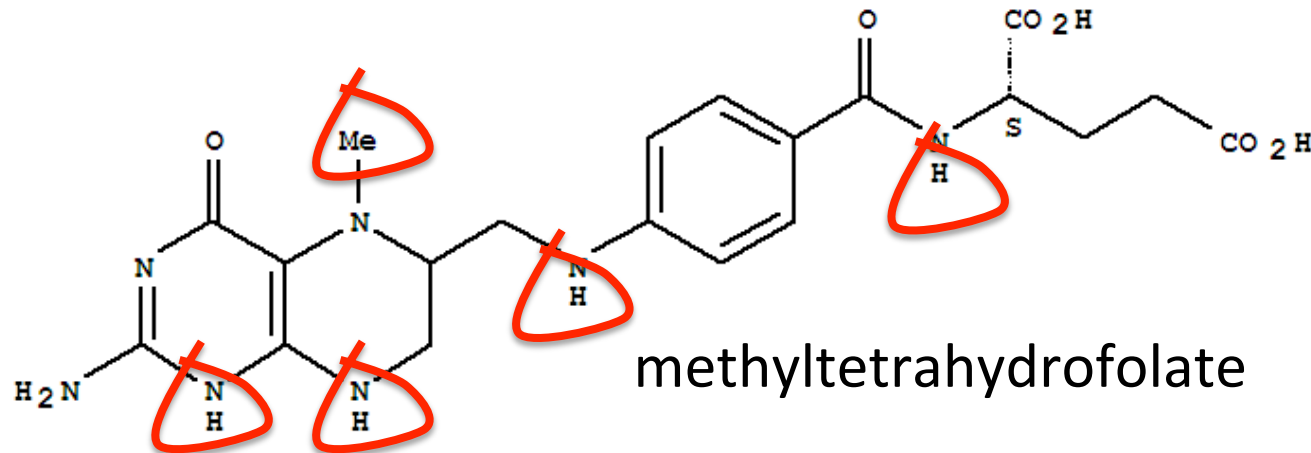
Mechanisms underlying the neurotoxicity induced by glyphosate*

“Taken together, these results demonstrated that Roundup® might lead to excessive extracellular *glutamate* levels and consequently to glutamate excitotoxicity and oxidative stress in rat hippocampus. “ - quote from abstract

*D Cattani et al., Toxicology 320 (2014) 34–45

Glyphosate and Folic Acid

Glyphosate and Folic Acid



- Folic acid is an oxidized, unmethylated synthetic form of folate
- Converting it to methyl tetrahydrofolate is costly
 - Liver glutathione and NAD are oxidized (bad)
 - Methionine is depleted (bad)
- Both NAD and folate are derived from the shikimate pathway
- Brain folate receptor antibodies may be a consequence of folic acid in the blood

“High folic acid consumption leads to pseudo-MTHFR deficiency, altered lipid metabolism, and liver injury in mice”*

- Fed mice excessive amounts of folic acid
- Reduced methylation capacity in liver
- CYP7A1 level was dramatically reduced. (rate limiting enzyme in bile acid synthesis)
- Caused liver damage and fatty liver disease



*KE Christensen et al., Am J Clin Nutr 2015;101:646–58.

Glyphosate and Vaccines

Glyphosate and Vaccines

- MMR, Varicella, flu vaccine and rabies vaccine contain *glutamate* (a neurotoxin)
 - Glyphosate disrupts conversion of glutamate to glutamine (detox)
- DTaP, HEP-B, Gardasil and others contain *aluminum* (a neurotoxin)
 - Glyphosate escorts aluminum to the pineal gland where it accumulates, causing sleep disorder and many associated neurological diseases

Impaired Thyroid Function

Impaired Thyroid Function

- Low thyroid hormone in mother → 4-fold increased risk to autism in child*
- Thyroid hormone is derived from tyrosine, a product of the shikimate pathway
- Thyroid depends on selenium to protect it from oxidative damage (chelated by glyphosate)

*GC Román et al., Ann Neurol. 2013 Nov;74(5):733-42.

Low Manganese in Autism

Low Manganese in Teeth Linked to Autism*

- Studied lead, mercury and manganese levels in tooth enamel of shed primary teeth in 84 children
- Manganese accumulated after birth was down by 60% in autistic children
- *No other result was statistically significant*



*MM Abdullah *et al.*, *J Autism Dev Disord.* 2012 Jun;42(6):929-36.

Low Manganese in Teeth Linked to Autism*

- Studied lead, mercury and manganese levels in tooth

Other studies have shown low serum manganese and low manganese in urine samples in association with autism

after birth was down by 60% in autistic children

- *No other result was statistically significant*

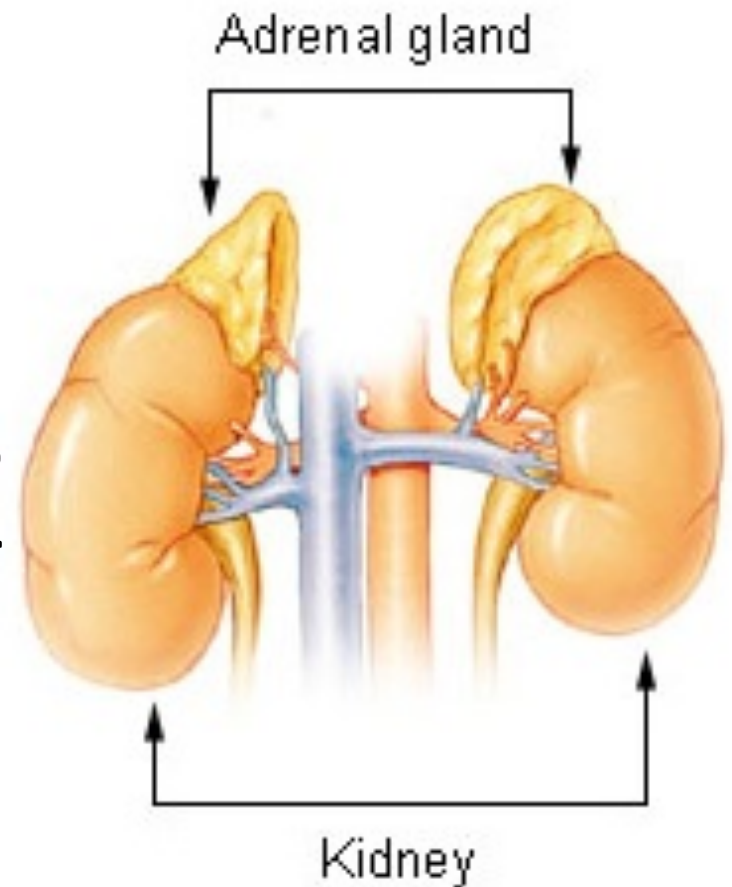


*MM Abdullah *et al.*, *J Autism Dev Disord.* 2012 Jun;42(6):929-36.

Endocrine Disruption

Glyphosate Disrupts Sex Hormone Synthesis in Adrenal Glands*

- Glyphosate was cytotoxic to adrenal cells and interfered with synthesis of sex hormones
- Roundup's toxicity was two orders of magnitude higher than glyphosate acting alone



*F Young et al., Integrative Pharmacology, Toxicology and Genotoxicology 2015; 1(1): 12-19.

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*
- Additive effect from genistein, a phytoestrogen in soybeans



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

Nancy Swanson's Paper

Paper Recently Published

Journal of Organic Systems, 9(2), 2014

ORIGINAL PAPER

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

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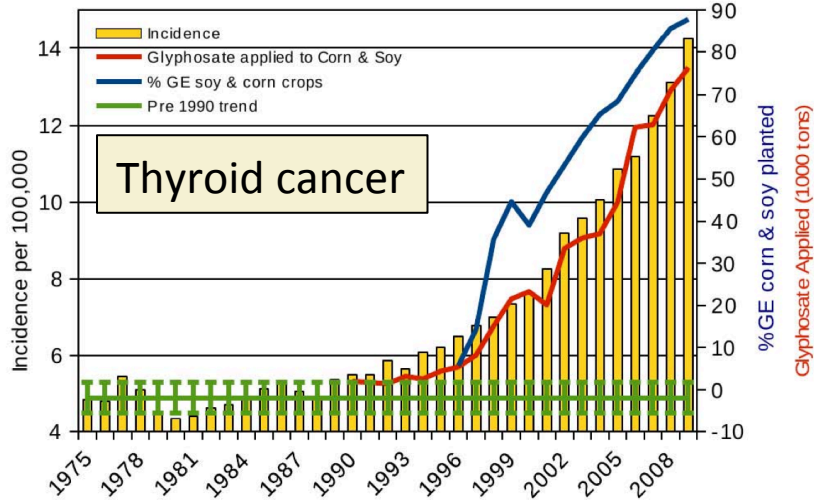
³ *Abacus Enterprises, Lummi Island, WA, USA*

⁴ *Crustal Imaging Facility, Conoco Phillips School of Geology and Geophysics, University of Oklahoma, USA*

* *Corresponding author: andreleu.al@gmail.com*

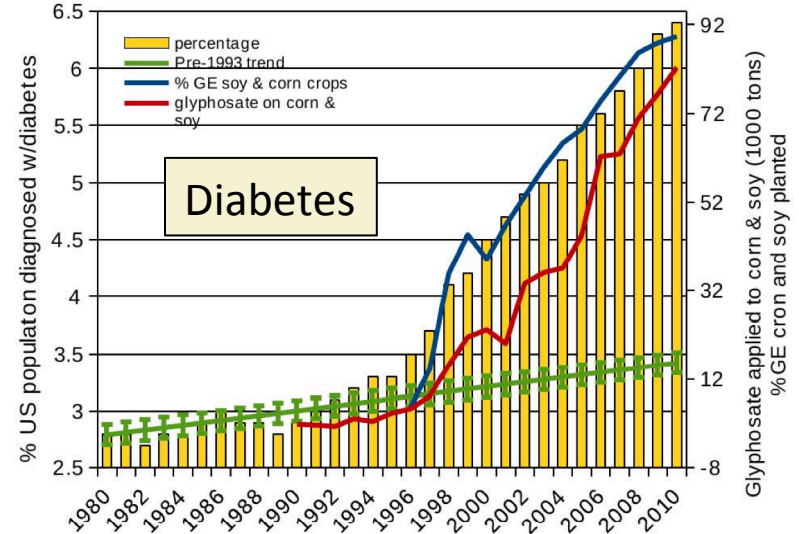
Thyroid Cancer Incidence Rate (age adjusted)

plotted against glyphosate applied to U.S. corn & soy ($R = 0.988$, $p \leq 7.612e-09$)
 along with %GE corn & soy crops $R = 0.9377$, $p \leq 2.152e-05$
 sources: USDA:NASS; SEER



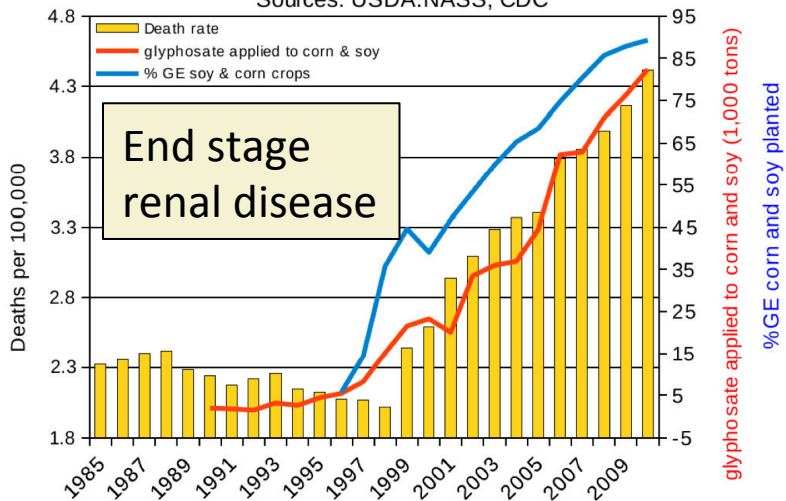
Prevalence of Diabetes in US (age adjusted)

plotted against glyphosate applied to corn & soy ($R = 0.971$, $p \leq 9.24e-09$)
 along with %GE corn & soy grown in US ($R = 0.9826$, $p \leq 5.169e-07$)
 sources: USDA:NASS; CDC



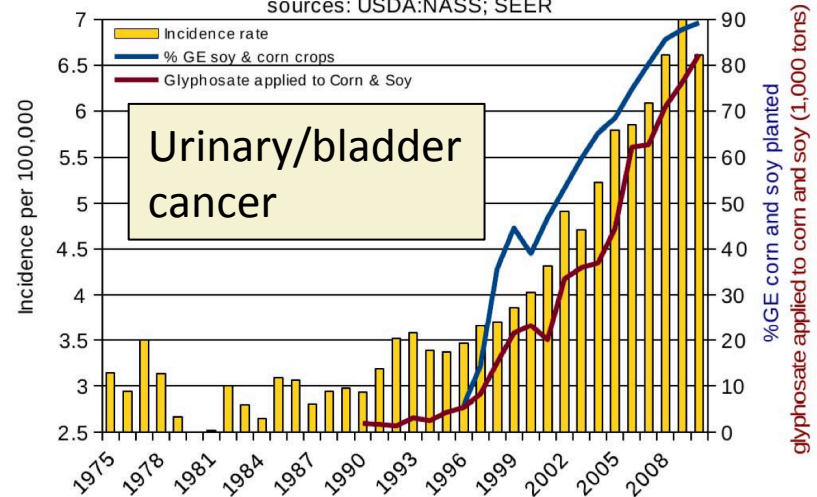
Age Adjusted End Stage Renal Disease Deaths (ICD N18.0 & 585.6)

plotted against %GE corn & soy planted ($R = 0.9578$, $p \leq 4.165e-06$)
 and glyphosate applied to corn & soy ($R = 0.9746$, $p \leq 7.244e-09$)
 Sources: USDA:NASS; CDC



Age Adjusted Urinary/Bladder Cancer Incidence

Plotted against % GE corn and soy ($R = 0.9449$, $p \leq 7.1e-06$)
 and glyphosate applied to corn and soy ($R = 0.981$, $p \leq 4.702e-09$)
 sources: USDA:NASS; SEER



Go Organic!



Summary

- Glyphosate is a major contributor to the autism epidemic, as well as in the deterioration of health in America more generally
- Key factor is disrupted glutamate metabolism due to manganese deficiency leading to neurotoxicity
- The bioavailability of many essential vitamins, minerals, and neurotransmitters is disrupted by glyphosate
- Glyphosate works synergistically with vaccines to cause harm