

## **The New Agent Orange: Roundup Poisoning and an Epidemic of Auto- immune and Neurological Disease**

Stephanie Seneff

MIT CSAIL

February, 2019

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[http://people.csail.mit.edu/seneff/2019/  
Seneff\\_February\\_2019\\_Hawaii.pptx](http://people.csail.mit.edu/seneff/2019/Seneff_February_2019_Hawaii.pptx)



“A truth’s initial commotion is directly proportional to how deeply the lie was believed... When a well-packaged web of lies has been sold gradually to the masses over generations, the truth will seem utterly preposterous and its speaker, a raving lunatic.”

- *Dresden James*

## **Outline**

- Introduction
- The California lawsuit: Glyphosate and non-Hodgkin's Lymphoma
- Glyphosate as a Glycine Analogue
- Autoimmune Disease Epidemic
- How Glyphosate Affects the Gut Barrier
- Glyphosate, MMR and Autism
- Molecular Mimicry
- A Failed System and a Growing Food Movement
- How to Safeguard Yourself and Your Family
- Summary

## **Introduction**

“Something very wrong is going on, something that is killing good people and causing untold suffering to families and communities around the world. Never has such a high percentage of the population been afflicted with so many tragic and wasting illnesses. In the past thirty years, a group of diseases has reached epidemic proportions in the United States and many other countries. These afflictions, often collectively referred to as diseases of civilization (DOC), include multiple sclerosis, Alzheimer's disease, breast cancer, lupus erythematosus, rheumatoid arthritis, melanoma, and autism - a once rare birth defect. Because the incidence of these diseases has increased gradually over three decades, we are inclined to accept this as a natural, if unfortunate, part of modern life. But such a lethal trend is not natural; the changes that we have witnessed over the last generation are unprecedented in the history of medical science.”

*Woodrow C. Monte, PhD. While Science Sleeps. 2011*

## Roundup and GMO Crops

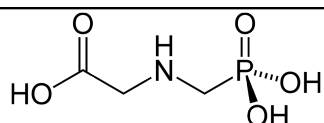
GMO Roundup-Ready corn, soy, canola, sugar beets  
cotton, tobacco and alfalfa





## Roundup as a Desiccant/Ripener just before Harvest

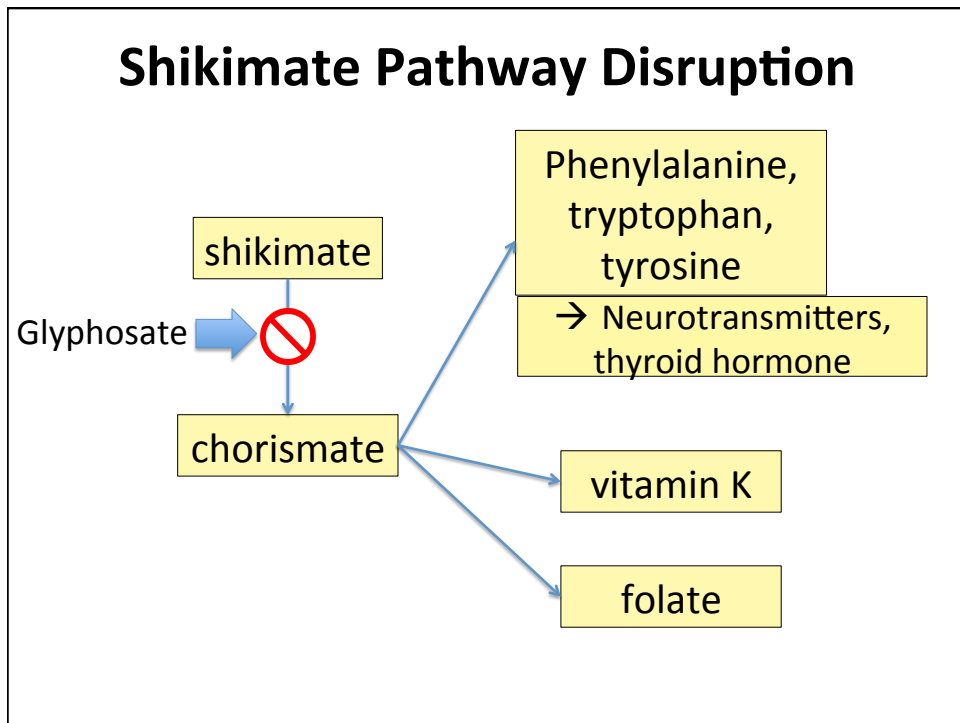
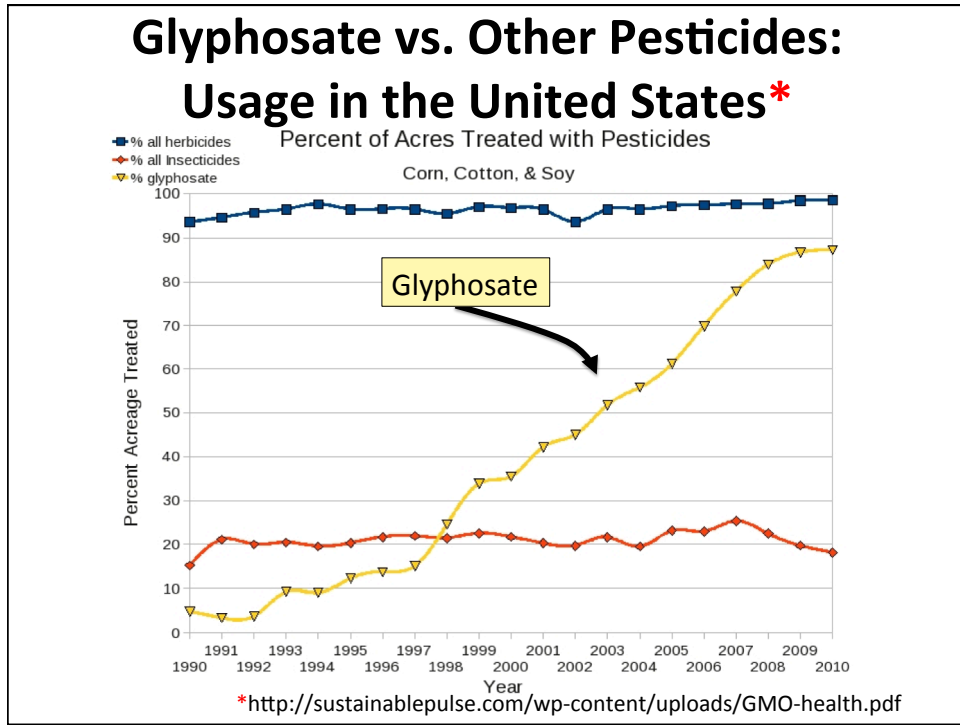
Wheat, Oats, Barley, Rye,  
Sugar cane, Beans, Lentils,  
Peas, Flax, Sunflowers,  
Pulses, Chick Peas



**Glyphosate!!**

- Glyphosate is now the #1 herbicide in use in the U.S. and is increasingly used around the world
  - Developed and patented by Monsanto in the 1970's
  - Introduced into the US food chain in 1974
  - Came out from under patent in 2000
  - Inhibits an enzyme in the *shikimate* pathway involved in the synthesis of tyrosine, tryptophan and phenylalanine (the three *aromatic amino acids*)
- Huge expansion of GMO corn, soy, cotton and canola crops has led to sharp increases in the last two decades





# Paper Showing Strong Correlations between Glyphosate Usage and Chronic Disease

Journal of Organic Systems, 9(2), 2014

ORIGINAL PAPER

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

Nancy L. Swanson<sup>1</sup>, Andre Leu<sup>2\*</sup>, Jon Abrahamson<sup>3</sup> and Bradley Wallet<sup>4</sup>

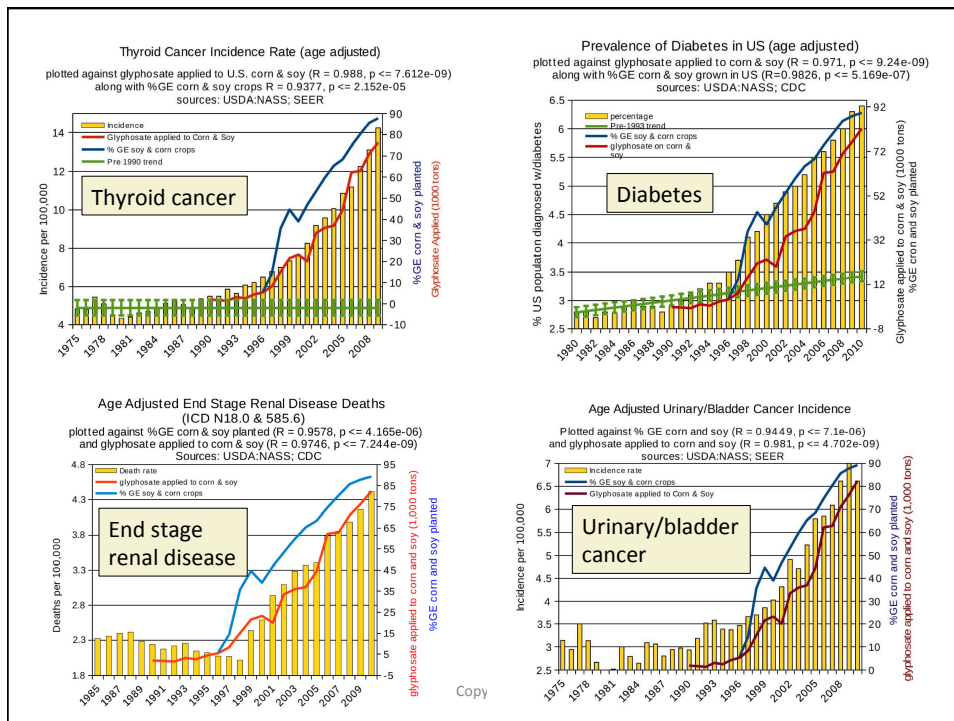
<sup>1</sup> Abacus Enterprises, Lummi Island, WA, USA

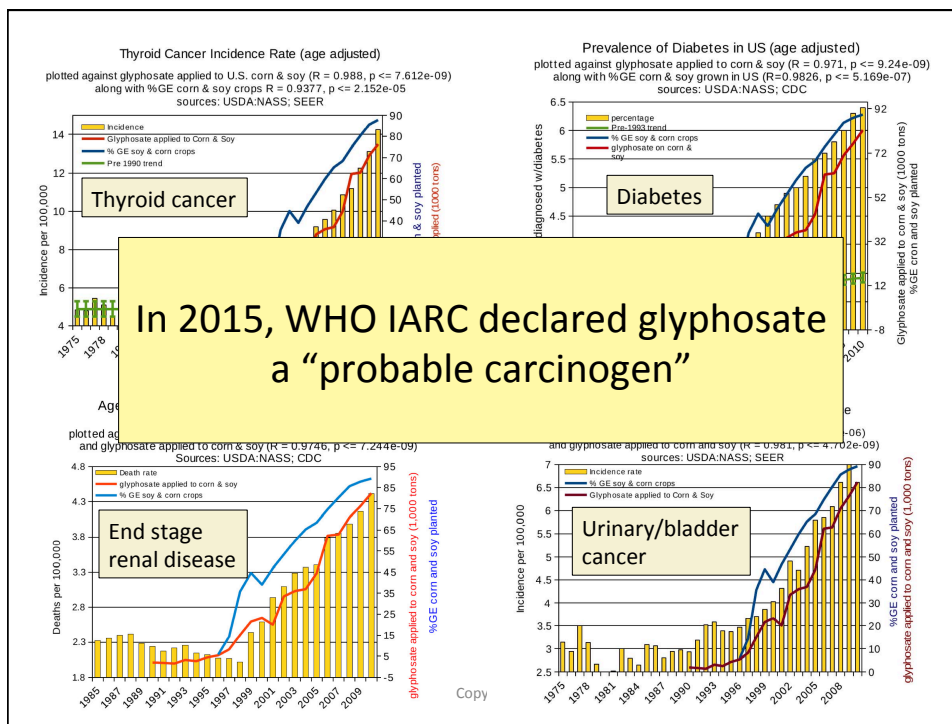
<sup>2</sup> International Federation of Organic Agricultural Movements, Bonn, Germany

<sup>3</sup> Abacus Enterprises, Lummi Island, WA, USA

<sup>4</sup> Crustal Imaging Facility, Conoco Phillips School of Geology and Geophysics, University of Oklahoma, USA

\* Corresponding author: andreleu.ai@gmail.com

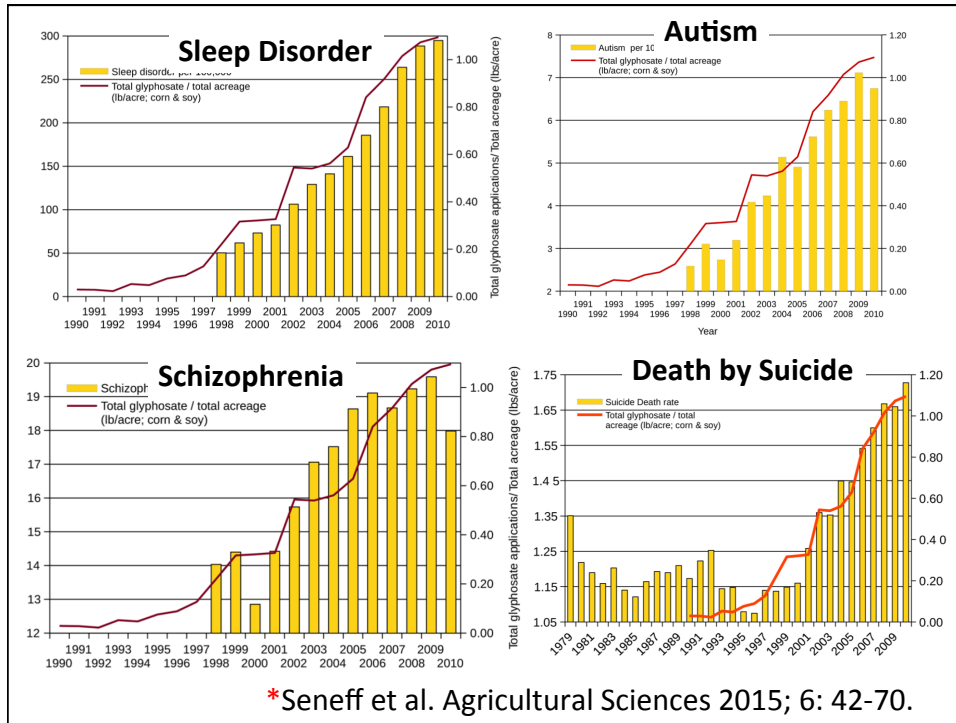




## Quote from the Conclusion\*

“Although correlation does not necessarily mean causation, when correlation coefficients of over 0.95 (with  $p$ -value significance levels less than 0.00001) are calculated for a list of diseases that can be directly linked to glyphosate, via its known biological effects, it would be imprudent not to consider causation as a plausible explanation.”

\*NL Swanson et al. Journal of Organic Systems 9(2), 2014, p. 32,



## List Compiled by Prof. Don Huber

### Diseases Increasing in Incidence (Epidemic)

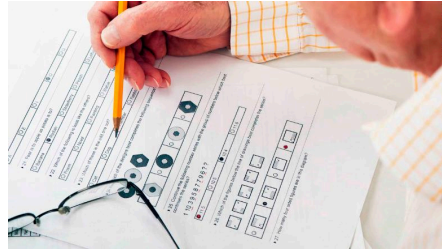
(after Fox, 2012; Antoniou et al., 2012; Samsel & Seneff, 2013; Swanson, 2013)

- |                                     |                                     |
|-------------------------------------|-------------------------------------|
| <i>Allergies, Asthma</i>            | <i>Diabetes</i>                     |
| <i>Alzheimer's</i>                  | <i>Difficile diarrhea</i>           |
| <i>Arthritis</i>                    | <i>Gluten intolerance</i>           |
| <i>Atopic dermatitis</i>            | <i>Indigestion</i>                  |
| <i>Autism</i>                       | <i>Infertility</i>                  |
| <i>Autoimmune diseases</i>          | <i>Inflammatory bowel disease</i>   |
| <i>Bipolar, Attn deficit (ADHD)</i> | <i>Irritable bowel disease</i>      |
| <i>Birth defects</i>                | <i>Leaky gut syndrome</i>           |
| <i>Bloat (fatal)</i>                | <i>Liver abnormalities</i>          |
| <i>Bowel disease</i>                | <i>Miscarriage</i>                  |
| <i>Cancer (some)</i>                | <i>Morgellon's (NEW)</i>            |
| <i>Celiac disease</i>               | <i>Multiple sclerosis</i>           |
| <i>Chronic fatigue syndrome</i>     | <i>Obesity</i>                      |
| <i>Colitis</i>                      | <i>Pancreas abnormalities</i>       |
| <i>Crohn's</i>                      | <i>Parkinson's</i>                  |
| <i>Dementia</i>                     | <i>Sudden Infant Death Syndrome</i> |

1995 1997 1999 2001 2003 2005 2007 2009 2011

## Decreasing IQ scores after 1975\*

“scores increased by almost 3 percentage points each decade for those born between 1962 to 1975 -- but then saw a steady decline among those born after 1975.”



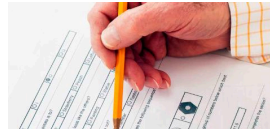
*“What specific environmental factors cause changes in intelligence remains relatively unexplored.”*

\*Rory Smith, CNN.

<https://www.cnn.com/2018/06/13/health/falling-iq-scores-study-intl/index.html>

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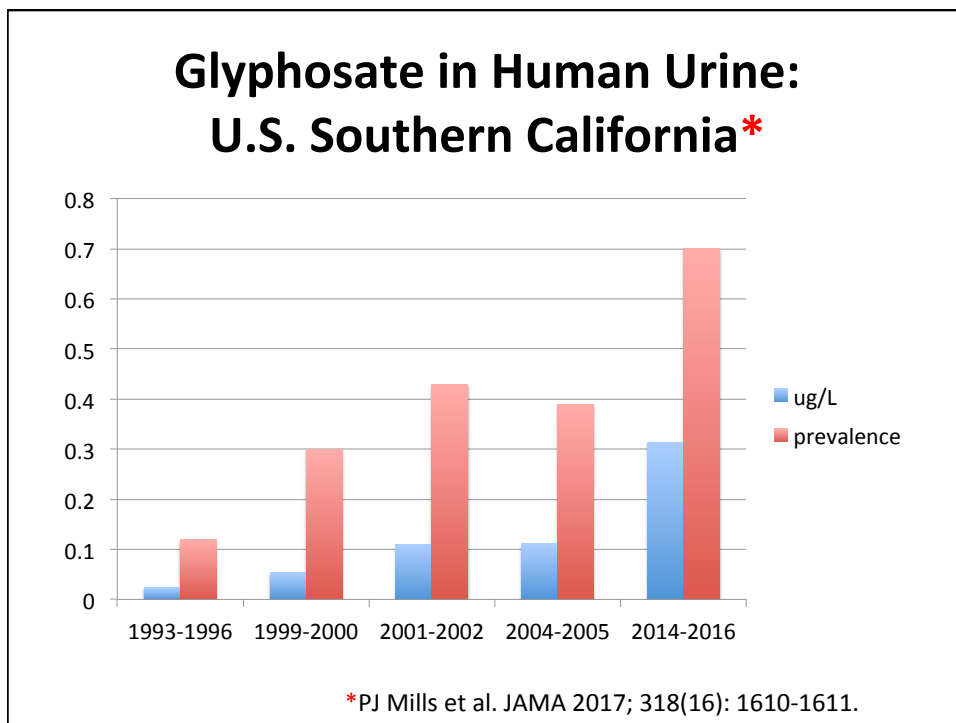
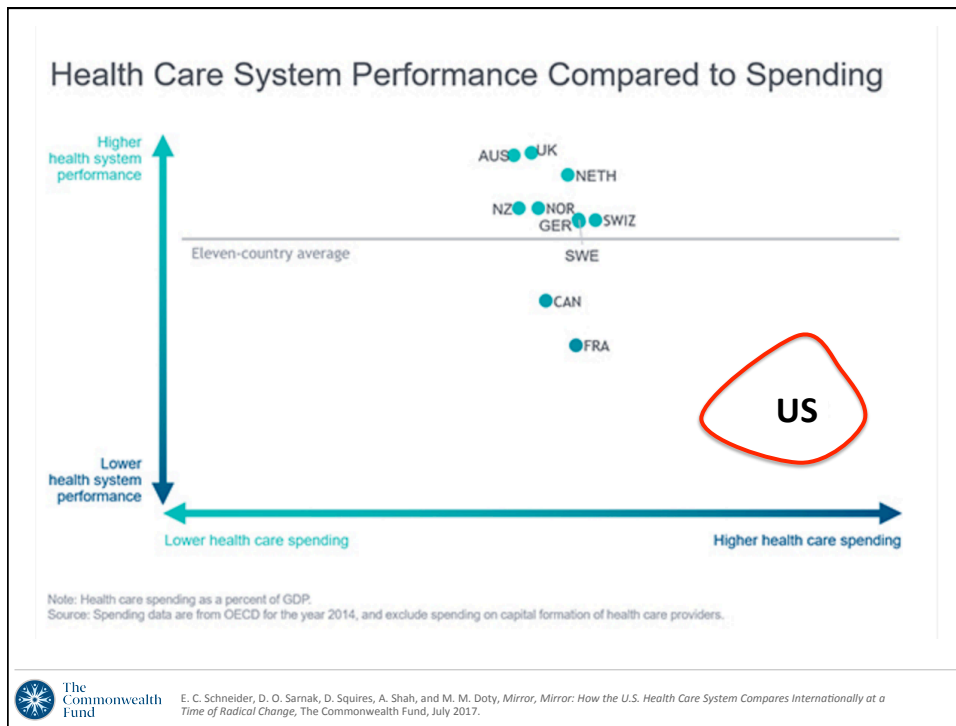
Glyphosate was introduced on the market in 1975

*“What specific environmental factors cause changes in intelligence remains relatively unexplored.”*

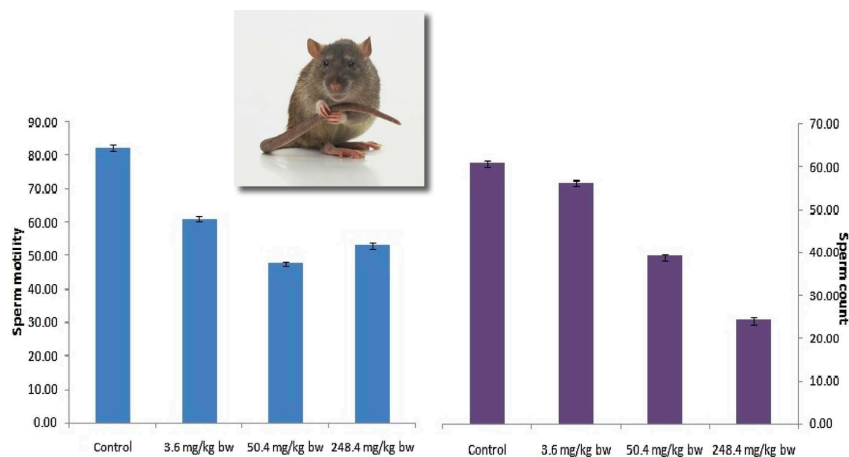
\*Rory Smith, CNN.

<https://www.cnn.com/2018/06/13/health/falling-iq-scores-study-intl/index.html>





## Glyphosate reduces sperm motility and sperm count\*



\*FO Owagboriaye et al. Experimental and Toxicologic Pathology 2017 Sep 5;69(7):461-468.

## Glyphosate Damages Second Generation\*

- Pregnant rats exposed to glyphosate starting at day 9 of gestation
- Two exposure levels (low, high), both levels considered to be safe according to regulators
- Neither the rats nor their offspring showed any obvious effects
- The second generation offspring from both exposed groups showed delayed growth, lower fetal weight and length and a higher incidence of abnormally small fetusus
- **Most surprising:** there were three cases (each from a different mother) among the second generation offspring with major fetal abnormalities (conjoined fetuses and abnormal limb development)



\*MM Milesi et al. Archives of Toxicology June 9, 2018 [Epub ahead of print]



## **America's Children are in Trouble!**

- It is now "normal" for a kindergarten child to have 12 colds every year and for a baby to have nine
- Fourfold increase in childhood obesity
- Double the asthma rate since the 1980's
- "Chronic illnesses" rose from 1.8% in 1960 to 7% in 2004
  - Today, 43% of US children are chronically ill
- 1 in 6 children in the USA has a neurodevelopmental disability
  - 1 in 38 boys are autistic
- US has the worst neonatal death rate of all industrialized countries
- Today's children in the US will have a shortened life span compared to their parents

Source: <http://www.vaccineviolence.com/>

## **The California Lawsuit: Glyphosate and non-Hodgkin's Lymphoma**

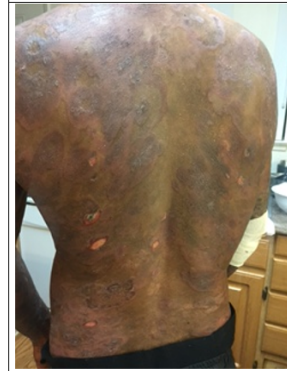
## Dewayne "Lee" Johnson vs Monsanto: Glyphosate & Non-Hodgkin's Lymphoma\*



\*<https://www.cnn.com/2018/06/17/us/monsanto-roundup-dewayne-johnson-trial/index.html>



Dewayne "Lee" Johnson



Skin lesions on Lee's back

## Details of the Lawsuit\*

- Johnson was a groundskeeper for the school district in Benicia, CA, just north of San Francisco
- He was diagnosed with non-Hodgkin's lymphoma (NHL) in 2014, at age 42.
- In 2015, WHO's IARC classified glyphosate as "probably carcinogenic to humans"
- Donna Farmer, Monsanto's "product protection lead" said in email to colleagues:
  - "You cannot say that Roundup does not cause cancer."
- Timothy Litzenburg, one of Johnson's lawyers, said:
  - "so much of what Monsanto has worked to keep secret is coming out."



[www.theguardian.com/business/2018/jul/09/monsanto-trial-roundup-weedkiller-cancer-dewayne-johnson](http://www.theguardian.com/business/2018/jul/09/monsanto-trial-roundup-weedkiller-cancer-dewayne-johnson)

“We’re going to see for the first time evidence that nobody has seen before, evidence that has been in Monsanto’s files that we’ve obtained from lawyers and the people in Monsanto... I don’t think it’s a surprise after 20 years Monsanto has known about the cancer-causing properties of this chemical and has tried to stop the public from knowing it, and tried to manipulate the regulatory process.”

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“ If we get a large award in this case, it could easily threaten the future financial viability of the company.”

-- *Robert F Kennedy, Jr.*  
*Co-counsel for Johnson*

AUGUST 11, 2018

Q


SUSTAINABLE PULSE

[SUSTAINABLE FOOD](#)
[SUSTAINABLE AGRICULTURE](#)
[GLOBAL GMO FREE COALITION](#)
[GMO EVIDENCE](#)

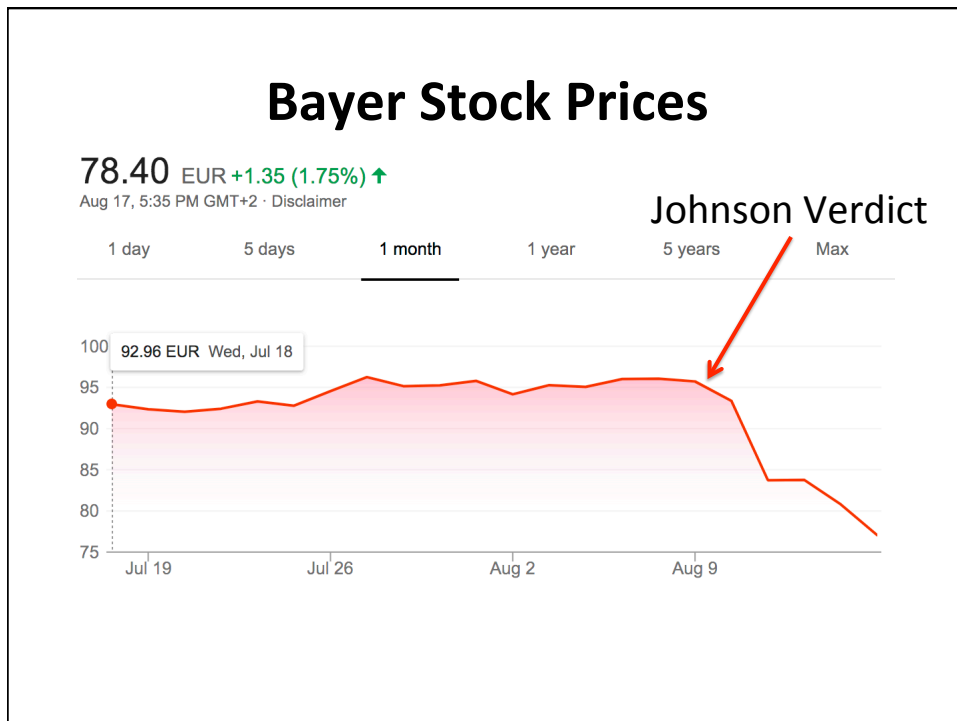
## Monsanto Loses Landmark Roundup Cancer Trial, Set to Pay USD 289 Million in Damages

Posted on Aug 11 2018 - 1:31am by Sustainable Pulse « PREVIOUS |

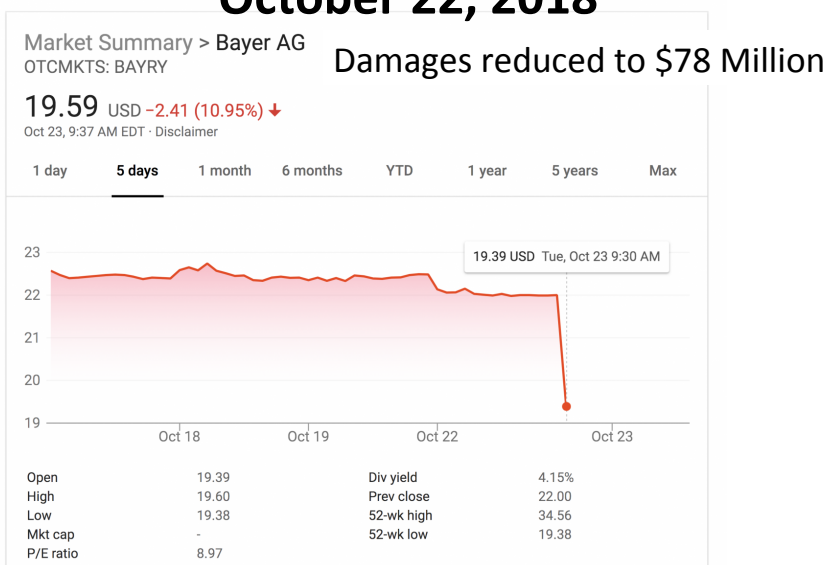
**Categorized as**

- Breaking News
- News
- Pulse News
- Highlights

Monsanto has lost a landmark cancer trial in San Francisco and has been ordered by the Judge to pay over USD 289 Million in total damages to the former school groundskeeper Dewayne Johnson, a California father who has non-Hodgkin's lymphoma, which was caused by Monsanto's glyphosate-based weedkiller Roundup.



## Verdict Upheld in Higher Court: October 22, 2018



## Bayer to sell businesses, cut jobs after Monsanto deal\*

“Chief Executive Werner Baumann is under pressure to boost Bayer’s share price after a drop of *more than 35 percent* so far this year, dragged down by concern over more than 9,000 lawsuits it faces over an alleged cancer-causing effect of Monsanto’s Roundup weed killer.”

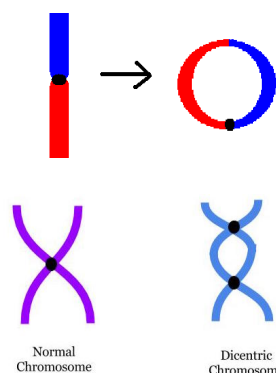
*Ludwig Burger*

*November 29, 2018*

\*<https://www.reuters.com/article/us-bayer-strategy/bayer-to-sell-businesses-cut-jobs-after-monsanto-deal-idUSKCN1NY1SI>

## “In vitro evaluation of genomic damage induced by glyphosate on human lymphocytes”\*

- In vitro exposure of human lymphocytes to glyphosate at levels of 0.5, 0.1, 0.050, 0.025 and 0.0125  $\mu\text{g}/\text{ml}$
- 0.5 is considered an "acceptable daily exposure level"
- Chromosomal aberrations and micronuclei frequencies were significantly high at all except the lowest exposure levels.

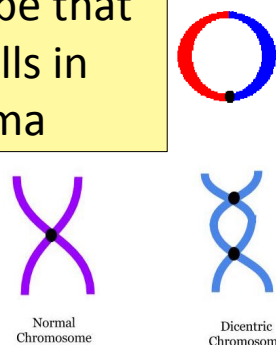


\*A Santovito et al. Environ Sci Pollut Res Int 2018;25(34):34693-700.

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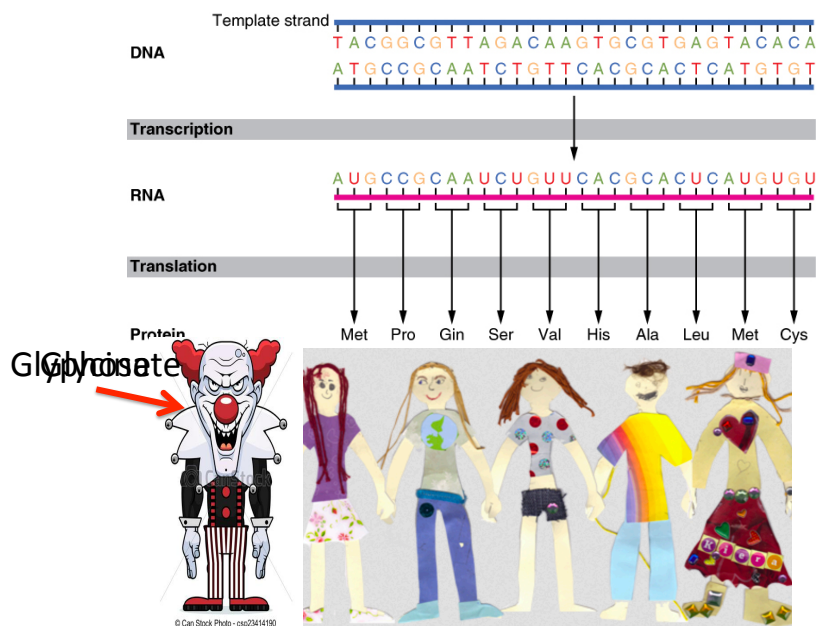
Lymphocytes are the cell type that transforms into cancer cells in non-Hodgkin's lymphoma



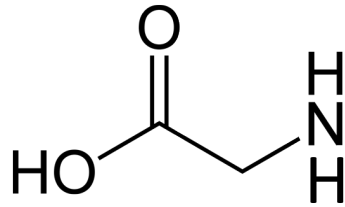
\*A Santovito et al. Environ Sci Pollut Res Int 2018;25(34):34693-700.

# Glyphosate as a Glycine Analogue

## The Basics of Protein Synthesis

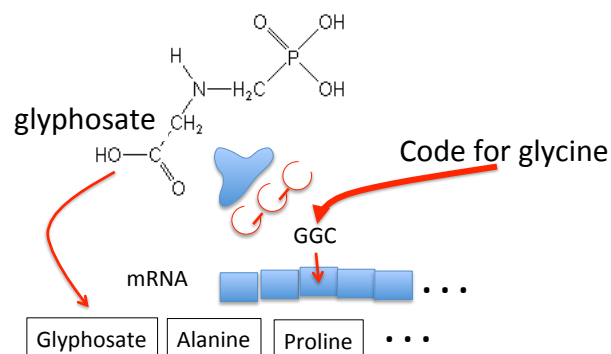


## Glyphosate is a non-coding amino acid analogue of glycine



**Glyphosate**

## What If Glyphosate Could Insert Itself Into Protein Synthesis by mistake???



Any proteins with conserved glycine residues are likely to be affected in a major way



## What If Glyphosate Could Insert Itself Into Protein Synthesis by mistake???



Multiple species of microbes have independently solved the glyphosate problem in the shikimate pathway by mutating a specific glycine residue in EPSP synthase to alanine. This mutation forms the basis for the GMO Roundup-Ready crops.

are likely to be affected in a major way

## Only Glyphosate Works!\*

“More than 1,000 analogs of glyphosate have been produced and tested for inhibition of EPSP synthase, but minor structural alterations typically resulted in dramatically reduced potency, and no compound superior to glyphosate was identified.”

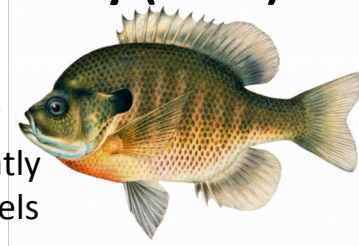
### Hypothesis:

These other molecules failed to work as an amino acid analogue of glycine, because they were not amino acids.

\*T Funke et al. PNAS 2006; 103(35): 13010-13015.

## Quote from Monsanto Study (1989)\*

- Study exposed bluegill sunfish to carbon-14 radiolabelled glyphosate
- Measured radiolabel in tissues greatly exceeded measured glyphosate levels
- Proteolysis recovered more glyphosate
  - 20% yield → 70% yield



"Proteinase K hydrolyses proteins to amino acids and small oligopeptides, suggesting that a significant portion of the 14C activity residing in the bluegill sunfish tissue was tightly associated with or *incorporated into* protein."

\*WP Ridley and KA Chott. Monsanto unpublished study. August, 1989.

## Some Predicted Consequences\*

- Neurological diseases
- Neural tube defects
- Celiac disease
- Impaired collagen → osteoarthritis
- Steatohepatitis (fatty liver disease)
- Obesity and adrenal insufficiency
- Impaired iron homeostasis and kidney failure
- Insulin resistance and diabetes
- Cancer
- Autoimmune diseases

\*A Samsel and S Seneff. Journal of Biological Physics and Chemistry 2016; 16:9-46.

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## Autoimmune Disease Epidemic

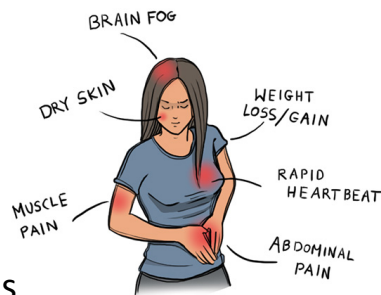
## Autoimmune Disease: An Invisible Epidemic\*

“Taken together, the number of people suffering from autoimmune diseases is 24–50 million Americans, 16% of the US population. To put it in perspective, autoimmune disease prevalence equals heart disease and cancer combined.”

\*Feldman B, Martin EM, Simms T. An Invisible Epidemic — When your body attacks itself — Autoimmune Disease; How Reframing the Data Unveils a Public Health Crisis Bigger than Cancer and Heart Disease Combined. [www.tincture.io](http://www.tincture.io).

## Autoimmune Disease Statistics\*

- Autoimmune Disease (AD) is a major health problem
- Annual direct health care costs for AD in US estimated to be ~\$100 billion
- At least 23.5 million Americans suffer from one or more autoimmune diseases
- Among the top-10 causes of death in females under 64 years old
- Immunosuppressant treatments have devastating side effects



\*<https://www.aarda.org/autoimmune-information/autoimmune-statistics/>

## Autoimmune disease preceding amyotrophic lateral sclerosis

An epidemiologic study

Martin R. Turner, PhD  
Raph Goldacre, BA  
Sreeram Ramagopalan,  
DPhil  
Kevin Talbot, DPhil  
Michael J. Goldacre,  
FFPH

Correspondence to  
Dr. Turner:  
martin.turner@ndcn.ox.ac.uk

### ABSTRACT

**Objective:** To study whether the risk of amyotrophic lateral sclerosis (ALS) is increased in people with prior autoimmune disease.

**Methods:** An all-England hospital record-linkage dataset spanning 1999–2011 was used. Cohorts were constructed of people with each of a range of autoimmune diseases; the incidence of ALS in each disease cohort was compared with the incidence of ALS in a cohort of individuals without prior admission for the autoimmune disease.

**Results:** There were significantly more cases than expected of ALS associated with a prior diagnosis of asthma, celiac disease, younger-onset diabetes (younger than 30 years), multiple sclerosis, myasthenia gravis, myxedema, polymyositis, Sjögren syndrome, systemic lupus erythematosus, and ulcerative colitis.

**Conclusions:** Autoimmune disease associations with ALS raise the possibility of shared genetic or environmental risk factors. *Neurology*® 2013;81:1222–1225

## Autoimmune disease preceding

"Results: There were significantly more cases than expected of ALS associated with a prior diagnosis of asthma, celiac disease, younger-onset diabetes (younger than 30 years), multiple sclerosis, myasthenia gravis, myxedema, polymyositis, Sjögren syndrome, systemic lupus erythematosus, and ulcerative colitis."

Why do we have an epidemic in autoimmune disease in America today?

## Hypothesis

- Glyphosate exposure sets up a weakened immune system, a leaky gut barrier and a leaky brain barrier
- Glyphosate contamination in *proteins* makes them hard to break down
- Person develops overactive antibody response to foreign protein contaminated with glyphosate and, through molecular mimicry, this leads to autoimmune disease
- This easily explains gluten intolerance and other food allergies
- And it eventually leads to more serious problems like ALS

## Does Glyphosate Acting as a Glycine Analogue Contribute To ALS?

Stephanie Seneff<sup>1\*</sup>, Wendy A. Morley<sup>2</sup>, Michael J. Hadden<sup>3</sup>, Martin C. Michener<sup>4</sup>

<sup>1</sup>Computer Science and Artificial Intelligence Laboratory, MIT, Cambridge MA 02139 USA

<sup>2</sup>Thionetic Nutrition, Richmond Hill, ON L4C 9S7 Canada

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<sup>4</sup>School of Landscape Architecture, Boston Architectural College, Newbury St. Boston MA 02115 USA

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### Abstract

Amyotrophic Lateral Sclerosis (ALS) is a fatal neurodegenerative disease involving several protein mutations in glycine-rich regions with limited treatment options. 90 - 95% of all cases are non-familial with epidemiological studies showing a significant increased risk in glyphosate-exposed workers. In this paper, we propose that glyphosate, the active ingredient in Roundup®, plays a role in ALS, mainly through mistakenly substituting for glycine during protein synthesis, disruption of mineral homeostasis as well as setting up a state of dysbiosis. Mouse models of ALS reveal a pre-symptomatic profile of gut dysbiosis. This dysbiotic state initiate a cascade of events initially impairing metabolism in the gut, and, ultimately, through a series of intermediate stages, leading to motor neuron axonal damage seen in ALS. Lipopolysaccharide, a toxic by-product of dysbiosis which contributes to the pathology, is shown to be statistically higher in ALS patients. In this paper we paint a compelling view of how glyphosate exerts its deleterious effects, including mitochondrial stress and oxidative damage through glycine substitution. Furthermore, its mineral chelation properties disrupt manganese, copper and zinc balance, and it induces glutamate toxicity in the synapse, which results in a die-back phenomenon in axons of motor neurons supplying the damaged skeletal muscles.

Received Date: October 20, 2016

Accepted Date: November 12, 2016

Published Date: November 21, 2016

Citation: Seneff, S., et al. Does glyphosate acting as a glycine analogue contribute to ALS? (2016) J Bioinfo Proteomics Rev 2(3): 1- 21.

DOI: 10.15436/2381-0793.16.1173



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## Food Allergies

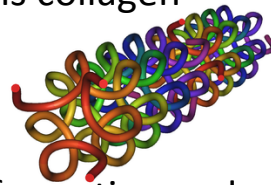


"In our study, with the largest case number reported thus far, the results supported the significant association between ASDs [autism spectrum disorders] and allergic diseases."\*

\*J Chen et al. Int J Dev Neurosci. 2014 Jun;35:35-41.

## Collagen and Gelatin

- 25% of the protein in our body is collagen
- 25% of the amino acids in collagen are glycines
- Glyphosate substitution for glycine will disrupt triple-helix formation and lead to diseases of the vasculature, joints and bones
- Gelatin is derived from collagen in bones and ligaments sourced from cows and pigs fed glyphosate-contaminated GMO Roundup-Ready feed



## Products Containing Collagen/ Gelatin !!



## Drugs and Autoimmune Disease\*

- Drugs that treat autoimmune disease have a huge problem with side effects
  - They suppress the immune system, and increase risk to tuberculosis, invasive fungal infections and lymphomas (cancers of the immune system)
- Humira is a TNF-alpha inhibitor, which blocks the immune response
  - It costs about \$3,100 per month
  - U.S. prescriptions for Humira have taken off in recent years: 1.5 million in 2011; 2.4 million in 2015.
  - It was linked to more than 209,000 adverse event reports since 2013, including more than 4,200 deaths.

\* [usatoday.com/story/news/nation-now/2017/03/19/analysis-reports-drug-side-effects-increase-fivefold-12-years/99384190/](http://usatoday.com/story/news/nation-now/2017/03/19/analysis-reports-drug-side-effects-increase-fivefold-12-years/99384190/)

## Chronic Pain\*

“The list of different types of chronic pain syndrome seems to be growing every day, including complex regional pain syndrome, failed back syndrome, fibromyalgia, interstitial cystitis, myofascial pain syndrome, postvasectomy pain, vulvodynia, pelvic pain syndrome – and on and on.”



\*P. 42, Anna Lembke, Drug dealer, MD  
John's Hopkins U Press, Baltimore, MD

## US Department of Health and Human Services Data on Pain-Killer Drug Abuse\*

- Drug overdose is the leading cause of injury death in the United States
  - Heroin, morphine, and prescription pain relievers
- More people died from drug overdoses in 2014 than in any previous year on record
- More than 6 out of 10 involved an opioid drug
- More than 650,000 opioid prescriptions are dispensed every day



\*<http://www.hhs.gov/opioids/about-the-epidemic/>

## **US Department of Health and Human Services Data on Pain-Killer Drug Abuse\***

• According to PBS Evening News (Sept. 29, 2017), 64,000 deaths in the U.S. were attributed to opioid drug overdose in 2016.

• This number increased to 72,000 in 2017 (up 10% from previous year)  
• (Reported August 16, 2018).

dispensed every day

\*<http://www.hhs.gov/opioids/about-the-epidemic/>

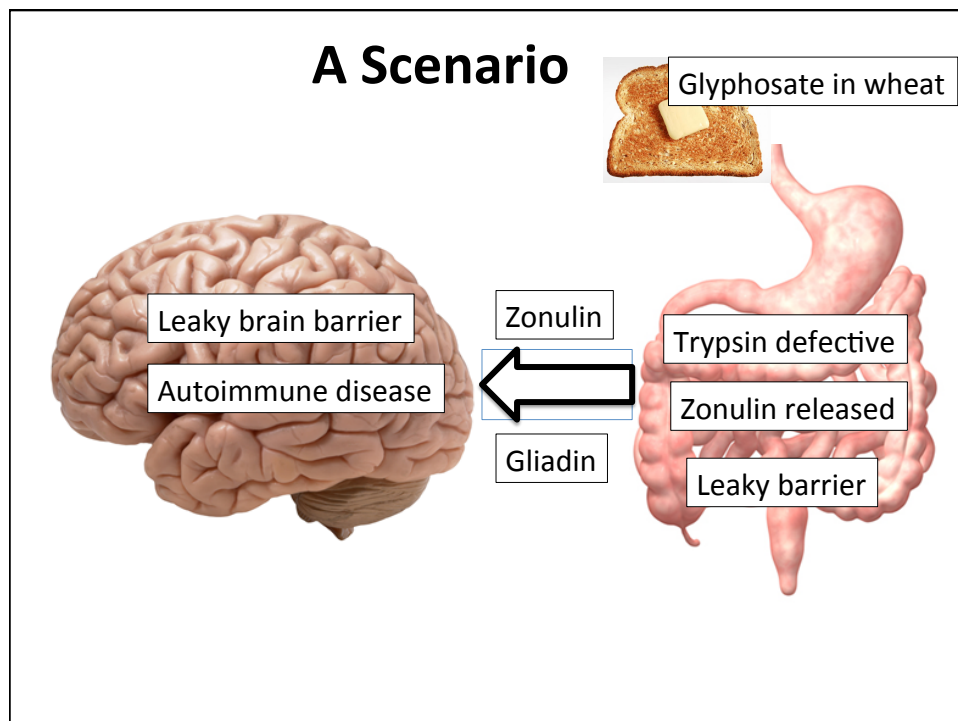
## **How Glyphosate Affects the Gut Barrier**

## Glyphosate and the Gut: Digestive Enzymes

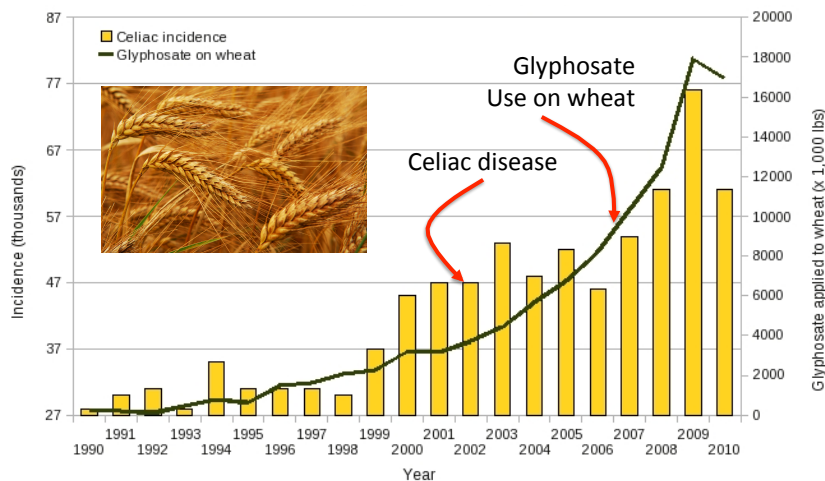
- Glyphosate has been found as a contaminant in digestive enzymes trypsin, pepsin and lipase\*
- Trypsin impairment prevents proteins like gluten in wheat from being digested
- Undigested proteins induce release of zonulin which opens up gut barrier\*\*
- Zonulin lingers because trypsin is defective

\*A Samsel and S Seneff. J Biol Phys Chem 2017;17:8-32

\*\* JJ Gildea et al. J Clin Nutr Diet. 2017, 3:1.



## Glyphosate and Celiac Disease\*



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

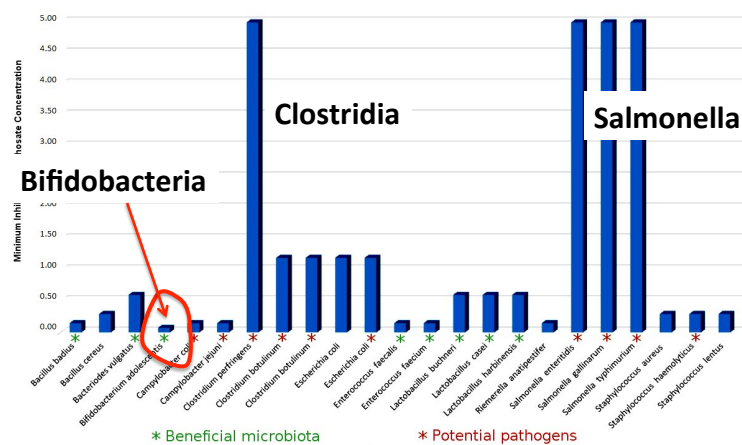
## Glyphosate and the Gut: Pathogen Overgrowth

- Glyphosate is an antimicrobial agent that preferentially kills beneficial microbes, allowing pathogens to flourish in the gut\*
- Immune cells invade the gut and release inflammatory cytokines
  - This causes increased risk to inflammatory bowel diseases such as Crohn's and ulcerative colitis

\* Samsel and Seneff. Entropy 2013; 15: 1416-1463.

## Pathogen Overgrowth in Poultry Microbes Exposed to Glyphosate\*

Shehata AA, Schrödl W, Aldin AA, Hafez HM, Krüger M. The effect of glyphosate on potential pathogens and beneficial members of poultry microbiota in vitro. Curr Microbiol. 2013 Apr;66(4):350-8.



\*Plot provided by Dr. Martin Michener

## Celiac Disease, Glyphosate and Non Hodgkin's Lymphoma

- Glyphosate preferentially kills *Bifidobacteria*\*
- Bifidobacteria are depleted in celiac disease\*\*
- Celiac disease is associated with increased risk to non Hodgkin's lymphoma\*\*\*
- Glyphosate itself is also linked directly to non Hodgkin's lymphoma\*\*\*\*

\* A.A. Shehata et al., Curr Microbiol. 2013 Apr;66(4):350-8.

\*\* M. Velasquez-Manoff, NY Times Sunday Review, Feb. 23, 2013.

\*\*\* C. Catassi et al., JAMA. 2002 Mar 20;287(11):1413-9.

\*\*\*\* M. Eriksson et al., Int J Cancer. 2008 Oct 1;123(7):1657-63.

## LETTER

doi:10.1038/nature09646

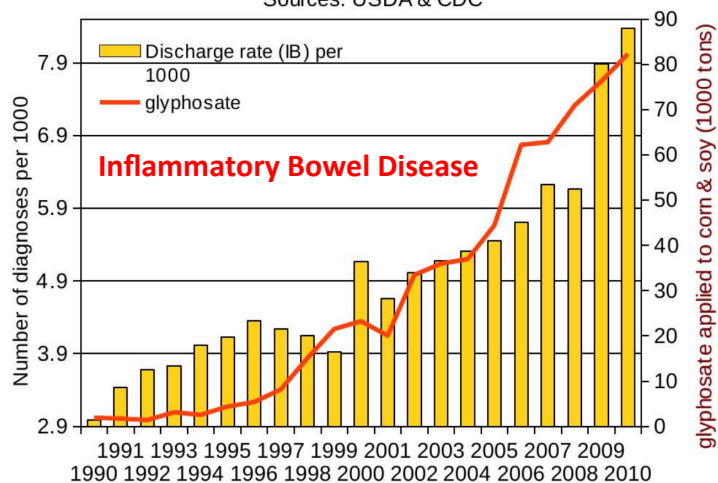
## Bifidobacteria can protect from enteropathogenic infection through production of acetate \*

Shinji Fukuda<sup>1,2</sup>, Hidehiro Toh<sup>3</sup>, Koji Hase<sup>1</sup>, Kenshiro Oshima<sup>4</sup>, Yumiko Nakanishi<sup>1,2,5</sup>, Kazutoshi Yoshimura<sup>6</sup>, Toru Tobe<sup>7</sup>, Julie M. Clarke<sup>8</sup>, David L. Topping<sup>8</sup>, Tohru Suzuki<sup>9</sup>, Todd D. Taylor<sup>3</sup>, Kikuji Itoh<sup>6</sup>, Jun Kikuchi<sup>2,5,10</sup>, Hidetoshi Morita<sup>11</sup>, Masahira Hattori<sup>4</sup> & Hiroshi Ohno<sup>1,2,12</sup>

“We propose that acetate produced by protective *bifidobacteria* improves intestinal defence mediated by epithelial cells and thereby protects the host against lethal infection.” [e.g., E coli]

\*S Fukuda et al. Nature. 27 Jan. 2011; 469: 543-547.

Hospital discharge diagnoses (any) of Inflammatory Bowel disease (Crohn's and Ulcerative Colitis ICD 555 & 556) plotted against glyphosate applied to corn & soy (R = 0.9378, p <= 7.068e-08)  
Sources: USDA & CDC



\*Figure 20, NL Swanson et al. Journal of Organic Systems 9(2), 2014, p. 25.



## Evidence linking autism to Clostridia overgrowth\*

- 14 autistic children with gut disorder compared to 21 controls
- Significant increase in *Clostridia* species in the gut in autistic children
- Associated with reduced tryptophan levels and increased expression of inflammatory markers
  - Tryptophan is a product of the shikimate pathway, which glyphosate blocks
  - Macrophages in inflamed tissue take up tryptophan, reducing bioavailability to the brain
- Proposed role for antibiotics
  - Glyphosate is a patented antimicrobial agent (2010)

\*RA Luna et al., Cellular and Molecular Gastroenterology and Hepatology 2017;3(2): 218-230

### CASE REPORT

#### **Elevated Urinary Glyphosate and Clostridia Metabolites With Altered Dopamine Metabolism in Triplets With Autistic Spectrum Disorder or Suspected Seizure Disorder: A Case Study\***

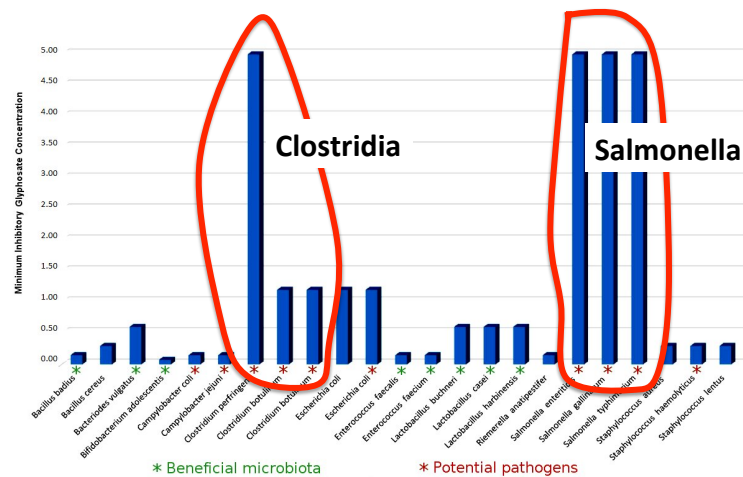
*William Shaw, PhD*

- Triplets: two boys, one girl. Both boys have autism and girl has seizure disorder
- Very high levels of glyphosate in urine in all three
- *Clostridia* overgrowth due to glyphosate disruption of gut microbes
  - Clostridia produce toxins HPHPA and p-cresol, which block the conversion of dopamine to norepinephrine.
  - Damage to neurons in the brain through oxidative stress

\*W. Shaw. Integrative Medicine 2017;16(1);50-57.

## Pathogen Overgrowth in Poultry Microbes Exposed to Glyphosate\*

Shehata AA, Schrödl W, Aldin AA, Hafez HM, Krüger M. The effect of glyphosate on potential pathogens and beneficial members of poultry microbiota in vitro. Curr Microbiol. 2013 Apr;66(4):350-8.



\*Plot provided by Dr. Martin Michener

## Recapitulation

- Glyphosate contamination in food proteins makes them hard to break down
- Glyphosate contamination in digestive enzymes makes them defective
  - Undigested proteins induce leaky gut barrier
  - Studies on poultry confirm glyphosate disrupts gut microbes
- Celiac disease is associated with increased risk to non-Hodgkin's lymphoma, which is also linked to glyphosate exposure.
- Glyphosate induces overgrowth of Clostridia species in gut
  - Clostridia release toxins that induce an inflammatory response and prevent dopamine metabolism
  - Clostridia overgrowth can lead to autism
- Inflammation in the brain and excessive neurostimulation by dopamine damages neurons

## **Glyphosate, MMR and Autism**

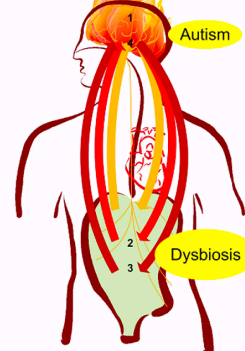
“There isn’t enough institutional infrastructure to educate the growing numbers of children with autism and house the adults they are becoming. Young adults with autism are increasingly sent to nursing homes because there’s nowhere else to go.”

*-- Louise Kuo Habakus*

*Founder and Chief Executive of Fearless Parent*

"We now know that autism is a multifaceted disorder associated with gastrointestinal inflammation, nutritional deficiencies, multiple food allergies and intolerances, impairments in liver detoxification and resultant accumulation of xenobiotics, the majority of which have neurotoxic and/or immunotoxic effects."\*

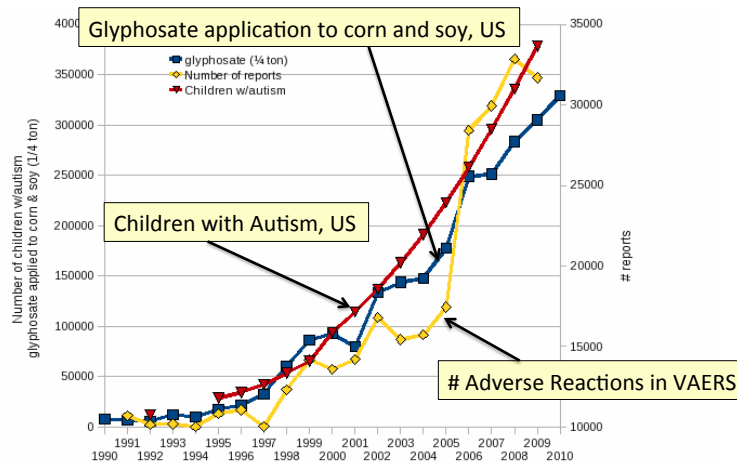
**AUTISM, DYSBIOSIS, AND THE GUT-BRAIN AXIS**



**DR ALEX VASQUEZ**

\*Dr. Alex Vasquez. **Biological Plausibility of the Gut-Brain Axis in Autism**  
<https://vimeo.com/235896380>

**Autism, Glyphosate, Vaccine Reactions\***



\*Data readily available from the CDC, FDA (VAERS) and USDA

## Vaxxed/Unvaxxed Study\*

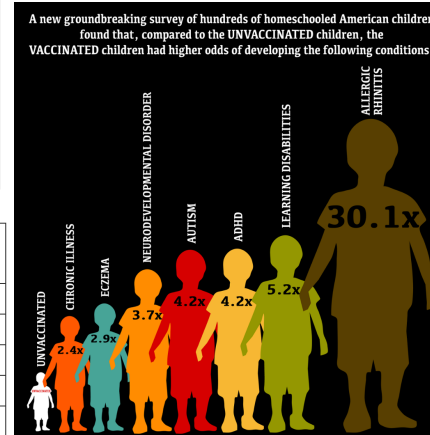
- Children aged 6-12; home-schooled
- Vaccinated children were significantly less likely than the unvaccinated to have had chickenpox and pertussis
- However, the vaccinated had higher rates of allergies and autism, ADHD, and/or a learning disability than the unvaccinated

\*AR Mawson et al. J Transl Sci 2017; 3(3): 1-12.

Vaccinated children had a -fold greater odds of having been diagnosed with:	Condition
30.1	Allergic rhinitis
5.2	Learning disabilities
4.2	ADHD
4.2	ASD
3.9	Other allergies
3.7	NDD
2.9	Eczema/atopic dermatitis
2.4	Any chronic condition

Vaccinated children had a -fold greater odds of:	Medication or health service used
21.5	Medication for allergies
8.0	Use of fitted ear drainage tubes*
4.6	Use of fever medication (1+ times)
2.4	Antibiotic use (past 12 months)
3.0	Sick visit (past year)
1.8	Hospital stay (1+ nights ever)

## Vaxxed/Unvaxxed Study, Results\*



\*AR Mawson et al. J Transl Sci 2017; 3(3): 1-12.

\*Being fitted with ear tubes is indicative of frequent or chronic ear infections.

## MMR and Autism

- Andrew Wakefield found a connection in 1998 in a now retracted publication\*
- CDC claimed proof of no link in 2004 paper\*\*
- Whistleblower, Dr. William Thompson, has now come forward:
  - Data supported significant increased risk for autism in black males with early vaccine
  - Demand for birth certificate hid this finding

\*A Wakefield et al., *The Lancet* 1998; **351** (9103): 637–41. (RETRACTED)

\*\*F DeStefano et al., *Pediatrics* 2004;113;259-266 .

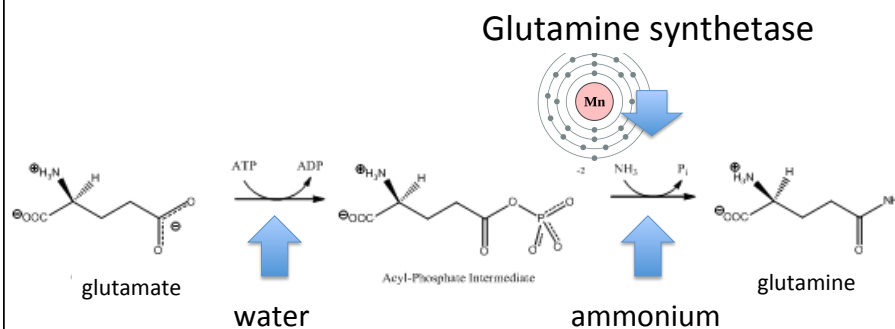
## Glutamate is an Additive in Vaccines!

- Flu vaccines (FluMist), MMR (measles, mumps and rubella), Rabies vaccine and Varicella vaccine (chicken pox) all contain glutamate
- Anecdotal evidence links these vaccines with autism
- My own studies on VAERS revealed a correlation between autism and MMR\*
- **Glyphosate's depletion of manganese prevents glutamate breakdown**



\*S. Seneff et al., *Entropy* 2012, 14, 2227-2253.

## Glutamate Detoxification Depends on Manganese!



Ammonium and glutamate toxicity in the brain can arise because of insufficient manganese

## “Alteration of Plasma Glutamate and Glutamine Levels in Children with High-Functioning Autism”\*

Amino acid	Control	HFA	p-value
Alanine	326.1±61.6	300.3±55.0	0.145
γ-Aminobutyric acid	18.8±3.8	18.7±5.4	0.971
Arginine	89.1±19.0	95.3±18.5	0.279
Asparagine	40.8±8.3	43.1±7.0	0.311

Glutamate	20.9±4.5	27.9±7.4	<0.002*
Glutamine	513.1±48.5	445.8±50.6	<0.0004**

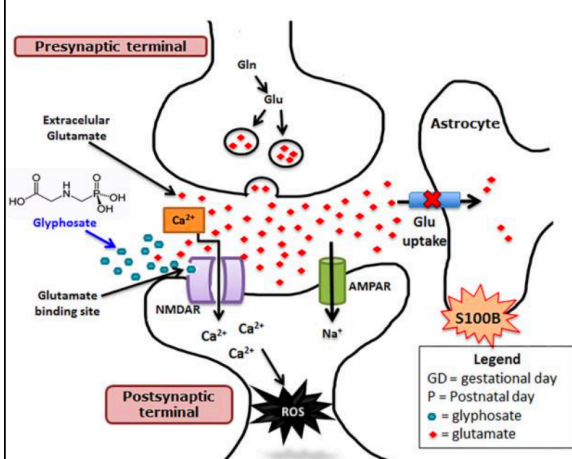
Isoleucine	53.6±11.5	62.2±14.5	0.033
Leucine	99.0±16.1	106.4±22.4	0.210
Lysine	155.3±28.5	164.2±32.5	0.332
Methionine	23.7±5.1	25.8±5.6	0.203
Ornithine	43.9±11.3	51.9±10.8	0.021
Phenylalanine	51.7±6.8	55.1±8.4	0.146
Proline	153.7±56.4	131.7±47.6	0.165
Serine	105.4±15.6	115.8±14.7	0.027
Taurine	33.4±5.5	37.8±7.9	0.036
Threonine	100.8±19.7	112.0±24.3	0.097
Tryptophan	44.8±5.6	47.3±6.4	0.167
Tyrosine	60.9±10.5	58.4±10.1	0.425
Urea	3976.3±818.7	3759.9±773.3	0.367
Valine	200.2±29.4	217.1±29.7	0.062

\*C. Shimmura et al.  
PLoSone October  
2011 6(1):e25340

## Glyphosate in Vaccines?

- For MMR, flu vaccine, and rabies vaccine, live virus is grown on *gelatin* derived from ligaments of pigs and *fetal bovine serum*
  - Cows and pigs are fed GMO Roundup-Ready corn and soy feed
- Gelatin is derived from collagen which is highly enriched in *glycine* and also contains *glutamate*
  - These two neurotransmitters excite the NMDA receptors in the brain
- Glyphosate stimulation of NMDA receptors could cause neuronal burnout

## Glyphosate Excites NMDA Receptors in Hippocampus\*,\*\*



Excess glutamate in synapse leads to neuronal burnout

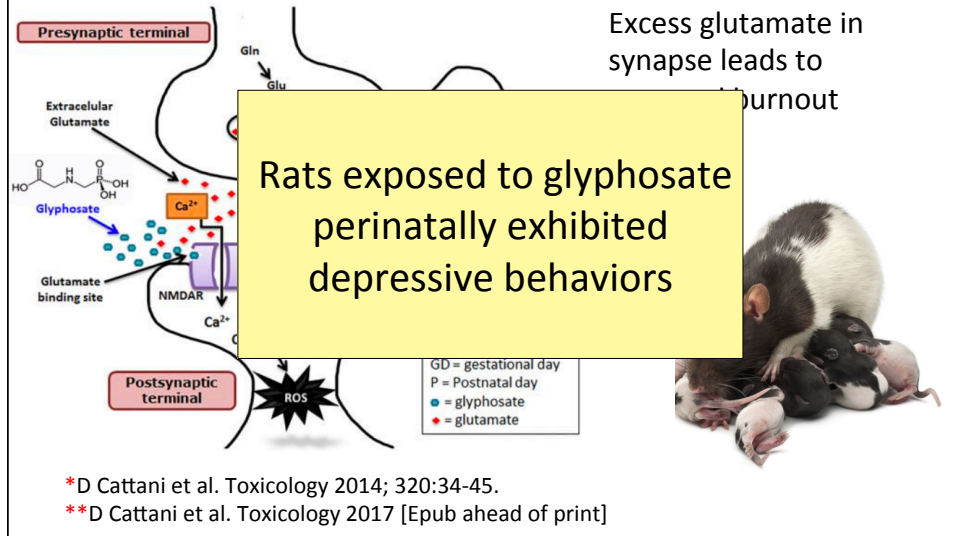


\*D Cattani et al. Toxicology 2014; 320:34-45.

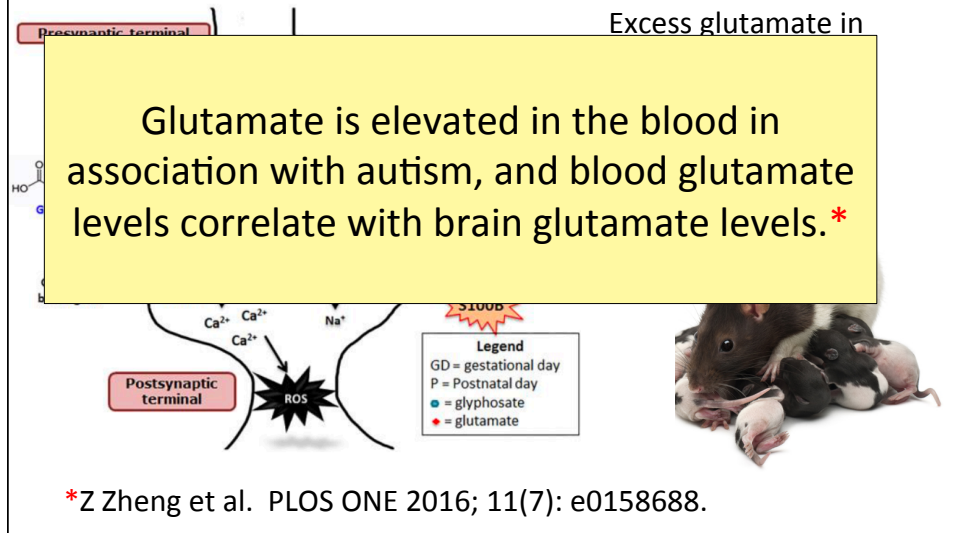
\*\*D Cattani et al. Toxicology 2017 [Epub ahead of print]



## Glyphosate Excites NMDA Receptors in Hippocampus<sup>\*,\*\*</sup>



## Glyphosate Excites NMDA Receptors in Hippocampus<sup>\*,\*\*</sup>





25SA16A

## Glyphosate pathways to modern diseases VI: Prions, amyloidoses and autoimmune neurological diseases

Anthony Samsel<sup>1</sup> and Stephanie Seneff<sup>2,\*</sup>

<sup>1</sup> Samsel Environmental and Public Health Services, Deerfield, NH 03037, USA

<sup>2</sup> Computer Science and Artificial Intelligence Laboratory, MIT, Cambridge, MA 02139, USA

Usage of the herbicide glyphosate on core crops in the USA has increased exponentially over the past two decades, in step with the exponential increase in autoimmune diseases including autism, multiple sclerosis, inflammatory bowel disease, type 1 diabetes, coeliac disease, neuromyelitis optica and many others. In this paper we explain how glyphosate, acting as a non-coding amino acid analogue of glycine, could erroneously be integrated with or incorporated into protein synthesis in place of glycine, producing a defective product that resists proteolysis. Whether produced by a microbe or present in a food source, such a peptide could lead to autoimmune disease through molecular mimicry. We discuss similarities in other naturally produced disease-causing amino acid analogues, such as the herbicide glufosinate and the insecticide L-canavanine, and provide multiple examples of glycine-containing short peptides linked to autoimmune disease, particularly with respect to multiple sclerosis. Most disturbing is the presence of glyphosate in many popular vaccines including the measles, mumps and rubella (MMR) vaccine, which we have verified here for the first time.

\*A Samsel and S Seneff, Journal of Biological Physics and Chemistry 2017;17:8-32.



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## Glyphosate Contamination in Vaccines (Parts Per Billion)\*

Merck	ZOSTAVAX	0.62	Shingles
<b>Merck</b>	<b>MMR-II</b>	<b>3.74</b>	<b>Measles, Mumps and Rubella</b>
Merck	VARIVAX	0.56	Varicella, Chicken Pox
MERCK	PNEUMOVAX	ND	Pneumococcal 18
MERCK	PROQUAD	0.66	Measles, Mumps, Rubella, Varicella
GSK	ENERGIX-B	0.34	Heptatitis B
Novartis	INFLUENZA	0.23	Flu

\*A Samsel and S Seneff, Journal of Biological Physics and Chemistry 2017;17:8-32.

## Symptoms of Adverse Reactions to MMR before and after 2002\*

### More Common Before 2002

Reaction	Count Before 2002	Count After 2002	<i>p</i> -value
joint pain	126	65	0.036

### More Common After 2002

Reaction	Count Before 2002	Count After 2002	<i>p</i> -value
hospitalization	71	319	0.00037
seizures	203	462	0.0014
shortness of breath	100	216	0.010
hives	324	504	0.011
mumps	5	51	0.014
abscess	51	120	0.022
autism	69	143	0.024
eczema	4	36	0.026
ear infection	16	56	0.031
anaphylactic shock	16	54	0.034
facial swelling	45	95	0.040
swelling	860	1018	0.048

Data analyzed from the VAERS database

\*A Samsel and S Seneff. J Biol Phys Chem 2017;17:8-32

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anaphylactic shock	16	54	0.034
Facial swelling	45	95	0.040
swelling	860	1018	0.048

These are all characteristic symptoms of allergies to MSG

\*Data analyzed from the VAERS database

## Recapitulation

- Vaxxed/Unvaxxed study reveals neurological and autoimmune disease prevalence among the vaxxed
- Glyphosate has been found as a contaminant in multiple vaccines, mostly those that contain live viruses
  - Likely due to glyphosate present in gelatin used as nutrient
- MMR vaccine may be causal factor in autism epidemic
  - CDC hid evidence of a link between MMR and autism
- Glyphosate and glutamate in MMR are synergistically neurotoxic through excitation of NMDA receptors

# Molecular Mimicry



Journal of Developing Drugs

Anumugham, J Develop Drugs 2015, 4:4  
<http://dx.doi.org/10.4172/2329-6631.1000137>

Case Report

Open Access

Evidence that Food Proteins in Vaccines Cause the Development of Food Allergies and Its Implications for Vaccine Policy

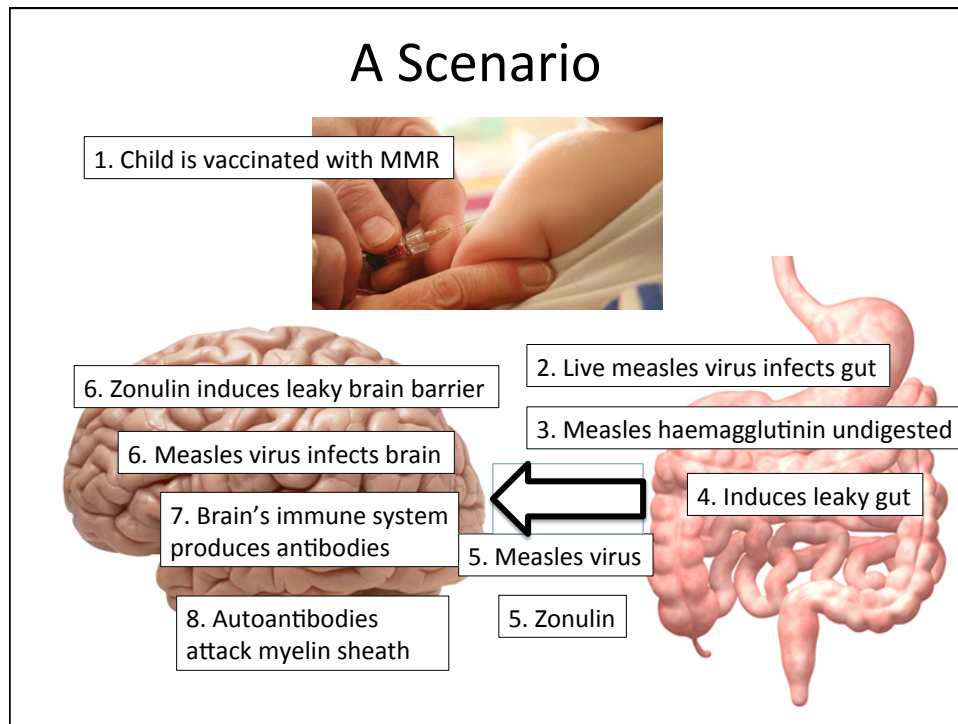
Vinu Arumugham\*  
San Jose, CA, USA

## Abstract

Nobel Laureate Charles Richet demonstrated over a hundred years ago that injecting a protein into animals or humans causes immune system sensitization to that protein. Subsequent exposure to the protein can result in allergic reactions or anaphylaxis. This fact has since been demonstrated over and over again in humans and animal models.



“Nobel Laureate Charles Richet demonstrated over a hundred years ago that injecting a protein into animals or humans causes immune system sensitization to that protein. Subsequent exposure to the protein can result in allergic reactions or anaphylaxis. This fact has since been demonstrated over and over again in humans and animal models.”



## Measles Virus and Haemagglutinin\*

- The measles virus synthesizes the protein haemagglutinin
  - Antibodies to haemagglutinin are essential following MMR vaccination to induce immunity
- Measles virus infects brain due to leaky barrier
- Haemagglutinin bears a sequence resemblance to myelin basic protein (MBP) → potential for autoimmune reaction
- MBP is essential for the formation of the myelin sheath surrounding nerve fibers
- Autoantibodies to MBP along with excessive levels of antibodies to measles haemagglutinin are linked to autism\*\*

\*Oldstone, MBA, Ed. Molecular mimicry: Infection inducing autoimmune disease. Springer Berlin Heidelberg; January 9, 2006.

\*\*VK Singh et al., J Biomed Sci 2002;9(4):359-64.

## Autism and Measles Haemagglutinin\*

- 125 autistic children and 92 control children
- 60% of the children with autism had high levels of antibodies to measles haemagglutinin specific to the MMR vaccine
  - 90% of these had autoantibodies to myelin basic protein (MBP)
- *0% of the control children had high antibody titers to either haemagglutinin or MBP*
- There were no elevations in antibodies detected against any proteins in the mumps or rubella viruses

\*VK Singh et al., J Biomed Sci 2002;9(4):359-64.

## A Failed System and A Growing Food Movement

“It is no measure of health to be well adjusted to a profoundly sick society.”

*-Jiddu Krishnamurti*

### “Is Agriculture’s Use of Glyphosate Feeding Lake O’s Explosive Algae Blooms?”\*

- Sugar cane agriculture is extensive all around Lake Okeechobee in S. Florida, and glyphosate is used both to control weeds and as a desiccant



- Cyanobacteria can break down the C-P bond in glyphosate and use its phosphorus atom as a fuel source\*\*

\*Prof. Geoffrey Norris.

<https://jacquithurlowlippisch.com/tag/>

[is-sugarcane-field-glyphosate-feeding-lake-os-blue-green-algae-blloms](https://jacquithurlowlippisch.com/tag/is-sugarcane-field-glyphosate-feeding-lake-os-blue-green-algae-blloms)

\*\*D Drzyzga et al. Environ Microbiol 2017 Mar;19(3):1065-1076



## Cyanobacteria Feed Red Tide Algae

“Both the coastal red tide and the inland blue-green algae have beset South Florida through the summer, killing vast numbers of fish and other wildlife, including dozens of dolphins, manatees, sea turtles, sharks and eels.” \*

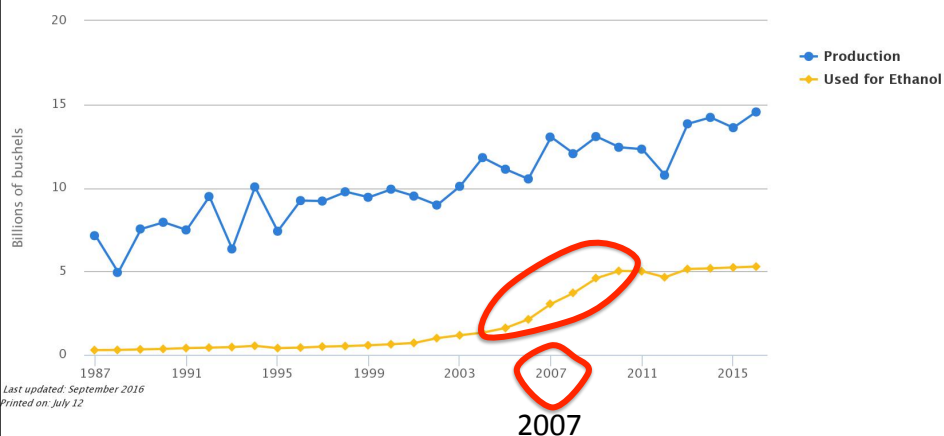
- Cyanobacteria feed off of glyphosate (phosphorus source) and produce nitrates from nitrogen
- Red Tide algae flourish, supplied with nitrates produced by cyanobacteria \*\*

\*<https://www.nbcnews.com/news/us-news/toxic-red-tide-florida-researchers-investigate-what-s-making-it-n900771>

\*\*<https://www.sailorsforthesea.org/programs/ocean-watch/nutrients-feed-red-tide>

## Corn for Ethanol Production\*

U.S. Total Corn Production and Corn Used for Fuel Ethanol Production



Last updated: September 2016  
Printed on: July 12

2007

Karen Perry Stillerman, July 17, 2018

<https://blog.ucsusa.org/karen-perry-stillerman/the-midwests-food-system-is-failing-heres-why>

## Corn for Ethanol Production\*



## Corn for Ethanol Production\*






### Why Regulators Lost Track and Control of Pesticide Risks: Lessons From the Case of Glyphosate-Based Herbicides and Genetically Engineered-Crop Technology

Charles M. Benbrook<sup>1</sup>

- Excessive confidence in the accuracy of pre-market risk assessments and regulatory thresholds
- Insufficient post-approval monitoring of actual impacts of multiple synergistic formulated pesticides
- Inadequate tools to deal with failing pest management systems due to the emergence of widespread resistance among the weeds and insects
- Lack of tools to stabilize or reverse rising risk trajectories, even when the steps needed are so well known

### Superweeds Are Now a Huge Problem\*

- 76.8% of samples submitted to a U of Illinois Plant Clinic from 10 states across the Midwest showed glyphosate resistance
- 
- “GM crops are on the edge of failure in the U.S. as farmers are asked to fork out more and more money on herbicides to try to control the superweeds. We simply can’t afford it! It is near the end of the road for these crops and many of my friends in the Midwest are on the edge of turning back to conventional farming methods.”  
 – Bill Giles, an Illinois farmer

\*[sustainablepulse.com/2017/02/04/farmers-losing-midwest-superweeds-fight-as-glyphosate-resistance-reaches-over-75/#](https://sustainablepulse.com/2017/02/04/farmers-losing-midwest-superweeds-fight-as-glyphosate-resistance-reaches-over-75/#)

## Fixing the Soil\*

- Dirt is inert; soil is alive
- Missouri farmer JR Bollinger grew corn and soy on a former coal mine
- “We tried ... all kinds of goodies: humates, ... sea minerals, microbes, fish meal and biochar powder.”
  - Earthworms till the soil
  - Soil microbes are crucial for soil health
- Greatly reduce fertilizer needs and improve yield



JR Bollinger

\*[ecofarmingdaily.com/wormhole-customizing-biological-methods-large-scale-farming/](http://ecofarmingdaily.com/wormhole-customizing-biological-methods-large-scale-farming/)

David Yarrow

Down the Wormhole: Customizing Biological Methods for Large Scale Farming

Belize Ag Report 2017;34:5-17.

## Sustainable Agriculture

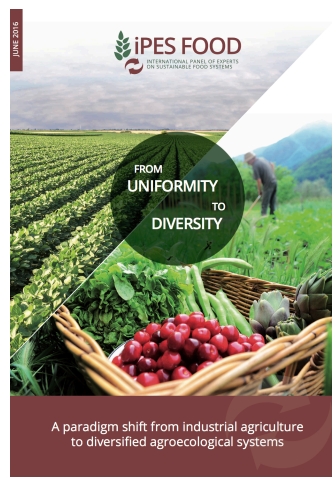
*“We say that every square meter of land that is worked with agro-ecology is a liberated square meter. We see it as a tool to transform farmers’ social and economic conditions. We see it as a tool of liberation from the unsustainable capitalist agricultural model that oppresses farmers.”*

-- Miguel Ramirez

National Coordinator of Organic Agriculture  
Movement in El Salvador

## From Uniformity to Biodiversity\*

- "Industrial Agriculture:" crop monocultures and industrial-scale feedlots
  - Chemical fertilizers, pesticides, antibiotics → multiple negative outcomes
- Diversify farming landscapes: holistic strategies
  - Retain carbon in the ground, support biodiversity, rebuild soil fertility, sustainable high yields
- Political incentives must be shifted to promote ecofriendly agriculture.



\*Emile A. Frison, REPORT 02. 2016

IPES Food: International Panel of Experts on Sustainable Food Systems

## Solving Global Climate Change through Agriculture\*

“Agriculture, with its unique ability to sequester carbon on ... billions and billions of acres, is the only industry poised to *reverse* global warming. Improved management of cropping and grazing heals land, boosts soil fertility, prevents flooding, enhances drought resilience, increases the nutritional content of food and restores wildlife habitat — while sequestering carbon.

\*<http://www.rutlandherald.com/articles/using-soil-to-fight-climate-change/>



## Small Organic Farms are the Answer



Bluebird Hill Organic Farm, North Carolina

## Why the Food Movement is Unstoppable\*

**Philosophy:** “The purpose of life is health and *the optimal and most just way to attain human health is to maximise the health of all organisms, with the most effective way to do that being through food.*”

**Practical consequence:** “It becomes the task of a food system, or any sub-part of it – such as a farm – to maximise the positive aspects of each component, so that the circle can become ever more virtuous.”

\*Jonathan Latham.

[www.independentsciencenews.org/health/why-the-food-movement-is-unstoppable](http://www.independentsciencenews.org/health/why-the-food-movement-is-unstoppable)

# How to Safeguard Yourself and Your Family



## Some Important Nutrients

- Curcumin
- Garlic
- Vitamin C
- Probiotics
- Methyl tetrahydrofolate
- Cobalamin
- Glutathione
- Taurine
- Epsom salt baths



## Biochar, Bentonite and Zeolite to maintain healthy microbial distribution in poultry\*



\*TP Prasai et al. PLoS ONE 11(4): e0154061.



## Anecdotal Evidence of Benefits of Fulvic Acid\*

*"In the last year I have become increasingly sick with ataxia, balance problems, muscle weakness, numbness in the hands and feet and a 'foggy' brain*

*... To cut a long story short, Jim suggested **Fulvic Acid** as a detox.*

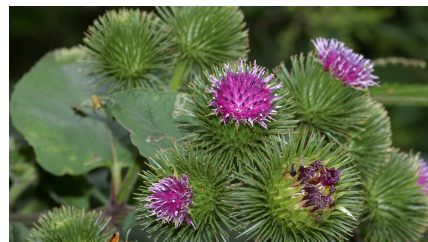
*At 10 days the effects started to 'kick in' and by 14 days it was as if a fog had been lifted from my brain. My muscle weakness has gone, I can walk for 2 hours and I can swim in the sea."*

"It is a miracle."

\*Shared by Nico DaVinci, personal communication concerning a patient

## Extracts from Common Plants Can Treat Glyphosate Poisoning\*

- Roundup is toxic to hepatic and embryonic cells at doses far below those used in agriculture and at residue levels present in some GM food.
- Extracts from common plants such as dandelions, barberry, and burdock can protect from damage, especially if administered prior to exposure.



\*C Gasnier et al. Journal of Occupational Medicine and Toxicology 2011, 6:3



- Sauerkraut and apple cider vinegar contain acetobacter, one of the very few microbes that can metabolize glyphosate
- Yogurt and kimchi probably do too



## Kefir: Natural Probiotics\*

- Kefir is a fermented milk product originating in the Caucasus mountains centuries ago
- Can be made from milk from cows, sheep and goats
- Slightly sour and carbonated
- One of the most potent probiotic foods available



\*<https://chriskresser.com/kefir-the-not-quite-paleo-superfood/>

## Recommendations from Dr. Zach Bush\*

1. Get out into nature. Walk in the woods, barefoot, feel the sunshine – rich environment, breathe in the nutrients in the air
2. Eat probiotics (naturally fermented foods)
3. Eat organic food  
Demand is dropping the price.  
Thrive Market – order online
4. Eat more fruits and vegetables
5. Bathe in natural waters



\*<https://www.youtube.com/watch?v=jWgnkgYtqnw&feature=youtu.be>

## **Conclusions**

- We are at a crossroads where we can choose to get sicker and sicker while destroying the ecosystem, or we can choose to drastically change our agricultural methods towards renewable organic solutions
- Grass roots bottom-up activities will institute a dramatic shift in food choices towards nutrient-dense organic whole foods instead of chemical-contaminated impoverished processed foods
- A market-driven economy will force farmers to switch to organic methods if they want to sell their crops to informed and health-conscious consumers
- This will lead to a dramatic reduction in health care costs and a vast improvement in the health of the population as a whole, of the nation, and of the earth

**Thank You for Listening!**