Is Roundup the Toxic Chemical That’s Making Us All Sick?

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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.

"If it is an environmental cause contributing to an increase, we certainly want to find it.”*

GLYPHOSATE
Glyphosate and Autism
Autism Prevalence: 6 year olds

*Plot provided by Nancy Swanson, with permission

Data sources: autism: US Department of Education; Glyphosate: US Department of Agriculture
Autism Prevalence: 6 year olds

U.S. Market is 25% of World Market of Roundup

*Plot provided by Nancy Swanson, with permission

Data sources: autism: US Department of Education; Glyphosate: US Department of Agriculture
**Is Glyphosate Toxic?**

- Monsanto has argued that glyphosate is harmless to humans because our cells don’t have the shikimate pathway, which it inhibits.
- However, our gut bacteria DO have this pathway.
  - We depend upon them to supply us with essential amino acids (among many other things).
- Other ingredients in Roundup greatly increase glyphosate’s toxic effects.
- Insidious effects of glyphosate accumulate over time.
  - Most studies are too short to detect damage.
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 and folate
- Disrupts sulfate synthesis and sulfate transport

*Samsel and Seneff, Entropy 2013, 15, 1416-1463
The Enhancing Effect of Adjuvants*

“Adjuvants in pesticides are generally declared as inerts, and for this reason they are not tested in long-term regulatory experiments. It is thus very surprising that they amplify up to 1000 times the toxicity of their APs [Active Principles] in 100% of the cases where they are indicated to be present by the manufacturer.”

Roundup Safety Claims Disputed*

“It is commonly believed that Roundup is among the safest pesticides. ... Despite its reputation, Roundup was by far the most toxic among the herbicides and insecticides tested. This inconsistency between scientific fact and industrial claim may be attributed to huge economic interests, which have been found to falsify health risk assessments and delay health policy decisions.”

Okay, It’s toxic!
But are we exposed?

Very little data!
Glyphosate Test Report: Findings in American Mother's Breast milk, urine and water*

• Moms Across America initiative!
• Breast milk levels ranging from 76 ug/l to 166 ug/l are 760 to 1600 times higher than the European Drinking Water Directive allows
• Urine testing shows glyphosate levels over 10 times higher than in Europe
• Monsanto is wrong regarding bioaccumulation

*Posted on Apr 6 2014 - 4:19am by Sustainable Pulse
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
Soy Formula Linked to Seizures in Autism*

"There was a 2.6-fold higher rate of febrile seizures, a 2.1-fold higher rate of epilepsy comorbidity and a 4-fold higher rate of simple partial seizures in the autistic children fed soy-based formula"

*CJ Westmark, PLOSOne March 12, 2014, DOI: 10.1371/journal.pone.0080488.
Some Biomarkers for Autism

- Disrupted gut bacteria; inflammatory bowel
- Low serum sulfate
- Methionine deficiency
- Serotonin and melatonin deficiency
- Defective aromatase
- Zinc and iron deficiency
- Urinary p-cresol
- Mitochondrial disorder
- Seizures; Glutamate toxicity in the brain
Some Biomarkers for Autism

- Disrupted gut bacteria; inflammatory bowel
- Low serum sulfate

These can all be explained as potential effects of glyphosate on biological systems

- Zinc and iron deficiency
- Urinary p-cresol
- Mitochondrial disorder
- Seizures; Glutamate toxicity in the brain
Dementia and Autism Have Much in Common

Deaths from Senile Dementia (ICD F01, F03 & 290) plotted against glyphosate applications on corn & soy (R = 0.9933, p <= 1.947e-09) sources: USDA:NASS; CDC

Plot kindly provided by Nancy Swanson
Digestive System Disorders
Gut Microbes and Obesity

• Our microbes outnumber our own cells 10 to 1
• There are between 200 and 300 different species in a typical person.
• Glyphosate causes a loss of beneficial bacteria and an overgrowth of pathogens in the gut
  – Pathogens release toxic phenols (e.g., p-cresol)
  – This can lead to inflammatory bowel disease
  • And a direct path to obesity!
• Gut microbes from an obese person induced obesity in mice*

Obesity Switch*

*Figure 3, Le Chatelier et al., Nature 500, Aug 29, 2013, 541-548.
Obesity in US over Time*

Glyphosate was introduced into the food chain in 1975

*Figure 1 in R.J. Johnson et al., Am J Clin Nutr 2007;86:899–906.
Pigs Fed GMOs Develop Inflamed Gut*

• Blind autopsies conducted
  – Female pigs' uterus 25% larger in GMO-fed pigs
  – Female pigs 2.2x more likely to get severe stomach inflammation on GMO diet
  – Males were 4x more likely

Photos kindly provided by Howard Vlieger

Human Digestive System Disorders

• Alarming increase in the US in many diseases related to the gut
  – Crohn’s disease, inflammatory bowel disease, colitis, acid reflux disease, gluten and casein intolerance, celiac disease, leaky gut

• The gut-brain axis links neurological disorders with gut disorders

• I believe that glyphosate is a major cause
CHECK OUT OUR NEW GLUTEN FREE AISLE!
Celiac Disease has Quadrupled in the US in the Last 50 Years
Hospital Discharge Diagnosis (any) of Celiac Disease ICD-9 579
and glyphosate applications to wheat (R = 0.9759, p <= 1.862e-06)
sources: USDA:NASS; CDC

Graph provided by Nancy Swanson, with permission

Wheat! Not corn and soy!
Why is glyphosate usage on wheat going up?
“Herbicide Resistant Ryegrass Troubling for Wheat Growers”*

“If you see ryegrass at harvest following an Axial XL application, it may be resistant. And you can scatter seed all over the field with the combine.”

“A reduced-tillage approach, using a burndown herbicide ahead of planting in a stale seedbed, also holds promise for improved control.”

“‘We may be able to knock out 80% to 90% of the resistant ryegrass with glyphosate.’”

-- Jim Swart, integrated pest management specialist

*Ron Smith, Western Farm Press, Mar. 23, 2013
Human Dietary Experiment on Wheat & Inflammatory Bowel Syndrome*

• Significant improvement in symptoms with dietary organic wheat from ancient source
  – Abdominal pain (P< 0.0001)
  – Bloating (P=0.004)
  – Stool consistency (P<0.001)
  – Tiredness (P< 0.0001)

• Reduced pro-inflammatory cytokines: IL-6, IL-17, interferon-gamma, VEGF

REVIEW ARTICLE

Glyphosate, pathways to modern diseases II: Celiac sprue and gluten intolerance

Anthony SAMSEL 1 and Stephanie SENEFF 2
Celiac Disease, Glyphosate and Non-Hodgkin’s Lymphoma

• Bifidobacteria are depleted in celiac disease*
  – They convert gluten to less toxic form
• Glyphosate preferentially kills bifidobacteria**
• Celiac disease is associated with increased risk to non-Hodgkin’s lymphoma***
• Glyphosate itself is also linked directly to non-Hodgkin’s lymphoma****

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

• Pseudomonas aeruginosa, a gram negative bacterium, is a major problem today in hospitals due to its resistance to multiple antibiotics

• P. aeruginosa is one of only three bacterial species that can break down glyphosate.
  – It produces formaldehyde as a by-product
  – Formaldehyde is a well established neurotoxin

“Dramatic Increase in Hospitalization of US Children With Inflammatory Bowel Disease”*

- Study conducted at Case Western Reserve University School of Medicine
- > 11 Million hospitalization records examined
- Patients < 20 years old
  - 49% increase from 2000 to 2009 in Crohn’s disease discharges
  - 71% increase in ulcerative colitis discharges

* Science Daily, June 25, 2013
Age Adjusted Deaths due to Intestinal Infection
(ICD A04, A09; 008, 009)
plotted against glyphosate applied to corn & soy (R = 0.9738, p <= 7.632e-09)
Sources USDA: NASS; CDC

*Plot prepared by Nancy Swanson from available data online*
Kidney Failure in Agricultural Workers*

- Workers in sugarcane fields in Central America and in India are dying at a young age in record numbers from kidney failure
- Arsenic exposure from drinking water?
- Excess use of tylenol?

*glyphosate disrupts the enzyme that breaks down tylenol, leading to tylenol toxicity

*ticotimes.net, San Jose, Costa Rica, August 8, 2013.
Acute Kidney Disease Death Rate Plotted Against Glyphosate and GMOs*

*Plot prepared by Nancy Swanson from available data online
Sri Lanka is the first Country to Ban Glyphosate

Hypothesis

Glyphosate, Hard Water and Nephrotoxic Metals: Are They the Culprits Behind the Epidemic of Chronic Kidney Disease of Unknown Etiology in Sri Lanka?
Another Country Responds to Kidney Failure in Agricultural Workers!

El Salvador Bans Monsanto RoundUp

eatlocalgrown.com
Recapitulation

• We depend on our gut bacteria in many ways
  – Bacteria from an obese person induce obesity in mice
• Glyphosate is an antibiotic that preferentially kills the good bacteria
  – Pigs fed GMO corn and soy develop inflammatory gut
  – Humans are experiencing an epidemic in gut disorders like inflammatory bowel disease and gluten intolerance
  – Due to herbicide-resistant rye grass, farmers use glyphosate as a desiccant at harvest time
• Kidney failure among agricultural workers can be explained by glyphosate
Summary

• We should be very worried about glyphosate contamination in the food supply
• Glyphosate usage on corn and soy crops correlates with the epidemic we’re seeing in autism, Alzheimer’s disease, celiac disease, and other intestinal disorders
• This correlation can be explained by the known effects of glyphosate in biological systems
• Glyphosate should be banned from agriculture