# GMOs and Glyphosate:
# A Dangerous Combination

Stephanie Seneff, MIT CSAIL, Oct 6, 2014



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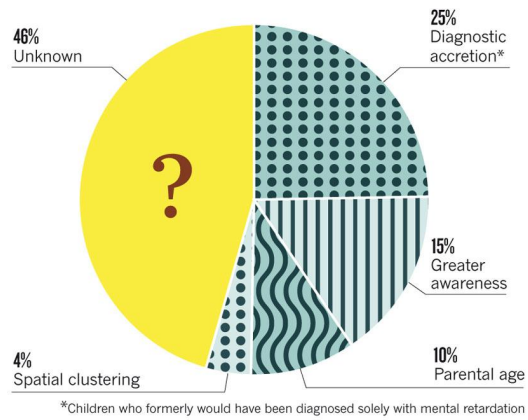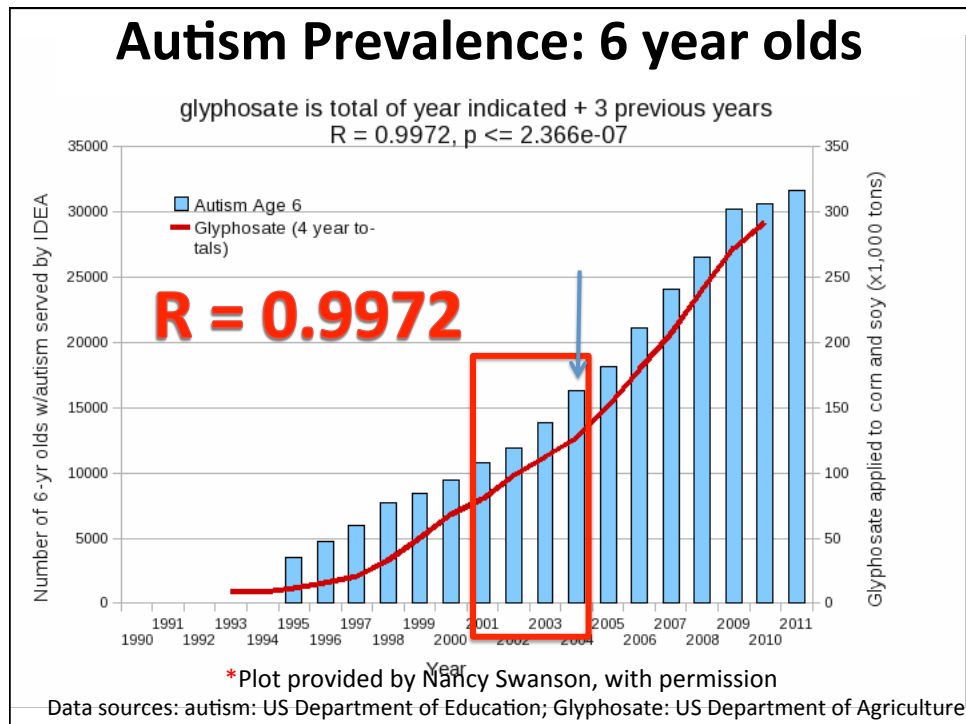
*K. Weintraub, Nature 479, Nov. 3 2011, 22-24.

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

Reasons: unclear

46%
Unknown

?

25%
Diagnostic
accretion*

15%
Greater
awareness

4%
Spatial clustering

10%
Parental age

\*Children who formerly would have been diagnosed solely with mental retardation

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

GLYPHOSATE

Autism Prevalence: 6 year olds

glyphosate is total of year indicated + 3 previous years
R = 0.9972, p <= 2.366e-07

R = 0.9972

*Plot provided by Nancy Swanson, with permission
Data sources: autism: US Department of Education; Glyphosate: US Department of Agriculture

# GMO Roundup Ready Crops

- Core crops of processed food industry: corn, soy, canola, sugar beets, cotton
- Introduced around 1998 – dramatic increase up to 80-90% of the crop by 2010
- "Roundup-ready" weeds quickly evolved
  - Escalating use of Roundup followed
- Now they're introducing 2,4-D resistant corn and soy
  - "Triple-stack" Bt, Roundup-ready and 2,4-D resistant corn coming?
  - Bt is a toxin that blows up the stomach of insects
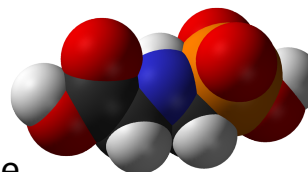  - 2,4-D is a component of Agent Orange

**Percent of GM herbicide-tolerant corn crops plotted alongside %corn treated with glyphosate**
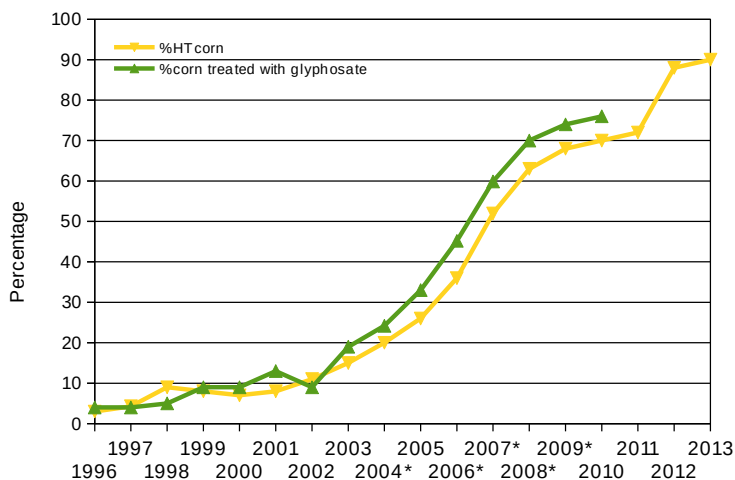
Plot provided by Dr. Nancy Swanson, with permission: gathered from US data readily available on the web

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# *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
  - Studies done by the chemical industry leave these out
- Insidious effects of glyphosate accumulate over time
  - Most studies are too short to detect damage

## 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."

*R. Mesnage et al.BioMed Research International 2014; Article ID:179691.

## 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*."

*R. Mesnage et al., Biomed Research International, Volume 2014 (2014), Article ID 179691

# 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*

These biological effects of glyphosate align remarkably well with the complex disease profile of autism spectrum disorder

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



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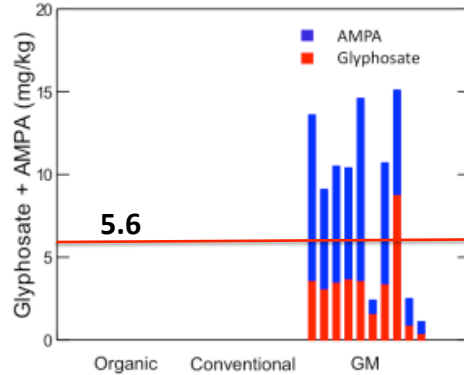
"Another claim of Monsanto's has been that residue levels of up to *5.6* mg/kg in GM-soy represent "...*extreme levels*, and far higher than those typically found" (Monsanto 1999).

www.greenmedinfo.com/blog/how-extreme-levels-roundup-food-became-industry-normal



Melatonin synthesis depends on shikimate pathway
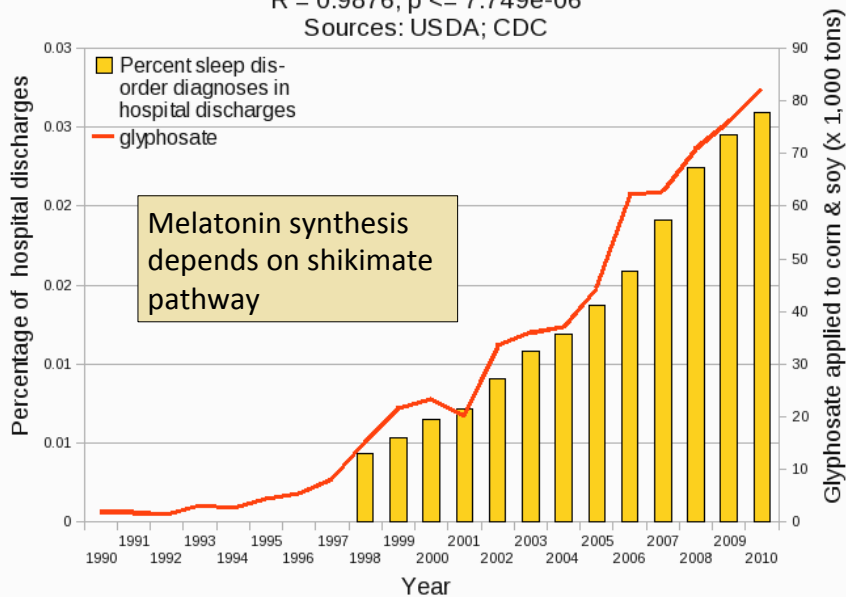
## "Dramatic Increase in Hospitalization of US Children With Inflammatory Bowel Disease"*
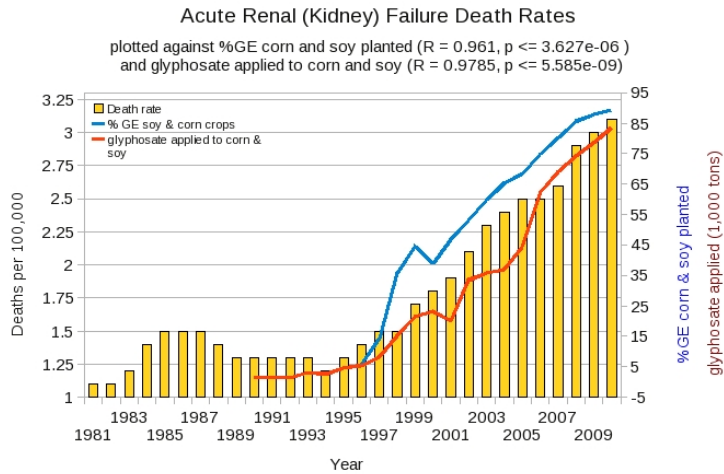
- Study conducted at Case Western Reserve University School of Medicine
- > 11 Million hospitalization records examined
- Patients < 20 years old
  - 49% increase from 2000 to 2009 in Crohn's disease discharges
  - 71% increase in ulcerative colitis discharges

* 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 provided by Dr. Nancy Swanson from available US data
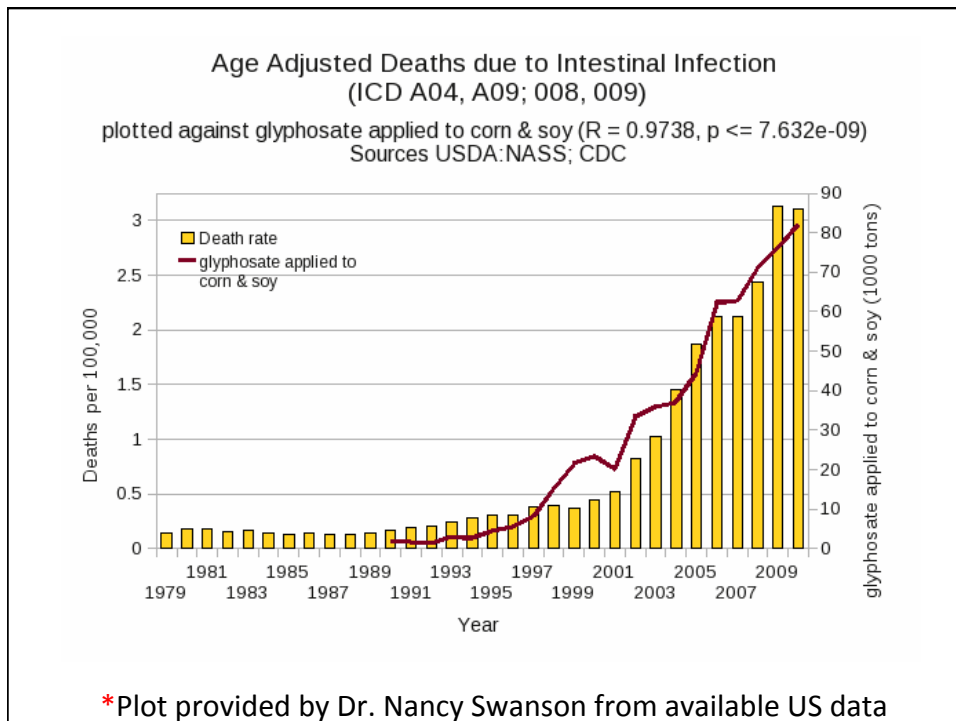
# Acute Kidney Disease Death Rate
# Plotted Against Glyphosate and GMOs*

### Acute Renal (Kidney) Failure Death Rates
plotted against %GE corn and soy planted (R = 0.961, p <= 3.627e-06 )
and glyphosate applied to corn and soy (R = 0.9785, p <= 5.585e-09)



*Plot prepared by Nancy Swanson from available data online
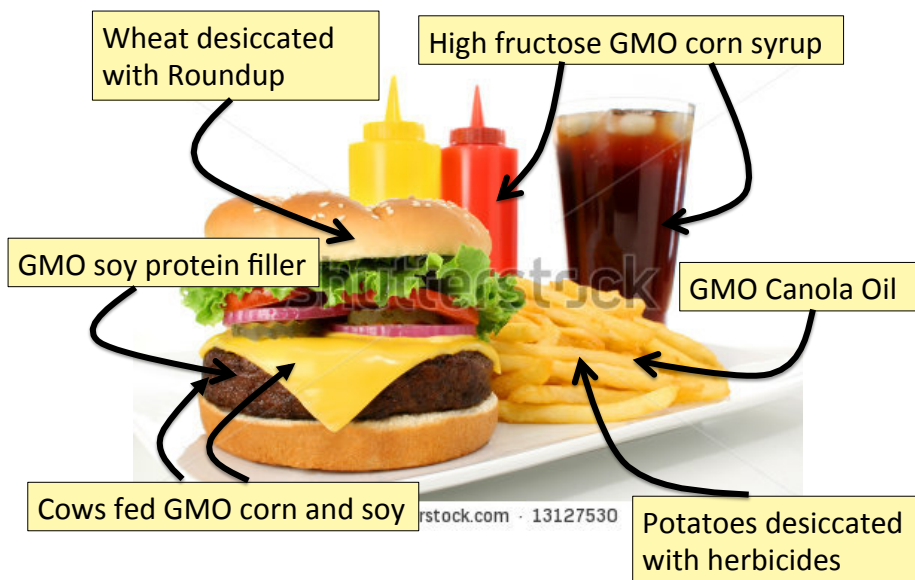
# Seralini's study on rats
# fed GM corn and soy*



*G-E Séralini et al. Environmental Sciences Europe 2014, 26:13

## Summary of Seralini's study

- Rats fed GM corn and soy throughout lifespan
- Females developed massive mammary tumors
- Males developed liver and kidney disease
- Animals died prematurely

## Is Glyphosate in Our Food?

Wheat desiccated with Roundup

High fructose GMO corn syrup

GMO soy protein filler

GMO Canola Oil

Cows fed GMO corn and soy

Potatoes desiccated with herbicides

## Further Exploration

- Samsel and Seneff paper:
http://www.mdpi.com/1099-4300/15/4/1416
- Seralini paper
http://www.enveurope.com/content/26/1/14
- Short video: Dr. Oz on new 2,4-D
http://www.doctoroz.com/episode/new-gmo-pesticide-doctors-are-warning-against
- Dr. Mercola interview with Dr. Seneff:
http://articles.mercola.com/sites/articles/archive/2013/06/09/monsanto-roundup-herbicide.aspx
- Jeffrey Smith interview with Dr. Seneff:
http://vimeo.com/65914121

# Thank you for listening