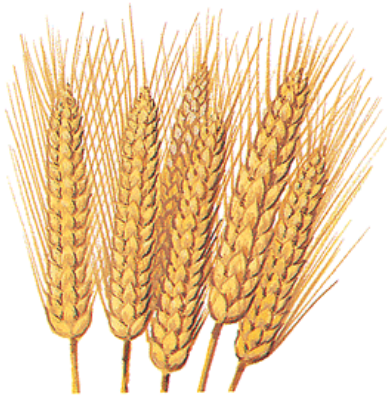


Nutrition, Toxins and Health: Facts and Speculation

Stephanie Seneff

Wise Traditions Workshop

Weston Price Foundation

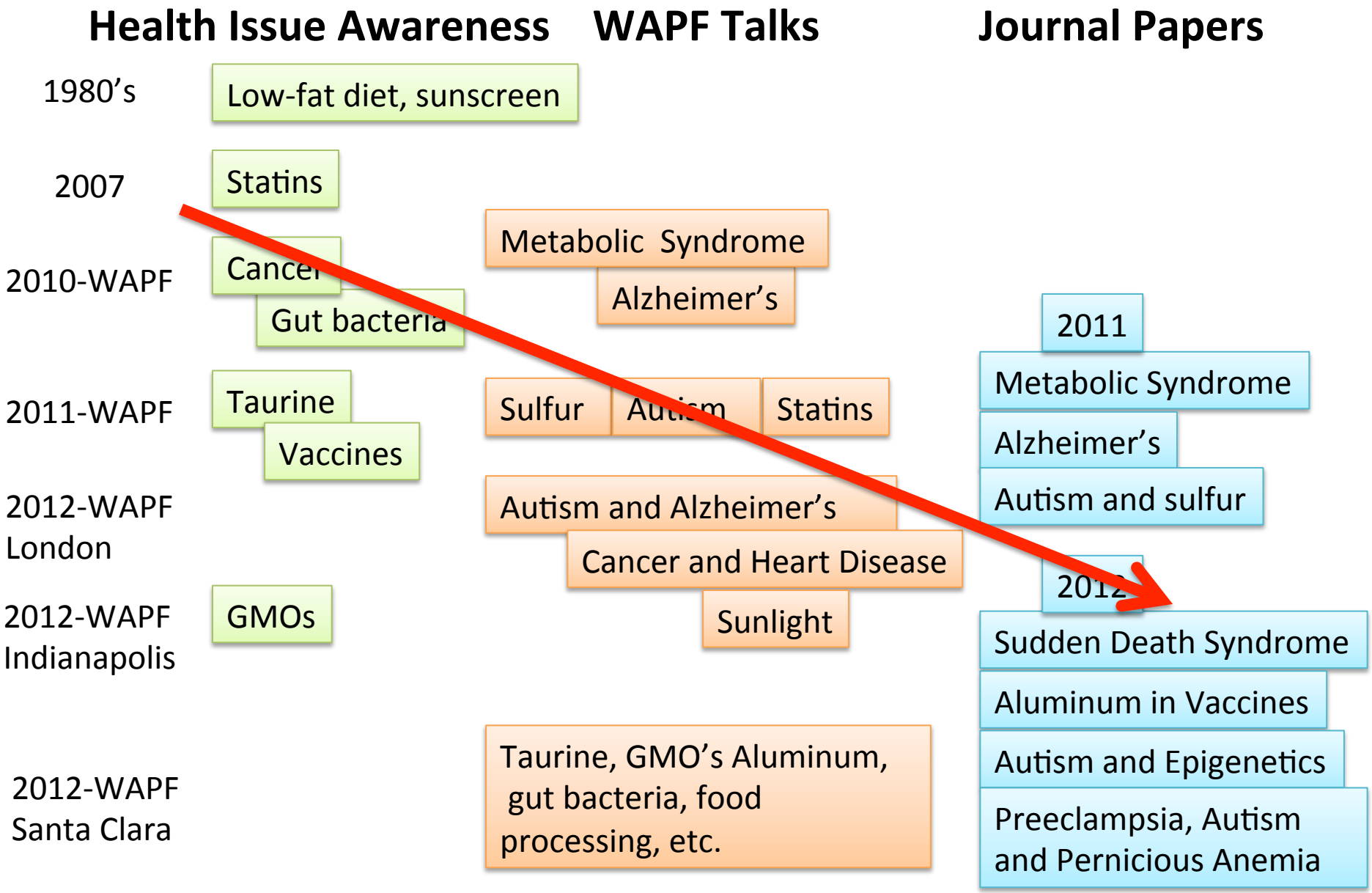
Monday, Nov. 12, 2012

Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has.

-- Margaret Mead

US anthropologist (1901 - 1978)

A Personal Journey



Part I: Nutrition

Download the slides from
http://people.csail.mit.edu/seneff/

Outline

- Introduction
- What is good nutrition?
- Food processing
- Glyphosate and GMOs
- Animal-based fats
- Shore-based foods
- Sulfur
- Vegan diets
- Diet and diabetes
- Lactose, lactate, and electrolytes
- Summary

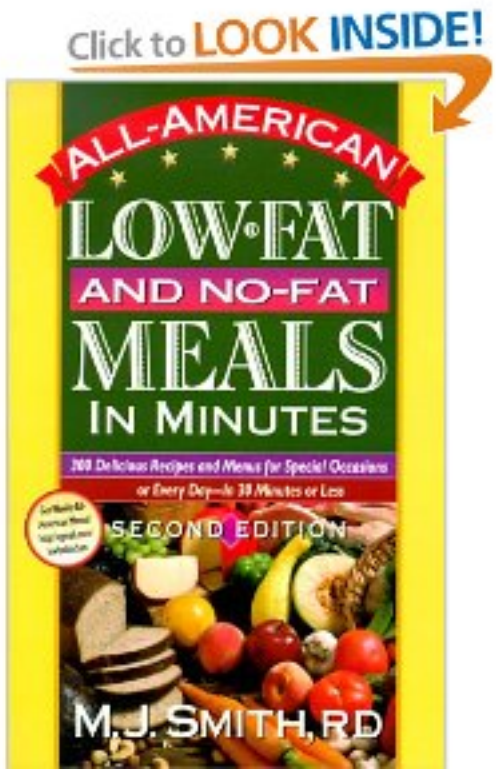
Introduction

- Key Messages
  - Modern dietary and lifestyle practices are making us sick
  - "Expert" nutritional advice is incorrect
- I will argue that good health comes from
  - Eating abundant dietary fat and cholesterol
  - Eating plenty of animal-based foods
  - Eating lots of cruciferous vegetables
  - Getting abundant sunlight exposure to the skin
  - Avoiding processed foods (especially high fructose corn syrup)
  - Eating organic foods

What is good nutrition?

Why We Are Unhealthy!

too much sugar



too little dietary fat, cholesterol and sulfur

too little sun exposure

The French Paradox is No Paradox

- Caviar, crème brulée, liver paté, brie, escargots
  - These foods contain lots of fat and cholesterol
- The Mediterranean sun





The Kuna of Panama*

"Here's my interpretation. The Kuna are healthier than their city-dwelling cousins for a number of reasons. They have a very favorable omega 3:6 ratio due to seafood, wild game and relatively saturated vegetable fats. Their carbohydrate foods are mostly unprocessed and mostly from non-grain sources. They also live an outdoor life full of sunshine (vitamin D) and exercise. The chocolate may also contribute to their health, as it contains high levels of potentially protective polyphenols. They're healthier than industrialized people because they live more naturally."

* Stephan Guyenet, B.S. Biochemistry, PhD Neurobiology
http://wholehealthsource.blogspot.com/2008/03/say-hello-to-kuna.html

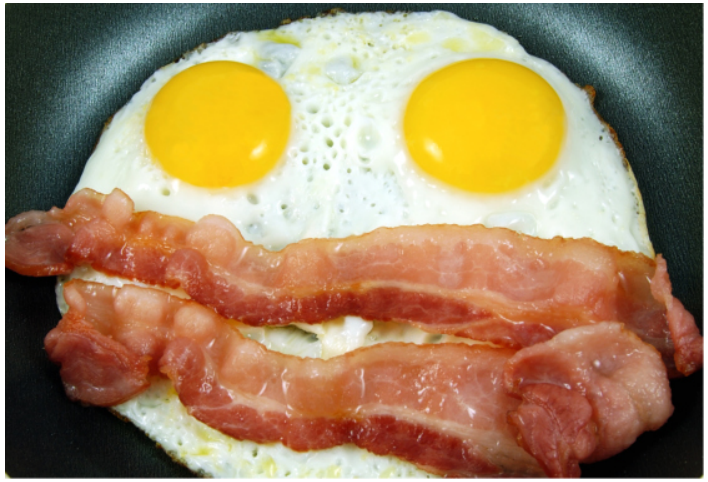
WBUR Interview with Dr. David Ludwig*

- Professor of pediatrics and nutrition and director of the Obesity Program at the Children's Hospital Boston.
- Conducted diet study on 21 obese adults
  - Low fat diet (20% fat)
  - Atkins diet (60% fat)
  - Low glycemic index diet (carbs less processed)
- Each person switched among these three diets over three month period

* http://onpoint.wbur.org/2012/07/05/new-research-on-carbs

A Calorie is a Calorie?*

- Low-fat diet led to metabolic syndrome
  - insulin resistance, triglycerides, and HDL cholesterol all worse
- Low-carb diet led to 350 extra calories burned per day compared to low-fat diet
  - Equivalent to 1 hour of moderate-intensity exercise
- Low glycemic index diet had only 150 extra calories dissipated compared to low-carb



* C.B. Ebbeling et al, JAMA 2012, 307, 2627-2634

"As Dr. Ludwig explained, when the subjects were eating low-fat diets, they'd have to add an hour of moderate-intensity physical activity each day to expend as much energy as they would effortlessly on the very-low-carb diet. And this while consuming the same amount of calories."

* http://www.nytimes.com/2012/07/01/opinion/sunday/what-really-makes-us-fat.html?

Ludwig's Key Take-away Message

- It's the quality, not the quantity, that counts
  - Quality of fat (**NOT TRANS FAT**)
  - Quality of carbs (**LOW GLYCEMIC INDEX**)
- Highly processed starch explodes into glucose
- Farm subsidies and special interest groups control the government's message, determined largely by profit motive for food manufacturers

An Important Question

How come in the '60's we ate a lot of carbs and we didn't get fat like we do today?

The Big Six… How We've Regressed

1960's	Today
stone ground wheat, steel cut oats	processed grains, GMOs
sugar	high fructose corn syrup
lard, butter	processed vegetable oils
sun worship	fear of sun
natural fertilizers	synthetic nitrates
liver is a healthy choice	cholesterol phobia

Recapitulation

- We need to return to a diet that reflects an earlier time
  - Less food processing; fewer refined carbs
  - Fewer chemical toxins; natural fertilizers
  - More dietary fat; less dietary sugar
- We need to get outdoors more to reap the benefits of sunlight
- A calorie is not a calorie!

Food Processing

Food Processing

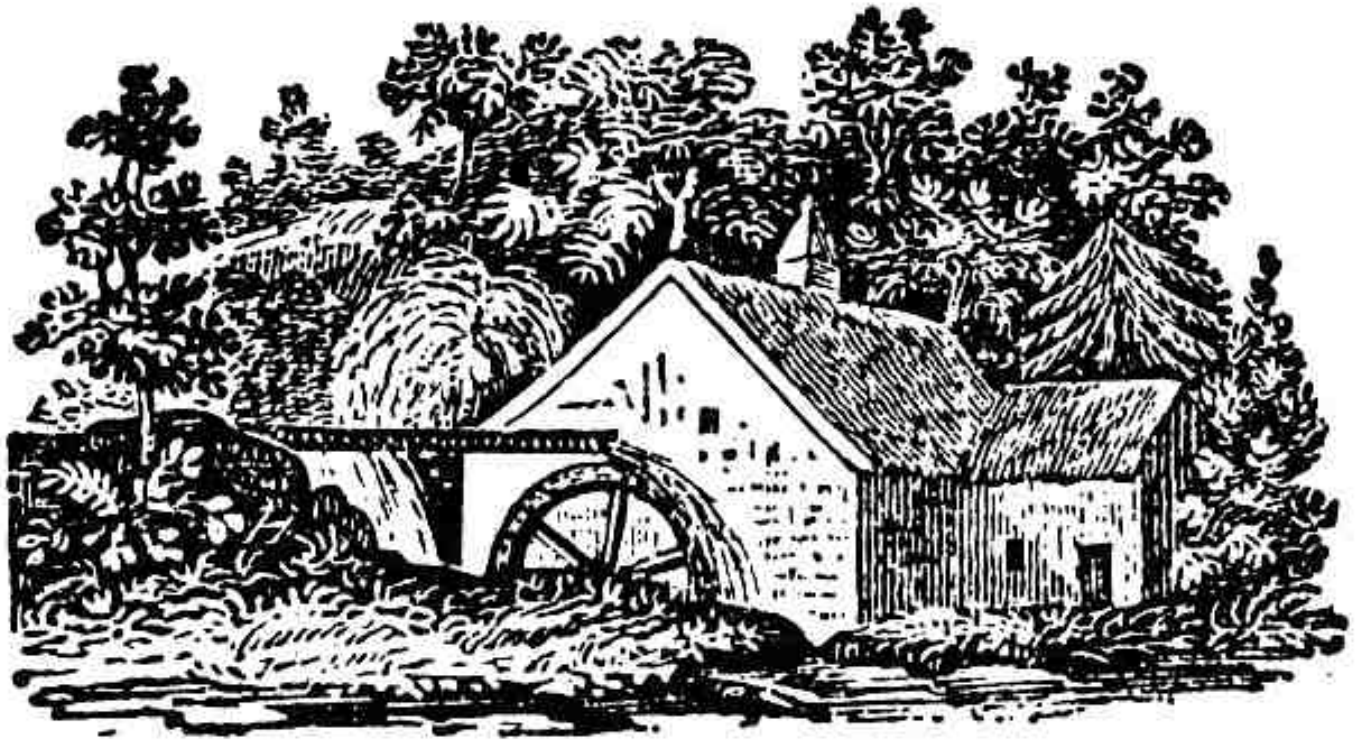
The nutrients are taken out of the food

The food gets broken down
into chemical components

The chemical components are
reassembled into pseudo-food

Synthetic vitamins are added

Stone Ground Grains!



The Mystery of the Mill *

"What else did the new high-speed *steel roller-mills* do except to *grind grain 100 times faster*? Well, it was soon evident that the *germ* gummed up the high speed rollers. Therefore, by a series of graduated siftings it was possible to screen out this germ. This epoch-making discovery allowed the millers to expedite their operations, but more significant, they discovered soon enough that *flour* from which the live and perishable germ was screened out would *keep indefinitely on store shelves."*

* http://www.angelfire.com/folk/molinologist/orton.html

Quote from
Geoffrey Bowles, British Countryman

Much of our national illness is caused by crazes for food that is

(1) white,

(2) refined, and

(3) keepable.

White flour, white sugar,
refined vegetable oils, and,
now, high fructose corn syrup

Processing Corn: Sulfur Dioxide*

- Corn wet-milling produces starch from corn
  - 149 million bushels during 1957–1959
  - 1,700 million bushels during 1996–1997

"The absorbed sulfur dioxide cleaves the disulfide bonds in the protein matrix that encapsulates the starch granules, dispersing the protein matrix, and enhancing starch release"

This means the food is partially digested before it hits the stomach

* Eckhoff et al., Cereal Chem. 76(1):96-99, 1999

Nixtamization of Corn

- Ancient process, first developed in Mesoamerica by the Indians
- Grain is soaked in lime and hulled
- Makes free niacin available for absorption: prevents pellagra
- Grain absorbs mineral from alkali used
  - Increases calcium by 750%
  - Increases iron, copper, zinc absorption
- Reduces infiltration of mycotoxins (molds) that infect maize, leading to cancer

Now We Use Machines to Process Corn and Wheat

Added digestive enzymes make the process go much faster. How does this affect our bodies? We don't know!

Gluten Intolerance*

- Manifested as diarrhea, weight loss, bloating
  - Often associated with neurological problems
- A growing problem: currently affects 15% of U.S. population
- Why?
  - Wheat products are too refined
  - Complex carbohydrates containing sugar and protein are decomposed into free amino acids
  - Bread is partially digested before we eat it
  - Contamination with herbicides?

* http://www.precisionnutrition.com/all-about-gluten

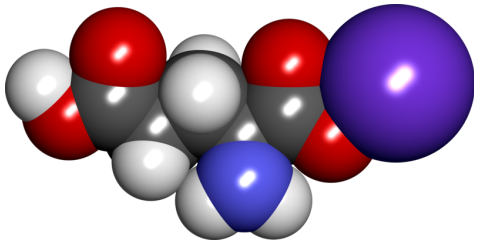
Why Gluten and Glutamate are Dangerous to the Nervous System*

- Gliadin (from gluten) is a major source of glutamate in the small intestine
- Leaky gut allows glutamate to enter blood circulation
- Free glutamate is the key problem – neurotoxin
  - Causes cellular death in the brain and nervous system
- Fast food has lots of free glutamate
- Example: patient sensitive to gluten and MSG
  - Used canned chicken broth, cooked at home
  - No added MSG but broth had free glutamate in it
  - Resulted in allergic reaction

*Dr. Vikki Petersen, http://wn.com/why_gluten_and_glutamate_are_dangerous_to_the_nervous_system

Monosodium Glutamate (MSG)

"My fortune cookie says that in a few minutes I will get a headache, feel flush and experience all the other symptoms typical of MSG overdose."



GLUTAMATE MG/100 GRAMS

FOODS PROCESSED INTENTIONALLY TO FREE GLUTAMIC ACID

AMOUNTS GIVEN ARE TOTAL UNLESS NOTED AS FREE

SOY
7774

YEAST
4154

WHEAT
3900

PEAS
3632

BARLEY
2771

MEAT
2703

FISH
2655

CORN
1800

COWS MILK
764

SOY SAUCE
1090
FREE

YEAST IS AUTOLYZED BY KILLING THE YEAST - LEAVING INTACT ENZYMES TO SPLIT THE PROTEINS APART

WHEAT GLUTEN
44,370

HYDROLYZED VEGETABLE PROTEIN CONTAINS APPROX. 20,000 MG FREE GLUTAMATE PER 100 GRAMS OF FOOD

HYDRO = "WATER"
LYSE = "TO SPLIT"

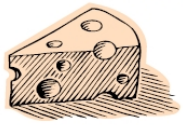
MALTING BARLEY INCREASES ITS FREE GLUTAMATE CONTENT X 5

SLOW COOKING MEAT WITH MOIST HEAT HYDROLYZES THE PROTEIN – USED TO CREATE BEEF "EXTRACT"

DECOMPOSED FISH = "EXTRACT" OR "FISH SAUCE" GLUTAMATE CONTENT INCREASES (GLUTAMINE CONVERTS TO GLUTAMATE)

CORN PROTEIN
25,560

PARMESAN
1200 FREE



CHEESE
3691

SOY PROTEIN
20,000

HYDROLYZED PROTEIN IS APPROX 20% FREE GLUTAMATE BY WEIGHT!

WHEY
19,000

MILK POWDER
5328

CASEIN
25,490

Deamidated Gliadin*

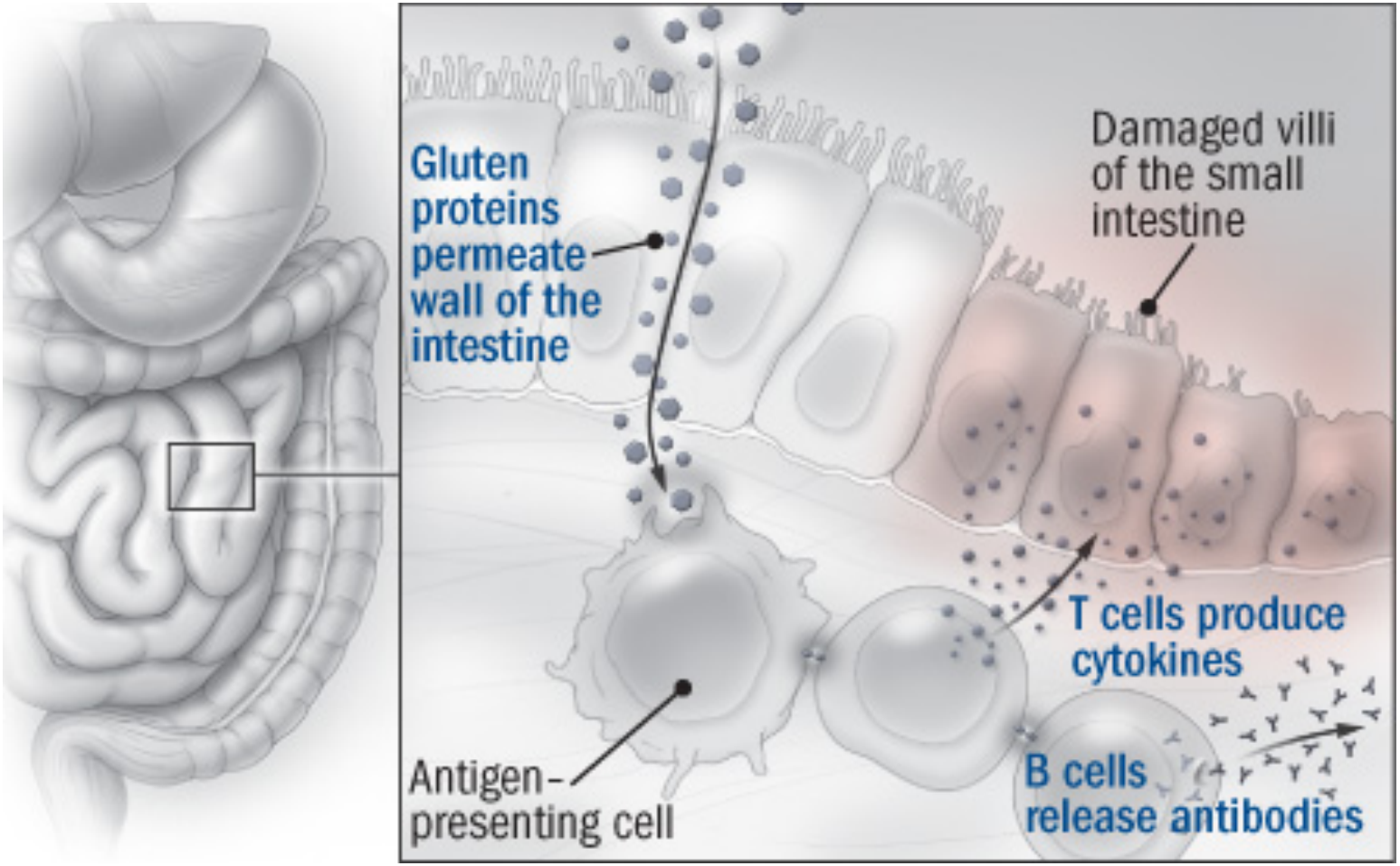
- Enzymatic treatment with transglutaminase
- Breaks down gluten to produce free glutamate

"Deamidated gliadin is the product of acid or enzymatic treatment of gluten often used in the food processing industry.

The purpose of deamidating gluten ... is to make the gliadin able to mix with other foods (like milk) without changing the foods' qualities."

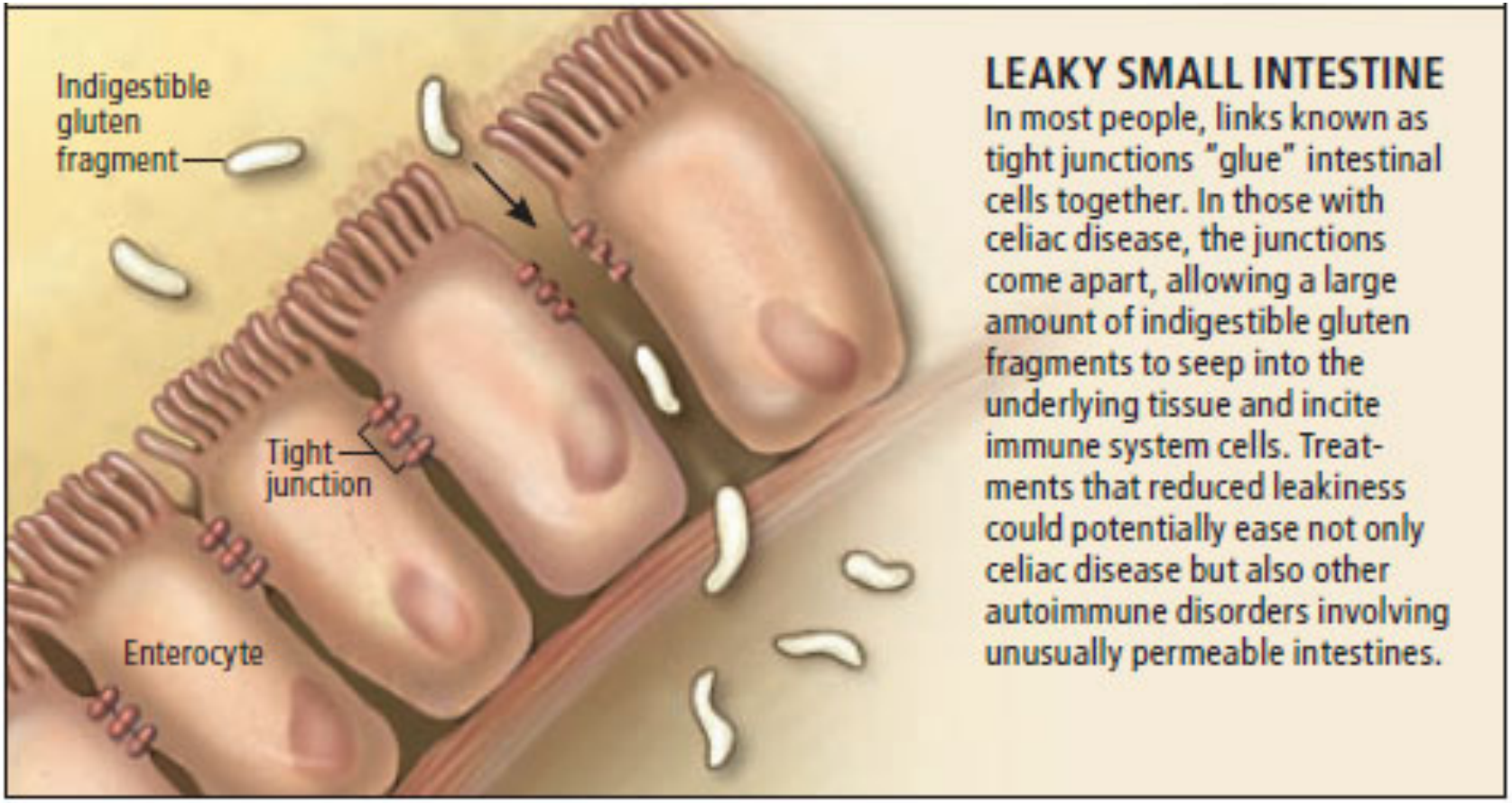
* Dr. Karl Johnson
http://www.helpmychronicpain.com/blog/bid/54865/
Gluten-Epitopes-Your-Hope-For-Recovery-From-Your-Illness

How Gluten Causes Trouble



* http://www.precisionnutrition.com/all-about-gluten

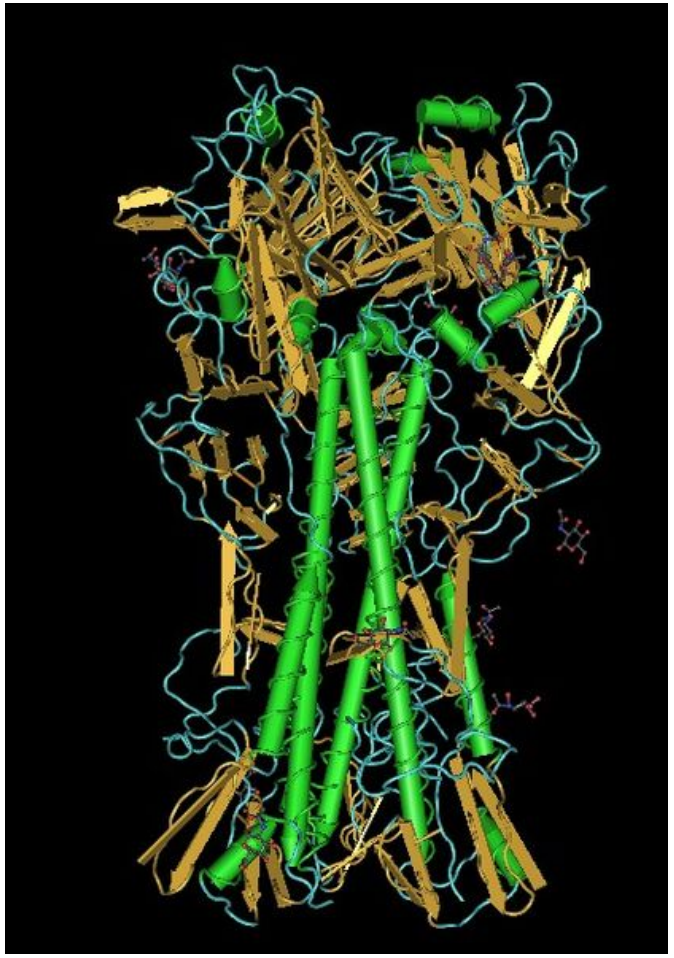
Leaky Gut Syndrome*



* From http://www.precisionnutrition.com/all-about-gluten

Lectins and Leptin Resistance*

- Lectins are found in legumes and cereals
- They bind to and inactivate leptin receptors (particularly problematic with leaky gut?)
- This leads to "leptin resistance," a defect found in association with obesity and preceding "insulin resistance"
- Zucker rats are obese and have a defective leptin receptor gene



* http://www.realfooduniversity.com/real-truth-healthy-grains/

Lectins and Leptin, Cont'd*

- Study on 24 domestic pigs
  - Cereal-free hunter- gatherer diet promoted significantly higher insulin sensitivity, lower diastolic blood pressure and lower C-reactive protein, compared to a cereal-based swine feed.
- Sourdough lactic acid bacteria hydrolyze gliadin peptides and inhibit their lectin-like behavior

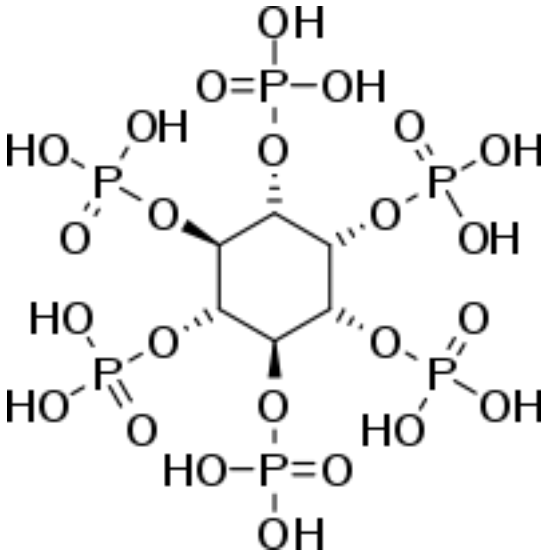
* T. Jonsson *et al.,* BMC Endocrine Disorders 2005, **5**:10.

Symptoms Associated w/ Gluten Intolerance*

- Weight loss or weight gain
- Nutritional deficiencies due to malabsorbtion (e.g. low iron levels)
- Fat in the stools (due to poor digestion)
- Aching joints
- Depression, anxiety, irritability and other behavioural changes
- Eczema and skin rashes
- Headaches
- Chronic fatigue and low energy
- Infertility, irregular menstrual cycle and miscarriage
- Cramps, tingling and numbness (often due to vitamin B12 malabsorption)
- Slow infant and child growth
- Decline in dental health
- Asthma and allergies
- Food cravings, especially for baked goods and sweets

* See: http://www.precisionnutrition.com/all-about-gluten

The Problem with Phytates*



- Grains were introduced relatively recently into the human diet (last 10,000 years)
- Phytates are phosphorus-containing compounds found in gluten and other grains
  - They are the indigestible dietary fiber
  - Decrease iron absorption by a factor of 15
  - Also bind calcium, magnesium, and zinc
- Fermentation reduces phytate content

* http://www.thenaturalrecoveryplan.com/articles/phytates.html

"Wheat Belly: Lose the Wheat, Lose the Weight"*

- Wheat has a high glycemic index (even whole wheat)
- Phytate in wheat chelates iron and zinc
- Gliadin (peptide in wheat) causes psychological and neurological damage
- Incidence of celiac disease (wheat allergy) has quadrupled over the last 50 years
- Author proposes obesity epidemic due to excess dietary wheat

* By William Davis, M.D., published August 2011

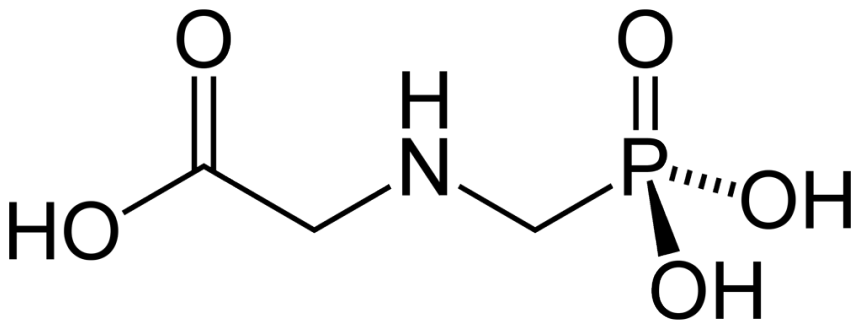
Four Other Good Books!

- *Good Calories, Bad Calories*, by Gary Taubes
  - Argues that its carbs, not fats that cause obesity
- *Breaking the Vicious Cycle: Intestinal Health through Diet*, by Elaine Gottschall
  - Solving Crohn's disease and Colitis through "Specific Carbohydrate Diet"
- *Cereal Killer*, by Alan Watson
  - Handbook on role of carbs in heart disease; easy to read
- *Trick and Treat: How 'Healthy Eating' is Making us Ill*, by Barry Groves
  - Lots of food for thought on why the "expert" dietary advice is broken

Recapitulation

- Efficiency and cost have been the drivers behind the food industry's processing methods
- Wheat and corn have been converted into toxic pseudo-foods
- Diet high in processed foods leads to leaky gut syndrome, gluten intolerance, colitis, and Crohn's disease
- Gliadin, phosphates,and glutamate are all problematic factors

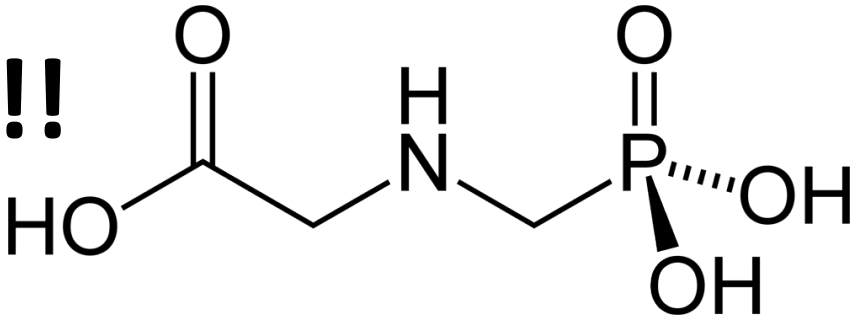
Glyphosate and GMOs



Prof. Don Huber on Glyphosate

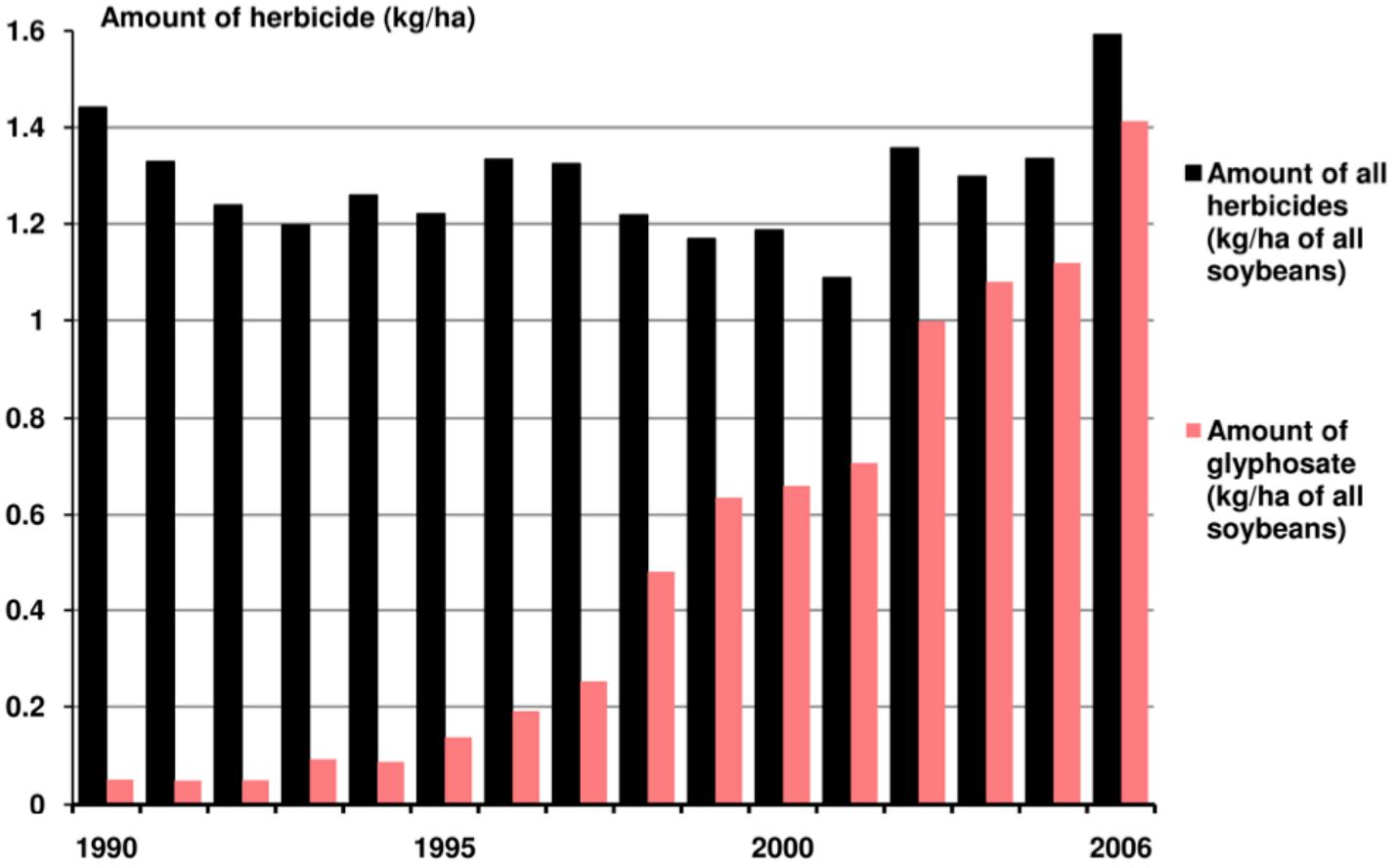
"When future historians write about our time, they're not going to write about the tons of chemicals that we did or didn't apply. When it comes to glyphosate, they're going to write about our willingness to sacrifice our children and jeopardize our existence, while threatening and jeopardizing the very basis of our existence; the sustainability of our agriculture."

Glyphosate!!!



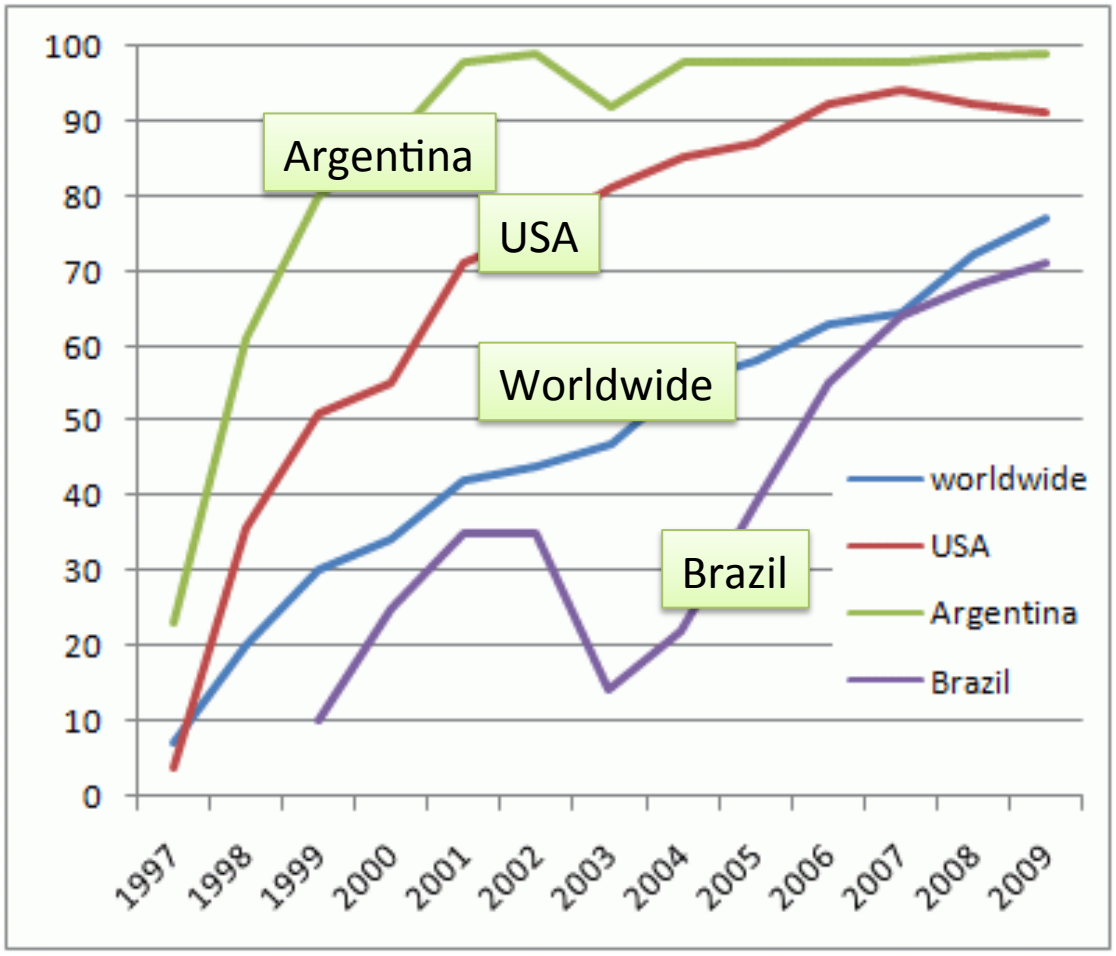
- Glyphosate is the active ingredient in Roundup, developed and patented by Monsanto in the 1970's
- Since 2000, when Roundup patent expired, glyphosate is being used much more extensively on crops around the world
- "Roundup Ready" crops have been genetically modified (GMOs) to tolerate glyphosate
  - They readily take it up into their leaves, which we then eat!
  - Corn, soybeans, cotton (clothing), alfalfa (cows)

Increased Use of Glyphosate Over Time*



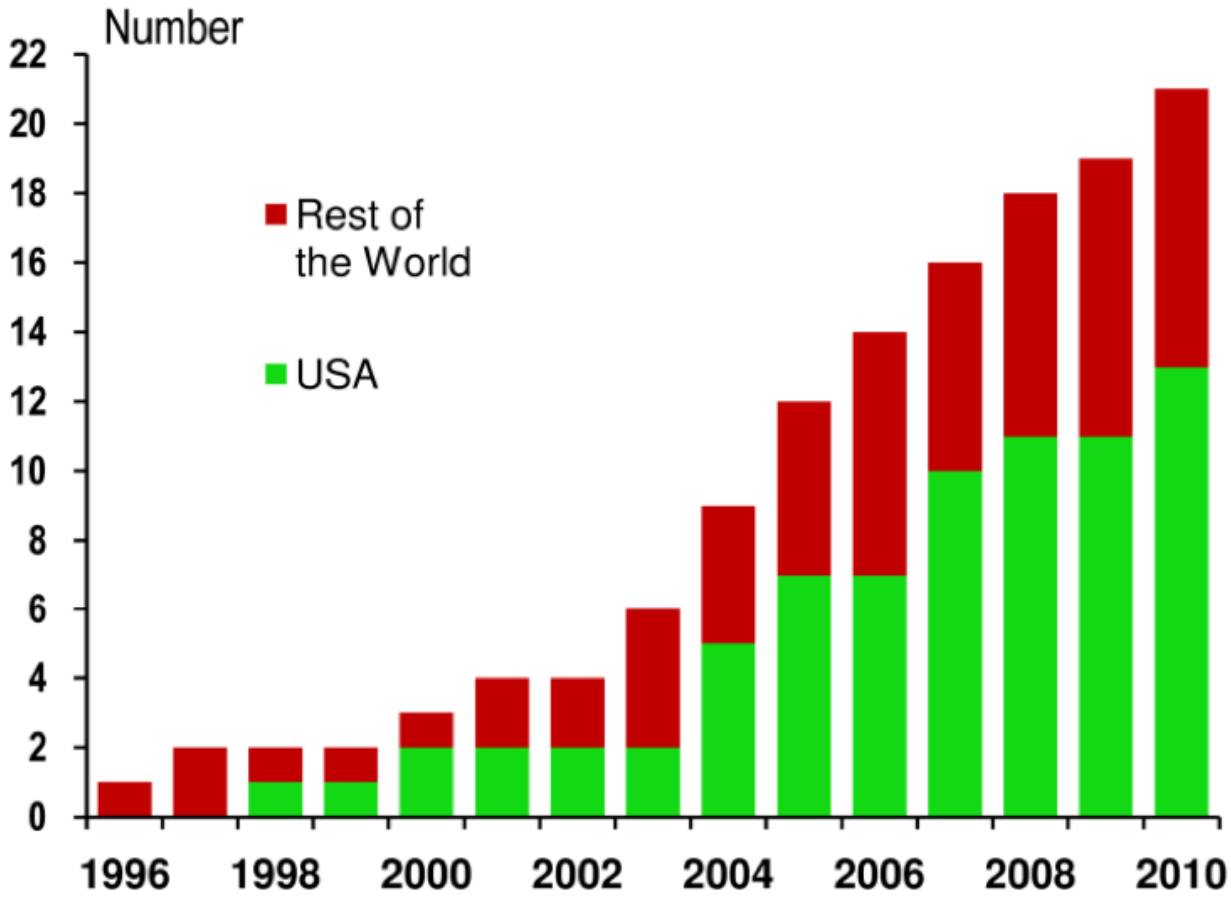
* Figure 5 from S. Bonny, *Sustainability* **2011**, *3*, 1302-1322.

GMO-engineered Soy Crops*



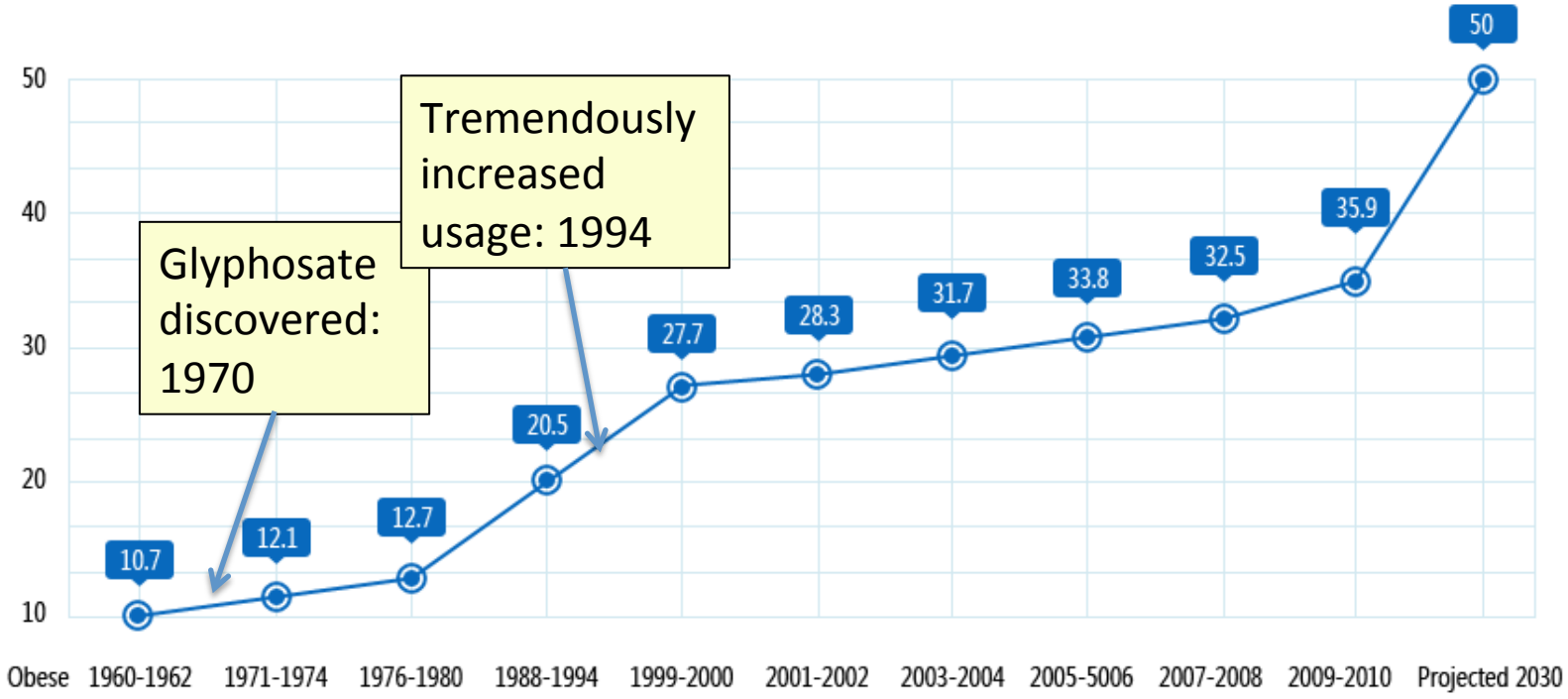
* From GMO Compass, article by Dr. Mercola, Nov. 1, 2012

Increase in Weed Resistance Over Time*



* Figure 7 from S. Bonny, *Sustainability* **2011**, *3*, 1302-1322.

Prevalence of Obesity Among U.S. Adults Aged 20-74



Derived from NHANES data (http://www.cdc.gov/nchs/data/hestat/obesity_adult_09_10/obesity_adult_09_10.html#table1)

Mercola Interview with Dr. Huber*

- Glyphosate chelates cations
  - Manganese, zinc, iron, copper, etc.
  - This creates deficiencies, especially if you're also eating micronutrient-depleted foods
- It hurts our own physiology if we eat the plant, which has taken up the glyphosate – you can't wash it off!
- The plant itself is nutritionally deficient
  - 12 grams per acre is enough to reduce iron by 50%, manganese by 80%, zinc by ~80%

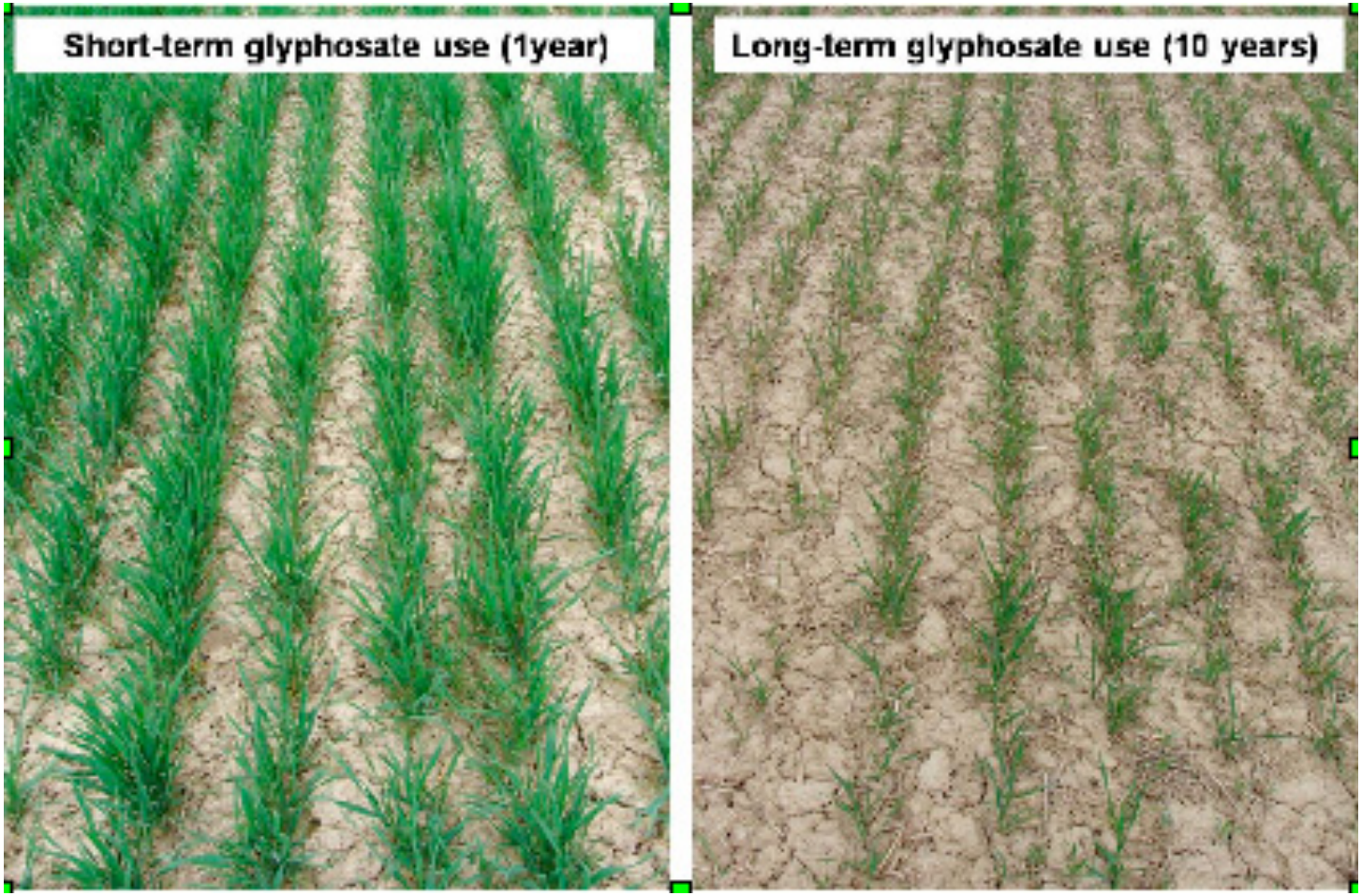
* December 2, 2011

Mercola Interview with Dr. Huber*

- Microorganisms in the soil essential for nitrogen-fixation
  - Glyphosate chelates nickel needed to fixate
  - Glyphosate is extremely toxic to these microorganisms – eliminating them from the soil
- Plants are getting new diseases – Goss' wilt
- Corn, soybeans, cotton, alfalfa – all contain GMOs to make them glyphosate resistant ("Roundup-Ready")
  - Alfalfa feeds herbivores
- In animals, glyphosates can kill "good" gut bacteria
  - Clostridium botulinum overgrows in intestinal track
  - Animal dies from toxin
  - Reduction in mineral content makes them much more susceptible
  - Animals are also becoming infertile
  - There's no good reason why it shouldn't happen to humans as well

* December 2, 2011

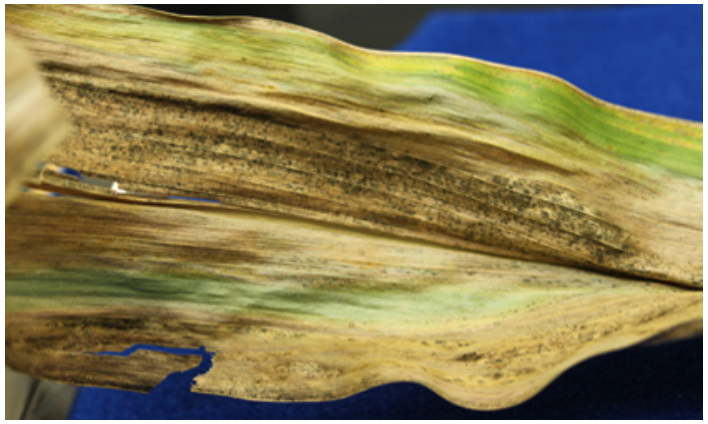
Monsanto's Roundup triggers Over 40 Plant Diseases and Endangers Human and Animal Health*



*article on Web by Jeffrey M. Smith, Jan 16, 2011

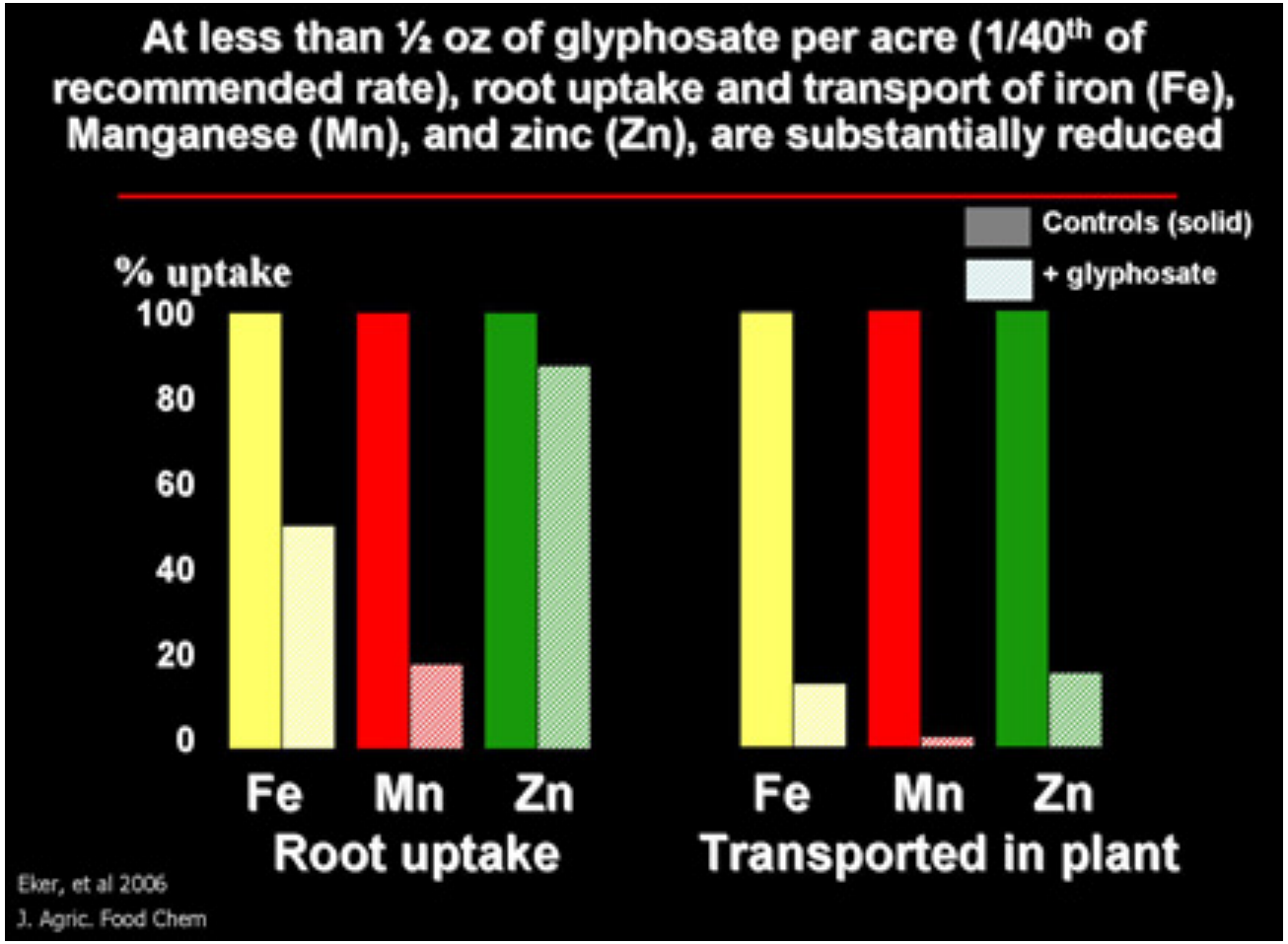
New Plant Diseases*

- Driving down yields in corn and soy crops
- "Sudden Death Syndrome" (SDS) in soy, and Goss' wilt in corn
- Associated with strange new pathogen: similar in size to a medium sized virus
  - Microfungal-like organism
  - Same pathogen infects the fungus that causes SDS: Fusarium solani



* http://farmandranchfreedom.org/gmo-miscarriages

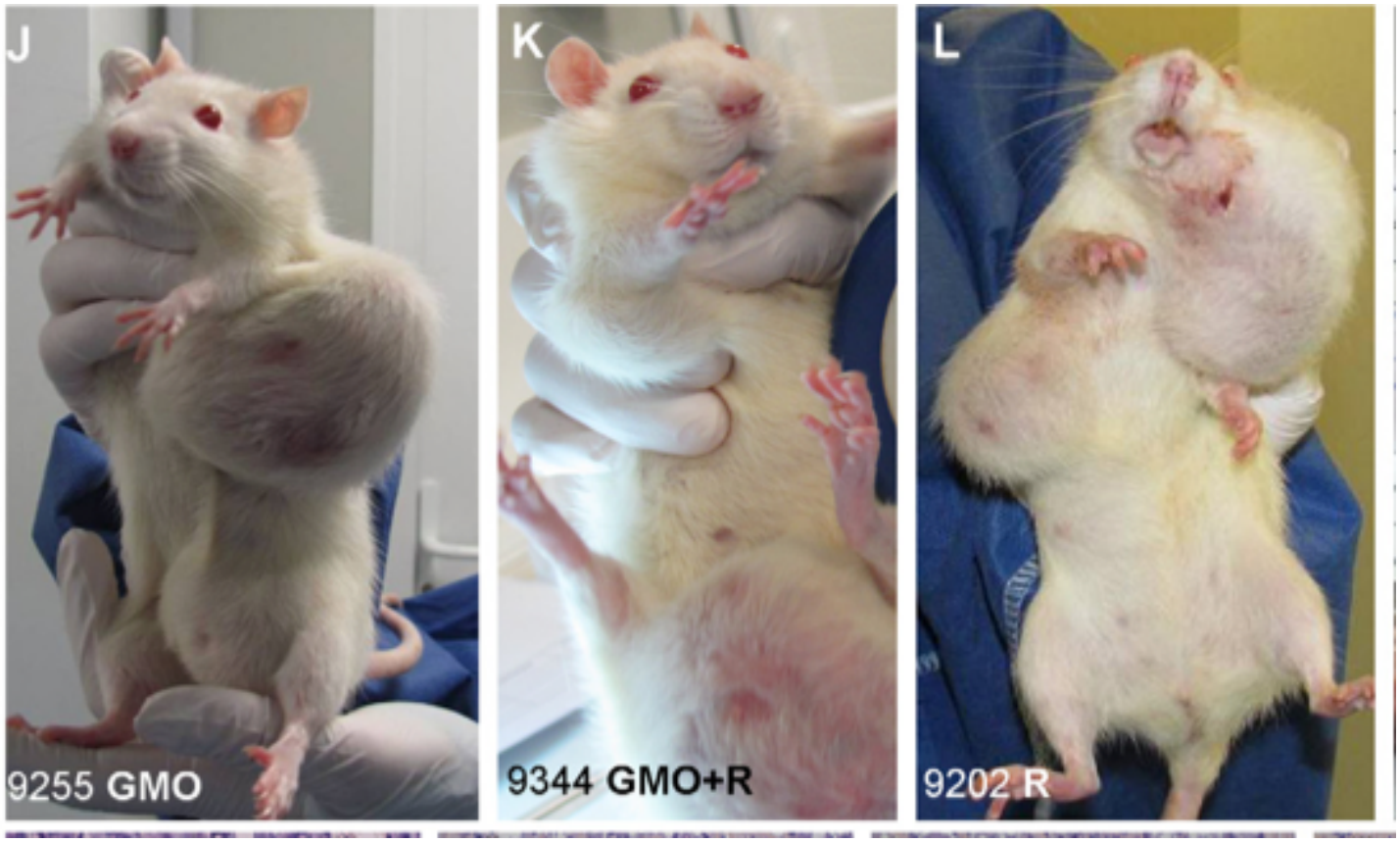
Glyphosate Depletes Nutrients



*article on Web by Jeffrey M. Smith, Jan 16, 2011

A Remarkable Study on Mice*

Compared control group with mice exposed to either Roundup (R) or GMO corn or both



*G.-E. Séralini et al., Food and Chemical Toxicology, 2012, *in press*

Conclusions from Mouse Study *

- Female mice had greatly increased risk of breast cancer
- Males had significantly increased risk of tumors of the liver and kidney
- Sex hormone disruption for both males and females
- Enhanced oxidative stress
- Very significant kidney dysfunction

*G.-E. Séralini et al., Food and Chemical Toxicology, 2012, *in press*

Glyphosate in our Food and in our Urine*

"Beer does not brew with grains that were `sprayed to death' with glyphosate. For bread and fodder grain, however, this reduced germination capacity is not a concern."*

This gives new motivation for consuming sour dough bread!

* **Herbicides found in Human Urine**. Ithaka Journal 1/2012: 270–272 (2012), Translated into English: http://www.gmwatch.org/latest-listing/1-news-items/14040

Glyphosate in Our Food (Cont'd)

"We should ask ourselves what our health is worth to us and whether we want ourselves and our children to consume more and more glyphosate in the future. There were alternatives to DDT, and there are alternatives to Roundup now. It is up to consumers, farmers and the relevant agencies to stop the accumulation of glyphosate in our food supply and environment."*

* **Herbicides found in Human Urine**. Ithaka Journal 1/2012: 270–272 (2012), Translated into English: http://www.gmwatch.org/latest-listing/1-news-items/14040

Recapitulation

- Glyphosate is the dominant weed killer in the U.S., and, increasingly, in the world
  - It also kills the bacteria in the soil
- The most common GMO is a "Roundup-ready" gene that provides tolerance to roundup
  - Also leads to decreased yield, higher water consumption, and nutrient depletion, and increased roundup usage
- Glyphosate likely also disturbs gut bacteria and leads to fertility problems in cattle
- Glyphosate chelates important nutrients like iron, manganese, and zinc
- Experiments with mice show severe toxicity with exposure to both Roundup and GMOs

Animal-based Fats

The Saturated Fat and Carbohydrate Debate

"Fifteen years ago, this debate would have been considered impossible because it was believed that SFA intake was the primary determinant of the high rates of CVD in Western countries. However, in recent years, that question has been reexamined, or, *more accurately, seriously examined* for the first time. In truth, *there was not very good epidemiological evidence for this relationship from the beginning*."

-- Walter C. Willett, MD, PhD
Harvard School of Public Health, Boston, MA, USA

"The diet–heart hypothesis: a critique"*

"A balanced appraisal of the diet–heart hypothesis must recognize the unintended and unanticipated role that the *LF-HCarb* diet may well have played in the current epidemic of *obesity*, abnormal lipid patterns, type II *diabetes*, and the *metabolic syndrome*. Defense of the LF-HCarb diet, because it conforms to current traditional dietary recommendations, by appealing to the authority of its prestigious medical and institutional sponsors or by *ignoring an increasingly critical medical literature,* is no longer tenable."

* S.L. Weinberg, J. Am. Coll. Cardiol. 2004;43;731-733.

Dietary Saturated Fats: It's complicated*

- It matters which food it comes from
- Processed meats contain nitrates and added salt which may be detrimental
- Saturated fat from dairy is clearly beneficial
  - "Each 5-unit increase in the percentage of energy from dairy SF was associated with 38% lower risk of CVD"

* De Oliviera et al., Am J Clin Nutr, electronic form, July 3, 2012

Saturated Fats and Heart Disease: Europe, 1998 *

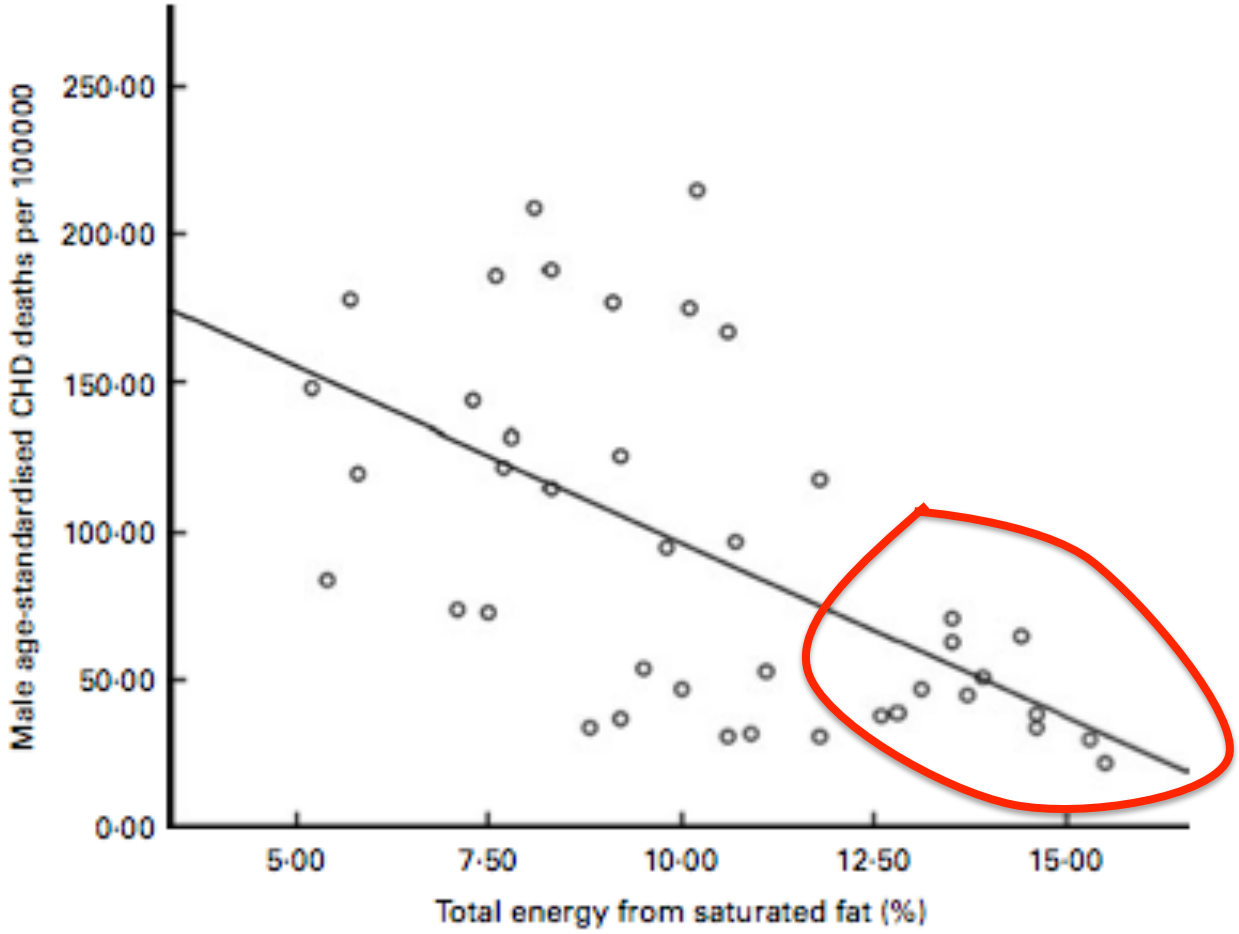


Fig. 1. Saturated fat intake and CHD mortality in Europe (1998). R^2 linear = 0·339.

* Hoenselaar, R. British Journal of Nutrition (2012), 108, 939-942.

Nutrition and Physical Degeneration*

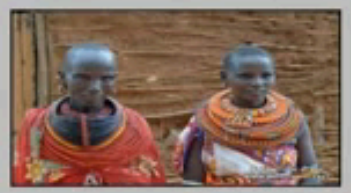
- Dr. Weston Price, a dentist in Cleveland, Ohio, traveled all around the world, comparing *traditional* diets with *Western influenced* diets
- Repeatedly, he observed that foods the natives treasured were ones that I know to be extremely high in *fat and cholesterol*
  - Fish eggs, shrimp, coconut, organ meats, oysters, chicken eggs, sweetbreads, . . .
- People who adopted the Western diet, particularly *white flour* and *white sugar*, were generally much less healthy

* Weston Price's famous book, written in 1939

Diets of People with the Lowest Risk of Heart Disease

Maasai – Kenya and Tanzania, Africa. Meat, milk, and blood from cattle. Butter for infants. Diet 66% saturated fat

Inuit (Eskimos) – Arctic. Whale meat and blubber. Diet 75% saturated fat



Rendille – Kaisut Desert, NE Kenya, Africa. Camel milk and meat, and "Banjo," a mixture of camel milk/blood. 63% Sat Fat

Tokelau – Three atoll islands, New Zealand. Fish and coconut. Diet 60% saturated fat

From Youtube video: Enjoy Eating Saturated Fats: They're Good for You. Donald W. Miller, Jr., M.D.
http://www.youtube.com/watch?v=vRe9z32NZHY

Dr. Andrew Weil on Low-Fat Diet*

- 3,386 “fat-free” foods on Amazon.com
- 3,597 “low-fat” foods on Amazon.com
- Replace fat with extra sugar or corn syrup

“No one's health is improved by swapping out natural saturated or monounsaturated fats for skim milk, sugars or processed grains.”

*http://www.drweilblog.com/home/2012/8/23/low-fat-foods-are-they-better.html

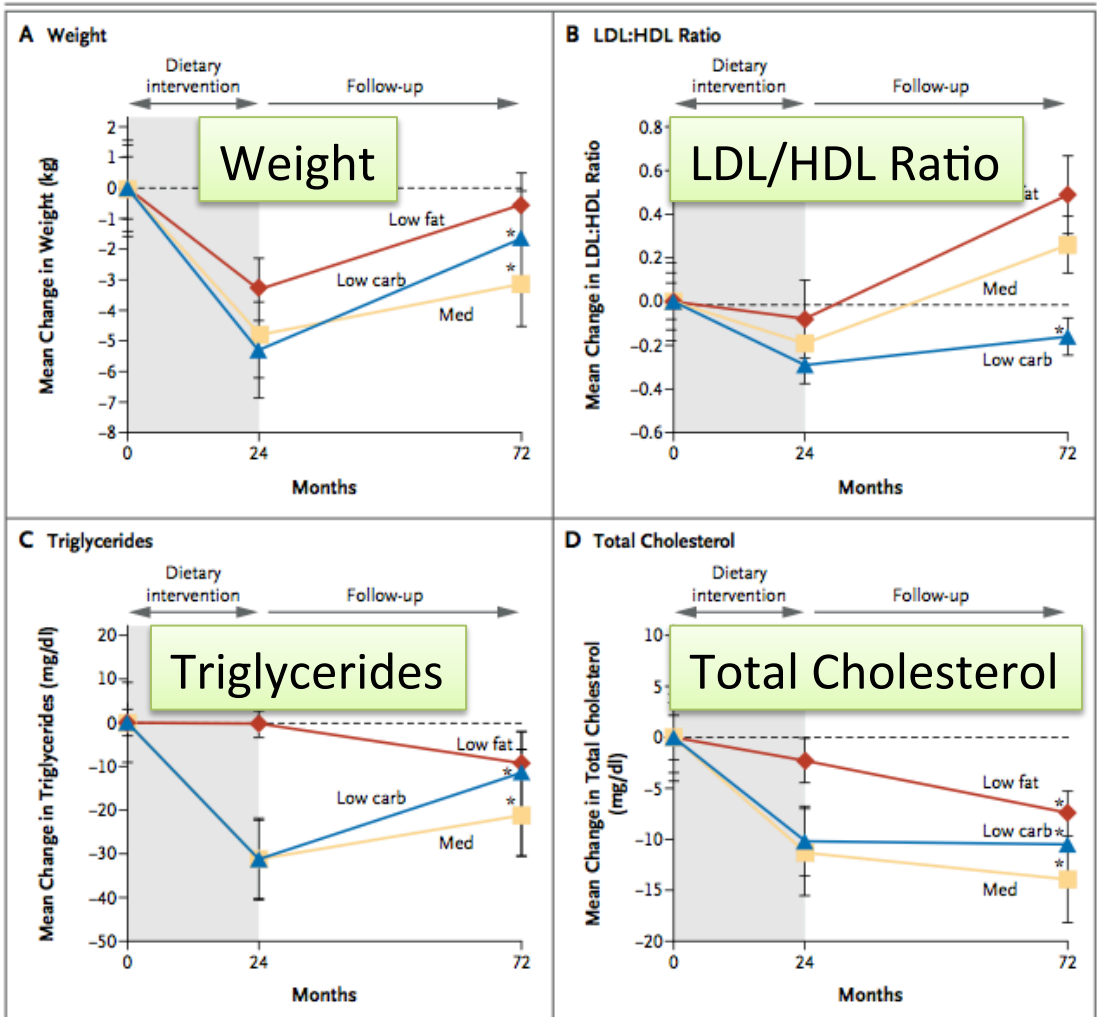
Dieting and Serum Cholesterol*

- High carb diet:
  - Dieters lose weight only by starving themselves
  - Only show improvements in serum LDL/HDL if weight is lost (burn body fat)
- High protein diet:
  - Dieters get to where they can't stand to face another lean pork chop
  - Lose weight because food is repulsive
- High fat diet:
  - Dieters can lose weight without feeling hungry all the time
  - Even those who don't lose any weight improve their serum LDL/ HDL levels**

* Gary Taubes, "Good Calories Bad Calories"

** Feinman and Volek, Nutrition and Metabolism, 2006

322 Moderately Obese People: Dietary Study*



* D.Schwarzfuchs and R. Golan, N. Engl. J. Med 367, 14, Oct. 4, 2012.

Dr. David Diamond on Fats*

- Professor and neuroscientist at U. of South Florida
  - Lecture on myths about saturated fat posted on Youtube
- Personal experiment: switch from high-carb to high-fat diet
  - triglycerides: 800 → 140
  - HDL cholesterol: 25 → 50

"People should understand that animal fat is one of the healthiest foods you can eat."

* http://www.cas.usf.edu/news/s/332/

Results of Low-Carb Diet from 17 Trials *

- Significantly decreased body weight, BMI, and abdominal circumference
- Lower blood pressure
- Lower plasma triglycerides
- Lower fasting plasma glucose
- Reduced glycated hemoglobin
- Reduced plasma C-reactive protein (an inflammatory marker)
- Increased HDL-C (the "good" lipoprotein)

* F.L. Santos et al., Obesity Reviews, July 2012

Obesity and Gallstones *

- Cross-sectional study of over 510,000 patients
- Obese children have increased risk to gallstones
  - Extremely obese kids have nearly eight times the risk of normal-weight kids
- Due to formation of cholesterol crystals in gall bladder
  - Hypothesis: Bile acid production is low due to insufficient dietary fats
  - Corollary: Low-fat diet leads to obesity.

* K.C. Smith et al., J Pediatr Gastroenterol Nutr 2012 Feb 6. [Epub ahead of print]

Recapitulation

- European study showed inverse relationship between dietary saturated fat and heart disease
- Indigenous peoples with high-fat diet have very low heart disease risk
- High fat diet leads to more painless weight loss and improved lipid markers
- Obese children have increased risk to gallstones

Shore-based Foods

The "Eatwell" Plate

* http://www.nhs.uk/Livewell/Goodfood/Pages/eatwell-plate.aspx

zinc

selenium

SULFUR

Copper

iron

iodine

Elaine Morgan and the Aquatic Theory

Proposed that we evolved to be human on ancient seashores, surviving the drought by eating seafood

- The Descent of Woman
- The Aquatic Ape
- The Scars of Evolution
- Descent of the Child
- Aquatic Ape Hypothesis

Survival of the Fattest*

"The prediction is that a functional deficit in brain development will occur if human infants consume inadequate amounts of shore-based foods"

* S.C. Cunnane, Survival of the Fattest, World Scientific Publishing Company, June 2005

Survival of the Fattest: The Key to Human Brain Evolution*

- Iron, iodine, selenium, zinc, copper, and the long-chain polyunsaturated fatty acid, docosahexaenoic acid, are needed to support our large and complex brain
- Maritime foods are among the best sources of these nutrients
- The shore-based diet hypothesis proposes that human "encephalization" was triggered by adaptation to life at the shoreline.

* S.C. Cunnane, Survival of the Fattest, World Scientific Publishing Company, June 2005

Iodine Deficiency*

- Iodine is essential for proper thyroid function
  - Thyroid hormones control metabolism
  - Essential in development of skeletal and central nervous system in the fetus
- In animal studies, iodine normalized stress-related elevation in cortisol
- Iodine deficiency is the most preventable cause of mental retardation

- Most of the earth's available iodine is in the sea
  - Seaweed is the best natural source
  - Shrimp, fish, eggs, other seafood

* L. Patrick, Alternative Medicine Review 13(2), 116-127, 2008

Iodine and Breast Cancer*

- Breast cancer rates in Japan are 6.6 per 10,000, v.s. 22 in U.S. and 27 in U.K.
  - 25-fold higher intake of iodine in Japan
- Iodine supplements shrink breast tumors in animal models
- Perchlorate is a toxicant that inhibits iodine uptake
  - Perchlorate contamination of food and water is growing problem in U.S.
  - Present in nitrate fertilizers and in pharmaceuticals

* L. Patrick, Alternative Medicine Review 13(2), 116-127, 2008

Recapitulation

- Aquatic theory of human origins proposes that we became human on the seashore
- Shore-based foods provide zinc, iron, sulfur, selenium, iodine, copper, and long-chain fats
- Shore-based foods are sorely lacking in the modern American diet
- Anticipitate deficit in brain function in infants deprived of shore-based foods
- Iodine deficiency is associated with mental retardation and breast cancer

Vegan Diets

"Somewhere between 30 and 50 percent of the girls and women seeking treatment for anorexia and bulimia are vegetarian."

-- **The Vegetarian Myth – Lierre Keith**

Barry Groves* on Human Diets**

- About half our brain consists of long-chain fatty acids
- Modern hunter-gatherers treasure animal fats
- Human milk contains much more fat than cow's milk
- Our gut matches much better to carnivores' guts than to herbivores' gut

"With such a small gut with which to absorb all the nutrients and energy our bodies need, a modern low-calorie, low-fat, fibre-rich, plant-based diet is woefully inadequate as an energy source for our energy-hungry system to function at peak efficiency."

* Author of "Trick and Treat"

** http://www.second-opinions.co.uk/vegetarians-have-smaller-brains.html

Barry Groves on Human Brains*

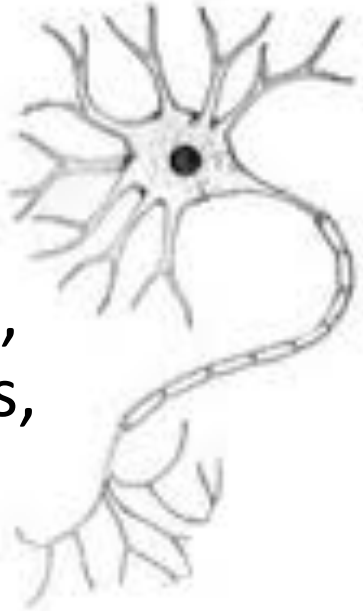
- Vegetarians experience brain shrinkage
  - Research shows a link between brain shrinkage and low B12, and between brain shrinkage and vegetarian diet
  - Our species' brain has shrunk by 11% from its peak size
- Vegetarians have severe problem with B12 deficiency
  - B12 is unavailable from plant-based foods except as a supplement
  - Best sources of B12 are "meat, particularly liver, milk, and fish"

"As brain size and energy use is so high, and our gut size so small, the amount of energy available to the brain is dependent … on the ability of our gut to extract sufficient energy from our food. That also confirms that the kind of diet we should eat must have the high nutrient density found in foods such as meat and fat."

* http://www.second-opinions.co.uk/vegetarians-have-smaller-brains.html

Nutritive Supplement Improves Alzheimer's*

- Contains choline, uridine and the omega-3 fatty acid DHA
- Uridine is a basic component of RNA
- Choline is a precursor for phosphatidylcholine, and sphingomyelin, essential components of cell membranes, and acetylcholine, a major neurotransmitter.
- DHA → Important fatty acid in cell membranes



* http://web.mit.edu/newsoffice/2012/alzheimers-nutrient-mixture-0709.html

Vegetarian Diet and Mental Disorders*

- Compared vegetarians with matched sample from general population (sex, age, educational level, marital status, urban residency)
- Elevated prevalence rates in vegetarians for depressive disorders, anxiety disorders, somatoform disorders and eating disorders (anorexia, bulimia)
- Suggested low dietary intake of cobalamin (vitamin B12) and long-chain omega-3 fatty acids might contribute

*J. Michalak et al., International Journal of Behavioral Nutrition and Physical Activity 2012, **9:67**

Recapitulation

- Our digestive system is designed for animal based foods
- Vegetarians have increased risk to anorexia, depression and anxiety disorders
- Vitamin B12 deficiency is common in vegetarians and carries great risk
- Nutritive supplement containing choline and omega-3 fats helps Alzheimer's disease

Sulfur!

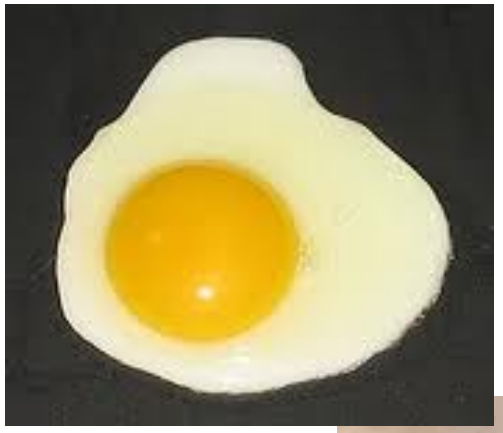
Sulfur: the Forgotten Nutrient*

" … the available knowledge on elemental *sulfur* in human nutrition looks like a *black hole*. Despite the fact that S8 follows H, C, O, N, Ca and P as the seventh most abundant element in mammalian tissues, it appears as a forgotten item. *Not the slightest attention is dedicated to S8* in the authoritative "*Present Knowledge in Nutrition"* series of monographs even though they go over most oligo- and trace-elements in minute detail."

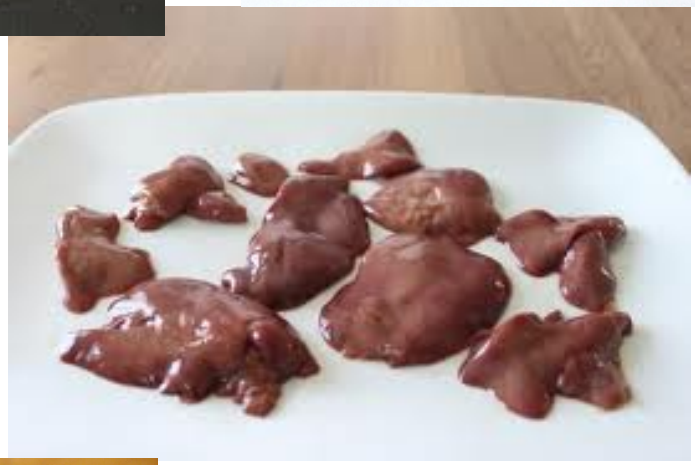
* p. 40, Y. Ingenbleek, The Open Clinical Chemistry Journal, 2011, 4, 34-44.

Foods Containing Sulfur



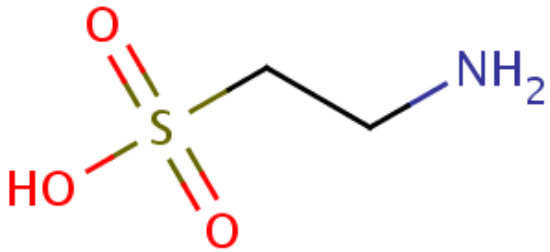








Taurine has Many Known Roles*

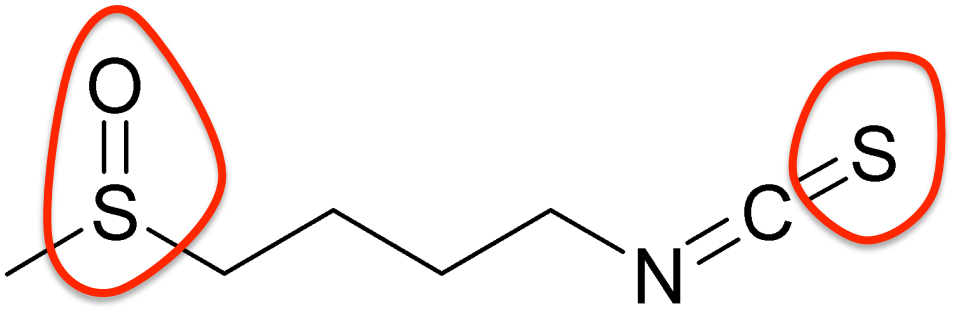
- Maintains osmotic balance in cells
- Bile acid formation (digest fats)
- Roles in mitochondria
  - Helps them maintain their membrane potential
  - Suppresses superoxide synthesis (oxidation damage)
- Clinical observations
  - Maintains healthy skin
  - Protects against diabetes and heart disease
  - Protects against heart arrhythmias
  - Low taurine in blood associated with many cancers



* Wesseling et al., Hypertension. 2009, 53, 909-911

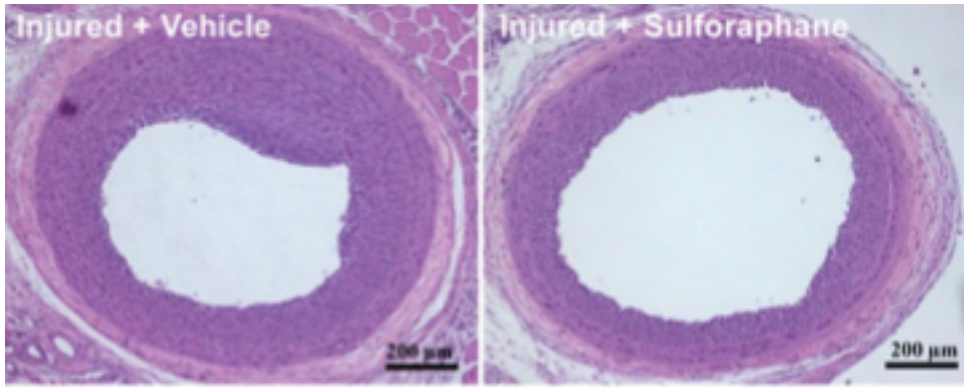
Cruciferous Vegetables!
The Really Healthy Vegetables

Sulforaphane*



- Experiment conducted on rats subjected to carotid artery balloon injury
  - Half the rats were given sulforaphane as nasal gel
  - Treated rats had reductions in inflammatory markers

Artery wall 14 days after injury

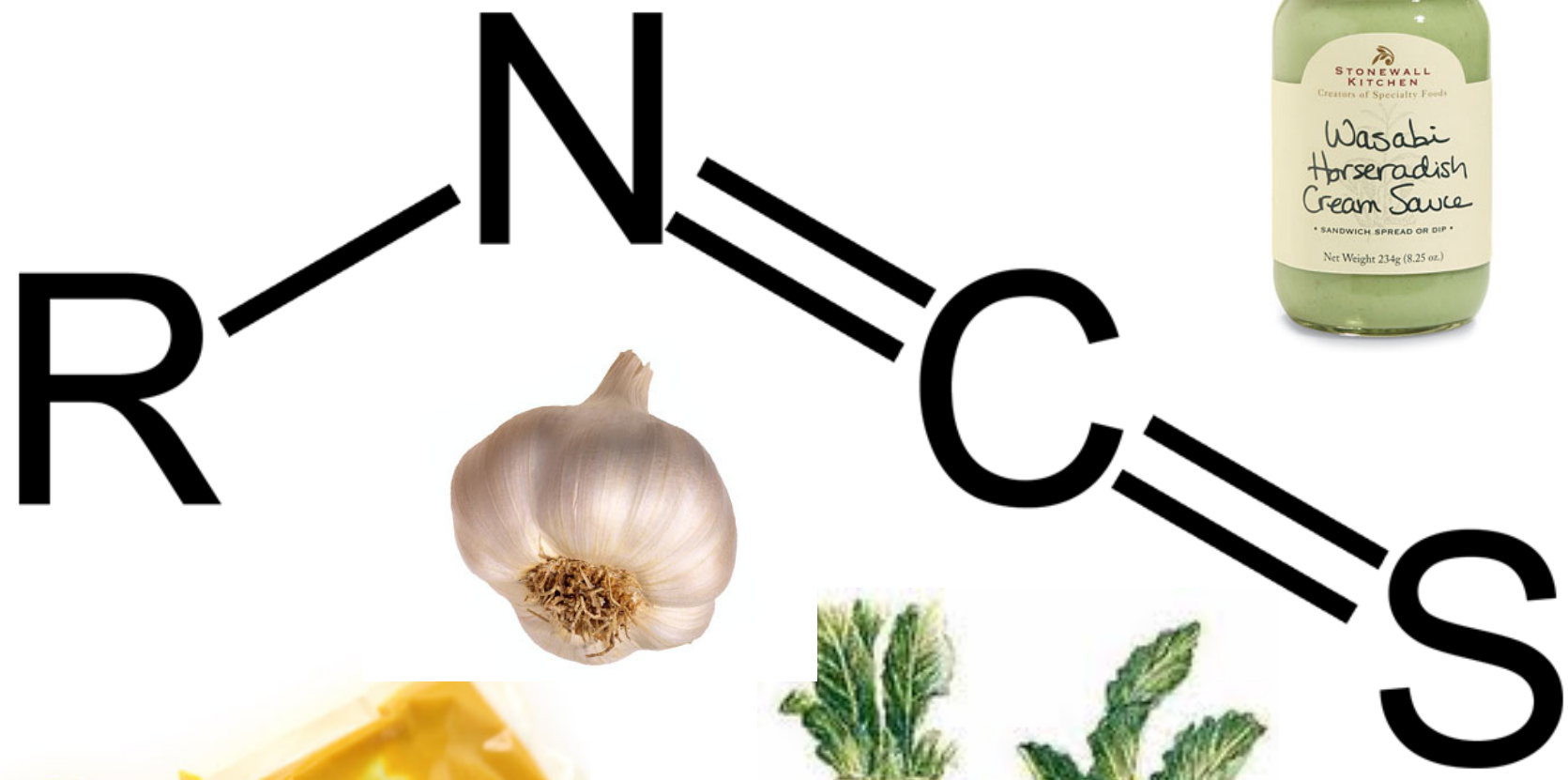


+ sulforaphane

Sulfur is protective!

* J.-S. Kwon et al., Atherosclerosis, *In Press*

Allyl Isothiocyanate



Isothiocyanates Inhibit Prostate Tumor Growth*

- Isothiocyanates protect laboratory animals from chemically induced tumors
- Experiment exposed human prostate tumor cells and normal prostate epithelial cells to isothiocyanates
  - Caused arrest of tumor cells in G2/M phase (aborted DNA duplication, arrested growth)
  - Non-toxic to normal cells

*D. Xiao *et a*l., Carcinogenesis 24(5), 891-897, 2003

Cruciferous Vegetables and Pancreatic Cancer*

"In this large population-based *prospective* study of Swedish women and men, overall fruit and vegetable consumption was not associated with pancreatic cancer risk. However, we observed an inverse association between consumption of cruciferous vegetables, especially of *cabbage*, and risk of pancreatic cancer."*

* Larsson et al., Cancer Epidemiol Biomarkers Prev 2006, 15:301-305.

Cruciferous Vegetables and Pancreatic Cancer*

- Retrospective studies on pancreatic cancer patients are often biased
- For "all fruits and vegetables," there was an insignificant *increased* risk of pancreatic cancer with greater consumption
- Cruciferous vegetables are an excellent source of sulfane sulfur, which can help supply heparan sulfate to the pancreas
  - The pancreas depends critically on heparan sulfate to protect from damage to beta cells with insulin processing

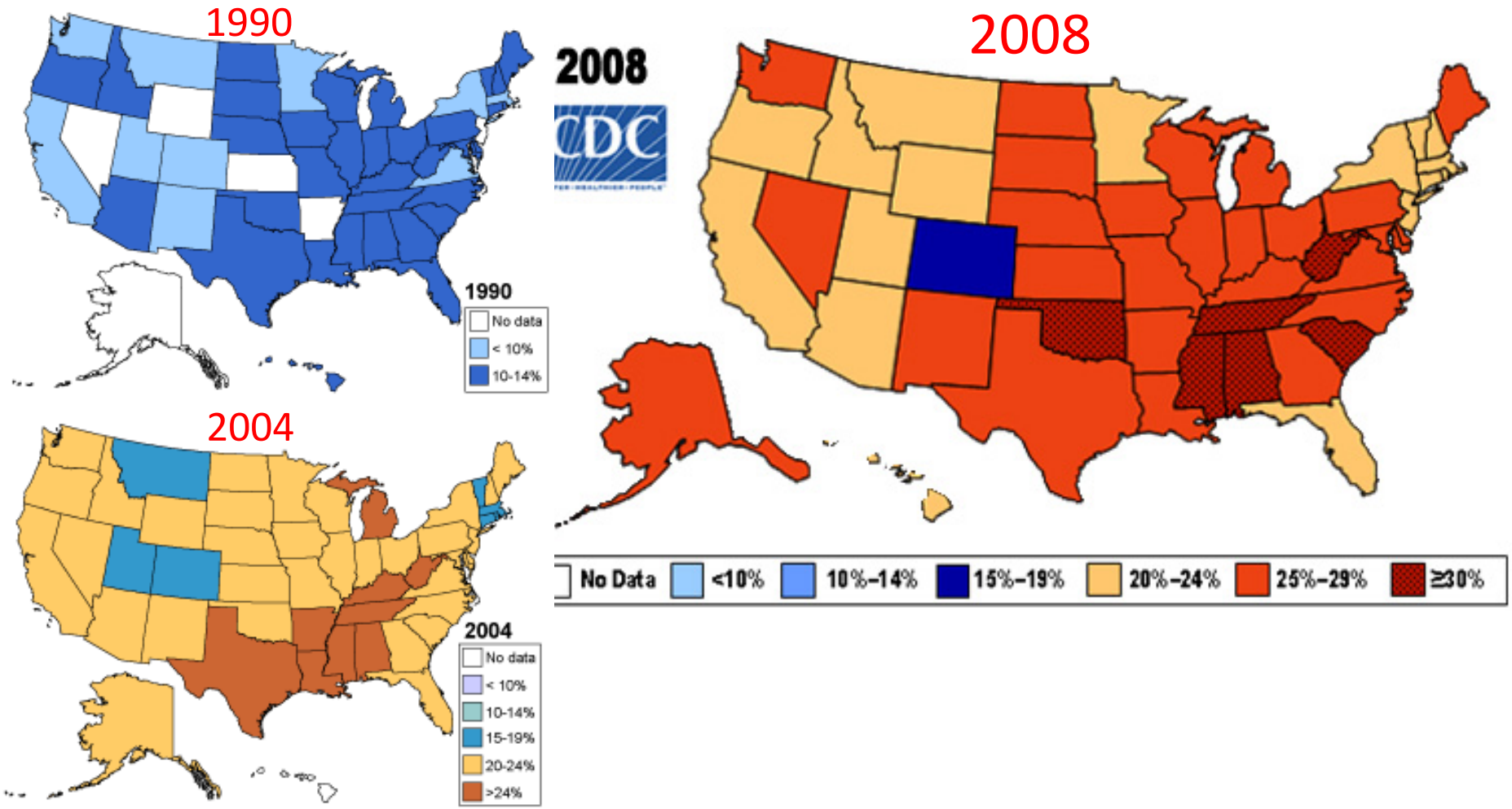
* Larsson et al., Cancer Epidemiol Biomarkers Prev 2006, 15:301-305.

Recapitulation

- Sulfur is an incredibly important but highly neglected nutrient
- Taurine is a sulfur-containing amino acid found only in animal-based foods
- Cruciferous vegetables are an excellent source of sulfane sulfur, and protect from pancreatic cancer
- Isothiocyante in garlic, mustard and horseradish has antitumor properties

Diet and Diabetes

The U.S. Obesity Epidemic*

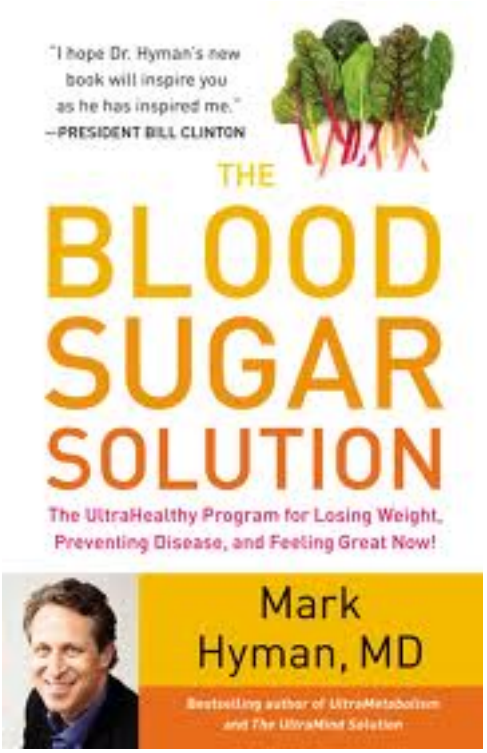


* Source: CDC Behavioral Risk Factor Surveillance System

Diabesity: The Curse of Modern Times*

"Seventy percent of the federal budget is for Medicare, Medicaid, and Social Security. By 2042, 100% of the federal budget will be required to pay for Medicare and Medicaid, leaving nothing for defense, transportation, education, agriculture, environment, or any of the government's other basic services."

-- Dr. Mark Hyman



* drhyman.com/blog/2012/06/29/why-obamacare-is-not-enough-its-the-health-care-costs-stupic

Type 2 Diabetes: A Global Problem*

- Type 2 diabetes is increasing at an alarming rate worldwide
- 285 million people worldwide in 2010

- Projection → 439 million by 2030
- 6.4% → 7.7% by 2030

* N. Grantham et al., Public Health Nutr. 2012 Jun 7:1-7. [Epub ahead of print]

"Western-Style Fast Food Intake and Cardio-Metabolic Risk in an Eastern Country" *

"In an analysis of more than 50,000 Chinese Singaporeans, those who ate fast food twice a week or more had a 27% increased risk of developing diabetes and a 56% increased risk of dying from coronary heart disease."

* A. Odegaard et al, Circulation, published online, July 2, 2012

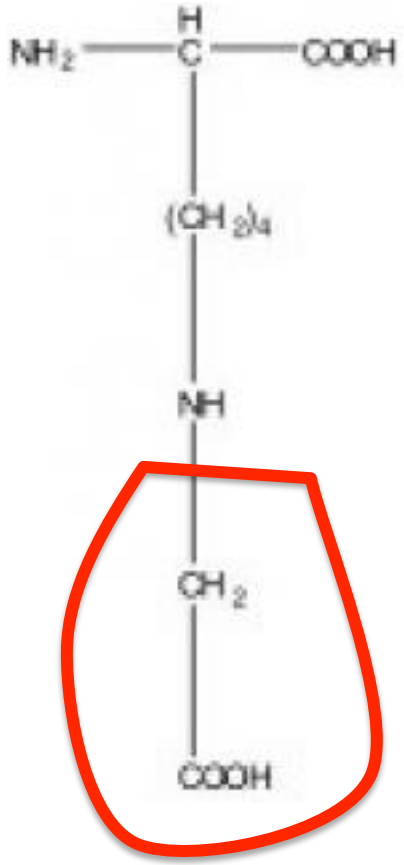
Diabetes due to Sugar Imports*

" … the level of food importation significantly shifts the content of markets such that a greater proportion of available joules is composed of sugar and related sweeteners. Sugar exposure statistically explained why urbanization and income have been correlated with diabetes rates."

* S. Basu et al., Public Health Nutr. 2012 Jun 13:1-8. [Epub ahead of print]

Glycation of Serum Proteins

- Due to excess sugars in the blood stream
  - Especially high fructose corn syrup
- Glycated hemoglobin is less efficient at delivering oxygen to tissues
- Glycated LDL is less efficient at delivering cholesterol to tissues
- Glycated LDL can't be recycled through LDL receptors in liver
- Builds up in blood serum as "small dense particles" (The bad kind)
- **Cells become deficient in cholesterol**



Advanced Glycation End (AGE) Products

- AGEs: nonenzymatic glycation and oxidation of proteins, fats, and nucleic acids (DNA, RNA)
- Accumulate at much higher rate in diabetics
  - Cross-links extracellular matrix proteins
- AGEd LDL is impaired in recycling in liver
  - Picked up in plaque and consumed by macrophages
- Heart failure is associated with high AGE levels

"Why Half of America May Have Impaired Brain Function by 2030"*

- Dr. Mercola has argued tirelessly against high fructose corn syrup
- UCLA Study on Rats
  - Fructose-fed rats struggled to solve a maze
  - Brains showed decline in synaptic activity
  - Extra omega-3 fats afforded partial protection
- Drugs are a terrible answer to diabetes
  - New drug Actos causes increased risk to heart disease, heart failure, kidney failure, bladder cancer, etc.
- Proposed solution
  - start taxing and stop subsidizing junk food

* Dr. Mercola, Sept. 2, 2012, articles.mercola.com/sites/articles/archive/2012/09/02/fructose-affects-brain-health.aspx

Dietary Methylglyoxal*

- Compared low-AGE and high-AGE dietary differences in mice
  - Monitored over 3 month period
- Serum AGE levels increased by 53% in high-AGE group and decreased by 7.8% in low-AGE group.
- Inverse correlation between circulating AGE and time to healing of skin wounds
- High-AGE group also had accelerated kidney dysfunction.
- Connecting link is AGE-dependent inflammatory response

* M. Peppa et al., Diabetes 52, Nov. 2003, 2805-2813.

Soft Drink Consumption

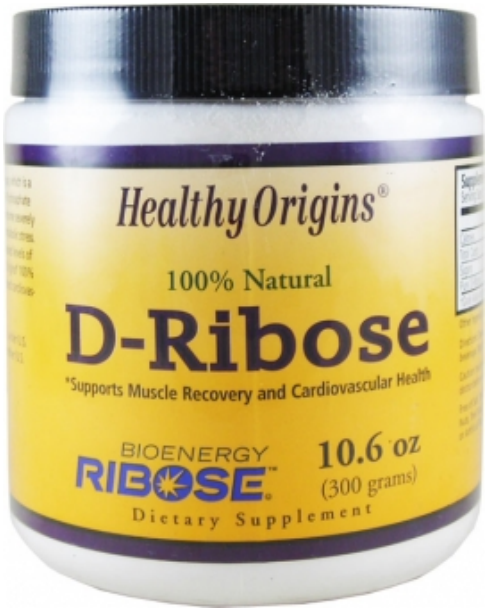
Schultze et al., JAMA 292(8), 927-34, 2004
Nurse's Health Study

- 90,000 women monitored over 8 years
- Women who reported drinking one soda per day gained on average ten pounds over four years
- Women who drank one or more servings per day of a sugar-sweetened drink were twice as likely to have developed type 2 diabetes compared to those who rarely drank these beverages

Dhingra *et al.*, Circulation 116, 480-488, 2007

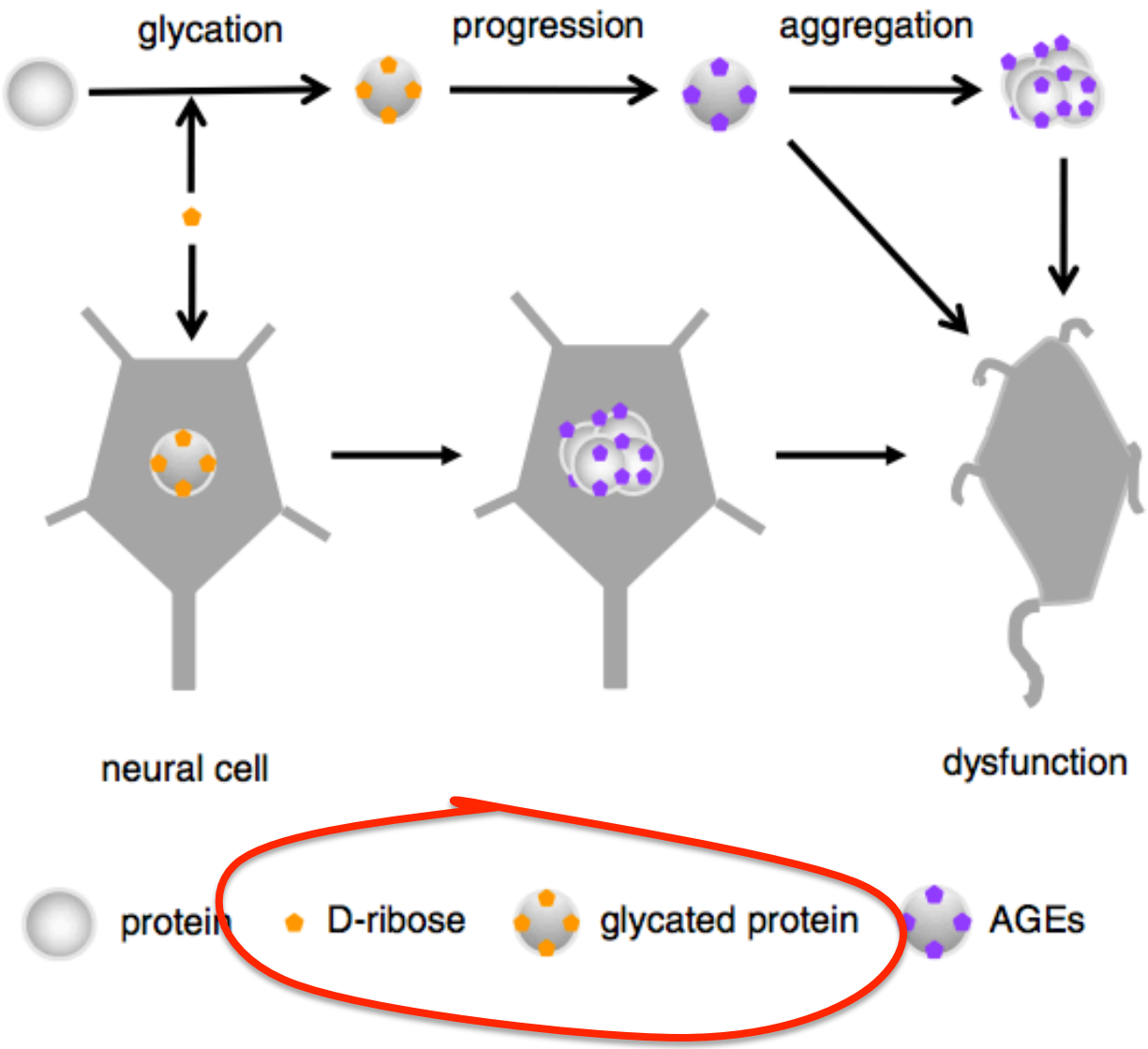
- Higher risk of obesity, high blood pressure, and diabetes for middle-aged adults who consumed at least one soft drink per day.

D-Ribose: Energy Drinks



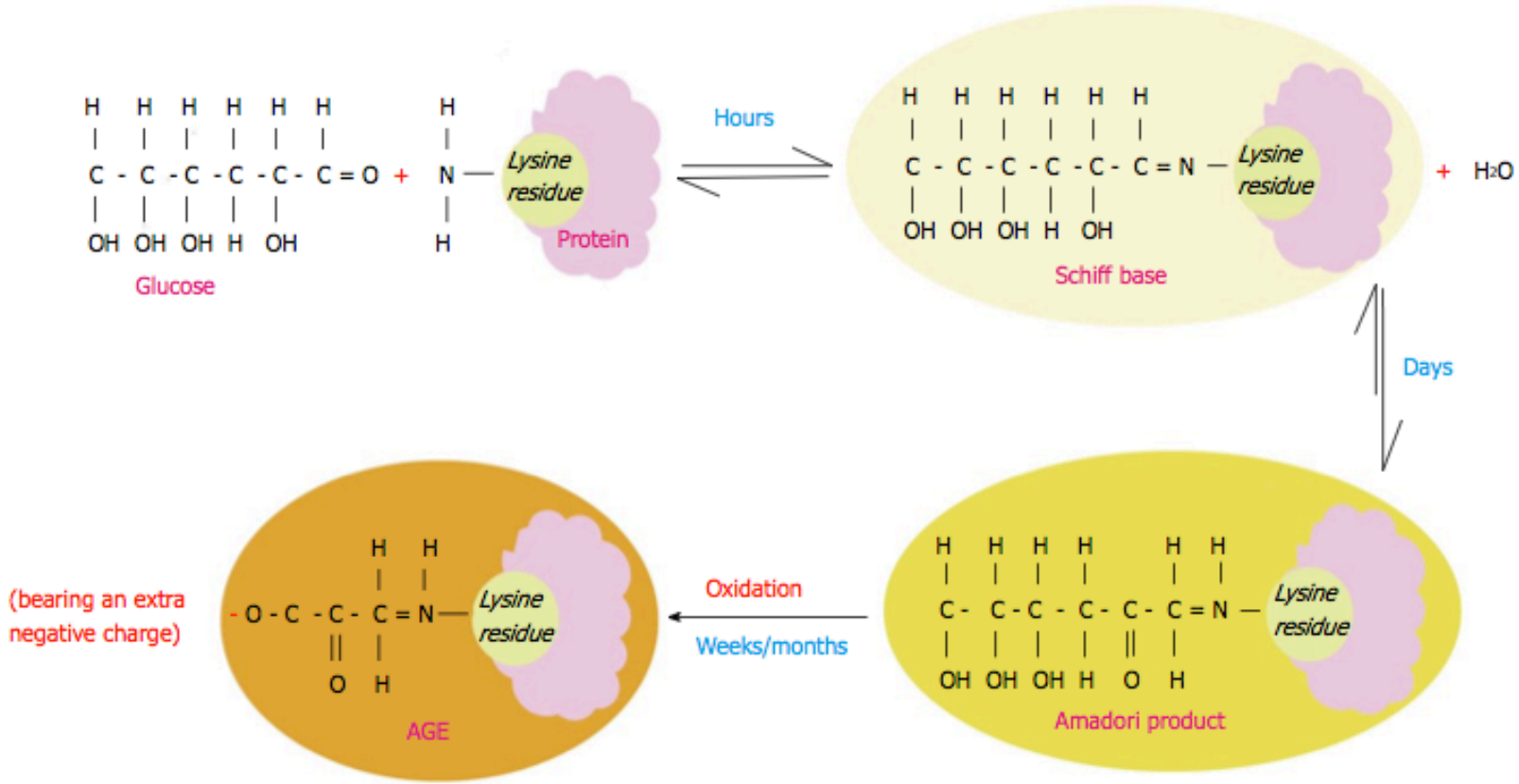
D-ribose is even worse than fructose in its ability to glycate proteins

D-ribose Damages Neurons*



* Y. Wei et al., Biochimica et Biophysica Acta 1820 (2012) 488–494

AGEd Lysine*



* Figure 1, Hegab et al., World J Cardiol 2012 April 26; 4(4): 90-102

Study Shows Fructose is Bad for your Health*

- 559 adolescents in the study
- Found that high fructose intake was associated with:
  - Increased visceral fat
  - Increased blood pressure
  - Increased C-reactive protein (inflammation indicator)
  - Reduced HDL (good lipid marker)

* N.K. Pollack et al., J. Nutr. 142(2):251-257, Feb 1, 2012.

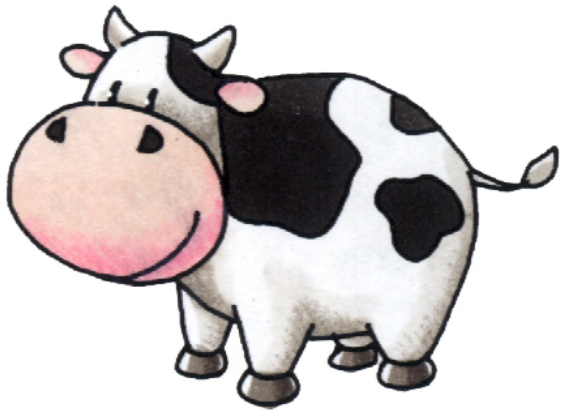
Recapitulation

- Diabetes and obesity are now a global problem
- Likely due to excess of highly processed carbohydrates, particularly sugars.
- Fructose is a worse glycating agent than glucose. D-ribose and methylglyoxal are even worse than fructose.
  - Methylglyoxal is found in carbonated beverages
- High fructose corn syrup is particularly bad, and it should be eliminated from the diet.
- Glycation causes damage to neurons, skin, and kidneys, and impairs serum protein function

Lactose, Lactate, and Electrolytes

"The Consumption of Milk and Dairy Foods and the Incidence of Vascular Disease and Diabetes: An Overview of the Evidence"*

-- benefit found in all cause mortality, heart disease, diabetes, and stroke



"In conclusion, there appears to be an enormous mismatch between the evidence from long-term prospective studies and perceptions of harm from the consumption of dairy food items."

* P.C. Elwood et al., Lipids (2010) 45:925–939

Argument Against the Dairy Myths*

- 5582 participants in Australia
- Higher dietary dairy reduced risk for diabetes, especially for men
- Men in the highest tertile (top third) reduced their risk for diabetes over five years by nearly 50% compared to first tertile

* N. Grantham et al., Public Health Nutr. 2012 Jun 7:1-7. [Epub ahead of print]

Lactate: The Perfect Food

- Doesn't generate AGEs like sugar and starch
- Doesn't generate oxidative damage like unsaturated fats
- Carries a negative charge: helps fight acidosis
- Heart, liver, and brain get first dibs
- These foods also contain vitamin K

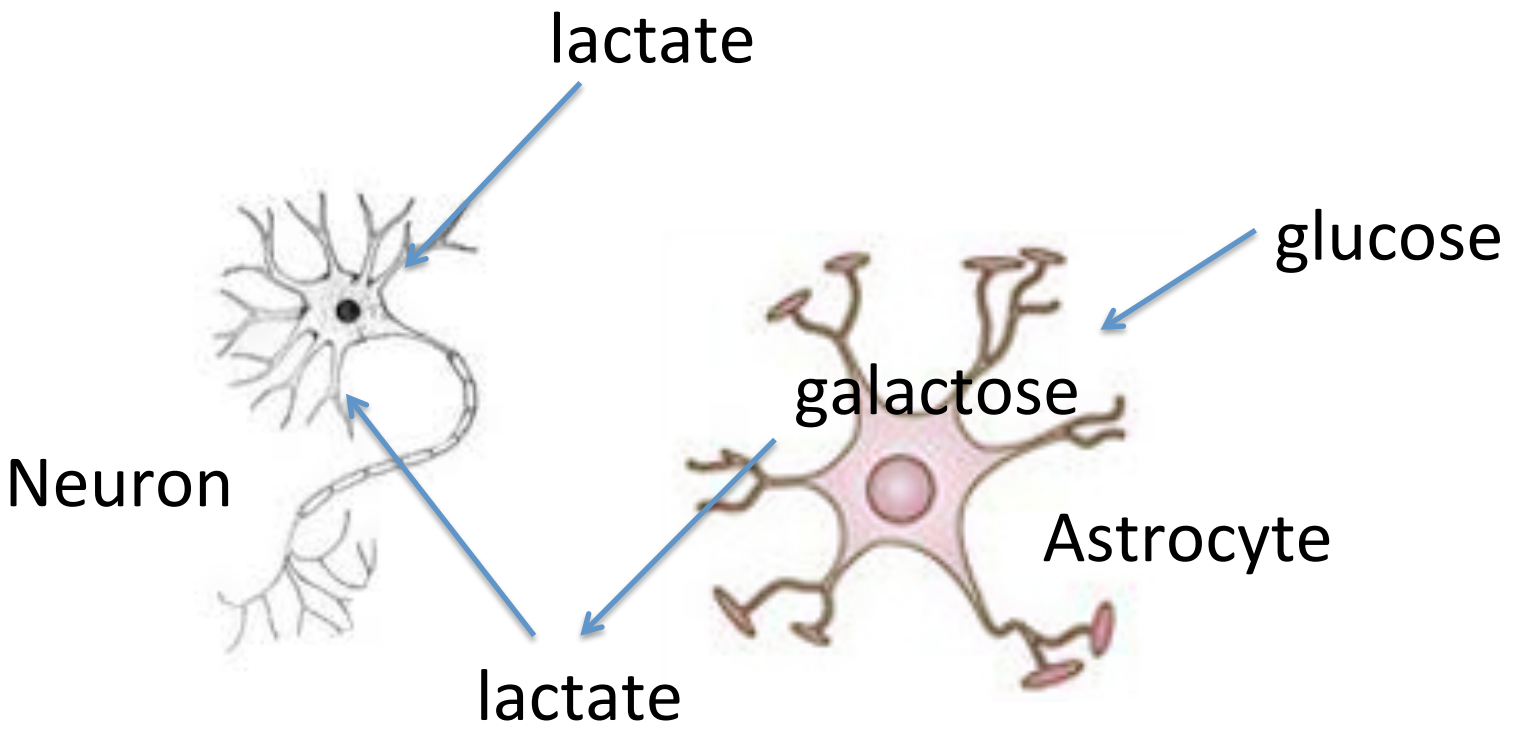
Lactate-rich Foods in Taiwan

Chou Doufu
(Stinky Tofu)

These foods are also a great source of vitamin K

Suan Cai Bai Rou Huo Guo
(Fermented Cabbage & Pork Firepot)

Lactate in the Brain*



- Neuron requires lactate to be able to form long-term memories
- Astrocyte can supply it (by conversion from glucose) or it can come directly from the medium (diet)

* Suzuki et al., Cell 144, 810–823, 2011

Soup: The Forgotten Food

- Bone marrow is a rich source of electrolytes, minerals, and fat-soluble vitamins
- Bone-based soups are extremely nutritious!

Homocysteine and Copper Deficiency *

- Copper deficiency leads to elevated cholesterol, blood pressure, homocysteine, isoprostanes, and uric acid
- Copper stimulates synthesis of paraoxonase (PON)
  - PON lowers risk of coronary artery disease and atherosclerosis
  - Prevents oxidation of LDL leading to plaque formation
- Copper supplementation benefits heart failure

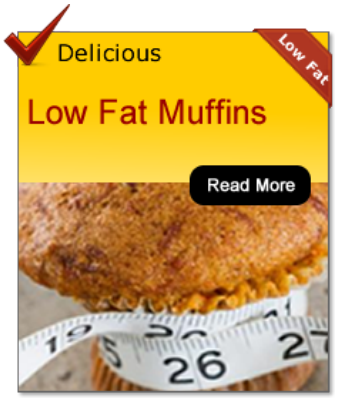
* L. Klevay, Arterioscler Thromb Vasc Biol. 2008, 28, p. e160

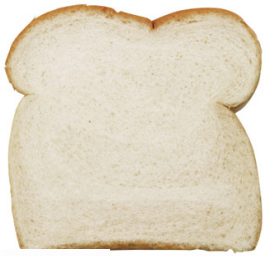
Food Sources of Copper

Sesame seeds, cashews, soybeans, lentils, lima beans, barley

In Summary…

Unhealthy Foods





Healthy Foods

IRON

CHOLESTEROL

SULFUR

FOLATE

VITAMIN D3

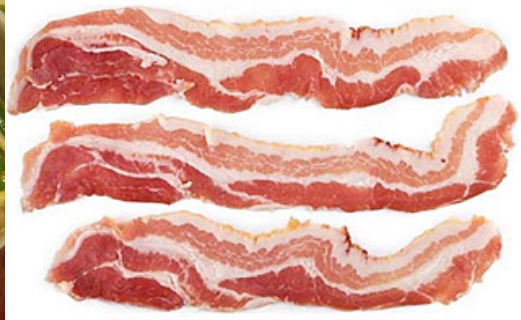
LACTATE

CHOLINE

VITAMIN K

VITAMIN A

ZINC



SATURATED FAT

ELECTROLYTES

Conclusions

- We are headed for an enormous crisis in our food supply due to industrialized farming methods
  - Depletion of nutrients; exposure to toxins
  - We need to move fast to avoid the point of no return
- The crisis is made worse by misguided "expert" nutritional advice – low fat/low cholesterol/high carbohydrate diets
  - Cholesterol is healthy
  - High fructose corn syrup is toxic
  - We need to think in terms of "nutrient-dense" foods
- We have forgotten how to prepare foods properly
- We pay for it in major health problems like diabetes, obesity and heart disease

Thank you!