

## "The Nutrition Prescription"



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*"Healthy At Home"* and  
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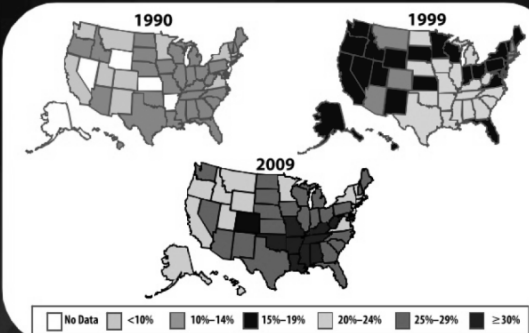
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## The Many Faces of Food

- Culture, custom, and social meanings
- Personal taste/preference
- Convenience
- Habit
- Advertising
- Availability
- Budget
- Health

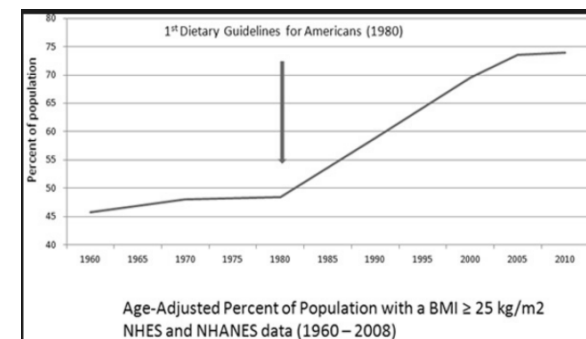
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## Rapid Increases in Adult Obesity in the U.S. BRFSS: 1990, 1999, 2009



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## Diet and Obesity in US



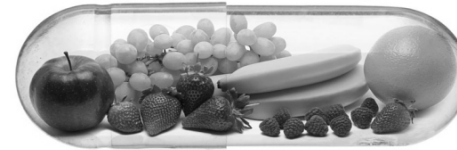
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## Nutrition in the 21<sup>st</sup> Century



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**Let your food be your medicine,  
and your medicine be your food.**

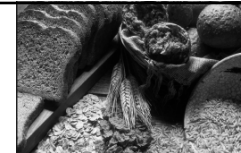


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## CARBOHYDRATES



- Provide majority of calories in most diets
- The body's preferred fuel source
- Largest contributor to glucose control
- Half of carbohydrates in North American diet come from: bread, soft drinks, cakes, cookies, donuts, quick breads, sugars, syrups, jams, white potatoes (including chips) and breakfast cereals

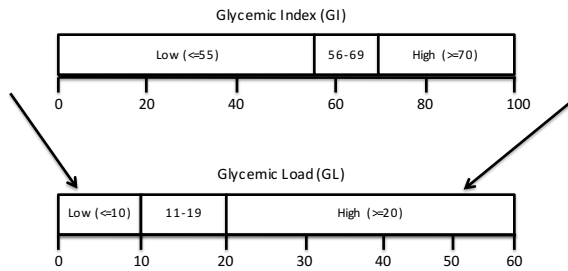
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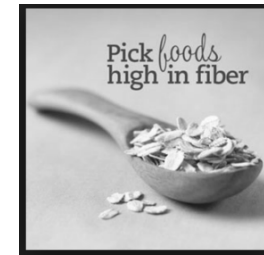
Glycemic Index &amp; Glycemic Load Rating Chart



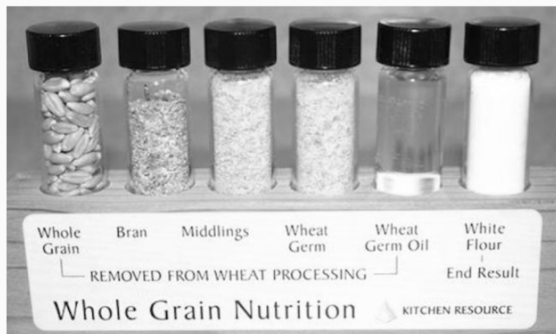
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## Influences on Glycemic Load of Foods

- Amount of processing (increases surface area)
- Fiber content (decreases GL)
- Fat content and protein slow stomach emptying and lower the glycemic load
- Many “fat-free” foods are high GL and contribute to obesity



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## Glycemic Load

Individual Food Portion		Whole Day	
Low	0-10	Low	< 80
Moderate	11-19	Moderate	80-120
High	20+	High	>120

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## Glycemic Load

Food	Serving Size	Glycemic Load
Grapefruit	½ large	3
Apple	1 medium	6
Banana	1 large	14
Raisins	1 small box	20
Watermelon	1 cup	8
Carrot	1 large	5
Orange	1 medium	6
Sweet potato	1 cup	17
Baked potato	1 medium	28
French fries	1 medium serving	26
Snickers	1 bar	35
Reese's cup	1 miniature	2
White table wine	5 ounces	1
Red table wine	5 ounces	1
Grape juice	6 ounces	12

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## Glycemic Load

Food	Serving Size	Glycemic Load
Asparagus	½ cup	2
Broccoli	1 cup	4
Green beans	1 cup	3
Tomato	1 medium	2
Subway sandwich Turkey breast	6 inch	17
Butter pecan ice cream	5.5 ounces (small)	22
Vanilla ice cream cone	4.5 ounces (small)	19
Potato chips, fat free	1 bag (8 ounces)	49
Tortilla chips, white corn	3.5 ounces	38
Eggo oat waffles	1 serving	13
Maple syrup	4 Tbsp	39
Egg, hard boiled	1	2
Apple juice	8 ounce	6

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## Glycemic Load

Food	Serving Size	Glycemic Load
Spaghetti	1 cup	38
Brown rice	1 cup	23
White rice	1 cup	33
White bread	1 slice	10
Whole grain bread	1 slice	5
Bagel, cinnamon raisin	13.5 inch	24
Pumpkin seed bread	1 slice	6
Macaroni and cheese	1 cup prepared	31
Chocolate doughnut	1 doughnut (80 g)	25
Glazed doughnut	1 doughnut (80 g)	12
Kellogg's Frosted Flakes	¾ cup	20
Kellogg's Special K	1 cup	14
Post Bran Flakes	¾ cup	12
Post Raisin Bran	1 cup	25

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## Pictures of Low/High GI Meals &amp; Snacks



GI = 60    GL = 48



GI = 42    GL = 31

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### Pictures of Low/High GI Meals & Snacks



GI = 80    GL = 32



GI = 61    GL = 12

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### Reality Check



- It is **not practical** to try to “count” **glycemic load**, in part because it will vary based upon portion size and other components in the meal.
- The take home message: cut back on processed, refined, sugary foods and drinks.

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### Resources

- The New Glucose Revolution by Jennie Brand-Miller, PhD
- The Glycemic Load Diet by Rob Thompson MD
- The Glycemic Load Diet Cookbook by R. Thompson
- The Easy GL Diet Handbook by Fedon Lindberg MD
- The 150 Healthiest 15-Minutes Recipes on Earth by Jonny Bowden, PhD

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### Sugar Substitutes/ Non-Caloric Sweeteners

- Aspartame (Equal & Nutrasweet)
- Sucralose (Splenda)
- Saccharin (Sweet 'N Low, Sweet Twin)
- Acesulfame K (Sunett, Sweet One)
- Stevia (Truvia, Pure Via, Sun Crystals)
  - From *Stevia rebaudiana* leaves
- Monk Fruit (Nectresse)

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### Sugar Alcohols

- Erythritol
- Hydrogenated starch hydrolysate
- Isomalt
- Lactitol
- Maltitol
- Mannitol
- Sorbitol

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### Natural Sweeteners

- Agave nectar
- Date sugar
- Fruit juice concentrates
- Honey
- Maple syrup
- Molasses
- Cane sugar

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### Gluten and Celiac

- Gluten is the name for the storage proteins found in wheat, barley, rye and related cereal grains – triticale, spelt and kamut.
- In patients with celiac disease, a strict gluten-free diet is the only treatment.
- Experts estimate that about 1% of Americans have celiac disease.
- The condition, caused by an abnormal immune response to gluten, can damage the lining of the small intestine.

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### Symptoms of Celiac

- Recurring bloating, gas, or abdominal pain
- Chronic diarrhea or constipation or both (can present like IBS)
- Pale, foul-smelling stool
- Unexplained anemia
- Bone or joint pain
- Behavior changes/depression/irritability
- Vitamin K Deficiency
- Fatigue, weakness or lack of energy
- Delayed growth or onset of puberty
- Failure to thrive (in infants)
- Missed menstrual periods, infertility male & female, miscarriage
- Canker sores inside the mouth
- Tooth discoloration or loss of enamel

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## Gluten Sensitivity

- Not much is known about this condition except:
  - People do not test positive for celiac disease.
  - Are not allergic to gluten.
  - They report feeling sick after eating or drinking products that contain gluten.
- In gluten sensitivity I often suggest a trial of stone ground whole meal flour (spelt, kamut or red fife).
- Many gluten-free foods contain rice starch, cornstarch, tapioca starch, potato starch and guar gum as a substitute for flour. In other words, a lot of these foods are not particularly “wholesome.”

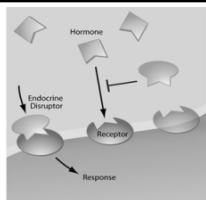
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Select Food Sources of Bioactive Food Components & Related Mechanisms of Cancer Prevention

Bioactive Food Component	Mechanisms of Cancer Risk Reduction	References
Avocado	Cell cycle arrest, apoptosis	Ding, et al., 2007
Broccoli, broccolisprouts	Histone deacetylation, hormone modulation, reduction in oxidative stress, carcinogen metabolism	Minich & Bland, 2007
Berries	Reduce malignant transformation, reduction in oxidative stress	Duthie, 2007
Curcumin	Anti-inflammatory, apoptosis, cell cycle arrest	Ferguson & Philpott, 2007; Surh & Chun, 2007
Garlic/organosulfur compounds	Carcinogen detoxification, antimicrobial, DNA repair, cell cycle arrest	Moriarty, et al., 2007
Grapes (resveratrol)	Reduce oxidative stress, anti-inflammatory	Jang, et al., 1997
Green tea	Anti-inflammatory, reduce oxidative stress, inhibition of growth factor cell signaling	Chen & Zhang, 2007
Tomato products	Reduce oxidative stress, modulation of IGFs	Riso, et al., 2006

Reference: Cynthia A. Thomson, Integrative Oncology; Well Integrative Medical Library

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## Bisphenol A

- Bisphenol A (BPA) is a known endocrine disruptor.
- BPA associated with increases in developmental disorders of the brain and nervous system in animals.
- Associated with obesity, diabetes, and CVD in adults.
- Recent study found that higher levels of urinary BPA were associated with a higher odds of obesity (BMI >95%) and abnormal waist circumference-to-height ratio in children ages 6-18.
- There is some evidence that prenatal exposure to BPA decreases respiratory function and increases persistent wheeze in children.

Eng DS, et al. *Pediatrics* 2013;132(3):e637-45.

Spanier AJ, et al. *JAMA Pediatr* 2014;168(12):1131-7

McGuinn LA, et al. *Environ Res* 2015;136:381-6.

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## Dental Sealants

- Some resin-based dental sealants and composites contain a BPA derivative. Researchers examined urinary BPA measurements and oral examination data for 1,001 children aged 6 to 19 years from 2003-2004 NHANES.
- Children with 7 to 42 restorations had mean BPA concentrations 20% higher than those of children with no restorations, this *did not* reach statistical significance.

McKinney C, et al. *J Am Dent Assoc* 2014 Jul;145(7):745-50.

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## Canned Soup

- Canned goods are significant source of BPA.
- Researchers at the Harvard School of Public Health found that volunteers consuming one serving of canned soup each day for five days had a more than **1,000% increase** in urinary BPA concentrations compared with when the same individuals consumed fresh soup daily for five days.

Carwile JL, et al. JAMA. 2011;306(20):2218-20.

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## Pesticide Exposure and ADHD

- Using data from NHANES – children with typical levels of pesticide exposure from eating pesticide-treated fruits/vegetables have higher risk of developing ADHD.
- Children ages 8-15 with higher urinary levels of dimethyl alkylphosphate (DMAP) had twice the odds of ADHD when compared with children with low or undetectable levels.

Kuehn BM. JAMA. 2010 Jul 7;304(1):27-8.

Bouchard, et al. Pediatrics. 2010 Jun;125(6):e1270-7.

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## Pesticide and ADHD

- Pyrethroid pesticides cause abnormalities in dopamine system and produce ADHD phenotype in animal models.
- 687 children (8-15 years of age) evaluated. Those with urinary 3-PBA above limit of detection were 2 x more likely to have ADHD compared with those below LOD.
- Hyperactive-impulsive symptoms increased by 50 % for every 10-fold increase in 3-PBA levels; change in inattention was not significant.

Wagner-Schuman M, et al. Environ Health. 2015; May 28;14:44.

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Eating an organic diet for one week significantly reduced pesticide exposure in adults. Mean total organophosphate metabolites were 89% lower than when participants were eating conventional foods. Similar results have been shown in children.

Oates L, et al. Environ Res. 2014; 132:105-11  
Bradman A, et al. Environ Health Perspect. 2015; 123(10):1086-93



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<http://www.ewg.org/foodnews/>



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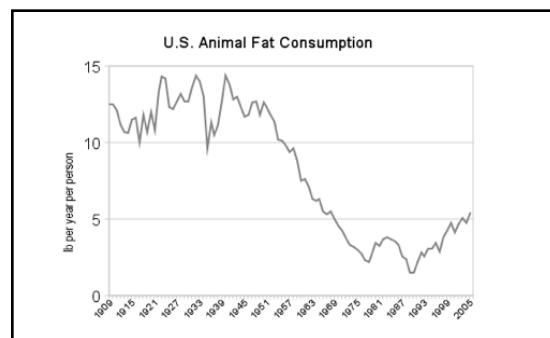


## FAT

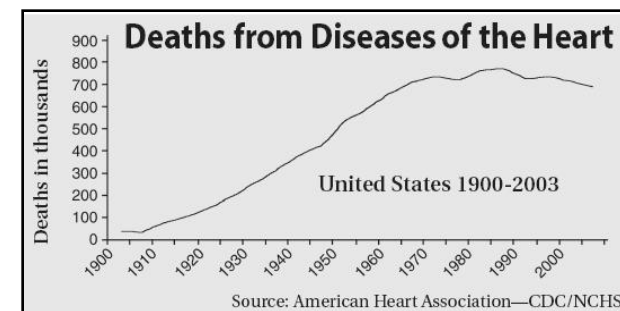
- Most concentrated source of energy, more than twice that of carbohydrates or proteins.
- Act as messengers in reactions that help control growth, immune function, reproduction and basic metabolism.
- Help absorb fat soluble vitamins (A, D, E, K).
- Certain fats, like linoleic acid and alpha linolenic acid, are "essential" because our bodies cannot produce them.
- Make foods flavorful and help us feel full.

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## Does Eating Fat Give You Heart Disease?

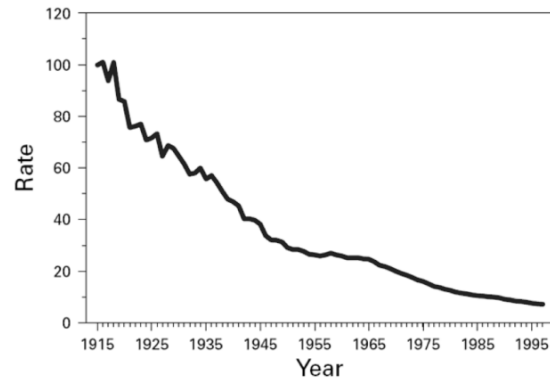


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FIGURE 1. Infant mortality rate,\* by year — United States, 1915–1997



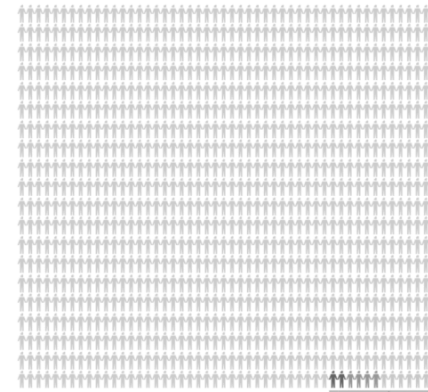
\*Per 1000 live births.

www.cdc.gov

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#### Effectiveness of statins

1,000 people taking statins for three years prevents



Prevents:

- 7 non fatal heart attacks
- 4 strokes
- 2 deaths

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## Saturated Fat Debate



- Three large meta analyses (21 studies, 12 studies, and 76 studies) have all failed to show any significant evidence that saturated fat increases the risk for heart disease.
- It also has failed to find any significant evidence that increasing polyunsaturated fats and decreasing saturated fats lowers heart risk.
- Advice for very low fat diets not supported by evidence.

Siri-Tarino, Amer J Clin Nutr 2010;91 (3):535-46.  
Schwingshackl L, et al. *BMJ Open* 2014;4(4):e004487.  
Chowdhury R, et al. *Ann Intern Med* 2014;160(6):398-406

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## Eggs

- Provide essential fatty acids, proteins, choline, vitamins A and B12, selenium, and other critical nutrients at levels above or comparable to those found in other animal-source foods.
- Meta-analysis suggests that egg consumption is not associated with the risk of CVD and cardiac mortality in the general population.
- New dietary guidelines **do not** limit dietary cholesterol.

Shin JY, et al. *Am J Clin Nutr* 2013; 98(1):146-59

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## Choline

- Related to B-vitamins. Necessary for synthesis of cell membranes, production of VLDL, precursor ACh
- Suboptimal intake of choline in 95% pregnant women in Boston. Low intake ↑ risk of NTD
- Higher maternal choline intake alters gene methylation and expression of placental CRH, key regulator in stress response. Baby's intelligence, memory, and possibly mood regulation may be damaged permanently if mother is choline deficient
- RDA: 450 mg/d Breastfeeding: 550 mg/d

Jiang X, et al. *FASEB J.* 2012;26(8):3563-3574.  
 Brunst KJ, et al. *Public Health Nutr* 2014; 17(9):1960-70.

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## Choline and Cognition

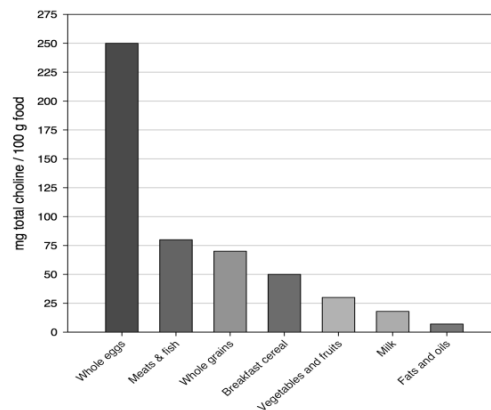


- Prospective study involving 154 healthy mother-infant pairs conducted in Vancouver, Canada (72% white, 15% Asian). All women were taking PNV.
- Maternal blood collected at 16 and 36 weeks gestation and infant neurodevelopment assessed at 18 months age for 154 mother-infant pairs. Babies were all singletons and full-term.
- Significant *positive* associations found between infant cognitive test scores and maternal plasma free choline ( $p=0.009$ ) and a strong trend towards gross motor development.

Wu BT, et al. *PLoS One* 2012; 7(8):e43448.

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Choline in Foods: <http://nalcd.nal.usda.gov/download/47335/PDF>



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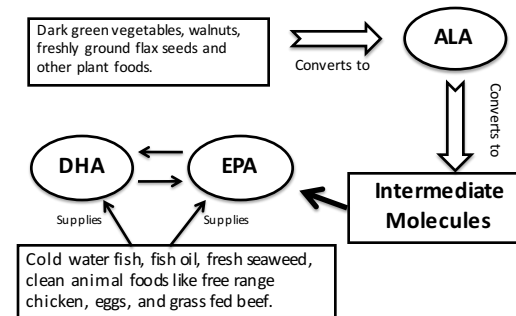
## Dietary Fat and Cancer Systematic Review

- No associations were found for prostate, esophageal, gastric, renal cell, bladder, lung, skin, or postmenopausal breast cancer by the total intake or types of dietary fat.
- There *may* be an association between total dietary fat and premenopausal breast cancer.
- Ovarian cancer there was limited-suggestive evidence for a positive association with intake of saturated fats.

Schwab U, et al. Food Nutr Res 2014;10:58. doi:10.3402/fnrv58.25145.

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## Omega 3 Fatty Acids from Plants and Animals



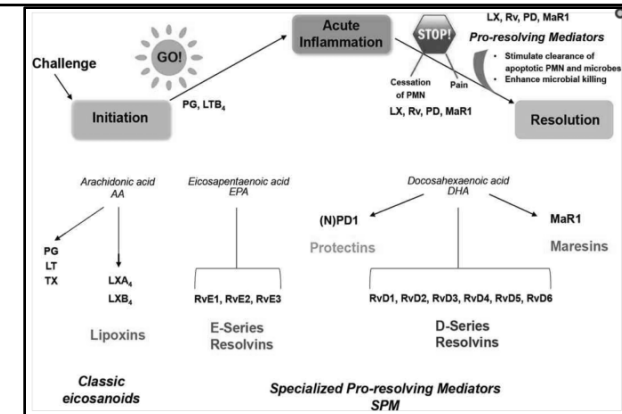
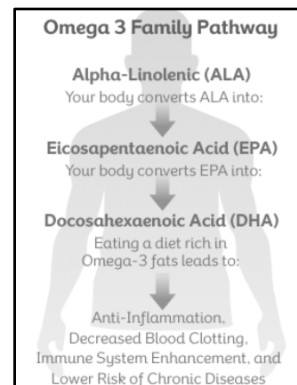
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## Conversion of ALA to EPA/DHA

- Women better able to convert ALA to DHA. Conversion associated with estrogen.
- Given importance of DHA to developing fetus, there was likely biological pressure for this to occur.

Kitson AP, et al. Lipids 2010;5(3):209-24.

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Serhan CN, Chiang N. Curr Opin Pharmacol 2013; 13(4):632-40.

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## Seafood Calculator

www.ewg.org/research/ewg-s-consumer-guide-seafood/seafood-calculator

Calculations are based on 4 oz. serving size

CATEGORY	SPECIES	WEEKLY MERCURY	SUSTAINABILITY	CONCLUSION
 <b>EWG'S BEST BETS!</b> Very High Omega-3s, Low Mercury, Sustainable	SALMON	NaN%	Best Choice: Wild Alaska	 
	SARDINES	NaN%	Best Choice: Pacific	 
	MUSSELS	NaN%	Best Choice: Farmed	 
	RAINBOW TROUT	NaN%	Best Choice: Farmed	 
	ATLANTIC MACKEREL	NaN%	Best Choice: Not Trawled	 

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## Olive Oil



- Cornerstone of Mediterranean diet. Rich in antioxidants, particularly vitamin E.
- Oleocanthal mimics effect of ibuprofen in reducing inflammation.
- Protects against heart disease; lowers total blood cholesterol, LDL-C, triglycerides; improves HDL.
- Nurses Health Study found that greater adherence to Mediterranean diet was associated with longer telomeres (health and longevity).

Hemaez A, et al. *Arterioscler Thromb Vasc Biol* 2014; 34(9):2115-9.  
Crous-Bou M, et al. *BMJ* 2014;349:g6674

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## Avocado

- Avocados second only to olives for level of monounsaturated fat.
- Randomized, crossover trial of 45 overweight/obese participants found inclusion of one avocado per day was superior to low-fat or moderate fat diet high in oleic acid for lowering cholesterol.
- Only avocado group had significantly decreased LDL particle number, small dense LDL-C and ratio of LDL/HDL.

Wang L, et al. *J Am Heart Assoc* 2015; 4(1). pii: e001355.

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## Protein



- From the Greek word *protos*, "first."
- Used to build new cells, maintain tissues (e.g., muscles, inner bone, hair, nails), create enzymes, make hemoglobin to carry oxygen, lipoproteins to transport cholesterol; present in inner and outer membrane of every living cell.
- Sources include meat, poultry, seafood, beans and peas, eggs, soy products, nuts, nut butters, and seeds.

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### WCRF/AICR Recommendations to **Reduce Cancer Risk**

- Limit consumption of red meats (beef, pork, lamb) and avoid processed meats.
- Strive for less than 18 ounces per week of red meat.



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- **Red meat** refers to beef, pork and lamb – foods like hamburgers, steak, pork chops and roast lamb.
- **Processed meat** is red meat that is preserved by smoking, curing, salting or adding other chemical preservatives. *Sausage, bacon, ham and lunch meats (such as bologna, salami and corned beef) are processed meats.*
  - The evidence is convincing that processed meats raise your risk of colorectal cancer, but the risk is considerably greater. *For every ounce and half of processed meat eaten per day, risk rises by 21 percent.*

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### Consumer's Union Guide to Environmental Eco-labels

Eco-Label			
Organization	USDA	Humane Farm Animal Care	Food Alliance <sup>1</sup>
Per Consumer Union	Highly meaningful	Highly meaningful	Highly meaningful
Antibiotic Use	Prohibited	Animals raised on a diet without antibiotics. Antibiotics only used to treat sick animals	No feed additive (non-therapeutic) antibiotics. Antibiotics only used to treat sick animals

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- Studies show dairy products are beneficial in muscle building, lowering blood pressure, preventing tooth decay, diabetes, colorectal cancer, and obesity.

Tunick MH, et al. J Agric Food Chem 2014; Nov 19

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## Dairy and Cancer

- WCRF/AICR report concluded that milk probably **decreases** risk of colorectal cancer.
- Analyses of hormone levels have shown that risk for prostate cancer is higher in men with relatively high blood levels of IGF-I (found in milk, especially with hormones).

Abid Z, et al. Am J Clin Nutr 2014; 100(S) 1:386S-93S

Key TJ. Recent Results Cancer Res 2014; 202:39-46

Troisi R, et al. PLoS One 2014; 9(12):e114455.

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### Calcium Calculator: A Quick Estimate

Food	# Servings/Day	Estimated Calcium per serving, in mg	Calcium in mg
Milk (8 ounces)		X 300	=
Yogurt (6 ounces)		X 300	=
Hard Cheese (1 ounce)		X 200	=
Soy milk, fortified (8 ounce)		X 300	=
Orange juice, fortified (8 ounce)		X 300	=
Tofu, firm calcium set (4 ounces)		X 300	=
All foods not included above		X 250	=
		Total Calcium	=
AI for your gender and age group		Subtract your total calcium from AI	= Supplement this amount

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## Quinoa



- High in protein (8 grams per cooked cup), low in cholesterol, good source of iron and fiber.
- Some varieties take 20 minutes to cook –turns slightly translucent when done.

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## Soy



- Soy contains isoflavones, saponins, phenolic acids, phytic acid, phytosterols, and protein kinase inhibitors.
- Soy inhibits the growth of prostate cancer cells and studies suggest that consuming soy in childhood and adolescence may help protect against breast cancer later in life.
- Including 1-2 servings/d of minimally processed and/or fermented soy in diet can be a healthy practice.

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## Soy and Breast Cancer

- LACE trial saw a 60% reduction in risk of breast cancer recurrence in women taking tamoxifen who were in the highest quintile of soy intake.
- Supplemental soy isoflavones significantly reduce hot flash frequency and severity, particularly those that provide a minimum of 18 mg/d of genistein.

Korde LA, et al. *Cancer Epidemiol. Biomarkers Prev* 2009;18(4):1050-1059.  
 Fritz H, et al. *PLoS One*. 2013;8(11):e81968  
 Taku K, et al. *Menopause* 2012;19(7):776-790

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## HEALTHY PROTEIN SOURCES

- Soy and other legumes (lentils, beans, etc)
- Nuts and seeds
- Low mercury cold water fish
- Organic poultry
- Grass fed beef, pork, lamb
- Wild game
- Milk and dairy without hormones
- Omega 3 enriched eggs

*Roughly 8 grams of protein per 20 pounds of body weight is generally recommended*

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## Sodium Recommendations?

- In May 2013, Institute of Medicine found limited evidence linking association between low sodium intake (1500-2300 mg/d) and improved health outcomes in those with diabetes, kidney disease, heart disease, hypertension or borderline hypertension; those 51 years of age and older; or African Americans (National Research Council).
- However, average American consumes 3400 mg/d sodium. Too much! Use iodized salt.

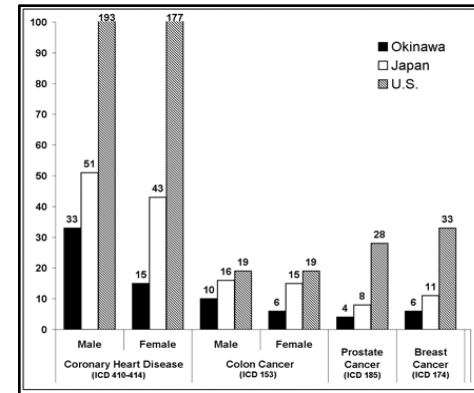
*Sodium Intake in Populations: Assessment of Evidence.* Washington, DC: The National Academies Press, 2013.

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## Traditional Asian Diet

- Little question many people in Asian countries have low rates of diabetes, heart disease and cancer.
- There is no one “Asian” diet but some generalizations that can be made.
- Traditional Chinese diets have been explored through the China-Cornell-Oxford project. This long-term study is discussed at length in the recent film Forks over Knives, which promotes better health through a plant-based diet.

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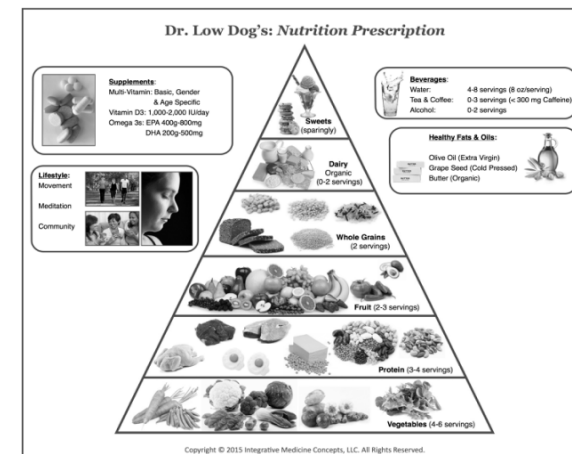
Willcox DC, et al. J Am Coll Nutr 2009; 28(S):500-516

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## Okinawan Dietary Pattern

- High consumption of vegetables
- High consumption of legumes (mostly soy)
- Moderate consumption fish products
- Low consumption meat and meat products
- Low consumption of dairy products
- Moderate alcohol consumption
- Low caloric intake
- Emphasis on low GL carbohydrates

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