

The Science Behind the Superfoods

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Objectives

- Explore the list of current 'superfoods'
- Review their primary active ingredients and their purported benefits
- Discuss the presence (or absence) of scientific evidence supporting each foods' 'super' status

The Superfoods

- Beans
- Blueberries*
- Broccoli
- Dark chocolate
- Oats
- Oranges
- Pumpkin
- Wild salmon*
- Soy
- Spinach*
- Tea
- Tomatoes
- Turkey
- Walnuts
- Yogurt

The Superfoods

- Macronutrients-fat, carbohydrate, protein
- Micronutrients-vitamins, minerals
 - Phytonutrients
 - Polyphenols-flavonoids, anthocyanins
 - Carotenoids
- Fiber
- Probiotics

Blueberries*

- **Contain:**

- Polyphenols(anthocyanins), carotenoids,
- fiber, folate, vit C,
- Vit E, Potassium, Mn, Mg, Fe, Riboflavin,
- Niacin, Phytoestrogens

- **Sidekicks**

- Purple grapes, cranberries, boysenberries,
- Raspberries, currants, blackberries, cherries

- **Highest anti-oxidant levels of any fruit or vegetable**



Chronicle / Liz Hafalia

Polyphenols/Anthocyanins

- Purported effects:
 - Anti-inflammatory, reduce CAD risk, slows neurologic aging
- In vitro and in vivo studies show increased NO production, anti-inflammatory effect, decreased platelet aggregation
- Human and animal studies show consumption of blueberries improves motor skills testing

Broccoli

- Contains:
 - Sulforaphane, indoles, folate, fiber
 - Ca, Vit C, Beta-carotene,
 - Lutein/zeaxanthin, Vit K
- Sidekicks:
 - Brussels sprouts, cabbage, kale, turnips,
 - Cauliflower, collards, bok choy, swiss chard
- Purported benefits:
 - Cancer prevention, ulcer prevention



Sulforaphane

- 2 oz broccoli sprouts for two weeks significantly eradicated H. Pylori
- Prostate cancer cells transplanted into mice blocked with broccoli diet
- Several in vitro and animal studies show blocking of tumorigenic enzyme pathways by sulforaphane

Dark Chocolate

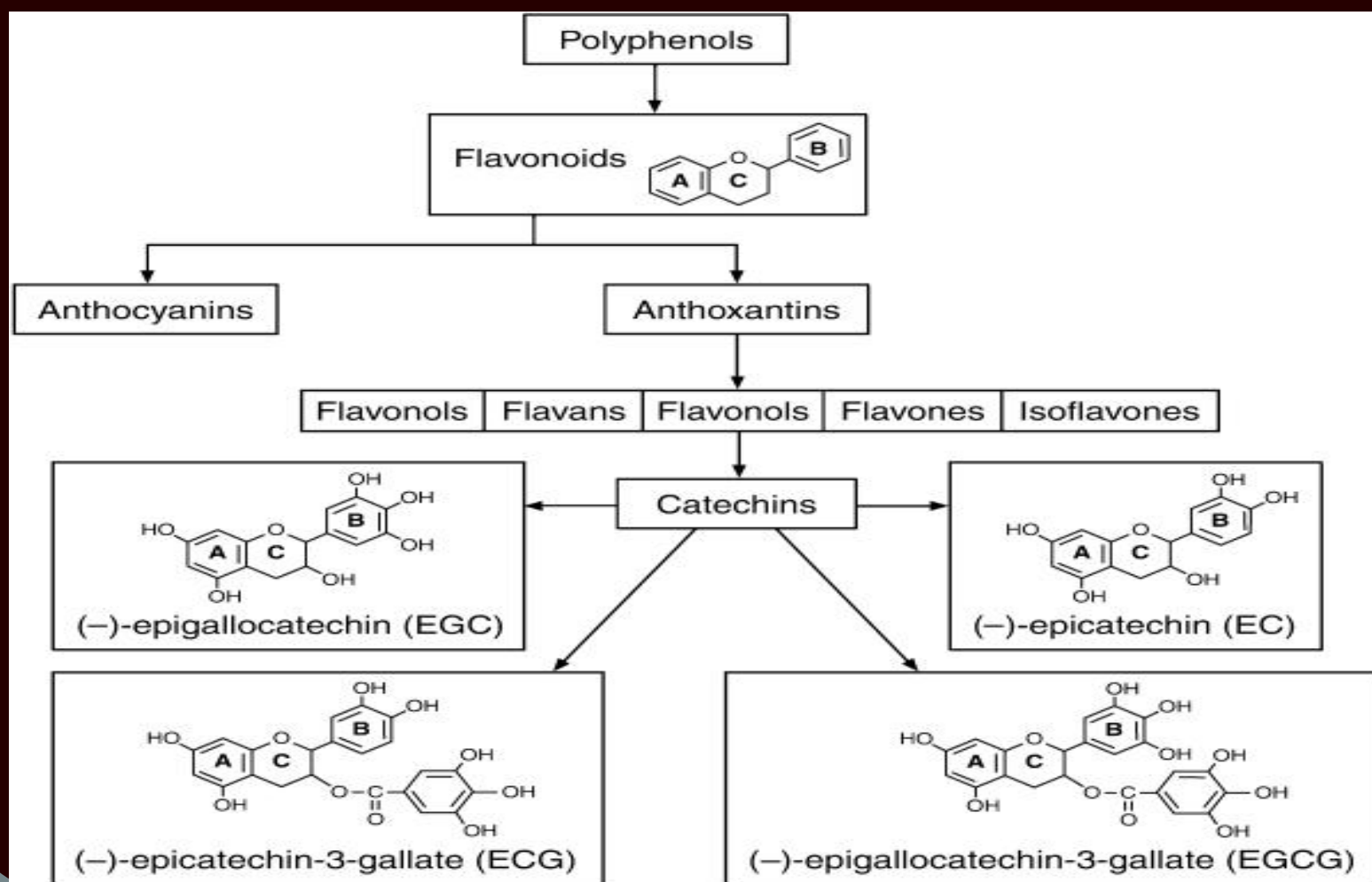
- Contains:
 - Flavonoids
- Purported benefits:
 - Anti-oxidant, cardiovascular
 - protection
- Shown to improve endothelial function, decrease blood pressure, increase insulin sensitivity, inhibit platelet aggregation



Dark chocolate

- 2006 Annals population study of elderly showed highest tertile of cocoa intake cut CAD mortality and all-cause mortality by 50%
- 2008 6 wk RCT sponsored by Hershey's showed no benefit in blood pressure, lipids, or neurological function

Polyphenols/Flavonoids



Oats

- **Contain:**
 - Fiber, protein, Mg, Potassium,
 - Zn, Cu, Mn,
 - Selenium, Thiamine
- **Sidekicks:**
 - Wheat germ, ground flaxseed
- **Purported benefits**
 - Cholesterol reduction, diabetes control, bowel regulation



Soluble Fiber/ β -Glucan

- 10 gm per day psyllium reduces LDL by 7%
 - 10% more reduction when added to simvastatin
- Blunts glycemic response in diabetics
- Several studies show soluble fiber to reduce cholesterol modestly
 - FDA supported claim

Wild Salmon*

- Contains:
- Marine Omega-3 fatty acids,
- B Vitamins, Selenium
- Vit D, Potassium, Protein

- Sidekicks:

- Halibut, Albacore tuna, sardines, herring,
- Trout, sea bass, oysters, clams



Walnuts

- **Contain:**
 - Plant omega-3 Fatty Acids, Vit E, Mg,
 - Polyphenols, Protein, fiber, K,
 - Plant sterols, Vit B₆
- **Sidekicks:**
 - Almonds, pistachios, sesame seeds, peanuts,
 - Pumpkin and sunflower seeds, macadamia nuts,
 - Pecans, hazelnuts, cashews



Omega-3 Fatty Acids

- Three important O-3s in humans
 - Alpha linolenic acid (ALA)
 - Docosahexaenoic acid (DHA)
 - Eicosapentaenoic acid (EPA)
- Compete for conversion with O-6 fatty acids
- In 2004, USDA gave “qualified health claim” to EPA and DHA, saying “Supportive but not conclusive research shows that consumption of DHA and EPA may reduce the risk of coronary heart disease.”

Omega-3 Fatty Acids

- Purported benefits:
 - Cardiovascular disease prevention
 - GISSI, JELLIS trials showed significant benefit
 - Walnuts as part of Mediterranean diet significantly reduced lipids
 - Cancer prevention (breast, colon, prostate), diabetes prevention, hypertension control, brain health, mood...
 - Data are mixed, not convincing

Spinach*

- **Contains:**

- Lutein/zeaxanthin, Beta-carotene,
- Omega-3 FA, glutathione, betaine,
- alpha lipoic acid, Vit C, Vit E,
- Thiamine, riboflavin, Vit B₆, folate,
- Ca, Fe, Mg, Mn, Zn, polyphenols

- **Sidekicks:**

- Kale, collards, Swiss chard, mustard greens,
- Turnip greens, bok choy, romaine, orange bell peppers



Lutein and Zeaxanthin

- Purported benefits:
 - Ocular protection
- 2004 RCT of 90 patients showed small but significant benefit in visual acuity
- Top quintile of carotenoid eaters had 43% less macular degeneration (AMD)
- 2008 study of 4500 elderly found 1/3 reduction in AMD in highest quintile intake

Tomatoes

- **Contain:**
- Lycopene, Vit C, Alpha and
- Beta carotene, Lutein, folate
- zeaxanthine, K, B₆, niacin,
- Thiamine, pantothenic acid,
- Biotin, chromium, fiber



- **Sidekicks:**
- Watermelon, pink grapefruit, persimmons,
- Red papaya, strawberry guava

Carotenoids

- Only a few carotenoids found in humans
 - Beta carotene
 - Lycopene
 - Lutein
 - Alpha-carotene
 - Alpha-cryptoxanthin
 - Beta-cryptoxanthin
 - Zeaxanthin

Lycopene

- Purported benefits:
 - Cancer prevention, CAD prevention
- Anti-oxidant, free radical scavenger
- Gives fruits their red color
- Poor bioavailability in raw fruits
- Fat soluble

Lycopene

- Men who consumed tomatoes at least 4 times per week cut prostate cancer risk by 20%
 - If 10x per week, cut by 45%
 - Out of 46 foods, tomatoes, tomato sauce, and pizza had highest reduction in prostate cancer incidence
- Lycopene supplementation slows PSA doubling time in men with prostate cancer
- Prospective studies show decreased LDL and LDL oxidation

Tea

(Camellia Sinensis)

- Contains:
- Flavonoids (catechins), caffeine,
- theophylline
- Mn, fluoride



- Most prevalent flavonoid:
 - Epigallocatechin gallate (EGCG)
 - 20 times more anti-oxidant effect than C or E

Tea

- Purported effects:
 - Anti-oxidant, anti-mutagenic, anti-diabetic, decreased Parkinson's disease
 - hyperlipidemia, hypertension, inhibits platelet aggregation
 - macular degeneration, obesity
 - Reduced dental caries
 - atopic dermatitis, hepatitis C progression

Tea

- Shown in prospective trial to reduce severe atherosclerosis
 - Elevates HDL, lowers LDL and triglycerides, cuts LDL oxidation
- Reduced risk of breast, stomach, pancreas, colon, bladder, lung, esophageal, and prostate cancer
- Daily use of green tea lowers blood pressure

Yogurt

- Contains: Probiotics, protein, Ca, riboflavin, B₁₂, K, Mg, Zn
- Probiotics= “Live
- micro-organisms that can benefit health”
 - Must say “live active cultures”
 - L. Acidophilus and Strep thermophilus usually
- Purported benefits:
 - GI health, eczema, IBD, IBS, cholesterol, ulcers, Antibiotic assoc. diarrhea, vaginitis



Probiotics

- 2003 RCT for prevention of antibiotic-associated diarrhea showed 50% relative reduction in
- NEJM article showed lactose better absorbed, with less diarrhea gas when eaten from yogurt vs. milk

Probiotics

- Grade A evidence for
 - Prevention and treatment of pediatric diarrhea
 - Prevention of antibiotic associated diarrhea
 - Treatment of lactose malabsorption
 - Prevention of atopic disease in children
- Grade B evidence for
 - Lowering cholesterol
 - Maintenance of remission in IBD

Summary

- Essentially no downside to consumption of these functional/super foods
- Often surprisingly encouraging data supporting their use for medical benefit
- Tremendous natural complexity makes research difficult
- They taste good, and large numbers of 'sidekicks' make them easy to incorporate into diet