The Nutrition Prescription

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National Geographic's
Life Is Your Best Medicine
Healthy At Home
Fortify Your Life
Guide to Medicinal Herbs

www.DrLowDog.com

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1

Nutrition Matters

Nutrition problems single most important cause of death in the U.S.

- **Dietary factors**
- Tobacco smoking
- High blood pressure
- High BMI
- High plasma glucose
- Elevated cholesterol

JAMA 2018

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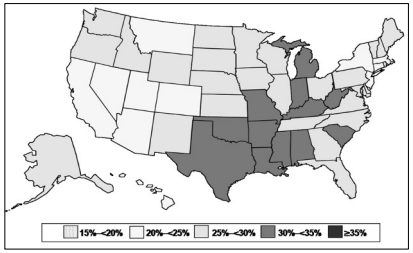
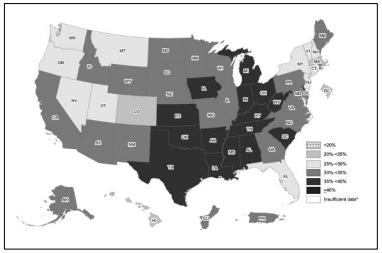
2

The Changing Landscape of Adult Weight

CDC 2011 Adult Obesity Prevalence Map



CDC 2020 Adult Obesity Prevalence Map



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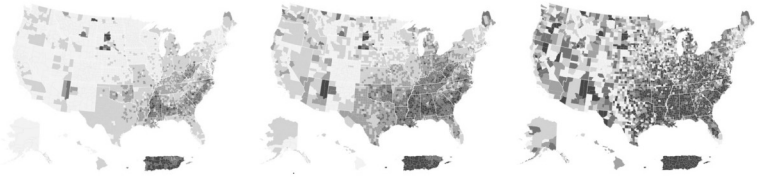
3

Figure 5. County-Level Distribution of Diagnosed Diabetes Prevalence Among US Adults Aged 20 Years or Older, 2004, 2008, and 2016



2004 2008 2016

1.5%–6.9%	7.0%–8.4%	8.5%–9.8%	9.9%–12.1%	12.2%–33.0%

Notes: Percentages are age-adjusted to the 2000 US standard population. Data were not available for all US territories. Figure adapted from CDC's *National Diabetes Statistics Report 2020.*
Data source: CDC's United States Diabetes Surveillance System. For detailed data for each map, go to https://gis.cdc.gov/grasp/diabetes/DiabetesAtlas.html#. Click "County Data" tab at top and select "All Counties."

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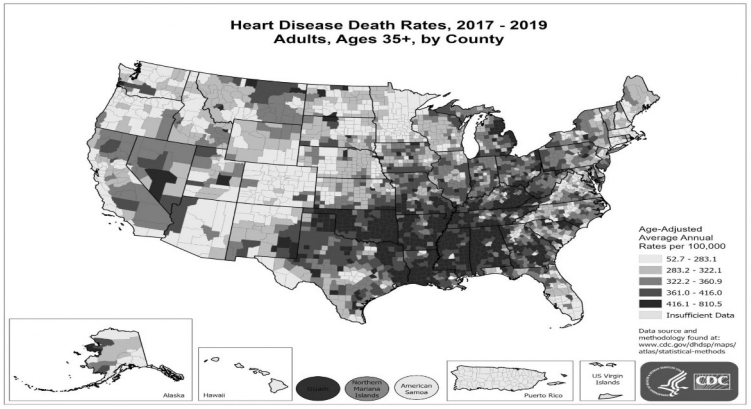
4

Heart Disease Death Rates, Total Population Ages 35+



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5

SCIENTIFIC AMERICAN

PUBLIC HEALTH

The Hunger Gains: Extreme Calorie-Restriction Diet Shows Anti-Aging Results

A new study shows five days of hunger a month may reduce risk factors for aging and age-related diseases

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6

Caloric Restriction?

Canto is 27-year-old monkey on CR diet, Owen is 29-year-old on unrestricted diet.

- 25-year study University of Wisconsin: **76 rhesus monkeys aged 7–14** years, fed **diet reduced in calories by 30%.**
- **Disease 3-fold greater in control group**. **No evidence of diabetes** in any caloric-restricted animal.[1]
- **2-year** study randomized 218 non-obese people to current diet or 25% caloric restriction (**11.7%** on average).[2]
  - **Statistically significant reduction in inflammatory markers, weight loss, improved mood, sleep duration, etc.**

1. news.wisc.edu/monkey-caloric-restriction-study-shows-big-benefit-contradicts-earlier-study/
2. Ravussin E, et al. *J Gerontol A Biol Sci Med Sci.* 2015;70(9):1097–104

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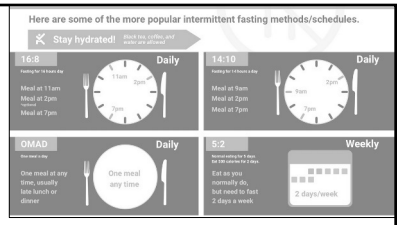
7

Intermittent Fasting



- Over human history, food sources were at times **abundant and at times scarce.**
- Periods of eating and fasting probably the norm. **Theory of thrifty genes states these fluctuations are required for *optimal* metabolic function.**
- **Intermittent fasting** is one way to replicate this evolutionary pattern.
- Bodies respond to intermittent fasting in ways that protect us from **diseases of aging by improving cardiovascular and cognitive function, and risk factors for developing metabolic diseases.**

Varady KA, et al. Alternate-day fasting and chronic disease prevention: a review of human and animal trials. *Am J Clin Nutr* 2007; 86(1): 7-13

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8

NEJM Review

Dozens of animal and human studies reviewed to explain how fasting improves **metabolism, lowering blood sugar**; **lessens inflammation,** which improves range of issues from **pain and heart disease to asthma**; helps remove **toxins and damaged cells**, lowering risk for **cancer and improving brain function.**

deCabo R, et al. Effects of Intermittent Fasting on Health, Aging, and Disease. *N Engl J Med* 2019; 381:2541-2551

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9

10

One Thing in Common

Despite incredible variation in dietary patterns, **all have this in common:**

- DRAMATIC reduction/elimination of **ultra-processed foods**—industrial foods with little/no intact foods, often high in **added sugars, salts, artificial flavors, colors and other additives.**
- Individuals with **highest vs. lowest** intake of ultra-processed foods had a **31% increased likelihood of death** after adjusting for confounders.[1]
- In US: **57% of total calories for adults**[2] and **67% of total calories for children**[3] come from these foods.

1. Kim H, et al. *Public Health Nutr* 2019; 22(10):1777-1785. 2. Juul F, et al. *Am J Clin Nutr* 2022; 115(1):211-221
3. Wang L, et al. *JAMA* 2021; 326(6):519-530

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11

Plant Based Diets

- Let's be more specific. Many not so healthy **"plant based" foods**: white rice, doughnuts, French fries, white bread, cookies, etc. Many high in refined starch/sugar, representing ~42% of all calories in US compared to ~5% of calories from unprocessed red meats.[1]
- **Poultry and eggs** neutral, **dairy** may have beneficial metabolic benefits, especially reducing body fat and type 2 diabetes; **seafood** linked to several health benefits.[2]
- **Plant based meats**? Genetically engineered yeasts; new proteins; Impossible adds "heme" iron; many high in **saturated fat, sodium**, **ultra processed.**
- Most diet-related diseases are caused by **NOT EATING ENOUGH** fruits, nuts, seeds, beans, vegetables, whole grains, plant oils, seafood, and yogurt **AND TOO MUCH** ultra-processed foods high in salt, refined starch, or added sugar.

1. Shan Z, et al. *JAMA* 2019; 322(12):1178-1187 2. Mozaffarian D. *Circulation* 2016; 133(2): 187-225.

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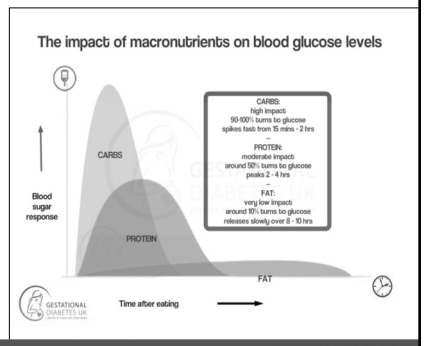
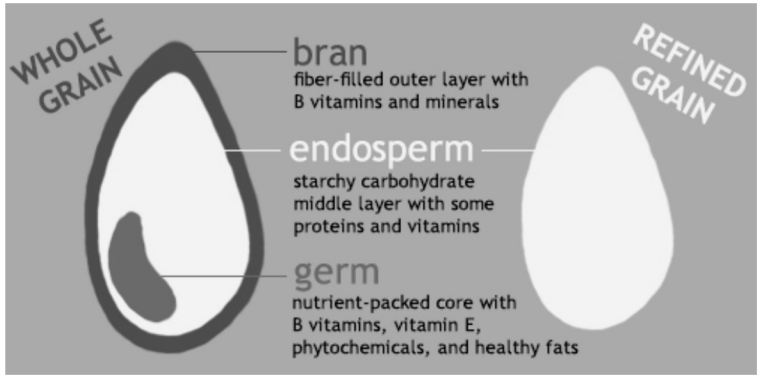
12

Refined Carbohydrates

- Overdo processed/refined carbs, **blood sugar rises, insulin released, store** extra glucose as **fat, drive inflammation.**
- Blood sugar goes up and then can plummet, **leaving one tired and disrupting sleep/wake cycle.**
- **Eating lots of carbs** makes one **crave** lots of carbs (dopamine rush).
- High sugar diets cause **dysbiosis and degrade intestinal barrier, leading to systemic inflammation.**



13



14

Sugars

- Table sugar (sucrose): bond **one glucose** molecule and **one fructose** molecule
- **High fructose corn syrup:** 55% fructose, 42% glucose, and 3% other sugars.
- Every cell in our body readily converts glucose into energy. But ***liver cells are one of few types of cells that can convert fructose to energy.***
- Large amounts of "free" fructose ***taxes the liver and increases risk of non-alcoholic fatty liver disease.***

15

Carbohydrates and Dental Caries

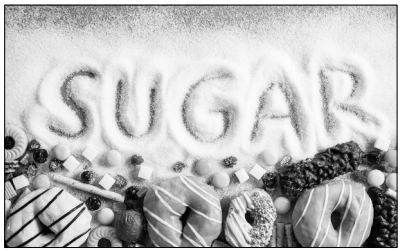
- Relationship between caries and carbohydrates well understood; **dental hard tissues demineralized by acidic by-products** produced by bacteria in biofilm (dental plaque) via **fermentation of dietary carbohydrates**.
- **Rapid fall in biofilm pH** (5.5 or below) **after carbohydrates are ingested**. This lower pH affects balance of microbes leading to **higher proportion of acidic biofilm species**, compounding tooth demineralization.
- **Sucrose most cariogenic sugar**, causes most **dramatic drop in pH**. **Lactose** is a sugar but **less cariogenic** because its fermentation produces smaller drop in pH.
- **Higher glycemic load foods** produce greater acute **pH decreases** and larger overall postprandial glucose responses compared to lower GL foods.

Tinanoff N, et al. *Int J Paediatr Dent* 2019;29(3):238-48; Sheiham A et al. *J Dent Res* 2015;94(10):1341-7.
Palacios C, et al. *Caries Res* 2016;50(6):560-70; Atkinson FS, et al. *Nutrients* 2021 Aug 6;13(8):2711.

16

Frequency of Consumption

- **Frequent** sucrose consumption associated with **decreased species diversity** and increased abundance of *Streptococcus spp.* in the oral biofilm and is **more predictive of caries risk** that simply **total sugar consumption.**
- Takes approximately **30 minutes for pH to drop after sugar intake,** so additional sugar intake *within* that 30-minute period **less harmful** than **additional intake *after* 30 minutes.**



van Loveren C. Sugar Restriction for Caries Prevention: Amount and Frequency. Which Is More Important? *Caries Res* 2019;53(2):168-75.
Millen AE, et al. Dietary carbohydrate intake is associated with the subgingival plaque oral microbiome abundance and diversity in a cohort of postmenopausal women. *Scientific Reports* 2022; 12: 2643

17

Sugar Substitutes: Better?

Nettleton JE, et al. Reshaping the gut microbiota: Impact of low calorie sweeteners and the link to insulin resistance? *Physiol Behav* 2016;164(Pt B):488-93.

- Sugar substitutes frequently ***1,000 times sweeter*** than sucrose.
- Despite GRAS status by regulatory agencies, sugar substitutes **can have negative effects** on gut microbiota.
- **Sucralose and saccharin disrupt** balance and **diversity** of gut microbiota. **Sucralose increases bacterial pro-inflammatory genes.**
- **Xylitol, erythritol neutral effect.**

18

Glycemic Index/Load

- **Glycemic load is** measurement of impact of **carbohydrates on *blood sugar/insulin.***
- International **consensus** conference concluded that given ***consistency of scientific evidence*,** diets **low in glycemic index/load** should be promoted in the **prevention and management of *diabetes*** and **coronary heart disease;** are **particularly important in individuals with insulin resistance.**

Augustin LS, et al. Glycemic index, glycemic load and glycemic response: An International Scientific Consensus Summit from the International Carbohydrate Quality Consortium (ICQC). *Nutr Metab Cardiovasc Dis* 2015 Sep;25(9):795-815.

19

Glycemic Index Calculation

Food containing 50 g carbohydrate is given
- ✦ 200 g of spaghetti = 50 grams of carbs
- ✦ Blood samples every 15 minutes for first hour then every 30 minutes and graphed
- ✦ Response compared to reference values found with 50 g of pure glucose (GI of 100)
- ✦ Retested 3 occasions and averaged with 8-10 other volunteers

20

Glycemic Load Calculation

Accounts for both GI and *serving size*

- GI x amount of carbohydrate (g)/100 = GL
- One teaspoon jam = **5** grams and has **GI 51**
- GL = (5 x 51) / 100 = **2.5**

Foods that slow digestion lower the GL

- Presence of **fiber or fat**
- **Presence of acid**
- **Lemon, lime juice, vinegar**

Low	0–10
Moderate	11–19
High	20 +

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21

21

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
Carrots	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

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	1 3.5 inch	24
Pumpernickel 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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22

Low/High GI Meals

GI = 80 GL = 32

GI = 61 GL = 12

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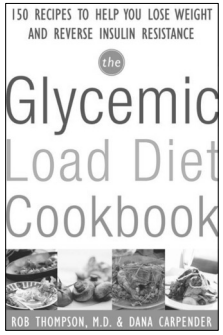
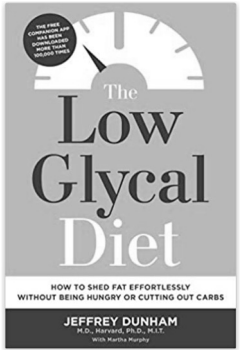
23





Low Glycal Diet Calculator

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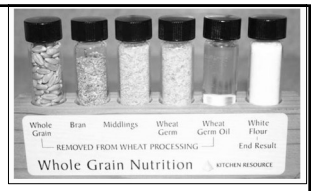
24

Tips on Whole Grains



- **100% Whole Wheat** (first ingredient!)
- **Oats** (skip the instant)
- **Brown** Rice (white has bran/germ removed, LOW in nutrients)
- **Whole Rye** (four times the fiber of whole wheat, most nutritious)
- **Whole Grain Barley** (not pearled: bran and germ have been removed)
- **Buckwheat** (loaded in magnesium, gluten-free)
- **Quinoa** (not a grain, it's a seed loaded in protein and omega 3)
- **Whole Wheat Couscous** (delicious and high in fiber)
- **Corn** (organic, non-GMO—increases healthy gut flora)

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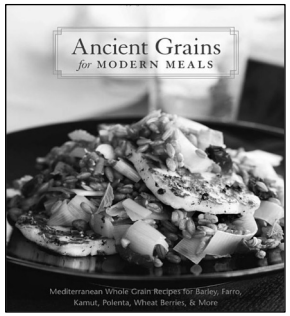
25

Consider Ancient Grains



- ***Teff*, einkorn, emmer, *amaranth*, *millet*, *quinoa*, *black rice,* black barley, and spelt.**
- Generally, have **more protein, fiber, and vitamins than modern grains.**
- Those italicized are gluten free. Those with *wheat intolerance can often* **consume ancient grains.**

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26

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27

Nutrition Facts
Serving Size 1/2 cup (40g)
Servings Per Container 28

Amount Per Serving	
Calories 190	Calories from Fat 90
	% Daily Value*
Total Fat 10g	**15%**
Saturated Fat 5g	**25%**
Trans Fat 0g	
Cholesterol 15mg	**5%**
Sodium 115mg	**5%**
Potassium 60mg	**2%**
Total Carbohydrate 24g	**8%**
Dietary Fiber 1g	**4%**
Sugars 18g	
Protein 2g	

Vitamin A 4% • Vitamin C 2%
Calcium 2% • Iron 8%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Potassium		3,500 mg	3,500 mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Nutrition Facts
Serving Size 1 1/4 Cup (58g)
Servings Per Container About 6

Amount Per Serving	
Calories 180	Calories from Fat 15
	% Daily Value*
Total Fat 2g	**3%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Polyunsaturated Fat 1g	
Monounsaturated Fat 0g	
Cholesterol 0mg	**0%**
Sodium 115mg	**5%**
Potassium 390mg	**11%**
Total Carbohydrate 40g	**13%**
Dietary Fiber 13g	**52%**
Soluble Fiber 1g	
Insoluble Fiber 12g	
Sugars 8g	
Protein 12g	**17%**

Vitamin A 0% • Vitamin C 0%
Calcium 4% • Iron 10%
Phosphorus 20% • Magnesium 15%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat. Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Potassium		3,500mg	3,500mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g
Protein		50g	65g

Carbs to Fiber Ratio

- Total carbs to dietary fiber
- Corn flakes far left, Kashi GoRise cereal right.
  - >10:1 is poor
  - <10:1 is good
  - <6:1 is great

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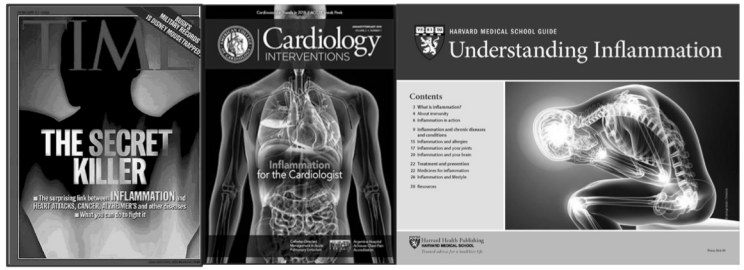
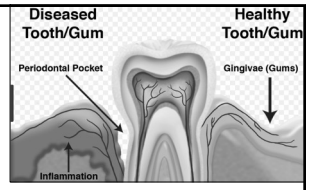
28

INFLAMMATION…



29

Inflammation and the Oral Cavity



- Inflammation and periodontal disease well established.
- **Dietary Inflammatory Index** based on measuring inflammation in the body in response to specific foods (1,900 studies).
- Tobacco and alcohol major risk factors for oral and pharyngeal cancers, but in large cohort, ***higher DII scores increased risk of oral/pharyngeal cancer.***
- NHANES – those with **highest DII score** had **16% more teeth lost compared to those with lowest scores.**

Shivappa N, et al. Inflammatory potential of diet and risk of oral and pharyngeal cancer in a large case-control study from Italy. *Int J Cancer* 2017; 141(3):471-479; Kotsakis GA, et al. Diet-borne systemic inflammation is associated with prevalent tooth loss. *Clin Nutr* 2018 Aug;37(4):1306-1312.

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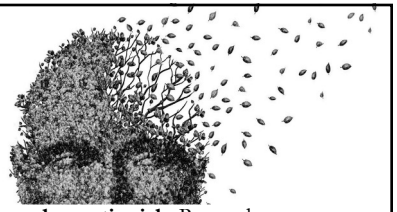
30

Mediterranean Diet Inflammation & Memory



- **Mediterranean diet associated with lower dementia risk.** Researchers evaluated inflammatory potential of diet in relation to mild cognitive impairment/dementia risk using the **DII during an average follow up of 9.7 years during Women's Health Initiative Memory Study.**
- **Higher inflammatory scores** were significantly associated with ***greater cognitive decline and earlier onset of cognitive impairment***.

Hayden KM, et al. The association between an inflammatory diet and global cognitive function and incident dementia in older women: The Women's Health Initiative Memory Study. *Alzheimers Dement* 2017 May 19. pii: S1552-5260(17)30185-1.

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31

Inflammatory Food Ratings

200 or higher	Strongly anti-inflammatory
101 to 200	Moderately anti-inflammatory
0 to 100	Mildly anti-inflammatory
-1 to -100	Mildly inflammatory
-101 to 200	Moderately inflammatory
-201 or lower	Strongly inflammatory

FOOD	SERVING SIZE	SERVING SIZE (GRAMS)	IF RATING
AGAVE NECTAR	1 TBSP	21	**-74**
ALMOND BUTTER	¼ CUP	64	100
CHEESE, CHEDDAR	1 OUNCE	28.35	**-20**
CHICKEN BREAST, RSTD	3 OUNCES	**85**	**-19**
MILK, WHOLE	1 CUP	246	**-46**
OLIVE OIL	1 TBSP	14	74
ONIONS, COOKED	½ CUP	105	240
RICE, WHITE	1 CUP	158	**-153**
SPINACH	1 CUP	30	75
SALMON, SOHO BAKED	3 OUNCES	85	**450**
TURMERIC	½ TSP	1.5	338

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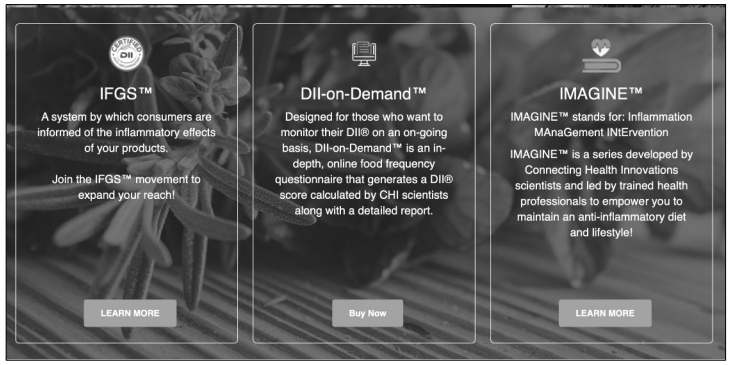
32



https://imaginehealthy.org

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33

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34

Protein Needs

- From Greek *protos,* "first." Build **new cells, maintain tissues** (e.g., muscles, hair, nails), create **enzymes, make hemoglobin**, **lipoproteins to transport cholesterol; present in membrane of every living cell.**
- **Protein depravation studies:** breakdown of periodontal ligaments, degeneration of gingival tissues, and resorption of alveolar bone. Danish study: **inverse** relationship **high protein intake and periodontitis**.
- Sources: meat, poultry, seafood, eggs, soy products, nuts, nut butters, beans, peas, and seeds.
  - Choose seafood 2 x weekly (low in mercury, high in omega 3s, sustainable).
  - Include beans and peas often in your diet, as a side or main dish.
  - Chicken and poultry regularly, red meat 10 ounces per week. Avoid processed red meats.

Adegboye AR, et al. Calcium, vitamin D, casein and whey protein intakes and periodontitis among Danish adults. *Public Health Nutr.* 2016; 19:503–51

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35

Protein Maintains Healthy Bones

- Framingham Osteoporosis Study: ***higher protein intakes*** (60–83g/d versus 46g/d) in men/women (mean 75 years) associated with ***37% decreased risk of hip fracture.***
- Systematic review ***29 studies: protein intakes above current RDA have beneficial role in preventing hip fractures and BMD loss.***

Misra D, et al. *Osteoporosis Int* 2011; 22(1):345-349.
Beasley JM, et al. *Am J Clin Nutr* 2014; 99(4):934-940.
Calvez J, et al. *Eur J Clin Nutr.* 2012;66(3):281-295.
Wallace TC, et al. J Am Coll Nutr 2017; 36(6):481-496

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36

Dairy: *Hero or Villain?* Neither.

- **Systematic review:** consumption of milk/other dairy products **did not show pro-inflammatory effect** in healthy subjects or individuals with metabolic abnormalities.
- Consumption of various forms of dairy products shows either **favorable or neutral associations** with **cardiovascular**-related clinical outcomes.
- **Fermented dairy** (e.g., cheese, kefir, yogurt) generally better outcomes.

Ulven SM, et al. Milk and Dairy Product Consumption and Inflammatory Biomarkers: An Updated Systematic Review of Randomized Clinical Trials. *Adv Nutr* 2019; 10(S2): S239-50

Soedamah-Muthu SS, et al. Dairy Consumption and Cardiometabolic Diseases: Systematic Review and Updated Meta-Analyses of Prospective Cohort Studies. *Curr Nutr Rep* 2018; 7(4): 171-82

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37

Red Meat Consumption

Recent review: **61 articles; 55 cohorts, 4.2 million participants**

- Low-certainty evidence: reduction in unprocessed red meat intake of 3 servings/week associated with **very small reduction in risk for cardiovascular mortality, stroke, heart attack and type 2 diabetes**.

Review: **118 articles, 56 cohorts, >6 million participants**

- Possible absolute effects of red and processed meat consumption on cancer mortality and incidence are very small; certainty of evidence is low to very low.

Zeraatkar D, et al. Red and Processed Meat Consumption and Risk for All-Cause Mortality and Cardiometabolic Outcomes: A Systematic Review and Meta-analysis of Cohort Studies. *Ann Intern Med.* 2019. DOI: 10.7326/M19-0655

Han MA, et al. Reduction of Red and Processed Meat Intake and Cancer Mortality and Incidence: A Systematic Review and Meta-analysis of Cohort Studies *Ann Intern Med.* 2019. DOI: 10.7326/M19-0699

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38

How Much Protein Do You Need Per Day?

- **~0.8 g/kg body weight for adults**
  - **(Multiply weight in lb. x 0.36)**
  - 150 pounds = 55 g/d
  - 180 pounds = 65 g/d
- **1.0–1.2 g/kg for those over age 60***
  - 150 pounds = 69–81 grams
  - 180 pounds = 81–98 grams
- **1.2–1.5 g/kg competitive athletes**

Not for those with kidney disease.

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39

Protein Rich Foods

Food	Portion Size	Protein (g) (approximate)
Meat, fish, or poultry	75g (2 ½ oz) / 125 mL (½ cup)	21
Firm tofu	150g / 175 mL (¾ cup)	21
Egg, chicken	2 large	13
Cheese	50 g (1 ½ oz)	12
Fortified soy beverage	250 mL (1 cup)	6-8.5
Cooked dried beans, peas, or lentils	175 mL (¾ cup)	12
Cow's milk	250 mL (1 cup)	9
Yogurt	175 mL (¾ cup)	8
Peanut butter or other nut spread	30 mL (2 Tbsp)	8
Nuts or seeds	60 mL (¼ cup)	7
Bread	1 slice (35g)	3
Cereals, cold	30 g	3
Cereals, hot	175 mL (¾ cup)	3
Pasta or rice	125 mL (½ cup)	3
Vegetables	125 mL (½ cup) or 250 mL (1 cup) lettuce	2
Fruit	1 fruit or 125 mL (½ cup)	1

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40

Protein Powders

- **Whey** protein hydrosolate: digested quickly after workout.
- **Casein:** "time-release protein" take before bed for muscle recovery.
- **Egg white:** no fat, equal to whey. Allergy.
- **Soy:** complete protein, no carbs/fiber, highly absorbed. Allergy.
- **Hemp:** omega 3, fiber, less protein.

  (All the above are "complete proteins")

- **Brown Rice - hypoallergenic**
- **Pea – see next page**

Per 20g serving	Soy*	Rice**	Pea*	Hemp*
Calories (kcal)	80	88	72	77
Protein (g)	17	15.3	15.5	9
Fat (g)	1	1.2	1.1	1.9
Carbs (g)	0	2.4	1.5	6.5 (5.2g fiber)
Sodium (mg)	190	0	192	0
Cost (per 100g) In USD	2.3	4.32	3.96	2.82

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41

Pea Protein

	Pea protein	Whey protein
Calories	120	118
Protein	22.5 grams	27 grams
Carbs	1.5 grams	1 gram
Fat	2.25 grams	less than 1 gram
Cholesterol	0 grams	0.011 grams
Fiber	1.5 grams	0 grams
Sugar	0 grams	0 grams
Sodium	15% of the Daily Value (DV)	2% of the DV
Calcium	7% of the DV	10% of the DV
Potassium	1% of the DV	4% of the DV
Iron	42% of the DV	0% of the DV

- Good choice for those with **allergies or who are vegan/vegetarian**
- Much higher in **iron,** making it a good choice for **menstruating or pregnant women**
- **No methionine**
- **Usually made from yellow split peas, not if you have gout**

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42

Favorite Protein Bars

- **RX Bar** (12 g protein, O g added sugar, 5 g fiber)
- **Aloha Plant Based** (14 g protein, 13 g fiber)
- **Layers Protein Bar** (15 g protein, 3 g added sugar)
- **Epic Meat Bars** (9-15 g protein, 0 added sugar)
- **Clif Bar Whey Protein** (14 g prot, 3 g fiber, 5 g sugar)
- **Kind Protein** (12 g protein, 5 g fiber, 6 g sugar)
- **Naked Nutrition Peanut Butter** (15 g protein, 6 grams fiber, 13 grams sugar)

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43

Healthy Fats

- **Most concentrated source of energy**—more than twice carbohydrates or proteins.
- Acts as messengers in reactions that help **control growth, immune function, reproduction, and basic metabolism.**
- Makes **foods flavorful** and help us feel full.
- Include a variety of healthy fats in the diet:
  - **Extra virgin olive, sunflower, avocado, peanut oils**
  - **Avocados**
  - **Nuts**
  - **Fish and seafood (omega-3 fatty acids)**

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44

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45

Fish & Seafood

Excellent source of protein high in **omega 3 fatty** acids. Provide **vitamin D and contribute valuable nutrients: selenium, iodine, magnesium, iron and copper.**

- Fish/seafood have **positive effect on oral health**
- **Help reduce atherosclerosis and maintain healthy blood pressure**
- **Promote brain health** and may help reduce the risk of **depression.**
- Necessary for the health of the **eyes.** Can help reduce **dry eye syndrome.**
- Crucial for health **pregnancy** and **childhood development.**
- Quells **inflammation**

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46

CATEGORY	SPECIES	HELPFUL INFORMATION
EWG'S BEST BETS! Very High Omega-3s, Low Mercury, Sustainable	WILD SALMON SARDINES MUSSELS RAINBOW TROUT ATLANTIC MACKEREL	One or two four-ounce servings a week of these fish have little mercury and optimum levels of omega-3 fatty acids for pregnant or nursing women and people with heart disease.
GOOD CHOICES High Omega-3s, Low Mercury	OYSTERS ANCHOVIES POLLOCK/IMITATION CRAB HERRING	These species have favorable concentrations of omega-3 fats. One four-ounce serving provides at least 25 percent of the weekly recommended omega-3 consumption. A pregnant woman of average weight could eat three four-ounce servings per week without ingesting too much mercury. These species do not necessarily come from sustainable sources.
LOW MERCURY But Also Low Omega-3s	SHRIMP CATFISH TILAPIA CLAMS SCALLOPS PANGASIUS (BASA, SWAI, OR TRA)	These varieties can be healthy sources of protein and other nutrients, but an adult would have to eat five to 20 four-ounce portions to meet the omega-3 recommendation for pregnant women and people with heart disease.
MERCURY RISKS ADD UP Pregnant Women And Children Should Limit Or Avoid	CANNED LIGHT AND ALBACORE TUNA HALIBUT LOBSTER MAHI MAHI SEA BASS	These fish contain too much mercury to be part of the regular diet of pregnant women and children. How much you can safely eat depends on your age, weight and health status. Use EWG's Seafood Calculator to gauge how often you can eat them and to find healthier options.

https://www.ewg.org/research/ewgs-good-seafood-guide/executive-summary

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47

AVOID Mercury Levels Too High To Eat Regularly	SHARK* SWORDFISH* TILEFISH* KING MACKEREL* MARLIN** BLUEFIN AND BIGEYE TUNA STEAKS OR SUSHI** ORANGE ROUGHY**	High-mercury seafood should never be eaten by pregnant women and children, according to EWG's analysis and federal government warnings. Everyone else should eat these species infrequently or not at all. *FDA/EPA advisories recommend that pregnant women and children never eat these species. ** EWG analysis concludes these species are high in mercury.

https://www.ewg.org/research/ewgs-good-seafood-guide/executive-summary

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48

Name of Oil	Smoke Point	Other
Avocado	520/420 F	Refined/unrefined. Good for deep frying, mild flavor
Rice bran oil	490 F	Good for stir-fries, light taste
Ghee	480 F	Nutty flavor,
Canola oil, high oleic	475 F	Light taste, high in omega 3 fatty acids
Olive oil	468/375 F	Regular/Extra Virgin
Coconut oil	450/350 F	Refined/Virgin
Sunflower oil	440/225 F	Refined/unrefined: Sauté, baking, light flavor, versatile
Peanut oil	440/320 F	Refined/unrefined. Neutral taste.
Grapeseed oil	420 F	Light, good for frying and baking
Almond oil	420 F	Clean flavor, stir fries/sauteeing.
Hazelnut/Macadamia oil	430/413 F	Baking, nutty flavor
Sesame oil	410/350 F	Refined /unrefined. Stir frying, salads
Butter	350 F	Highly versatile, watch smoke point.

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49

- Extra virgin olive oil made simply by crushing olives. Only cooking oil made without the use of chemicals and industrial refining.
- Must be produced entirely by mechanical means without the use of any solvents, and under temperatures that will not degrade the oil.
- Olive oil should be kept refrigerated for optimal shelf life.
- To find top olive oils that meet rigorous quality standards: **www.bestoliveoils.com**

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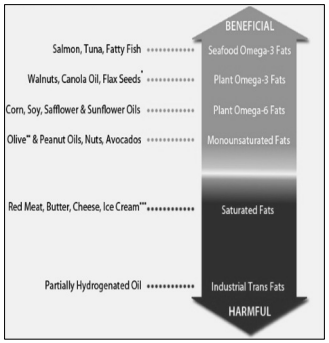
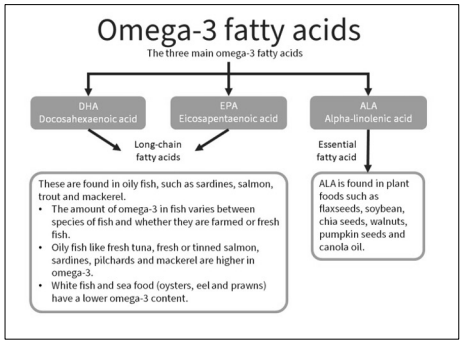
50





Fish concentrate EPA and DHA from algae, their primordial source.

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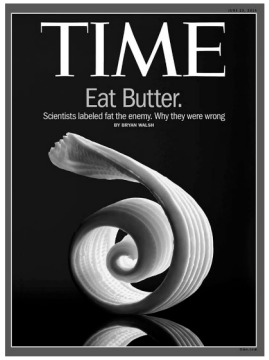
51

Saturated Fat Debate

- Three large meta-analyses (21 studies, 12 studies, and 76 studies) **failed to show significant evidence that saturated fat increases risk for heart disease.**
- Failed to find significant evidence that **increasing polyunsaturated fats and decreasing saturated fats lowers heart risk.**
- ***Note: high saturated fat diets increase intestinal permeability and can drive inflammation.***



Siri-Tarino, *Amer J Clin Nutr* 2010; 91 (3): 535–46.
Schwingshacki 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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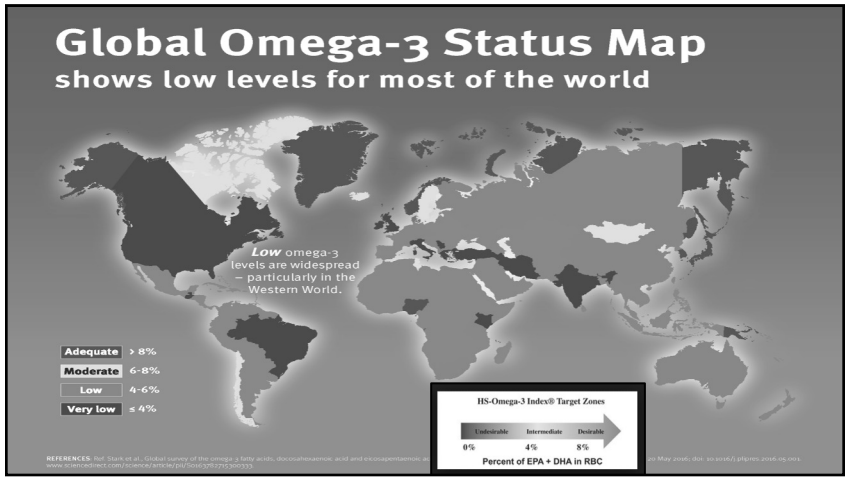
52



53

EPA & DHA Health Benefits

- Crucial for brain/eye development of baby first 1,000 days of life
- Lower triglycerides (but non-LDL-C)
- Mildly lower blood pressure
- Reduces inflammation
- Reduces risk of heart disease
- May improve cognitive function, depression, and ADHD

Mohan D, et al. *JAMA Intern Med* 2021 May 1;181(5):631-649.

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54

Greater Longevity with a Higher Omega-3 Index

WOMEN'S HEALTH INITIATIVE

Postmenopausal women with an Omega-3 Index over 8% were 30% less likely to die than those with an Index under 4% over 15 years.

Recovering from a Heart Attack with Omega-3s: The OMEGA-REMODEL Study

VE RI TAS
HARVARD MEDICAL SCHOOL

Patients who had recently had a heart attack and were then treated with omega-3 fatty acids for 6 months had healthier hearts if their Omega-3 Index reached 11% compared to those with lower levels.

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55

The Omega-3 Index and Risk for Fatal CHD

Stanford University

Data from 10 prospective cohort studies including >24,000 subjects showed that an Omega-3 Index of 8% or greater was associated with the lowest risk for fatal CHD.

Total Mortality and the Omega-3 Index: Heart and Soul

UCSF
University of California San Francisco

People with the highest Omega-3 Index levels lived longer than those with the lowest levels.

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56

Omega 3 and Periodontitis

- Increasing **omega-3** intake associated with **lower gum inflammation.**
- Harvard study: **55 adults** with moderate periodontitis randomized to receive **81 mg per day aspirin** plus either **2,000 mg/d DHA or placebo** (soy/corn oil) for 3 months.
- In active group: DHA levels increased from 3.6% to 6.2%, no increase observed in placebo group.
- Improvements noted in **pocket depth and gingival index**, as well as reduction in **CRP and IL-1-beta in the oral cavity.**

Naqvi AZ, et al. Docosahexaenoic acid and periodontitis in adults: a randomized controlled trial. *J Dent Res* 2014 Aug;93(8):767-73.

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57

Fish Oil: What Type is Best?

- Supplementation **is an *alternative* to eating fish; however, not all supplements are equal.**
- Randomized, crossover study of 35 healthy individuals compared four popular brands/types of omega 3 fatty acids:
  - **Concentrated triglyceride (rTG) – Nordic Naturals ProOmega**
  - **Ethyl ester (EE) – Minami MorEPA**
  - **Phospholipid krill oil (PL) – Source Natural Arctic Pure**
  - **Triglyceride salmon oil (TG) – New Chapter Whole Mega Salmon**

Laidlaw M, et al. *Lipids Health Dis* 2014; 13:99

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58

Dosing According to Manufacturer's Recommendations

TRT	Product	EPA & DHA per capsule*	Tested values	Label use: caps/day	Daily dosage of EPA + DHA
rTG	Nordic Naturals ProOmega®	325 mg EPA	329.6 mg EPA	2	EPA: 650 mg
	Triglyceride	225 mg DHA	226.0 mg DHA		DHA: 450 mg
EE	Minami MorEPA®	756 mg EPA	774.2 mg EPA	1	EPA: 756 mg
	Platinum Ethyl Ester	228 mg DHA	233.7 mg DHA		DHA: 228 mg
PL	Source Naturals ArcticPure®	75 mg EPA	78.0 mg EPA	2	EPA: 150 mg
	Krill Oil Phospholipid	45 mg DHA.	46.7 mg DHA.		DHA: 90 mg
TG	New Chapter				
	Wholemega® Salmon	90 mg EPA	96.4 mg EPA	2	EPA: 180 mg
	Oil Triglyceride	110 mg DHA	109.5 mg DHA		DHA: 220 mg

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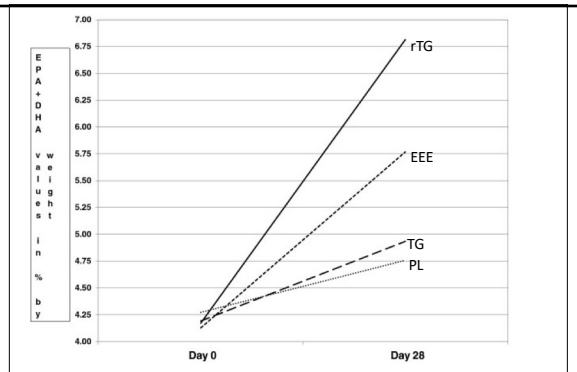
59



Mean levels of EPA + DHA for four supplement groups at Day 0 and Day 28.

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60

Omega 3 and Prostate Cancer?

- **SELECT trial raised concerns** about potential link between omega-3s and increased prostate cancer/aggressive cancer.
- European Food Safety (EFSA) concluded, "there is **no evidence** for a role of EPA and/or DHA intake in the development of prostate cancer."
- Also, ***"supplemental intake of EPA and DHA combined at doses up to 5 g/d does not give rise to safety concerns for adults."***
- FDA: safe supplemental level **2 g/d and total EPA/DHA at 3 g/d**

EFSA Journal 10(7): doi:10.2903/j.efsa.2012.2815

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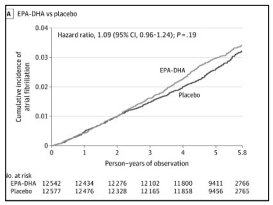
61

Heart Arrythmias?



Albert CM, et al. Effect of Marine Omega-3 Fatty Acid and Vitamin D Supplementation on Incident Atrial Fibrillation: A Randomized Clinical Trial. *JAMA* 2021 Mar 16;325(11):1061-107

- Omega 3's have been said to **reduce** *and* **increase** the risk of heart arrythmias.
- Randomized clinical trial **25,119 women/men aged 50 years or older** without cardiovascular disease, cancer, or AF **failed to show any effect (positive or negative) with 1 gram/d marine omega 3, 2000 IU vitamin D, or combo.**

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62

Eggs Primary Source of Choline

- Choline water soluble nutrient in B-vitamin family. Without **adequate choline** for phosphatidylcholine synthesis, **triglycerides** accumulate, which leads to **non-alcoholic fatty liver**.
- Deficiency in pregnancy may be associated with permanent changes in brain function that negatively impact intelligence, memory, mood regulation, and stress response in baby.

Current adequate intake recommendations for choline.

Stage	IOM—1998 [1]				EFSA—2016 [2]	
	Age	AI (mg/day)		UL (mg/day)	Age	AI (mg/day)
		Males	Females			
Infants	0–6 month	125	125	-	0–6 month	120
	7–12 month	150	150	-	7–11 month	160
Children	1–3 year	200	200	1000	1–3 year	140
	4–8 year	250	250	1000	4–6 year	170
	9–13 year	375	375	2000	7–10 year	250
	14–18 year	550	400	3000	11–14 year	340
					15–17 year	400
Adults	≥19 year	550	425	3500	≥18 year	400
Pregnancy	-	-	450	3000	-	480
Lactation	-	-	550	3500	-	520

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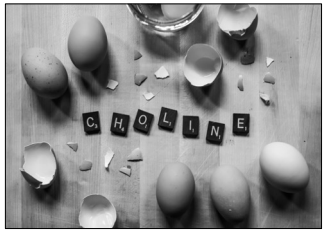
63

Choline

- American Congress of Obstetricians and Gynecologists, American Academy of Pediatrics, Europe Food Safety Authority, WHO: choline as ***crucially important*** during pregnancy.[1]
- Choline key nutrient in **early neurodevelopment** and for **lifelong mental health**.[1]
- **Pregnant** women need **450 mg/d, lactating** women need **550 mg/d**.
- Review 38 animal 16 human studies: supplementing over first 1,000 days of life could:
  - **Support normal brain development**
  - Protect against **neural and metabolic insults**, particularly when the **fetus is exposed to alcohol**
  - Improve **neural and cognitive functioning.**[2]



1. Schwarzenberg SJ. *Pediatrics.* 2018:141. doi: 10.1542/peds.2017-3716. 2. Derbyshire E, et al. *Nutrients* 2020 Jun 10;12(6):1731

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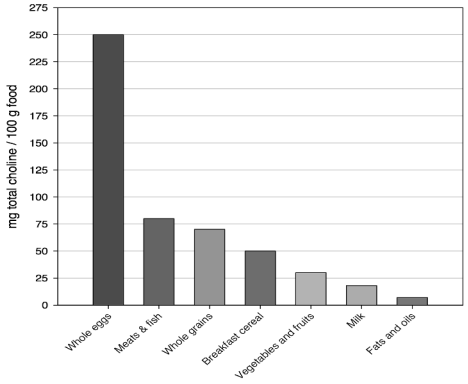
64

Choline in Foods: http://naldc.nal.usda.gov/download/47335/PDF



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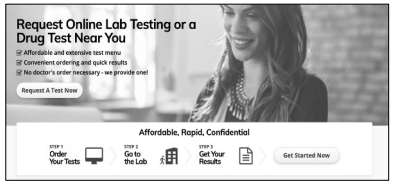
65

Where Can You Get Tested?

- Talk to your health care practitioner about potential concerns around micronutrient deficiencies.
- Most lab tests are readily available through LabCorp or Quest.
- If you order your own tests, www.requestatest.com, Vibrant America, **EveryWell,** and SpectraCell are commonly used.



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66

Beverages

- Your primary beverage of HYDRATION should be **water.**
  - Add fruit, cucumbers, mint leaves
  - Make your own "bubbly"
- **Coffee and tea** are fine (3–4 cups/d). Watch caffeine if ***sensitive*** to its effects.
- **Herbal tisanes** lovely addition for an afternoon or evening beverage
  - *Traditional Medicinals* and *Yogi* have many excellent offerings
- **Alcohol**: limit 1 serving/d if you drink

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67

Brand	pH
Simple Truth	5.0
Le Bleu	5.0
Dasani	5.0
Aquafina	5.0
Tap Water	6.5
The Mountain Valley	6.5
Spring Time	6.5
S. Pellegrino	6.5
Just Water	6.5
Icelandic Glacial	6.5
Voss	7.0
Smart Water	7.0
LifeWater	7.0
Kroger	7.0
Hydrogen Water	7.0
Fiji	7.0
Aqua Panna	7.0

Independent testing of various bottled waters.

https://watertestingkits.com/7-facts-about-ph-of-bottled-water/

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68

Resources

- ***Fortify Your Life*** and ***Guide to Medicinal Herbs*** with National Geographic
- **Dietary Supplement Label Database**: dsld.nlm.nih.gov
- **NIH National Center for Complementary & Integrative Health** (NCCIH): nccih.nih.gov
- **Office of Dietary Supplements**: ods.od.nih.gov
- **Linus Pauling Institute**: lpi.oregonstate.edu
- **Consumer Labs**: www.ConsumerLabs.com
- **Natural Medicines Research Collaboration** https://naturalmedicines.therapeuticresearch.com

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69