

The Use Of Diet and Nutritional Supplements to Maximize Wellness and Prevent Illness

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I have no conflicts of interest

I would describe my diet as:

- Balanced, healthy
- Not as healthy as I want it to be
- Vegetarian
- Pesco-vegetarian
- Mediterranean
- Low carbohydrate
- Low glycemic index
- Gluten-free
- Paleo
- None of the above

Why Do We Care About What We Eat?

US Leading Causes of Death, CDC	
1. Heart Disease	32.6%
2. Cancer	30.9%
3. Chronic lower respiratory disease	7.5%
4. Stroke	7.0%
5. Accidents	6.4%
6. Alzheimer's disease	4.3%
7. Diabetes	3.7%
8. Influenza and pneumonia	2.9%
9. Nephritis, nephrotic syndrome & nephrosis	2.7%
10. Intentional self-harm (suicide)	2.0%

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Lifestyle and Disease

- 1/3 of premature deaths in the U.S. are attributable to poor nutrition and physical inactivity.
- Over 50% of American adults do not get the recommended amount of physical activity.
- Only 10% of Americans eat a healthy diet consistent with federal nutrition recommendations.
 - Too high in calories, saturated and trans fat, salt, and refined sugars.
 - Too low in fruits, vegetables, whole grains, and fiber.

Topics

- Total calories and macronutrient balance
- Dietary Fiber
- US Dietary Guidelines
- Sodium
- Vegetarian Diets
- Mediterranean Diets
- Antioxidants and B vitamins
- Fish oil
- Vitamin D
- Recommendations

U.S. Calorie Intake

- Calorie consumption in the U.S. has increased 30% over the past 4 decades.

Year	Average calories consumed
1970	2,057
2008	2,674

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Top calorie sources in U.S.

1. Grain-based desserts
2. Yeast breads
3. Chicken and chicken-mixed dishes
4. Soda, energy drinks, and sports drinks
5. Pizza
6. Alcoholic beverages
7. Pasta and pasta dishes
8. Mexican mixed dishes
9. Beef and beef dishes
10. Dairy desserts

Extra Calories From Eating Away From Home

	Calories/meal at home	Calories/meal at a restaurant
Normal Weight	550	825
Overweight/Obese	625	900

Public Health Nutrition, 2013

Macronutrient Composition

- **Macronutrient composition:** the relative proportions of fat, carbohydrate, and protein in the diet
- **Bottom line:**
 - a wide range of macronutrient composition is consistent with a healthy diet
 - in most clinical circumstances total calories “trumps” macronutrient composition
 - achieving desired calorie intake will achieve most clinical goals

Dietary Fiber

- **Plant matter**
 - Not digested by human digestive enzymes
 - Some can be digested by gut bacteria
- **Includes**
 - Cellulose, hemicellulose, pectins, gums, and mucilages, lignins
- **Classified as soluble or insoluble**
- **IOM: Men 30-38 g/day. Women 21-25 g/day.**

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Dietary Fiber: The Most Important Nutrient?

- **Heart:** Lowers LDL, lowers triglycerides
- **Diabetes:** Reduces blood sugar
- **Gut:** Prevents constipation, hemorrhoids, diverticular disease
- **Weight:** Promotes satiety

Baron RB, BMJ 2013

Dietary Fiber: The Most Important Nutrient?

- **Meta-analysis of 22 cohort studies:**
- **Every 7 grams of fiber associated with a 9% decrease in CV events**
- **One portion of whole grains and one portion of legumes, or from two to four servings of fruits and vegetables.**

Threapleton DE, BMJ, 2013

Quantifying Dietary Fiber (per serving)

Apple:	4.4	Shredded wheat	6.1
Blueberries:	3.6	Brown rice	1.5
Orange:	3.0	White rice	0.3
Grapes	0.8	Peanuts	9.1
Pear:	5.5	Asparagus	1.4
Raspberries	8.0	Kidney beans	6.8
White bread	0.7	Broccoli	1.1
Wheat bread	1.9	Carrot	1.7
Wheat-bran cereal	7.4	Spinach	3.5
Cornflakes	0.9	Tomato	1.0
Oatmeal	4.8	Powdered psyllium	3.0

Principles of a Healthy Diet

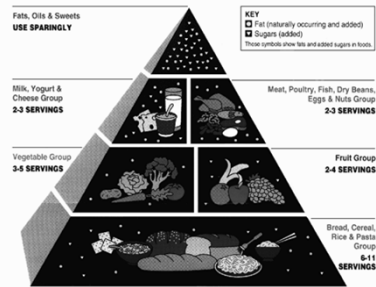
- **Wide variety of foods**
- **High food quality**
- **Moderation (right quantity)**

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“Basic Four” Food Groups (1956)



Food Group Pyramid (1992)



MyPlate (2010)



MyPlate

Grains 48 ounces	Vegetables 4 1/2 cups	Fruits 2 cups	Dairy 3 cups	Protein 5 1/2 ounces
Make half your grains whole Aim for at least 3 ounces of whole grains a day	Vary your veggies Aim for these amounts each week : Dark green veggies = 1 1/2 cups Red & orange veggies = 5 1/2 cups Beans & peas = 1 1/2 cups Starchy veggies = 5 cups Other veggies = 4 cups	Focus on fruits Eat a variety of fruit Choose whole or cut-up fruits more often than fruit juice	Get your calcium-rich foods Drink fat-free or low-fat (1%) milk, for the same amount of calcium and other nutrients as whole milk, but less fat and Calories Select fat-free or low-fat yogurt and cheese, or try calcium-fortified soy products.	Go lean with protein Twice a week, make seafood the protein on your plate Vary your protein routine—choose beans, peas, nuts, and seeds more often Keep meat and poultry portions small and lean
Find your balance between food and physical activity Be physically active for at least 150 minutes each week.		Know your limits on fats, sugars, and sodium Your allowance for oils is 6 teaspoons a day. Limit calories from solid fats and added sugars to 200 Calories a day. Reduce sodium intake to less than 2300 mg a day.		

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Dietary Guidelines 2010

- Enjoy food, but eat less
- Make half your "plate" fruits and vegetables; consume beans, whole grains, nuts and seeds
- Increase the intake of seafood & fat-free & low-fat milk and milk products
- Drink water instead of sugary drinks
- Compare sodium in foods and choose the lower v
- Consume only moderate amounts of lean meats, poultry & eggs

Dietary Guidelines 2015 (Draft)

- Limitations on dietary cholesterol have been removed
- Consume a diet rich in fruits and vegetables, whole grains, low-fat dairy, seafood, legumes, and nuts
- Consume a diet low in red or processed meats, sugar sweetened foods and beverages, and refined grains

Dietary Guidelines 2015 (Draft)

- Limit daily consumption of added sugars (<10% of calories), saturated fat (<10% of calories), and dietary sodium (2300 mg)
- Half of all grain intake should come from whole grains
- Moderate alcohol is fine in most adults
- Up to five cups of coffee per day is not associated with adverse effects in most adults

Too Many Refined Grains

- Federal guidelines recommend six 1 ounce servings per day for a 2000 calorie diet, and half should be whole grain.
- The average person eats 8 servings of grains per day, and 7 of the 8 are refined.



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What is a serving of grain?

- 1/2 cup cooked rice or other cooked grain
 - 1/2 cup cooked pasta
 - 1/2 cup cooked hot cereal, such as oatmeal
 - 1 six inch tortilla
 - 1 slice of bread (1 oz.); 1/2 bun
 - 1 very small (1 oz.) muffin
 - 1/2-1 cup ready-to-eat cereal
- (1/2 cup = 1/2 a baseball)



Select whole grains

- Look for “whole” in the first ingredient on the label.
- Aim for total carbs/fiber = <10 for bread and <5 for cereals.

Way Too Much Added Sugar

The average person consumes 30 teaspoons of sugar and sweeteners per day (over 15% of calories).

(Includes cane and beet sugar, high fructose corn syrup, corn syrup, dextrose, honey)

➤ The AHA recommends ≤ 6 teaspoons (24 grams) of added sugar per day for women, and ≤ 9 (36 grams) for men .

➤ A 20 oz. soda has twice that.

Nutrition Action Health Letter, CSPI, March, 2013



Salt and Public Policy

- Coronary Heart Disease Policy Model to quantify benefits of modest salt reduction in U.S.
- Benefit through a reduction in systolic blood pressure from 1-9 mm Hg in selected populations
- New cases of CHD decrease by 4.7 - 8.3 and stroke by 2.4 to 3.9 /10,000
- Regulatory change leads to wide benefit and is cost-effective

Bibbins-Domingo K, et al. NEJM 2010

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Sodium reduction and BP control in individual patients

- Reduce sodium intake to ≤ 100 meq/d (2.4 g Na): 2-8 mm Hg in SBP
- DASH Diet: 6 mm alone;
- DASH diet plus sodium restriction: 14 mm Na

Dietary Guidelines 2010

Addressing Sodium:

- 2,300 mg per day for general population
- 1,500 mg for aged 51+, African Americans & hypertension, diabetes & kidney disease

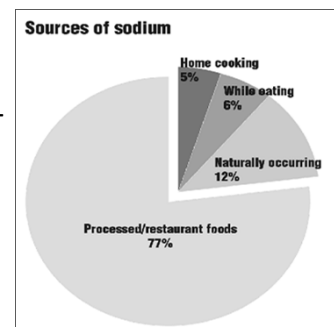
Sodium

But:

- 1/2 of U.S. would qualify for 1,500 mg recommendation
- Average current intake 3,400 mg per day (1.5 teaspoon salt)
- Institute of Medicine: May 2013:
 - Limit everyone to 2,300 mg per day (1 teaspoon salt)
 - Evidence doesn't support lower recommendations

Salt in the US Diet

80% in processed or pre-prepared foods



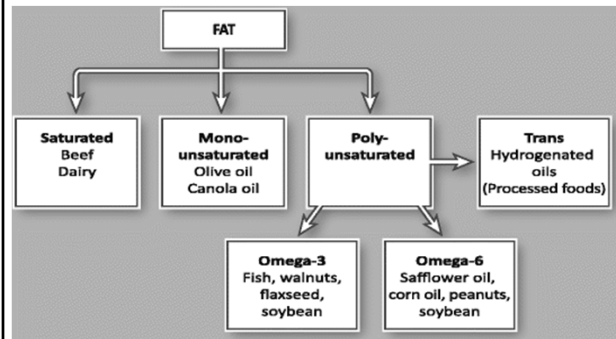
Sources: Mattes et al.

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Top sodium sources in U.S.

1. Yeast breads
2. Chicken and chicken-mixed dishes
3. Pizza
4. Soda, energy drinks, and sports drinks
5. Cold cuts
6. Condiments
7. Mexican mixed dishes
8. Sausage, franks, bacon and ribs
9. Regular chees
10. Grain-based desserts

Classification of Dietary Fat



Saturated Fat and Cardiovascular Disease (CVD)

- Meta-analysis of observational studies: no association between higher saturated fat and CVD
- But: strong evidence from RCT's that replacing saturated fat with unsaturated fat reduces total and LDL cholesterol.
- Replacing sat fat with carbohydrates also reduces total and LDL cholesterol but increase triglycerides and lowers HDL

Saturated Fat and Cardiovascular Disease (CVD)

- Replacing saturated fat with poly-unsaturated fat (or mono-unsaturated fat) reduces CVD events and mortality
- But: reducing total fat with carbohydrates does not lower CVD risk
- Current recs: need to be careful what replacers saturated fat.
- Use oils (soy, corn, olive, canola) to replace animal fats (butter, cream, lard) or tropical oils (palm, coconut)

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Mediterranean Diet: Healthy fats and good carbs with a big side of fruits and vegetables



HEALTHY EATING PLATE

HEALTHY OILS
Use healthy oils (like olive and canola oil) for cooking, on salad, and at the table. Limit butter. Avoid trans fat.

WATER
Drink water, tea, or coffee (with little or no sugar). Limit milk/dairy (1-2 servings/day) and juice (1 small glass/day). Avoid sugary drinks.

VEGETABLES
The more veggies—and the greater the variety—the better. Potatoes and french fries don't count.

WHOLE GRAINS
Eat whole grains (like brown rice, whole-wheat bread, and whole-grain pasta). Limit refined grains (like white rice and white bread).

FRUITS
Eat plenty of fruits of all colors.

HEALTHY PROTEIN
Choose fish, poultry, beans, and nuts; limit red meat; avoid bacon, cold cuts, and other processed meats.

STAY ACTIVE!

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The Nutrition Source
www.hsph.harvard.edu/nutritionsource

Harvard Medical School
Harvard Health Publications
www.health.harvard.edu

Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

NEJM, Feb. 25, 2013

7447 Men and women, type 2 diabetes or at least 3 CV risk factors. 4.8 years

Compared 1) Mediterranean diet supplemented with 4 Tbsp/day of olive oil or 2) with 1 ounce of nuts/day; vs. 3) a low fat diet (the control)

Results: 288 cardiovascular events occurred: 3.8% in the olive oil group, 3.4% in the nut group, and 4.4% in the control group. (P=0.015)

Eat about 1 ounce of nuts most days

- 1 ounce of nuts=1/4 cup or a small handful
- But be aware of the calories...
 - 1 ounce=160-200 calories



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Vegetarian Diets

- Vegans
- Fruitarians
- Lacto-vegetarians
- Lacto-ovo vegetarians
- Pesco-vegetarians
- Pollo-vegetarians
- Flexitarians (Semi-vegetarians)

Vegetarian Diets: Observational Study

- Adventist Health Study 2
 - 73,000 participants; 2570 deaths
 - 5.8 years follow-up
- Compare: vegans, pesco-; lacto-ovo-; and semi-vegetarians to non-vegetarians
- Outcome: lowest mortality in pesco-vegetarians and vegans (15-20%).

Orlich, JAMA IM, 2013
Baron, JAMA IM, 2013

Antioxidants

- Meta-analysis of 47 high-quality randomized trials of antioxidants
- 181,000 individuals
- 25,000 deaths

Bjelakovic, JAMA, 2007

Antioxidants: All-cause mortality

- Vitamin A 16% increase
- Beta-carotene 7% increase
- Vitamin E 4% increase
- Vitamin C 6% trend towards increase

All p << 0.05 except vitamin C

Bottom line: actively discourage anti-oxidant use

Bjelakovic, JAMA, 2007

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Folate Supplements

- Pooled meta-analysis of 8 large, high quality randomized trials
- 37,485 individuals
- 5,125 deaths
- 9,326 major vascular events
- 3,010 cancers

Clarke, Archives IM, 2010

Folate/Homocysteine RCTs

- Homocysteine 25% decrease
 - Death No effect: 1.02 (97-1.08)
 - CVD events No effect: 1.01 (.97-1.05)
 - Cancer No effect: 1.05 (.98-1.13)
- Folate does not prevent cancer or heart disease

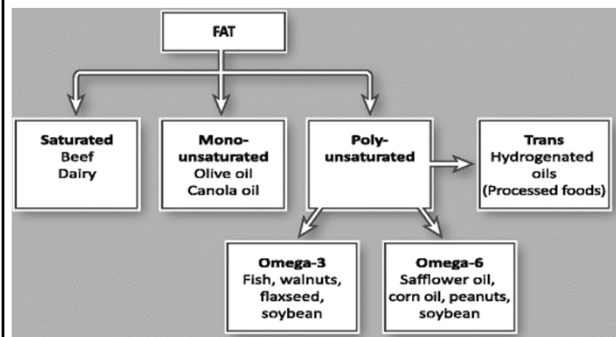
Clarke, Archives IM, 2010

Folate And Neural Tube Defects (NTD)

- 70% reduction in 2nd occurrences
 - 4 mg of folate
- 63% reduction in 1st occurrence
 - 0.4 mg of folate
- Since flour fortification
 - 46% reduction in NTD

Meta-analysis, Blencowe, IJE, 2010

Classification of Dietary Fat



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Omega 3 Fatty Acids: Meta-analysis

- 48 RCTs of 36,913 participants; 41 cohort trials
- No significant effect of omega 3 fats on mortality, CV events, or cancer
- Analysis of diet only trials: also no benefit
- No reason to advise people to stop rich sources of omega 3 fats, but better trials needed

Cochrane Library, 2009

Since meta-analysis: Two additional RCTs

- ORIGIN trial: NEJM June 2012
 - 12,536 patients with DM or high sugar
 - 1 g daily of omega-3 x 6.2 years
 - NO reduction in death, CVD events
- Risk and Prevention Trial: NEJM May 2013
 - 12,513 patients at high risk for CVD
 - 1 g daily of omega-3 x 5 years
 - NO reduction in death, CVD events

Vitamin D

- Many clinicians measure vitamin D and recommend supplements, often high doses, for possible prevention of cancer, CVD, diabetes, autoimmune disorders, cognitive decline, and other conditions

But:

- USPSTF: no data to support overall risks and benefits of supplemental vitamin D and no role for screening for vitamin D deficiency
- IOM: no clear evidence that supplemental vitamin D lowers risk of non-skeletal health outcomes

Manson, JAMA 2015

Vitamin D

- IOM: Recommends 600 IU < age 70; and 800 IU > age 70
- Equivalent to: 3-4 servings per day for fortified foods: milk, yogurt, soy beverages, OJ, cereal plus fatty fish twice per week
- Adequate for 97.5% of US and Canadian residents (including those who live in north in winter.)
- Normal serum concentration of 20-50 ng/ml

Manson, JAMA 2015

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Calcium

- Adequate calcium important for skeletal health at all ages
- Food is preferred approach. No routine recommendation for supplements. May consider if intake is inadequate
- Recent studies have raised concerns about increased CV risk with supplements

Bauer, NEJM 2013

Calcium

IOM Recommends:

- Women age 19-50 and men age 19-70: 1000 mg per day
- Women >50 and men >70: 1200 mg per day
- Avoid > 2000 mg per day (after age 50)

Bauer, NEJM 2013

Dietary Calcium

- Dairy mg
 - Plain Yogurt 8 oz 448
 - Mozzarella 1.5 oz 333
 - Cheddar 1.5 oz 307
 - 2% milk 1 cup 293
 - Cottage cheese 1 cup 206
- Fruits and vegetables
 - Fortified OJ 6 oz 261
 - Kale 1 cup 100
 - Bok Choy 1 cup 74
 - Broccoli 1 cup 43

Dietary Calcium

- Canned fish mg
 - Sardines 3 oz 325
 - Salmon 3 oz 183
- Grains
 - Fortified cereals 1 cup 100-1333
 - Fortified cooked oats 1 cup 187
- Commercial breads 1 slice 30-73

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Calcium and Vitamin D: Summary

- Primary Prevention of Fractures: Insufficient (I)
- >400 D3 and >1000 Calcium: Insufficient (I)
- <400 D3 and >1000 Calcium: Discourage (D)
- Screening for Vitamin D deficiency: Insufficient (I)
- Vitamin D for preventing falls with in high risk, >65: Recommend (B)

USPSTF 2013/2014

Dietary Supplements: Summary

- Beta-carotene Discourage - harmful
- Vitamin E Discourage - harmful
- Folate Prevent neural tube defects
- Omega-3s No benefit
- Vit D and Ca Use with bisphosphonates
Correct deficiency, <20ng/ml

Michael Pollan's Three Rules

- Eat food
- Not too much
- Mostly plants

Baron's Rules

- Eat unprocessed foods
- Eat the right amount to maintain your weight
- Eat something colorful at every meal (and every snack)
- Don't drink calories
- If can't make the "best" choice, make a better choice
- Be as fit as you can be: exercise daily
- Eat with your children; eat at home

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The “Generic” Diet

- **Continued debate:** macronutrient balance, amounts of meat/fish/fowl, other specific foods
- **But almost all agree:** Limit sugar, refined grains, large amounts of saturated and *trans* fat. Eat fruits and vegetables, healthy oils, whole grains, legumes and nuts
- **Bottom line:** Master a “generic” diet for patients and self

Baron, RB JAMA Int Med, 2013

For More Information

- Dietary Guidelines for Americans, 2015
<http://health.gov/dietaryguidelines/2015>.
- USDA’s Food & Nutrition Information Center:
http://fnic.nal.usda.gov/nal_display/index.php?info_center=4&tax_level=1
- CDC Division of Nutrition, Physical Activity & Obesity:
<http://www.cdc.gov/nccdphp/dnpao/index.html>
- USDA National Agricultural Library:
<http://www.nutrition.gov/>
- Center for Science in the Public Interest (CSPI):
<http://www.cspinet.org/>
- ChooseMyPlate.gov: <http://www.choosemyplate.gov/>

For More Information

- FDA: How to Understand and Use the Nutrition Facts Label:
<http://www.fda.gov/Food/ResourcesForYou/Consumers/NFLPM/ucm274593.htm>
- FDA: Label Man – Make Your Calories Count:
<http://www.accessdata.fda.gov/videos/CFSAN/HWM/hwmintr.cfm>
- Nutrition.gov: Shopping, Cooking & Meal Planning:
<http://www.nutrition.gov/shopping-cooking-meal-planning>
- Healthy Eating Plate (Harvard):
<http://www.hsph.harvard.edu/nutritionsource/what-should-you-eat/pyramid/>