NUTRITION

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Discussion Topics

1. Food and Nutrients
2. Food as Medicine
3. Coffee, Tea, Caffeine, and Stress
4. Alcohol
5. Tobacco Use
6. Obesity and Weight Loss
7. Healthy Eating

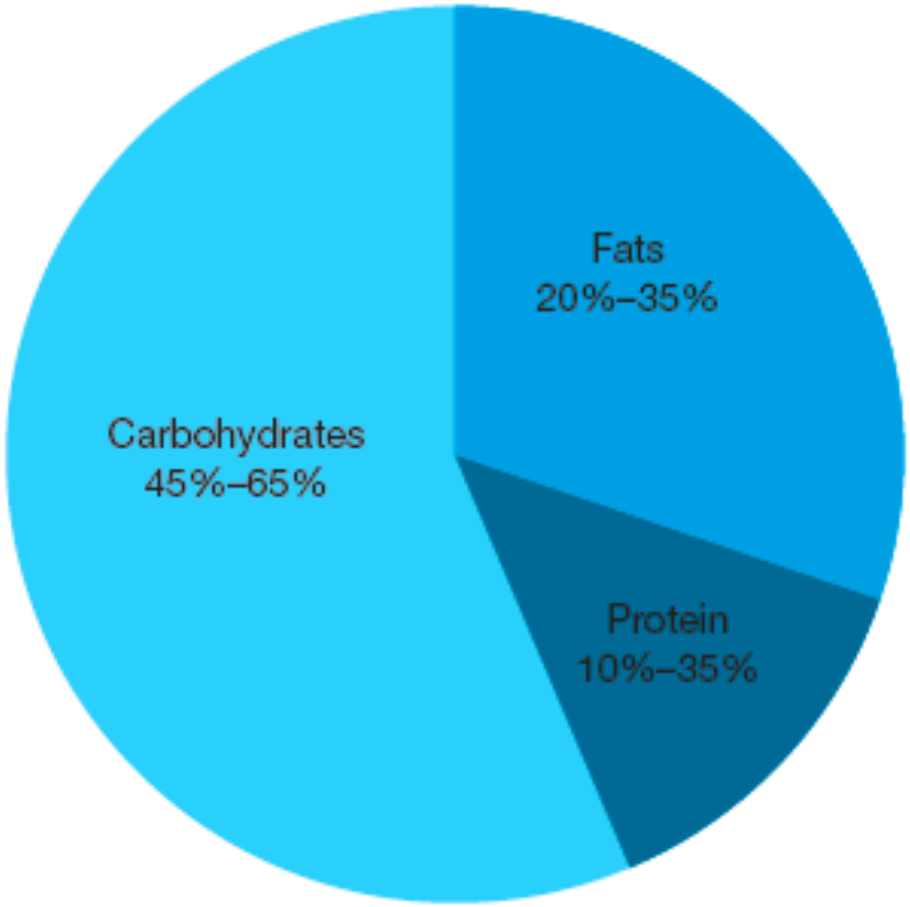
FOOD AND NUTRIENTS

Food and Nutrients

- **Nutrients:** ingredients in food that provide energy or sustain our cells and tissues
  - Divided into macronutrients (carbohydrates, protein, and fat) and micronutrients (vitamins, minerals, etc.)
- **Phytochemicals:** compounds found in plants that are bioactive but not essential
- **Fiber:** consists of plants' indigestible cellulose components

Food and Nutrients

- Water is necessary to sustain life
- **Simple carbohydrates:** consist of single or double glucose units
- **Complex carbohydrates:** long chain glucose molecules called starches
- Glucose essential for fueling the brain and skeletal muscles
- **High glycemic index/load:** foods that cause spike in blood sugar levels when eaten



Food and Nutrients

- **Figure 12.1** The Institute of Medicine's Food and Nutrition Board's (2002)
- guidelines for a healthy balance of macronutrients

Food and Nutrients (cont'd.)

- **Low-glycemic foods** usually preferred in healthy eating plans; tend to be more nutrient dense
- **Empty calories:** calories consumed have little nutritional value; over time can become nutrient-deficient even if getting a lot of calories
- Low-glycemic foods have health benefits and may even prevent certain diseases

Food and Nutrients

- Fiber once thought to be useless, but actually has high health value and benefits:
  - Lower circulating LDL levels
  - Reduces demands on the insulin system
  - Prevents constipation
  - Promotes cardiovascular health and prevents metabolic syndrome
- **Protein:** a macronutrient that consists of amino acids; repairs body's structures

Food and Nutrients

- Body cannot synthesize the essential amino acids, so they must come from diet
- Proteins found in animal sources, dairy sources, and plant sources
- Animal sources and soy are complete proteins because they contain all of the essential amino acids
- **Fat:** fatty acids and their related organic compounds

Food and Nutrients

- Fat used for building hormones, a form of insulation, and for energy storage
- Triglycerides: fatty acid form of fat that are stored in fat cells and burned for later energy
- **Saturated fat**:
  - Found primarily in animal sources
  - Raises LDL levels and the risk for heart disease
- **Trans-fats:**
  - Chemically modified vegetable oils; avoid them

Food and Nutrients

- **Cholesterols:**
  - Manufactured by the body and not required through food
  - Present in meat and eggs; should be avoided
- **Monounsaturated fats:**
  - Plant-based and considered healthy
  - Reduce LDL, raise HDL, and lower risk of heart disease

Food and Nutrients

- **Polyunsaturated fats:**
  - Found in plant-based foods and fish
  - Same benefits as monounsaturated fats
  - Two important ones are the essential fatty acids: omega-3 fatty acids and omega-6
  - With a typical Western diet, we consume enough omega-6 but probably not enough omega-3
  - Fish and fish oils are good sources for omega-3

Food and Nutrients

- Vitamins: essential organic substances
  - Some vitamins can be produced in body, but most needed through food
  - Example: Vitamin C used to prevent scurvy
  - Evidence on benefits of multivitamins is inconclusive
- Minerals: inorganic substances necessary in small quantities
  - Americans consume too much sodium
  - Sodium can cause increased blood pressure

FOOD AS MEDICINE

Food as Medicine

- **Phytochemicals**: Fruits and vegetables contain bioactive substances known as phytochemicals
- **Functional foods:** foods that contain added health benefits above nutritional value
- **Antioxidants:** chemicals found in certain vitamins, minerals, and phytochemicals that reduce oxidative stress
- **Oxidative stress:** the adverse effects of oxygen free radicals on our cells

Food as Medicine

- Phytochemicals protect plants, and can also protect us when we ingest them

Examples of Functional Components*		
Class/Components	**Source***	**Potential Benefit**
Carotenoids		
Beta-carotene	carrots, various fruits	neutralizes free radicals, which may damage cells; bolsters cellular antioxidant defenses
Lutein, Zeaxanthin	kale, collards, spinach, corn, eggs, citrus	may contribute to maintenance of healthy vision
Lycopene	tomatoes and processed tomato products	may contribute to maintenance of prostate health
Flavonoids		
Anthocyanidins	berries, cherries, red grapes	bolster cellular antioxidant defenses; may contribute to maintenance of brain function
Flavanols—Catechins, Epicatechins, Procyanidins	tea, cocoa, chocolate, apples, grapes	may contribute to maintenance of heart health
Flavanones	citrus foods	neutralize free radicals, which may damage cells; bolster cellular antioxidant defenses

Table. Beneficial components of foods (partial list)

Food as Medicine

- More research needed for link between fruits and vegetables and decreased cancer risk

Food as Medicine

- Three healthy eating patterns:
  - **DASH:** emphasizes vegetables, fruits, and low-fat milk products
  - **Mediterranean diet:** emphasizes vegetables, fruits and nuts, olive oil, and grains
  - **Vegetarian eating pattern:** no food from animal sources, though some include milk and eggs

COFFEE, TEA, CAFFEINE, AND STRESS

Coffee, Tea, Caffeine, and Stress

- Black tea is most common tea consumed in Western countries
- Primary polyphenols found in green tea are catechins
- Not oxidized, so antioxidant effects are greater in green tea than in black tea
- Catechins in green tea may reduce cardiovascular risk and prevent cancer
- Coffee also contains phenolic antioxidants
- These antioxidants seem to have anti-inflammatory effects

Coffee, Tea, Caffeine, and Stress (cont’d.)

- **Caffeine:** can stimulate body’s neurons by lowering their threshold for excitability
- High doses of caffeine associated with anxiety reactions; moderate doses with decreased depressive symptoms and increased alertness

Coffee, Tea, Caffeine, and Stress (cont’d.)

- Coffee and black tea contain the most caffeine
- Theanine in tea associated with relaxation

ALCOHOL

Alcohol

- Moderate alcohol consumption associated with decreased risk of CHD and increased longevity
- Excessive consumption can cause many health problems and even morbidity
- Considered empty calories and calorie dense
- Is a CNS suppressor and has addictive qualities

Alcohol

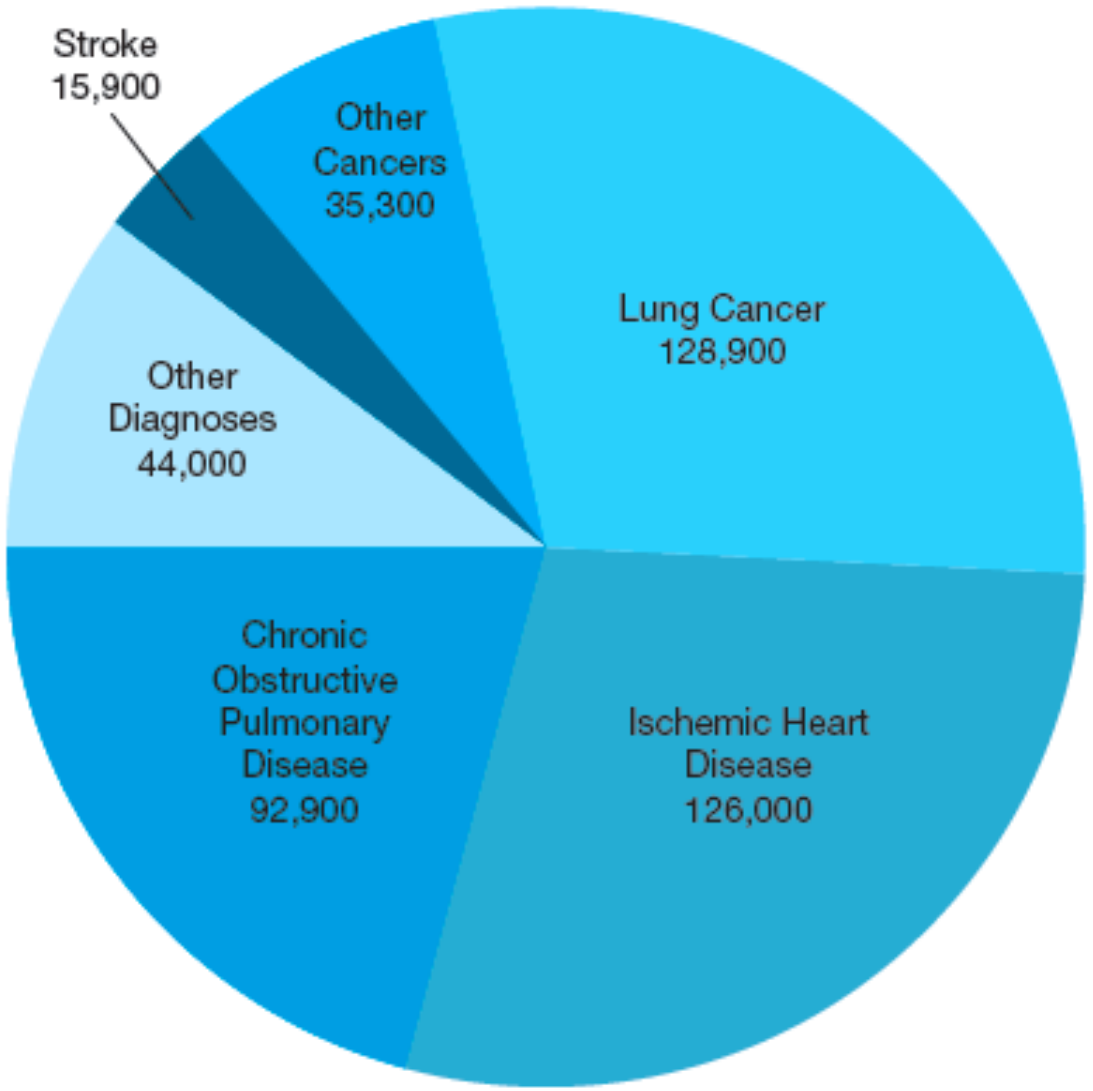
- Moderate consumption has anti-inflammatory effect, but excessive consumption is pro-inflammatory
- Even one drink a day raises women’s risk of breast cancer
- Red wine is believed to have some heart health advantages over other types of liquor
- Can get polyphenols in other ways, so not necessary to begin drinking red wine

TOBACCO USE

Tobacco Use

The single greatest cause of preventable death

Figure. Cause of deaths attributable to cigarette smoking in the United States.



Tobacco Use

- **Nicotine:** affects neurotransmitters in the brain and raises heart rate and blood pressure
- Smoking relieves negative affect caused by nicotine withdrawal, not stress itself
- Medication and behavioral strategies can help people to quit smoking

OBESITY AND WEIGHT LOSS

OBESITY AND WEIGHT LOSS

Obesity and Weight Loss

- BMI over 30 indicates obesity
- Over 2/3 of the US population is overweight or obese
- **Calorie imbalance:** consuming more calories than one expends

Obesity and Weight Loss

- Models for weight gain:
  - **Weight set point model:** people with higher fat set points have a greater tendency to gain weight

Obesity and Weight Loss

- **Genetics model:**
  - genetics may account for some people having a higher set point
  - Twins seem to have high heritability for weight
- **Positive incentive model:**
  - motivation to eat is primarily driven by pleasure
  - Evolutionarily driven to consume high-fat foods

Obesity and Weight Loss

- Strategies for weight loss plus exercise:

    1. Calorie reduction
    2. Switch to high protein foods
    3. Portion control

		Physical Activity Level[b]		
Gender	Age (years)	Sedentary	Moderately Active	Active
Child (female and male)	2–3	1,000–1,200[c]	1,000–1,400[c]	1,000–1,400[c]
Female[d]	4–8	1,200–1,400	1,400–1,600	1,400–1,800
	9–13	1,400–1,600	1,600–2,000	1,800–2,200
	14–18	1,800	2,000	2,400
	19–30	1,800–2,000	2,000–2,200	2,400
	31–50	1,800	2,000	2,200
	51+	1,600	1,800	2,000–2,200
Male	4–8	1,200–1,400	1,400–1,600	1,600–2,000
	9–13	1,600–2,000	1,800–2,200	2,000–2,600
	14–18	2,000–2,400	2,400–2,800	2,800–3,200
	19–30	2,400–2,600	2,600–2,800	3,000
	31–50	2,200–2,400	2,400–2,600	2,800–3,000
	51+	2,000–2,200	2,200–2,400	2,400–2,800

Table: Estimated Calorie Needs per Day by Age, Gender, and Physical Activity Level

HEALTHY EATING


HEALTHY EATING
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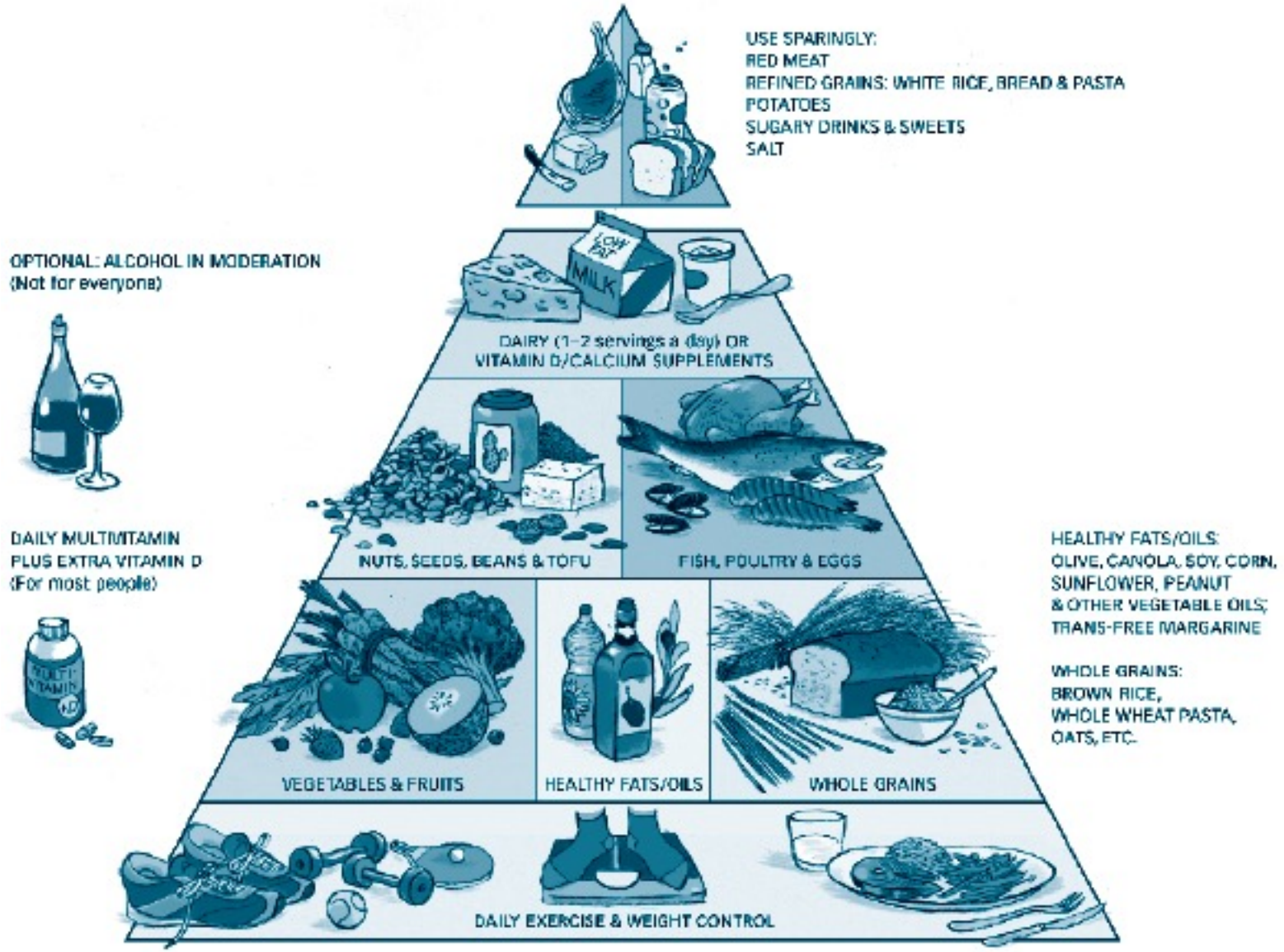

Figure: The healthy eating pyramid form the Harvard School of Public Health.

Summary

- Components of foods: micronutrients, macronutrients, phytochemicals, fiber, and water
- Fiber reduces LDL and CHD risk
- Monounsaturated and polyunsaturated fats have health benefits
- Eating fruits and vegetables daily reduces risk of CHD and particular cancers
- Green tea has beneficial polyphenols

Summary (cont’d.)

- Moderate alcohol consumption shows some health benefits
- Tobacco use has many health risks and linked to early mortality
- Obesity is a result of caloric imbalance
- Weight loss involves calorie restriction in some form, and should also involve exercise