BI 199 Discussion 3


II. **Connections** Discretionary Calories? History + *MyPlate*? S&W pp 47-9 AICR Dietary Guidelines? Eating Like the Rainbow…?

III. **Label Help**? DA+ Activity, S&W p 49-57

*American Heart Association Reading Food Nutrition Labels*
*FDA How to Understand & Use the Nutrition Facts Label*

IV. **Think Fitness** S&W p 42+ ACSM/CDC, USDA/HHS guidelines

*cf*: Diet vs. Exercise? Zuti & Golding 1976!

V. **Quiz Bowl Chapter 2** New groups

VI. **Controversy 2** Are some foods “superfoods”…? S&W pp 63-9

VII. **The Remarkable Body** S&W ch 3 pp 70-81

VIII. **Market of Choice Shopping Label Activity** 1960 Franklin Blvd, meet in Lobby in 15-17 min, ~ 5:35 pm.

...Field trip tonight!!

Fun! Fun!

Hooray!
Figure 2–6
How Solid Fats and Added Sugars Add Calories to Nutrient-Dense Foods

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Calories in nutrient-dense form of the food</th>
<th>Additional &quot;empty&quot; calories</th>
<th>Total Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular ground beef patty (75% lean) cooked, 3 oz</td>
<td>184</td>
<td>52</td>
<td>236</td>
</tr>
<tr>
<td>Breaded fried chicken strips, 3 oz</td>
<td>138</td>
<td>108</td>
<td>246</td>
</tr>
<tr>
<td>Frosted corn flakes cereal, 1 c</td>
<td>90</td>
<td>57</td>
<td>147</td>
</tr>
<tr>
<td>Curly French fried potatoes, 1 c</td>
<td>117</td>
<td>141</td>
<td>258</td>
</tr>
<tr>
<td>Sweetened applesauce, 1 c</td>
<td>105</td>
<td>68</td>
<td>173</td>
</tr>
<tr>
<td>Whole milk, 1 c</td>
<td>83</td>
<td>66</td>
<td>149</td>
</tr>
</tbody>
</table>

The discretionary calorie allowance sets the upper limit for calories from added sugars and solid fats in USDA Food Patterns.
History of Establishing Guidelines for Americans
USDA Food Pyramid 1992

Fats, oils, and sweets
Use Sparingly

Milk, yogurt, and cheese group
2-3 Servings

Vegetable group
3-5 Servings

Meat, poultry, fish, dry beans, eggs, and nuts group
2-3 Servings

Fruit group
2-4 Servings

Bread, cereal, rice, and pasta group
6-11 Servings

Key
- Fat (naturally occurring and added)
- Sugars (added)
Willett & Stampfer Suggestions 2003

NEW FOOD PYRAMID

- Daily exercise and weight control

- Whole grain foods AT MOST MEALS
- Vegetables IN ABUNDANCE
- Nuts and legumes 1 TO 3 SERVINGS
- Dairy or calcium supplement 1 TO 2 SERVINGS
- Red meat and butter USE SPARINGLY
- White rice, white bread, potatoes, pasta and sweets USE SPARINGLY
- Fish, poultry and eggs 0 TO 2 SERVINGS
- Fruit 2 TO 3 SERVINGS
- Plant oils (olive, canola, soy, corn, sunflower, peanut and other vegetable oils) AT MOST MEALS

- Alcohol in moderation UNLESS CONTRAINDIATED
- Multiple vitamins FOR MOST
US Modifications to 1992 Food Pyramid 2005

- Use sparingly: Fats, oils, and sweets

- Regular Physical Activity: Exercise! Exercise!!
- 5 or more!
- 3 or more!
- 4 or more!
- 1/2 whole grain
- 2–4 servings fruit group
- 2–3 servings meat, poultry, fish, dry beans, eggs, and nuts group
- 2–3 servings milk, yogurt, and cheese group
- 3–5 servings vegetable group
- Saturated & trans fats!
- "good" fats!
- eg, fish, nuts

- 6–11 servings bread group
Dietary Guidelines for Americans 2005
Food Guidance System

1. ↑emphasis on ↓kcal + ↑exercise.
2. 9-A-Day! 4 fruit + 5 vegetable servings.
3. ≥ 3 of 6 whole grains → ½ whole grains!
4. 3 servings of dairy, eg 3 c fat-free milk.
5. ↓saturated + trans fats + ↑unsaturated/
“good” fats, eg Ω-3 fish, walnuts.
6. Drink in moderation if at all.
7. Practice food safety.

Hooray!
2. Focus on fruits. Whole fruit preferable to juice, but any fruit counts! Fill ½ your plate with fruits & vegetables!

3. Make at least ½ of your grains whole grains!

4. Go lean with protein. Keep protein to < ¼ plate! Nuts, beans, peas, seeds, poultry, lean meat, seafood,…

5. Get your calcium-rich foods. Buy skim or 1% milk. Go easy on cheese!

MyPlate launched June 2, 2011!
Diet & Health Guidelines for Cancer Prevention

1. Choose a diet rich in variety of plant-based foods.
2. Eat plenty of vegetables & fruits.
3. Maintain a healthy weight & be physically active.
4. Drink alcohol only in moderation, if at all.
5. Select foods low in fat & salt.

And always, remember...

Do not smoke or use tobacco in any form.

American Institute for Cancer Research (AICR)
Your plate should be the size of a Frisbee, not a manhole cover.

When it comes to colorful foods, Fruit Loops don’t count.

A surprising number of people get 1/5 of their calories from sodas or other liquids.

If you look at the label & need a chemistry degree to read it, put the item back on the shelf!

The multiple colors of the pyramid illustrate variety: each color represents one of the five food groups, plus one for oils. Different widths of colors suggest the proportional contribution of each food group to a healthy diet.

A person climbing steps reminds consumers to be physically active each day.

Greater intakes of grains, vegetables, fruits, and milk are encouraged by the width of orange, green, red, and blue, respectively.

The name, slogan, and website present a personalized approach.

The narrow slivers of color at the top imply moderation in foods rich in solid fats and added sugars.

The wide bottom represents nutrient-dense foods that should make up the bulk of the diet.
How much aerobic?

- Continuous exercise
- > 50% muscle mass
- > Conversational pace
- 20-60 min/session
- 3-5 days/wk

Federal exercise guidelines include strength training for all


**Adults**: Moderate to Vigorous Exercise

> 30 min, 5 d/wk

**Children**: Moderate to Vigorous Exercise

> 60 min, 5 d/wk
Diet vs. Exercise?

NB: Each group 500 kcal deficit/day, 16 weeks
Compared to dieting, exercise is superior in inducing % body fat reduction & preserving lean body mass!
1. The nutrient standards in use today include all of the following except:
   a. Adequate Intakes (AI)
   b. Daily Minimum Requirements (DMR)
   c. Daily Values (DV)
   d. Tolerable Upper Intake Levels (UL)

2. The Dietary Reference Intakes were devised for which of the following purposes?
   a. to set nutrient goals for individuals
   b. to suggest upper intake limits above which toxicity is likely
   c. to set average nutrient requirements for use in research
   d. all of the above

3. According to the USDA Food Patterns, which of the following vegetables should be limited?
   a. carrots    b. avocados   c. baked beans      d. potatoes

4. The USDA Food Patterns recommend a small amount of daily oil from which of these sources?
   a. olives       b. nuts            c. vegetable oil     d. all of these
5. Which of the following is found on food labels?
   a. Daily Values (DV)
   b. Dietary Reference Intakes (DRI)
   c. Recommended Dietary Allowances (RDA)
   d. Estimated Average Requirements (EAR)

6. The energy intake recommendation is set at a level predicted to maintain body weight.  T  F

7. The Dietary Reference Intakes (DRI) are for all people regardless of their medical history.  T  F

8. People who choose not to eat meat or animal products need to find an alternative to the USDA Food Patterns when planning their diet.  T  F

9. By law, food labels must state as a % of the Daily Values, vitamin A, vitamin C, niacin, and thiamin present in food.  T  F

10. Sugar-free or fat-free means containing < ½ g per serving.  T  F
Group Work to Discuss Potential Superfoods!
SUPERFOODS

Bang! pow!

Summer of The Super-food
Salmon

Superfoods?

Forgetful? Blueberries sharpen brain function!

Worried about cancer? Eat tomatoes!

Too many colds? Try immune-boosting soybeans!
Phytochemicals ≡ Plant chemicals

1. **Anti-oxidants**
   - Protect DNA from oxidative damage

2. **Protein synthesis**
   - Regulation/control

3. **Hormone-like action**
   - Endocrine mimicry

4. **Blood effects**
   - Modify blood chemistry

Potential regulators of health!

10s of thousands!

*Phytochemicals* = *Plant chemicals*

Aroma, color, taste
Broccoli sprouts may contain ~ 10,000 unique phytochemicals!
A Wealth of Phytochemicals

All cruciferous vegetables contain powerful cancer-fighting phytochemicals, including: diindolylmethane (DIM), one of many indoles found in these vegetables, has been shown to inhibit proteins associated with breast and ovarian cancers. crambene, plentiful in Brussels sprouts, may offer the most preventive benefits when combined with indole-3-carbinol (I3C). glucosinolates, which turn into powerful protective agents called isothiocyanates when a cruciferous vegetable is chewed or chopped. May reduce inflammation, a factor in cancer development.
<table>
<thead>
<tr>
<th>Rank</th>
<th>Food Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blackberries</td>
</tr>
<tr>
<td>2</td>
<td>Walnuts</td>
</tr>
<tr>
<td>3</td>
<td>Strawberries</td>
</tr>
<tr>
<td>4</td>
<td>Spinach</td>
</tr>
<tr>
<td>5</td>
<td>Artichokes, prepared</td>
</tr>
<tr>
<td>6</td>
<td>Cranberries</td>
</tr>
<tr>
<td>7</td>
<td>Coffee</td>
</tr>
<tr>
<td>8</td>
<td>Raspberries</td>
</tr>
<tr>
<td>9</td>
<td>Pecans</td>
</tr>
<tr>
<td>10</td>
<td>Blueberries</td>
</tr>
<tr>
<td>11</td>
<td>Cloves, ground</td>
</tr>
<tr>
<td>12</td>
<td>Grape juice, cranberry juice, pomegranate juice</td>
</tr>
<tr>
<td>13</td>
<td>Chocolate, dark, unsweetened</td>
</tr>
<tr>
<td>14</td>
<td>Cherries, sour</td>
</tr>
<tr>
<td>15</td>
<td>Wine, red</td>
</tr>
</tbody>
</table>
Antioxidant Capacity Depends Upon Seasons, Storage, Testing Methods, Variety...

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Food Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 sm</td>
<td>Apple, Red Delicious, w/skin</td>
</tr>
<tr>
<td>1 oz</td>
<td>Chocolate, dark</td>
</tr>
<tr>
<td>½ c</td>
<td>Plums, dried</td>
</tr>
<tr>
<td>5 fl oz</td>
<td>Wine, red</td>
</tr>
<tr>
<td>½ med</td>
<td>Artichokes, boiled</td>
</tr>
<tr>
<td>1 oz</td>
<td>Pecans</td>
</tr>
<tr>
<td>½ c</td>
<td>Blueberries, fresh</td>
</tr>
<tr>
<td>1 oz</td>
<td>Walnuts, English</td>
</tr>
<tr>
<td>½ c</td>
<td>Strawberries, sliced</td>
</tr>
<tr>
<td>1 med</td>
<td>Sweet potato, baked</td>
</tr>
</tbody>
</table>

*aMeasured in micromole TE (Trolox equivalents), a laboratory-derived value used to measure the antioxidant activity of foods. Other laboratory methods yield other results.*

Blueberry anti-oxidant phytochemicals may reduce age-related mental declines!
Dark chocolate contains an anti-oxidant flavonoid that may help the cardiovascular system.

NB: Watch out for kcal, 400 in 3 oz!
Flaxseed contains lignans converted to phytoestrogens, potential anti-cancer agents
≥ 5 tomato-containing meals per week may protect from cancers of the esophagus, stomach & prostate!
...but, the phytochemical candidate, *lycopene* with anti-oxidant activity is also in guava, papaya, pink grapefruit & watermelon!
Garlic organosulphurs may inhibit cancer!
Resveratrol, a flavonoid in purple grape juice & red wine may lower incidence of cardiovascular diseases.

**NB:** ...but typical serving amounts may be too small to benefit human health!...Alcoholism?

S&W 2014 p 67
High doses of soy phytoestrogens may lower blood cholesterol

*NB:* ...but low doses of the phytoestrogen, *genistein* promotes breast cancer cell division (in lab cultures & mice).

*Life is all about balance: too much? too little?*
Functional Foods or Drugs?
Stay closest to the earth!!
Pick an abundance of whole grains, legumes, nuts, vegetables & fruits!
Don't bank on a single magical food's phytochemicals or marketed "functional foods," rather choose a wide variety of whole grains, legumes, nuts, vegetables & fruits...!
Time-out for discussion!
Body Levels of Organization

1. Molecular
2. Cellular
3. Tissue
4. Organ
5. System

Entire Organism, like you & me!
Genes are Recipes for Making Proteins!

1. Each cell’s nucleus contains DNA — the material of heredity in all living things.

2. Long strands of human DNA coil into 23 pairs of chromosomes. If the strands of DNA in all the body’s cells were uncoiled and laid end to end, they would stretch to the sun and back four hundred times. Yet DNA strands are so tiny that about 5 million of them could be threaded at once through the eye of a needle.

3. Genes contain instructions for making proteins. Genes are sections along the strands of DNA that serve as templates for the building of proteins. Some genes are involved in building just one protein; others are involved in building more than one.

4. Many other steps are required to make a protein. See Figure 6-6 of Chapter 6.

5. Proteins do the work of living cells. Cells employ proteins to perform essential functions and provide structures.

6. Communities of functioning cells make up the living tissue.
What are DNA’s major functions?
Heredity + Day-to-Day Cell Function
4 Cs for Tissue/Cell Type Functions!

- Nerve conducts
- Muscle contracts
- Connective connects!!
- Epithelial covers
Organs are made up $\geq 2$ tissue types

Organ:
Body structure that integrates different tissues and carries out a specific function

Epithelial tissue
- protection, secretion, absorption

Connective tissue
- structural support

Muscle tissue
- movement

Nervous tissue
- communication, coordination, control
Which body systems?
Which body systems?
Cardiovascular or CV System

1. Heart
2. Vessels
3. Blood
NB: Figure-8 loop

Pulmonary

8

Systemic

Capillary beds of lungs where gas exchange occurs

Pulmonary arteries
Pulmonary veins
Vena cavae
Aorta and branches
Right ventricle
Left ventricle
Arterioles
Venules

Oxygen-poor, CO₂-rich blood
Oxygen-rich, CO₂-poor blood

Pulmonary circuit
Systemic circuit

DC 2003
Lymphatic System

1. Lymph Nodes
2. Vessels
3. Lymph

No pump!
Lymphatic System
Alternative System of Circulation or Drainage System

Lymph Vessels || Veins
Lymphatic System Blockage in Elephantiasis from Mosquito-borne Parasitic Filaria Worm

Source: L Sherwood 2006 fig 10-22 p 298
White Blood Cells = Body Defenders & Surveillance System!
Heart
Right side pumps blood to lungs
Left side pumps oxygenated blood to body

Intestines
Absorb nutrients

Liver
Filters toxins from blood
Stores, transforms, and mobilizes nutrients

Kidneys
Filter wastes from blood
Form urine

Lungs
Oxygenate blood
Remove carbon dioxide from blood
Return blood to heart

Capillaries, Where Exchange Takes Place, Are Everywhere!

Modified after S&W 2014 fig 3-3 p 75
Body Fluids Mingle @ Capillary Level

Capillary wall has spaces between its flat cells.

Cells of surrounding tissue.

Blood enters tissues by way of artery.

Inside capillary.

Blood circulates among cells by way of capillaries.

Blood collects into veins for return to heart.

S&W 2014 fig 3-4 p 76
RBCs pick up O₂ in lungs & deliver to tissues in periphery.

RBCs pick up CO₂ in periphery & dump off at lungs!
Fluid filtrate with nutrients & gases flows from blood to tissue spaces to lymphatic capillaries.

Lymphatic vessels return run-off like sewer system to large vein in neck.
Next time, the Digestive (GI) System!