BI 199 Discussion 4

I. Announcements
   Personal shopping analysis tonight. Next M 26\textsuperscript{th} Diet analyses: DA+ & \url{https://www.supertracker.usda.gov/}
   Record diet for $\geq$ 1-day! Bring DA+ card. Computer? Q? U of O website! \url{http://housing.uoregon.edu/nutrition-dietary-needs}

II. Group Work: Market of Choice Label Investigation
   Group summary comments, then editorial overview!

III. Group Work: Mini-Overhead Summary Presentations
   Group summary overheads from food shopping analyses


V. Environmental Working Group on Pesticides + Videos

VI. Body Systems
   GI Focus S&W pp 74-97
   A. We're wired for survival!
   B. Bagel/Doughnut/ (!) hole analogy
   C. GI tract organ-by-organ overview?
   D. Ulcers?
   E. Letter from GI tract!

VII. Quiz Bowl
   S&W ch 3

VIII. Controversy
   Alcohol & nutrition: Benefits vs. risks? S&W pp 100-110

...Please read! Good stuff!!

More nutrition fun!!
Hijacked

How the food industry converts diet advice into profits

By Bonnie Lengman

Make half your plate fruits and vegetables. Make at least half your grains whole. Eat fish at least twice a week and nuts four times a week. Eat more fiber.

It doesn’t matter what health experts recommend. Companies are eager to meet those needs.

But instead of pushing healthier foods, they use new buzzwords (“1 full serving of vegetables!” “Made with whole grains!” “Omega-3”) to keep the same cheap ingredients (mostly white flour, sugar, and oil) flying off the shelf.

Goodbye veggies. Hello cookies, chips, and chewy bars.

Continued on page 3.
**BHT** is butylated hydroxytoluene, a preservative added to many foods to prevent spoilage.

In butter, meats, cereals, gum, baked goods, snack foods, dehydrated potatoes, beer, animal feed, packaging, cosmetics, rubber & petroleum products; to prevent oxidative rancidity of fats; maintains food odor, color & flavor.
**Nutrition Facts**

**Serving Size 1 1/4 cup (50g)**  
**Servings Per Container about 9**

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>Cereal with 1/2 cup Skim Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calories</strong></td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>220</td>
</tr>
<tr>
<td><strong>Calories from Fat</strong></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

**% Daily Value**

- **Total Fat**: 1g*  
  - Cereal: 2%  
  - Skim Milk: 2%
- **Saturated Fat**: 0g  
  - Cereal: 0%  
  - Skim Milk: 2%
- **Trans Fat**: 0g  
  - Cereal: 0%  
  - Skim Milk: 0%
- **Polyunsaturated Fat**: 0.5g  
  - Cereal: 2%
- **Monounsaturated Fat**: 0g  
  - Cereal: 0%  
  - Skim Milk: 0%
- **Cholesterol**: 0mg  
  - Cereal: 0%  
  - Skim Milk: 1%
- **Sodium**: 0mg  
  - Cereal: 0%  
  - Skim Milk: 3%
- **Potassium**: 170mg  
  - Cereal: 5%  
  - Skim Milk: 11%

- **Total Carbohydrate**: 40g  
  - Cereal: 14%  
  - Skim Milk: 16%
- **Dietary Fiber**: 6g  
  - Cereal: 24%  
  - Skim Milk: 24%
  - **Soluble Fiber**: less than 1g  
  - **Insoluble Fiber**: 5g
- **Sugars**: 0g  
  - Cereal: 0%  
  - Skim Milk: 0%
- **Other Carbohydrate**: 33g  
  - Cereal: 24%
  - Skim Milk: 24%
- **Protein**: 6g

*Amount in cereal. One half cup skim milk contributes an additional 40 calories, less than 5mg cholesterol, 65mg sodium, 6g total carbohydrate (6g sugars) and 4g protein.

**Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:**
Ingredients: Whole grain wheat, sugar, contains 2% or less of brown rice syrup, gelatin, BHT for freshness.

Vitamins and Minerals: Reduced iron, niacinamide, vitamin B₆ (pyridoxine hydrochloride), vitamin B₂ (riboflavin), vitamin B₁ (thiamin hydrochloride), zinc oxide, folic acid, vitamin B₁₂.

CONTAINS WHEAT INGREDIENTS.

Distributed by Kellogg Sales Co.
Battle Creek, MI 49016 USA
® TM, © 2012 Kellogg NA Co.
### Nutrition Facts

**Serving Size**: 21 Biscuits (54g)  
**Servings Per Container**: About 9

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
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</tr>
</thead>
<tbody>
<tr>
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<td>190</td>
</tr>
<tr>
<td><strong>Calories from Fat</strong></td>
<td>10</td>
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<tr>
<td><strong>Total Fat</strong></td>
<td>1g*</td>
</tr>
<tr>
<td><strong>Saturated Fat</strong></td>
<td>0g</td>
</tr>
<tr>
<td><strong>Trans Fat</strong></td>
<td>0g</td>
</tr>
<tr>
<td><strong>Polyunsaturated Fat</strong></td>
<td>0.5g</td>
</tr>
<tr>
<td><strong>Monounsaturated Fat</strong></td>
<td>0g</td>
</tr>
<tr>
<td><strong>Cholesterol</strong></td>
<td>0mg</td>
</tr>
<tr>
<td><strong>Sodium</strong></td>
<td>0mg</td>
</tr>
<tr>
<td><strong>Potassium</strong></td>
<td>200mg</td>
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<tr>
<td><strong>Total Carbohydrate</strong></td>
<td>46g</td>
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<tr>
<td><strong>Dietary Fiber</strong></td>
<td>6g</td>
</tr>
<tr>
<td><strong>Sugars</strong></td>
<td>11g</td>
</tr>
<tr>
<td><strong>Protein</strong></td>
<td>5g</td>
</tr>
</tbody>
</table>

**% Daily Value**

| Vitamin A | 0% | 4% |
| Vitamin C | 0% | 0% |
| Calcium   | 0% | 15%|
| Iron      | 90%| 90%|
| Thiamin   | 25%| 30%|
| Riboflavin| 25%| 35%|
| Niacin    | 25%| 25%|
| Vitamin B₆| 25%| 25%|
| Folic Acid| 25%| 25%|
| Vitamin B₁₂| 25%| 35%|
| Phosphorus| 20%| 30%|
| Magnesium | 10%| 15%|
| Zinc      | 10%| 15%|
| Copper    | 10%| 10%|

* Amount in cereal. One half cup of skim milk contributes an additional 40 calories, 65mg sodium, 6g total carbohydrates (6g sugars), and 4g protein.

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

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<th></th>
<th>Calories</th>
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<th>2,500</th>
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<td>80g</td>
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<tr>
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<td>25g</td>
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<tr>
<td>Cholesterol</td>
<td>Less than</td>
<td>300mg</td>
<td>300mg</td>
</tr>
<tr>
<td>Sodium</td>
<td>Less than</td>
<td>2,400mg</td>
<td>2,400mg</td>
</tr>
<tr>
<td>Potassium</td>
<td>3,500mg</td>
<td>3,500mg</td>
<td>3,500mg</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
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</tr>
<tr>
<td>Dietary Fiber</td>
<td>25g</td>
<td>30g</td>
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</tr>
<tr>
<td>Vitamin</td>
<td>Plain Generic</td>
<td>Frosted National</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td>0%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Vitamin C</td>
<td>0%</td>
<td>0%</td>
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</tr>
<tr>
<td>Calcium</td>
<td>2%</td>
<td>?</td>
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</tr>
<tr>
<td>Iron</td>
<td>8%</td>
<td>90%</td>
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<tr>
<td>Vitamin D</td>
<td>0%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Thiamin</td>
<td>10%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Niacin</td>
<td>15%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Vitamin B₆</td>
<td>0%</td>
<td>25%</td>
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</tr>
<tr>
<td>Folate</td>
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<td>25%</td>
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<td>Vitamin B₁₂</td>
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<td>25%</td>
<td></td>
</tr>
<tr>
<td>Phosphorus</td>
<td>20%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Magnesium</td>
<td>15%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td>8%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td>8%</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

*Fortified or ingredients added!*
Beautiful K+/Na+! Why?
Exceptional, Low Fat, Low Sodium, High Fiber Choice!
Close to the earth!
Truly local cereal!
Made in Eugene, OR!
Look at Labels!
Stay close to the earth & close to home!
Remember Whole Grain Hot Cereals for No/Low Sodium + Low Calorie Breakfast!

Does depend on what you add!!
Lean? Really?
99/140 ≡ 70.7%
71% of calories from fat!
False advertising?
Agriculture lobby?
Miscalculation?

Ground? Yikes!

Lean? Really?
99/140 ≡ 70.7%
71% of calories from fat!
False advertising?
Agriculture lobby?
Miscalculation?

45/140 ≡ 32.1%
Beans can be a great, low-fat, high-nutrient density substitute!

### Nutrition Facts

<table>
<thead>
<tr>
<th>Amount/serving</th>
<th>% DV*</th>
<th>Amount/serving</th>
<th>% DV*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat</td>
<td>2.5g</td>
<td>Total Carb.</td>
<td>41g</td>
</tr>
<tr>
<td></td>
<td>5%</td>
<td></td>
<td>14%</td>
</tr>
<tr>
<td>Sat. Fat</td>
<td>0g</td>
<td>Dietary Fiber</td>
<td>8g</td>
</tr>
<tr>
<td></td>
<td>0%</td>
<td></td>
<td>32%</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>0g</td>
<td>Sugars</td>
<td>11g</td>
</tr>
<tr>
<td>Cholest.</td>
<td>0mg</td>
<td>Protein</td>
<td>10g</td>
</tr>
<tr>
<td></td>
<td>0%</td>
<td></td>
<td>17%</td>
</tr>
<tr>
<td>Sodium</td>
<td>70mg</td>
<td></td>
<td>3%</td>
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</tbody>
</table>

*Percent Daily Values (DV) are based on a 2,000 calorie diet

This Health Valley Chili contains 70 milligrams sodium per serving. Other leading brands contain 780 milligrams sodium or more per serving.

**Exchanges:**
1 Protein, 1 1/2 Starch

**MADE WITH NO GENETICALLY ENGINEERED INGREDIENTS.**

**INGREDIENTS:** FILTERED WATER, ORGANIC TOMATOES, ORGANIC PINTO BEANS, ORGANIC ONIONS, ORGANIC TOMATO PASTE, ORGANIC BROWN RICE FLOUR, ORGANIC SOY PROTEIN, ORGANIC EVAPORATED CANE JUICE, ORGANIC GARLIC POWDER, ORGANIC ONION POWDER, NATURAL FLAVORS, ORGANIC SPICES, ORGANIC EXPELLER PRESSED CANOLA OIL, ASCORBIC ACID. CONTAINS: SOY.
Group work for mini-overhead presentations
GOING ORGANIC
What’s the payoff?

Sales of organic foods are growing by 10 to 20 percent each year in the United States. More than 10 percent of fruits and vegetables sold are now organic. By any measure, organic foods are starting to enter the mainstream American diet.

And with good reason. Organic produce often has higher levels of potentially healthy compounds. And organic farms may fare better in droughts, don’t use synthetic fertilizers that contaminate groundwater, and are more hospitable to critical pollinators like bees and butterflies.

What’s more, “the data show that you reduce your exposure to pesticide residues when you buy organic foods,” says organics expert Charles Benbrook.

Continued on page 3.
WHAT DOES ORGANIC MEAN?

ORGANIC FRUITS, NUTS, VEGETABLES, & GRAINS
- no synthetic pesticides
- not irradiated
- no synthetic fertilizers
- not genetically engineered
- no sewage sludge

ORGANIC MEAT & POULTRY
- access to outdoors
- not irradiated
- no growth hormones, antibiotics, other drugs
- raised on 100% organic feed
- not fed animal byproducts

ORGANIC EGGS
- hens fed 100% organic feed
- no growth hormones, antibiotics, other drugs
- not necessarily cage-free or free-range

ORGANIC MILK
- cows have access to outdoors
- no growth hormones, antibiotics, other drugs
- all cows’ feed for past 12 months
- at least 100% organic
- at least 30% of cows’ diet from pasture during primary growing season

ORGANIC SEAFOOD
- no current official U.S. standards
- USDA working on a standard for farm-raised seafood

PACKAGED FOODS
- “100% ORGANIC” all ingredients are organic
- “ORGANIC” at least 95% of ingredients are organic
- “MADE WITH ORGANIC INGREDIENTS” at least 70% of ingredients are organic
WHAT DO LABELS MEAN?

“Organic” claims are always independently verified. Other label claims only are if they’re part of a certification program. So a “natural” breast of chicken may have been injected with (salty) broth and may have come from an animal raised on a factory farm.

NO ANTIBIOTICS ADDED
If beef, pork, lamb, or poultry, documentation required. No procedure for verifying claim on eggs, milk, or fish.

CAGE-FREE
Poultry not confined to cages. May or may not have access to outdoors.

HORMONE-FREE
Illegal claim. All animals produce hormones.

NATURAL
Contains no artificial ingredients or added colors, and is no more than “minimally processed.” Does not mean organic or raised in any particular way. Official definition applies only to meat, chicken, and eggs, not other fresh or packaged foods.

NO HORMONES ADMINISTERED
If on beef, documentation required. Meaningless on pork and chicken since hormone use is never permitted. No procedure for verifying claim on milk, fish, or eggs.

CERTIFIED HUMANE RAISED AND HANDLED
Animals have ample space and shelter and are able to perform natural behaviors like dust bathing (chickens) or rooting (pigs). No cages or crates used. Feed contains no added antibiotics or hormones. Humanely slaughtered. Other certifications with high standards: Animal Welfare Approved and American Humane Certified.

FREE-RANGE FREE-ROAMING
Poultry has access to the outdoors, but for no minimum time. No official definition for beef.

GRASS-FED
Animals get most of their nutrients from grass throughout their lives. Unless also labeled organic, may be given antibiotics, hormones, and insecticides.

VEGETARIAN-FED
Feed does not contain animal byproducts like feather meal, chicken litter, dried blood, or ground up meat, poultry, or fish.

PASTURE-RAISED
No official meaning.
### Scoring Pesticides

Charles Benbrook’s Dietary Risk Index (DRI) compares the average pesticide levels found on a food to the maximum levels that the U.S. Environmental Protection Agency regards as safe. (When those levels are equal, the DRI is 100.) The DRI takes into account average pesticide residue levels in an edible portion of a food, the toxicity of each pesticide, and how frequently residues are present.

Most DRIs are well below 100, as you can see from this list of conventionally grown domestic and imported produce for which at least 10 samples have been analyzed. But don’t panic if your favorite fruit or vegetable is over 100. The EPA builds in a 100-fold or 1,000-fold margin of safety.

<table>
<thead>
<tr>
<th>Fruit</th>
<th>DRI</th>
<th>Vegetable</th>
<th>DRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peaches (Chile)</td>
<td>596</td>
<td>Sweet bell peppers (Mexico)</td>
<td>608</td>
</tr>
<tr>
<td>Nectarines (Chile)</td>
<td>424</td>
<td>Cucumbers (Honduras)</td>
<td>172</td>
</tr>
<tr>
<td><strong>Maximum level considered safe</strong></td>
<td><strong>100</strong></td>
<td>Green beans</td>
<td>157</td>
</tr>
<tr>
<td>Pears (Chile)</td>
<td>48</td>
<td>Asparagus (Peru)</td>
<td>105</td>
</tr>
<tr>
<td>Strawberries</td>
<td>48</td>
<td><strong>Maximum level considered safe</strong></td>
<td><strong>100</strong></td>
</tr>
<tr>
<td>Strawberries (Mexico)</td>
<td>45</td>
<td>Sweet bell peppers</td>
<td>90</td>
</tr>
<tr>
<td>Apples (Chile)</td>
<td>42</td>
<td>Kale</td>
<td>90</td>
</tr>
<tr>
<td>Cherries (Canada)</td>
<td>40</td>
<td>Green beans (Mexico)</td>
<td>79</td>
</tr>
<tr>
<td>Oranges (Australia)</td>
<td>27</td>
<td>Sweet bell peppers (Canada)</td>
<td>53</td>
</tr>
<tr>
<td>Apples</td>
<td>27</td>
<td>Summer squash</td>
<td>51</td>
</tr>
<tr>
<td>Peaches</td>
<td>27</td>
<td>Cucumbers (Mexico)</td>
<td>51</td>
</tr>
<tr>
<td>Pears</td>
<td>26</td>
<td>Collards</td>
<td>41</td>
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<tr>
<td>Grapes (Chile)</td>
<td>26</td>
<td>Sweet potatoes</td>
<td>41</td>
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<tr>
<td>Grapes (Peru)</td>
<td>24</td>
<td>Tomatoes (Mexico)</td>
<td>36</td>
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<td>Watermelon (Mexico)</td>
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<tr>
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<tr>
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<td>Blueberries (Chile)</td>
<td>16</td>
<td>Summer squash (Mexico)</td>
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<tr>
<td>Grapes</td>
<td>12</td>
<td>Asparagus</td>
<td>18</td>
</tr>
</tbody>
</table>
**Imported vs. Domestic**

Roughly 80 percent of the average American’s pesticide risk now comes from imported produce. But some imports are cleaner than others. Foods from Canada, for example, tend to have a lower Dietary Risk Index (DRI) than the same foods grown in the United States, while foods from Chile are more likely to have a higher DRI.

<table>
<thead>
<tr>
<th></th>
<th>US Domestic (DRI)</th>
<th>Imported (DRI)</th>
<th>MEXICO</th>
<th>CHILE</th>
<th>CANADA</th>
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<tr>
<td>Asparagus</td>
<td>18</td>
<td>0</td>
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<tr>
<td>Broccoli</td>
<td>8</td>
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<tr>
<td>Cantaloupe</td>
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<td>1</td>
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<td>Carrots</td>
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<td>23</td>
<td>3</td>
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<td>Cucumbers</td>
<td>25</td>
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<td>Grapes</td>
<td>12</td>
<td>7</td>
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<tr>
<td>Green beans</td>
<td>157</td>
<td>79</td>
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<td>Hot peppers</td>
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<tr>
<td>Kale</td>
<td>90</td>
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<td>20</td>
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<tr>
<td>Watermelon</td>
<td>4</td>
<td>18</td>
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<td></td>
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</tbody>
</table>

|                |                |                |        |       |        |
| Apples         | 27              | 42             |        |       |        |
| Blueberries    | 17              | 16             |        |       |        |
| Grapes         | 12              | 26             |        |       |        |
| Nectarines     | 17              |                |        |       |        |
| Oranges        | 8               | 16             |        |       |        |
| Peaches        | 27              |                |        |       |        |
| Pears          | 26              | 48             |        |       |        |

|                |                |                |        |       |        |
| Blueberries    | 16              | 8              |        |       |        |
| Cherries       | 12              | 40             |        |       |        |
| Cucumbers      | 25              | 3              |        |       |        |
| Potatoes       | 27              | 0              |        |       |        |
| Sweet bell peppers | 90      | 53             |        |       |        |
| Tomatoes       | 20              | 5              |        |       |        |
12 Most Contaminated
Buy These Organic

• Apples
• Bell Peppers
• Celery
• Cherries
• Imported Grapes
• Nectarines
• Peaches
• Pears
• Potatoes
• Red Raspberries
• Spinach
• Strawberries

12 Least Contaminated

• Asparagus
• Avocados
• Bananas
• Broccoli
• Cauliflower
• Corn (sweet)
• Kiwi
• Mangos
• Onions
• Papaya
• Pineapples
• Peas (sweet)
Which body systems?
1. **Mouth**

*Ingestion* entry way
salivary gland secretion
mucus + enzymes
enzymatic digestion: carbohydrate
mastication = chewing
deglutition = swallowing

2. **Esophagus**

*Rapid transit*
peristalsis
secretion mucus

3. **Stomach**

*Mixing*
peristalsis
secretion mucus + HCl
+ enzymes
enzymatic digestion:
protein + butter fat!

4. **Liver-Gall Bladder**

*Emulsification* =
detergent action of bile
+ secretion

5. **Pancreas**

*Secretion*
mucus + NaHCO₃ + enzymes
enzymatic digestion:
carbohydrate, fat, protein

6. **Small Intestine**

*Absorption*
Secretion mucus
+ enzymes
enzymatic digestion:
carbohydrate, fat, protein

7. **Large Intestine**

*Dehydration*
secretion + absorption
storage + peristalsis
Taste hard-wired for survival!

@ rest

 distilled $\text{H}_2\text{O}$

sugar

sour

S&W fig 3-8 p 82
Bitter is yucky!!
Gl-Doughnut/Bagel (!) Analogy

GI Lumen

Body
## Gut Secretions

<table>
<thead>
<tr>
<th>Secretion</th>
<th>Release Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mucus</td>
<td>into GI Lumen</td>
</tr>
<tr>
<td>2. Enzymes</td>
<td>into GI Lumen</td>
</tr>
<tr>
<td>3. $\text{H}_2\text{O}$, acids, bases+</td>
<td>into GI Lumen</td>
</tr>
<tr>
<td>4. Hormones</td>
<td>into Blood</td>
</tr>
</tbody>
</table>
Accessory Organs

Stomach
- Adds acid, enzyme for protein
- Churns, mixes food to chyme

Pancreas (beneath stomach)
- Makes enzymes for digesting all energy-yielding nutrients
- Releases bicarbonate to neutralize stomach acid

Gallbladder
- Stores & secretes bile

Liver
- Makes bile, a detergent for emulsifying fats

Salivary Glands
- Donate starch-digesting enzyme

Primary Organs

Mouth
- Chews & mixes food w/saliva

Esophagus
- Passes food to stomach

Stomach
- Adds acid, enzyme for protein
- Churns, mixes food to chyme

Small Intestine
- Adds enzymes for digesting carbohydrates, fats & protein
- Cell lining absorb nutrients into blood & lymph

Large Intestine
- Reabsorbs water & electrolytes
- Storage chamber for feces

S&W 2014 fig 3-9 p 83
Normal swallowing:
- Tongue
- Esophagus (to stomach)
- Larynx rises
- Trachea (to lungs)
- Epiglottis closes over larynx

Choking:
- Food

S&W 2014 fig 3-15 p 94

Normal swallowing Choking!
Cross section of the digestive tract, showing muscles.

- Circular muscles are inside.
- Longitudinal muscles are outside.
As the circular and longitudinal muscles tighten and relax, the food moves ahead of the constriction.

Swallowed food
Time in mouth < 1 min

Time in stomach ~1–2 hr
Time in small intestine
~7–8 hr*

Time in large intestine
~12–14 hr*

*Based on a 24-hour transit time. Actual times vary widely.

S&W 2014 fig 3-13 p 89
**Stomach** - a flexible mixing bag!

Food is mixed & churned here

Gas more than food stored here

**Esophagus** - a rapid transit tube!

The pyloric valve controls the flow of chyme

Crisscrossed muscle layers create churning and mixing motions.

**Small Intestine** (Duodenum)

Muscle cross section

inner
middle
outer
Small intestine wall has 1000s of folds & is carpeted with villi

Each villus is covered with many microvilli to increase SA further!

Intestinal villi move like a sea anemone with constant motion

Muscle layers beneath folds

A villus

Capillaries

Lymphatic vessel

Artery

Vein

Lymphatic vessel

Microvilli

EM photo of human intestinal cell w/microvilli
What is the **major function** of the small intestine?

Absorption!!
Ulcer Facts

• Most ulcers are caused by an infection, not spicy food, acid or stress.
• The most common ulcer symptom is burning pain in the stomach.
• Your doctor can test you for *H. pylori* infection.
• Antibiotics are the new cure for ulcers.
• Eliminating *H. pylori* infections with antibiotics means that your ulcer can be cured for good.
Clipping a Duodenal Ulcer

Peering through the pylorus into the duodenum, we see some blood and a vessel sticking out of the wall, just at the front edge of a small but deep ulcer.

In the second photograph, a disposable metal clip is applied to the ulcer. The patient remained well and left hospital three days later.
Large Intestine \equiv \text{Dehydration Chamber}
1. All of the following are **correct** concerning ulcers **except**:  
   a. they usually occur in the large intestine  
   b. many are caused by a bacterium  
   c. if not treated correctly, they can lead to stomach cancer  
   d. their symptoms can be masked by using antacids regularly

2. Which of the following **increases** the production of intestinal gas?  
   a. chewing gum  
   b. drinking carbonated beverages  
   c. eating certain vegetables  
   d. all of the above

3. **Chemical digestion** of all nutrients mainly occurs in which **organ**?  
   a. mouth  
   b. stomach  
   c. small intestine  
   d. large intestine

4. Which **chemical** released by the pancreas **neutralizes stomach acid** entering the small intestine?  
   a. mucus  
   b. enzymes  
   c. bicarbonate  
   d. bile

5. Which passes through the large intestine mostly **unabsorbed**?  
   a. starch  
   b. vitamins  
   c. minerals  
   d. fiber
6. **T-cells** are immune cells that *ingest and destroy antigens* in a process known as *phagocytosis*.
   T  F

7. **Bile** starts the process of *protein digestion* in the stomach.
   T  F

8. **To digest** foods *efficiently*, people should not combine certain foods, such as meat and fruit, at the same meal.
   T  F

9. The **gall bladder** stores **bile** until it is needed to *emulsify fat*.
   T  F

10. **Absorption of the majority of nutrients** takes place across the mucus-coated lining of the **stomach**.
    T  F
Alcohol Facts

1. 33% of US college students are binge drinkers (≥ 4 drinks in a short time span) yet > 90% deny it.

2. Alcohol is involved in 20% of all boating fatalities...

3. ...23% of all suicides...

4. ...39% of all traffic fatalities...

5. ...40% of all residential fire fatalities...

6. ...47% of all homocides...

7. ...65% of all domestic violence incidents.
<table>
<thead>
<tr>
<th>Myth</th>
<th>Truth</th>
</tr>
</thead>
<tbody>
<tr>
<td>A shot of alcohol warms you up.</td>
<td>Alcohol diverts blood flow to the skin making you feel warmer, but it actually cools the body.</td>
</tr>
<tr>
<td>Wine and beer are mild; they do not lead to addiction.</td>
<td>Wine and beer drinkers worldwide have high rates of death from alcohol-related illnesses. It’s not what you drink but how much that makes the difference.</td>
</tr>
<tr>
<td>Mixing drinks is what gives you a hangover.</td>
<td>Too much alcohol in any form produces a hangover.</td>
</tr>
<tr>
<td>Alcohol is a stimulant.</td>
<td>Alcohol depresses the brain’s activity.</td>
</tr>
<tr>
<td>Alcohol is legal; therefore, it is not a drug.</td>
<td>Alcohol is legal, but it alters body functions and is medically defined as a depressant drug.</td>
</tr>
</tbody>
</table>
What's a drink? $\equiv \frac{1}{2}$ oz of pure ethanol (ETOH)

- 10 oz wine cooler
- 12 oz beer, alcoholic lemonade or alcoholic carbonated drink
- 1.5 oz hard liquor 80 proof (40% ETOH whiskey, gin, brandy, rum, vodka)
- 5 oz wine (12% ETOH)
## Women & Blood Alcohol [ BAC ]

### Table: Body Weight in Pounds—Women

<table>
<thead>
<tr>
<th>Drinks</th>
<th>90</th>
<th>100</th>
<th>120</th>
<th>140</th>
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## Men & Blood Alcohol [ BAC ]

<table>
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<th>Drinks</th>
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</table>

- ONLY SAFE DRIVING LIMIT
- IMPAIRMENT BEGINS
- DRIVING SKILLS SIGNIFICANTLY AFFECTED
- LEGALLY INTOXICATED

S&W 2014 fig C3-3 p 105
Blood Alcohol Concentration (BAC) & Accident Probability

Accident probability

% BAC

S&W 2014 fig C3-4 p 106
Motor Sensory

M. Supplementary motor area (on inner surface—not visible; programming of complex movements)

M. Premotor cortex (coordination of complex movements)

M. Primary motor cortex (voluntary movement)

M. Central sulcus

S. Primary sensory cortex (sensation)

S. Primary visual cortex surrounded by higher-order visual cortex (sight)

A. Posterior parietal cortex (integration of somatosensory and visual input; important for complex movements)

A. Wernicke’s area (speech understanding)

A. Parietal-temporal-occipital association cortex (integration of all sensory input; important in language)

A. Limbic association cortex (mostly on inner and bottom surface of temporal lobe; motivation and emotion; memory)

A. Prefrontal association cortex (planning for voluntary activity; decision making; personality traits)

A. Broca’s area (speech formation)

S. Primary auditory cortex surrounded by higher-order auditory cortex (hearing)

LS 2006, cf: LS 2012 fig 5-8a

Key

M. Motor cortex
A. Association cortex
S. Sensory cortex
Alcohol's Progressive Effects on the Brain

1. Judgment & Reasoning
   - to Broca's Area for Speech Formation (outer L hemisphere)

2. Speech & Vision

3. Voluntary Muscle Coordination

4. Breathing & Heart Beating

http://learn.genetics.utah.edu/content/addiction/mouse/
Alcohol Metabolism & Disease Progression

Alcohol (ethanol) (Alcohol dehydrogenase) → Free radicals → Energy → Oxidative stress & inflammation → Liver disease, cancer, CVDs

Acetaldehyde (Aldehyde dehydrogenase) → Free radicals → Energy → Free radicals

Acetate → Used for energy or changed into fat and stored
Stomach (partly removed to show underlying pancreas)

Liver

Gallbladder

Duodenum

Pancreas

Common bile duct

Pancreatic duct
Normal → Fatty → Cirrhosis
Finally, we can tell our patients something they want to hear – a little bit of drinking is good for you – it will keep you alive!