


More nutrition fun!!



## ***BI 199 Discussion 4***

- I. Announcements*** Personal shopping analysis tonight. Next M 27<sup>th</sup> Diet analyses: DA+ & <https://www.supertracker.usda.gov/> Record diet specifics for at least 1 day! Bring DA+ card! Q? U of O website! <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
- IV. What Does Organic Mean on a Label?*** NAHL Oct 2012
- 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!  ...Please read! Good stuff!!
- VII. Quiz Bowl*** S&W ch 3
- VIII. Controversy 3*** Alcohol & nutrition: Benefits vs. risks?  
S&W pp 100-110

# Nutrition Action

OCTOBER 2014 \$2.50

HEALTH LETTER®  
CENTER FOR SCIENCE IN THE PUBLIC INTEREST

## HIJACKED



### HOW THE FOOD INDUSTRY CONVERTS DIET ADVICE INTO PROFITS

BY BONNIE LIEBMAN

**M**ake 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 appear 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.*

**WESTERN  
FAMILY<sup>®</sup>**

*Excellent Source  
of Fiber*

# Bite Size Shredded Wheat

*Made from 100% Natural Whole Grain Wheat*



SERVING SUGGESTION

**NET WT 16.4 OZ (1 LB 0.4 OZ) 465g**

ENLARGED  
TO SHOW TEXTURE

**U PAREVE**

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

**INGREDIENTS:** 100% WHOLE GRAIN WHEAT.

BHT ADDED TO PACKAGING MATERIAL TO HELP PRESERVE FRESHNESS.

**CONTAINS WHEAT**



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.

**BHT** is butylated hydroxytoluene, a preservative added to many foods to prevent spoilage.

a fat-soluble, anti-oxidant

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Marca Registrada



# Nutrition Facts

Serving Size 1¼ cup (50g)

Servings Per Container about 9

Amount Per Serving	Cereal with ½ cup Skim Milk	
	Cereal	Skim Milk
<b>Calories</b>	170	220
Calories from Fat	10	10
	<b>% Daily Value**</b>	
<b>Total Fat</b> 1g*	<b>2%</b>	<b>2%</b>
Saturated Fat 0g	<b>0%</b>	<b>2%</b>
Trans Fat 0g		
Polyunsaturated Fat 0.5g		
Monounsaturated Fat 0g		
<b>Cholesterol</b> 0mg	<b>0%</b>	<b>1%</b>
<b>Sodium</b> 0mg	<b>0%</b>	<b>3%</b>
<b>Potassium</b> 170mg	<b>5%</b>	<b>11%</b>
<b>Total Carbo- hydrate</b> 40g	<b>14%</b>	<b>16%</b>
Dietary Fiber 6g	<b>24%</b>	<b>24%</b>
Soluble Fiber less than 1g		
Insoluble Fiber 5g		
Sugars 0g		
Other Carbohydrate 33g		
<b>Protein</b> 6g		

Vitamin A	0%	4%
Vitamin C	0%	2%
Calcium	2%	15%
Iron	8%	8%
Vitamin D	0%	15%
Thiamin	10%	10%
Riboflavin	0%	10%
Niacin	15%	15%
Vitamin B <sub>6</sub>	0%	0%
Folate	0%	0%
Vitamin B <sub>12</sub>	0%	0%
Phosphorus	20%	30%
Magnesium	15%	20%
Zinc	8%	10%
Copper	8%	8%

\*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:

Excellent Source of **FIBER** & Made from **100% WHOLE GRAIN**

**190** CALORIES  
**0g** SAT FAT  
**0mg** SODIUM  
**11g** SUGARS  
PER 21 BISCUIT SERVING

**Kellogg's**

**FROSTED**

**Mini-Wheats**

**Bite Size**



ENLARGED TO SHOW TEXTURE

**Original**

LIGHTLY SWEETENED  
WHOLE GRAIN CEREAL

COLLECT SPIDEY CODES  
**GET MOVIE TICKETS**  
SEE BACK FOR DETAILS



SEE  
**THE AMAZING SPIDER-MAN IN 3D**  
ONLY IN THEATERS



CEREAL

NET WT 18 OZ (1 LB 2 OZ) (510g)

**Ingredients:** Whole grain wheat, sugar, contains 2% or less of brown rice syrup, gelatin, BHT for freshness.

**Vitamins and Minerals:** Reduced iron, niacinamide, vitamin B<sub>6</sub> (pyridoxine hydrochloride), vitamin B<sub>2</sub> (riboflavin), vitamin B<sub>1</sub> (thiamin hydrochloride), zinc oxide, folic acid, vitamin B<sub>12</sub>.

**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

Amount Per Serving	Cereal	with 1/2 cup skim milk
<b>Calories</b>	190	230
Calories from Fat	10	10
<b>% Daily Value**</b>		
<b>Total Fat</b> 1g*	<b>2%</b>	<b>2%</b>
Saturated Fat 0g	<b>0%</b>	<b>0%</b>
Trans Fat 0g		
Polyunsaturated Fat 0.5g		
Monounsaturated Fat 0g		
<b>Cholesterol</b> 0mg	<b>0%</b>	<b>0%</b>
<b>Sodium</b> 0mg	<b>0%</b>	<b>3%</b>
<b>Potassium</b> 200mg	<b>6%</b>	<b>11%</b>
<b>Total Carbohydrate</b> 46g	<b>15%</b>	<b>17%</b>
Dietary Fiber 6g	<b>23%</b>	<b>23%</b>
Sugars 11g		
<b>Protein</b> 5g		

Vitamin A	0%	4%
Vitamin C	0%	0%
Calcium	0%	15%
Iron	90%	90%
Thiamin	25%	30%
Riboflavin	25%	35%
Niacin	25%	25%
Vitamin B <sub>6</sub>	25%	25%
Folic Acid	25%	25%
Vitamin B <sub>12</sub>	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:

	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



# Plain Generic



VS.



# Frosted National

Vitamin A	0%
Vitamin C	0%
Calcium	2%
Iron	8%
Vitamin D	0%
Thiamin	10%
Riboflavin	0%
Niacin	15%
Vitamin B <sub>6</sub>	0%
Folate	0%
Vitamin B <sub>12</sub>	0%
Phosphorus	20%
Magnesium	15%
Zinc	8%
Copper	8%

?

0%
0%
0%
90%
0%
25%
25%
25%
25%
25%
25%
20%
10%
10%
10%

Fortified or  
ingredients  
added!



100% NATURAL WHOLE GRAIN  
WHEAT & WHEAT BRAN

**9** OUT OF **10**  
**DOCTORS**  
**RECOMMEND**  
POST SHREDDED WHEAT



TO HELP REDUCE  
THE RISK OF  
**HEART  
DISEASE\***

**SHREDDED  
WHEAT** Spoon  
Size®

Wheat'n Bran

### Nutrition Facts

Serving Size 1 1/4 cup (59g)  
Servings Per Container about 9

Amount Per Serving	Cereal with 1/2 cup Fat Free Milk	
	Cereal	Fat Free Milk
<b>Calories</b>	200	240
Calories from Fat	10	10

	% Daily Value**	
<b>Total Fat</b> 1g*	2%	2%
Saturated Fat 0g	0%	0%
Trans Fat 0g		
Polyunsaturated Fat 0.5g		
Monounsaturated Fat 0g		

**Cholesterol** 0mg 0% 0%

**Sodium** 0mg 0% 3%

**Potassium** 230mg 7% 12%

**Total Carbohydrate** 48g 16% 18%

Dietary Fiber 9g 36% 36%

Soluble Fiber 2g

Insoluble Fiber 7g

Sugars 0g

Other Carbohydrate 39g

**Protein** 6g

Vitamin A 0% 4%

Vitamin C 0% 0%

Calcium 2% 15%

Iron 15% 15%

Thiamin 8% 10%

Riboflavin 2% 10%

Niacin 15% 15%

Vitamin B6 2% 4%

Folic Acid 4% 4%

Phosphorus 20% 30%

Magnesium 20% 25%

Zinc 10% 15%

Copper 10% 10%

\* Amount in Cereal. One half cup fat free milk contributes an additional 40 calories, 65mg sodium, 200mg potassium, 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:

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 3,500mg 3,500mg

Total Carbohydrate 300g 375g

Dietary Fiber 25g 30g

**INGREDIENTS:** WHOLE GRAIN WHEAT AND WHEAT BRAN. TO PRESERVE THE NATURAL WHEAT FLAVOR, BHT IS ADDED TO THE PACKAGING MATERIAL.

**CONTAINS: WHEAT.**

POST FOODS, LLC  
1 UPPER POND ROAD  
PARSIPPANY, NJ 07054 USA



Beautiful  
K+/Na+! Why?

Close to the earth!

Exceptional,  
Low Fat,  
Low Sodium,  
High Fiber Choice!



PER SERVING

210 CALORIES	0g SAT FAT 2% DV	35mg SODIUM 1% DV	11g SUGARS	6g FIBER	7g PROTEIN
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# Fruit & Nut Muesli

Low Fat Muesli

Whole Grain Rolled Oats, Raisins, Apples, Almonds and a Hint of Cinnamon



Net Wt.  
16 oz (454g)



**Giving Back**

A contribution will be made to non-profit causes for every Peace Cereal product sold.

See back for details



## Fruit & Nut Muesli

Low Fat Muesli

### Nutrition Facts

Serving Size 1/2 cup (55g)  
Servings Per Container: About 8

Amount Per Serving	
<b>Calories</b>	210
Calories From Fat	25
% Daily Value*	
<b>Total Fat</b> 3g	4%
Saturated Fat 0g	2%
Trans Fat 0g	
<b>Cholesterol</b> 0mg	0%
<b>Sodium</b> 35mg	1%
<b>Total Carbohydrate</b> 42g	14%
Dietary Fiber 6g	25%
Sugars 11g	
<b>Protein</b> 7g	
Vitamin A	0%
Vitamin C	2%
Calcium	4%
Iron	10%

\* 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
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

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

**Ingredients:** Whole Rolled Oats, Raisins (Raisins, Vegetable Glycerin, Vegetable Oil [Canola and/or Sunflower Oil]), Rolled Rye, Apple Powder (Apples, Calcium Stearate), Apples, Date Powder, Corn Flour, Almonds, Rice Flour, Milled Cane Sugar, Cinnamon Bark, Barley Malt Syrup, Salt, Annatto (for color), Turmeric (for color), Purple Carrot Juice (for color).

**Contains Almonds.** May contain other Tree Nuts, Wheat, and Soy.

Peace Cereal®  
Attune Foods, LLC  
2545 Prairie Road, Eugene, OR 97402  
Product of the U.S.A.  
1-888-720-4367  
www.peacecereal.com  
©2013, Attune Foods, LLC



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!



Made With Whole Grains | Excellent Source of ALA Omega-3\*



Does depend on what you add!!

# GROUND TURKEY BREAST 95% LEAN / 5% FAT

## Nutrition Facts

Serving Size 4 oz (112g)  
Serving Per Container varied

Amount Per Serving

Calories 140      Calories From Fat 99

% Daily Value\*

Total Fat 5g **x 9 kcal/g** 8%

Saturated Fat 1g 5%

Trans Fat 0g

Cholesterol 65mg 22%

Sodium 270mg 12%

Total Carbohydrate 0g 0%

Protein 24g

Calcium 2%      Iron 4%

Not a significant source of Dietary Fiber, Sugars,  
Vitamin A or Vitamin C.

\* Percent Daily Values are tested on a 2,000  
calorie diet.



Ground?  
Yikes!

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

$45/140 \equiv 32.1\%$



**NUTRITION SCORECARD** (PER SERVING)

SODIUM  
**70** mg

FAT  
**2.5** g

FIBER  
**8** g

ANTIOXIDANT  
**30%** RDI\*

\*VITAMIN C



**New**

VEGETARIAN  
**CHILI**

**NO SALT ADDED**  
**Tame Tomato**

Serving  
Suggestion

NET WT  
15 OZ (425g)



# Beans can be a great, low-fat, high-nutrient density substitute!

QUESTIONS/COMMENTS: 1-800-434-4246, or visit [www.healthvalley.com](http://www.healthvalley.com).

## Nutrition Facts

Serv. Size 1 Cup (245g)  
 Servings about 2  
**Calories** 210  
 Fat Cal. 25

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

Amount/serving	% DV*	Amount/serving	% DV*
<b>Total Fat</b> 2.5g	<b>5%</b>	<b>Total Carb.</b> 41g	<b>14%</b>
Sat. Fat 0g	<b>0%</b>	Dietary Fiber 8g	<b>32%</b>
<i>Trans</i> Fat 0g		Sugars 11g	
<b>Cholest.</b> 0mg	<b>0%</b>	<b>Protein</b> 10g	<b>17%</b>
<b>Sodium</b> 70mg	<b>3%</b>		
Vitamin A 10% • Vitamin C 30% • Calcium 10% • Iron 15%			

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

**Exchanges:**  
 1 Protein, 1½ 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.**

X2103-005



***Group work for***



***mini-overhead  
presentations***



# Nutrition Action

OCTOBER 2012 \$2.50

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## 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.*

Photo © iStockphoto.com



# 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 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

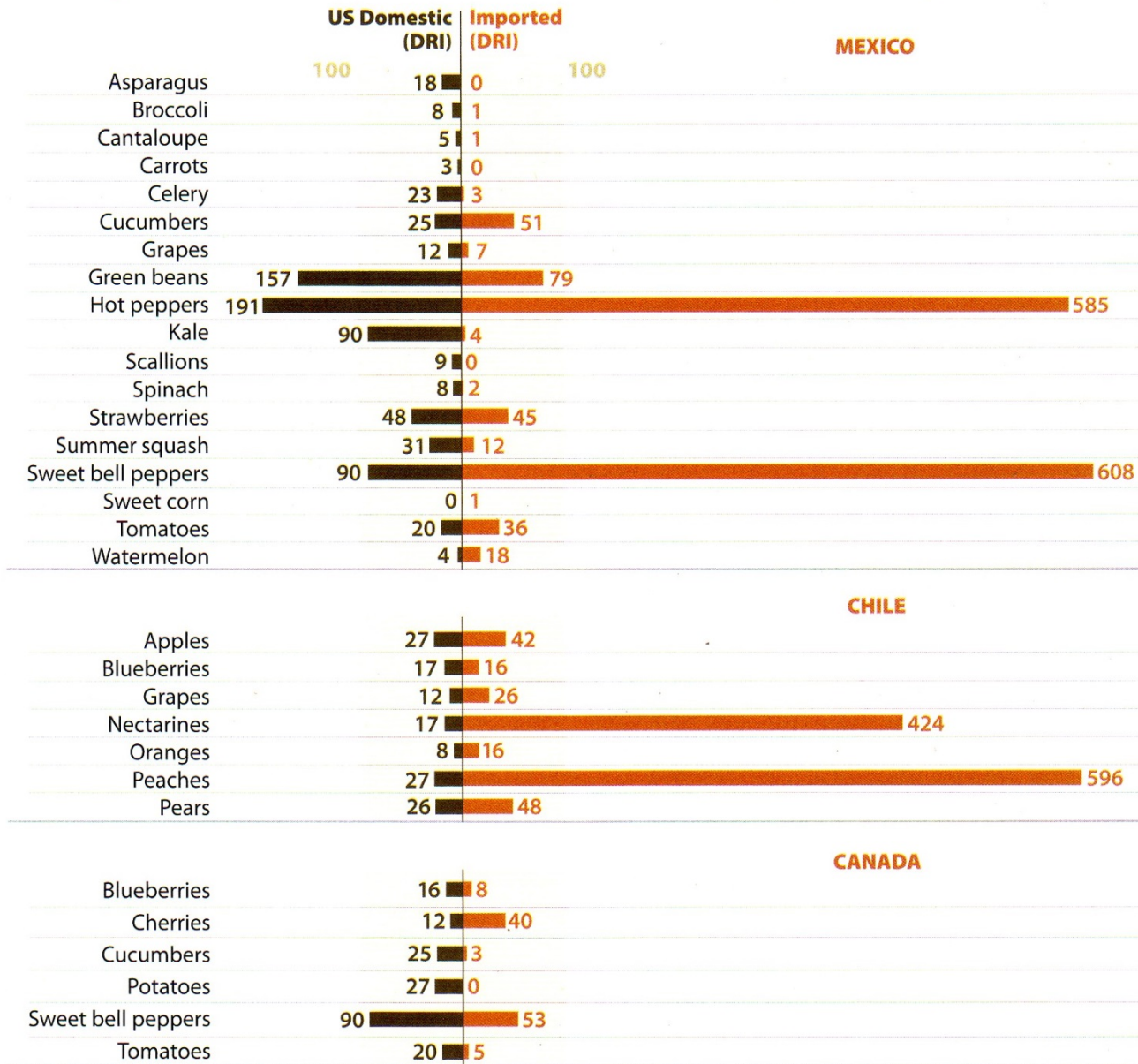
Charles Benbrook's Dietary Risk Index (DRI) compares the average pesticide levels found on a food to the maximum levels that the U.S. Environmental Protection Agency regards as safe. (When those levels are equal, the DRI is 100.) The DRI takes into account average pesticide residue levels in an edible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

<b>Fruit</b>	<b>DRI</b>	<b>Vegetable</b>	<b>DRI</b>
Peaches (Chile)	596	Sweet bell peppers (Mexico)	608
Nectarines (Chile)	424	Cucumbers (Honduras)	172
<b>Maximum level considered safe</b>	<b>100</b>	Green beans	157
Pears (Chile)	48	Asparagus (Peru)	105
Strawberries	48	<b>Maximum level considered safe</b>	<b>100</b>
Strawberries (Mexico)	45	Sweet bell peppers	90
Apples (Chile)	42	Kale	90
Cherries (Canada)	40	Green beans (Mexico)	79
Oranges (Australia)	27	Sweet bell peppers (Canada)	53
Apples	27	Summer squash	51
Peaches	27	Cucumbers (Mexico)	51
Pears	26	Collards	41
Grapes (Chile)	26	Sweet potatoes	41
Grapes (Peru)	24	Tomatoes (Mexico)	36
Watermelon (Mexico)	18	Potatoes	27
Nectarines	17	Cucumbers	25
Blueberries	16	Celery	23
Oranges (Chile)	16	Tomatoes	20
Blueberries (Chile)	16	Summer squash (Mexico)	19
Grapes	12	Asparagus	18

## 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.



# Environmental Working Group Suggestions

<http://www.foodnews.org/reportcard.php>

## 12 Most Contaminated Buy These Organic



• Apples



• Bell Peppers



• Celery



• Cherries



• Imported Grapes

• Nectarines



• Peaches



• Pears

• Potatoes



• Red Raspberries



• Spinach



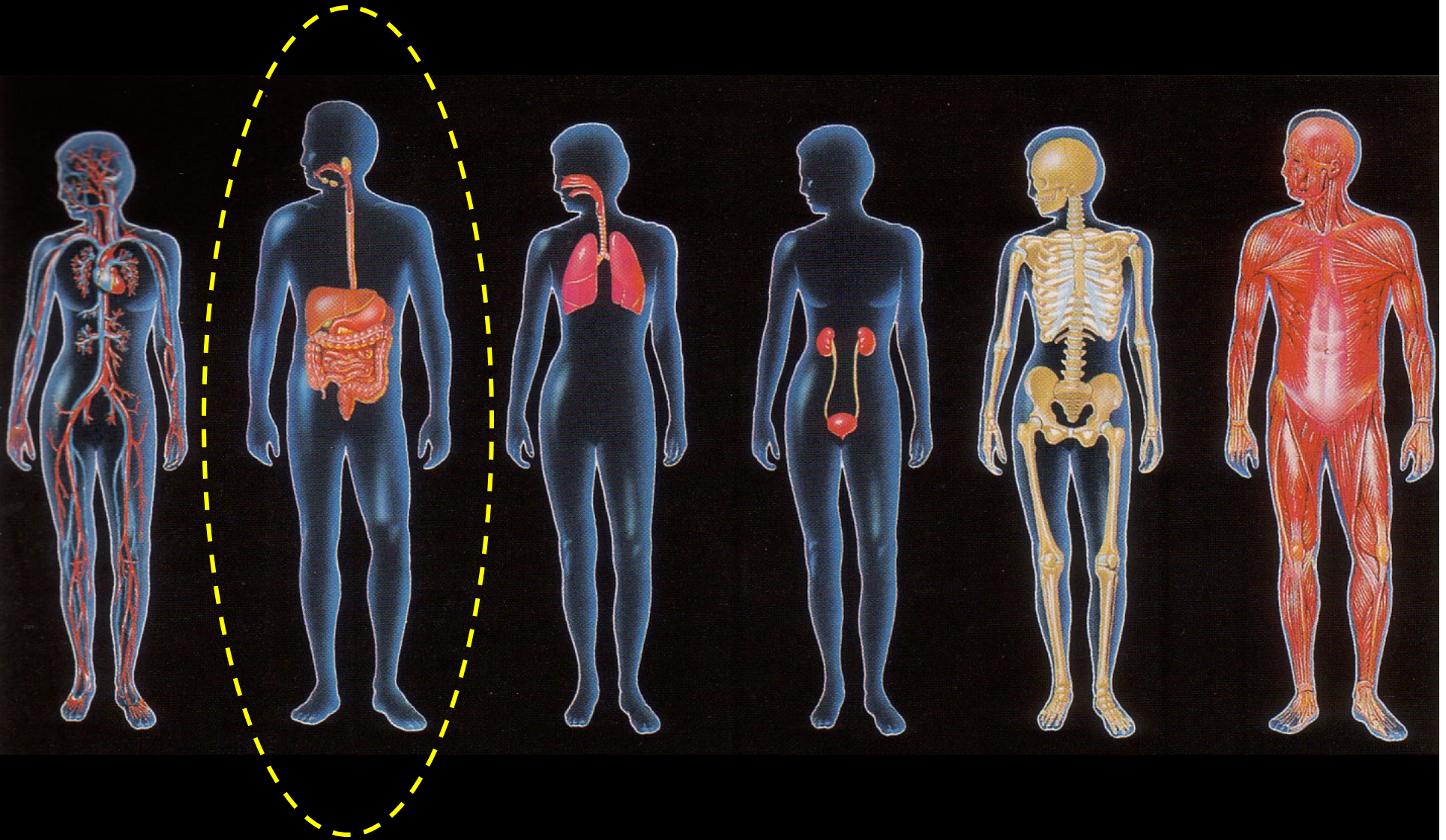
• Strawberries



## 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

# 4. Liver-Gall Bladder

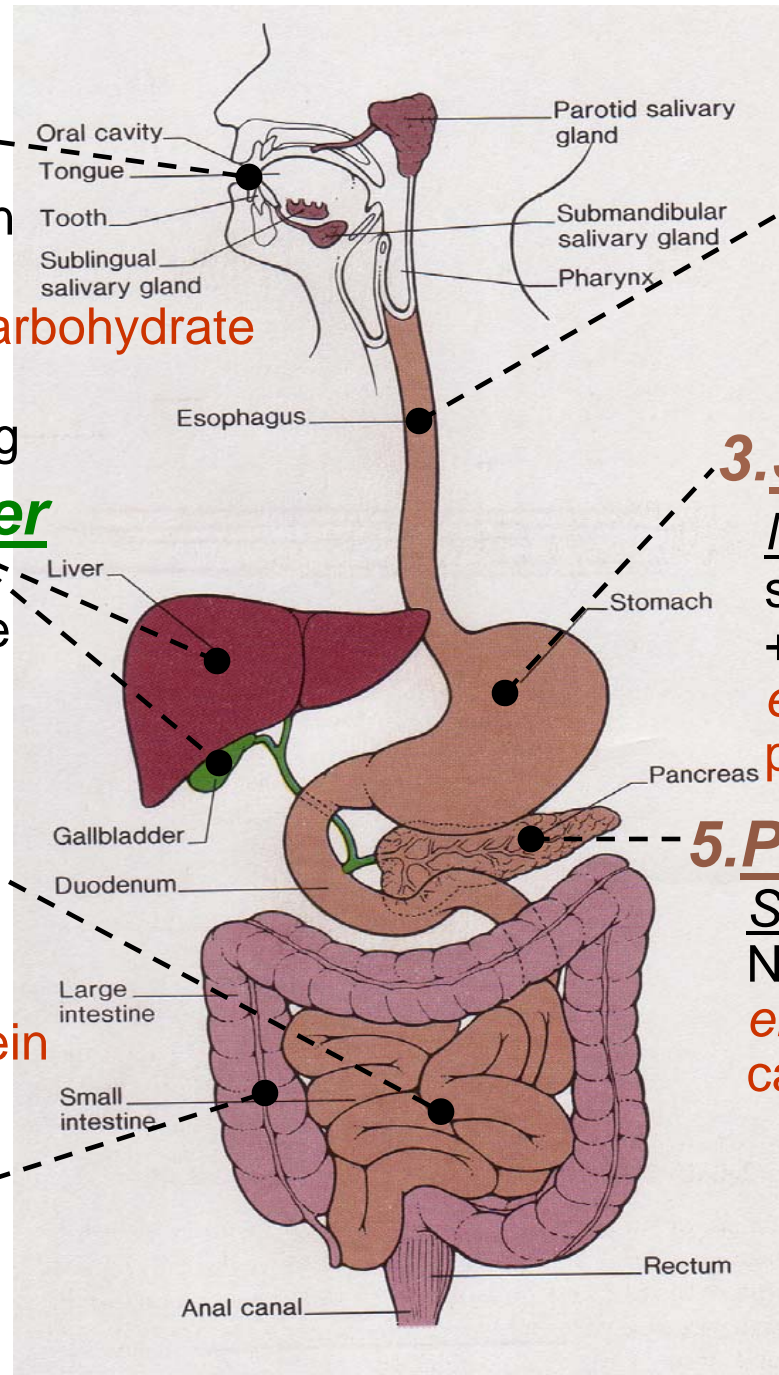
Emulsification =  
detergent action of bile  
+ secretion

# 6. Small Intestine

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

# 7. Large Intestine

Dehydration  
secretion + absorption  
storage + peristalsis



# 2. Esophagus

Rapid transit  
peristalsis  
secretion mucus

# 3. Stomach

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

# 5. Pancreas

Secretion mucus +  
NaHCO<sub>3</sub> + enzymes  
enzymatic digestion:  
carbohydrate, fat, protein



# ***Taste hard-wired for survival!***



**@ rest**



**distilled H<sub>2</sub>O**



**sugar**



**sour**

***Bitter is yucky!!***

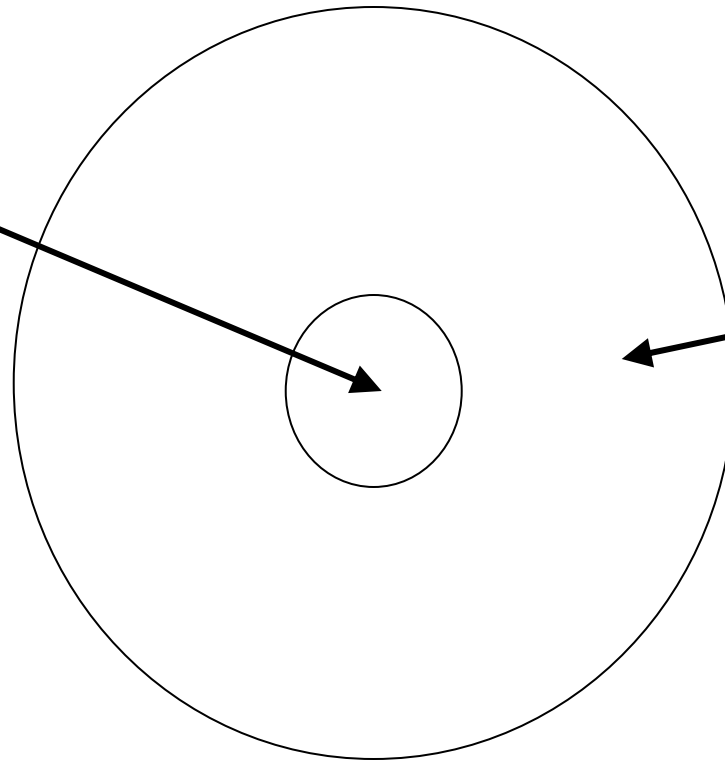


S&W fig 3-8 p 82

# *GI-Doughnut/Bagel (!) Analogy*

**GI Lumen**

**Body**



# ***Gut Secretions***

## ***Secretion***

## ***Release Site***

**1. Mucus**

**into GI Lumen**

**2. Enzymes**

**into GI Lumen**

**3. H<sub>2</sub>O, acids, bases+**

**into GI Lumen**

**4. Hormones**

**into Blood**

## Accessory Organs

### Salivary Glands

Donate starch-digesting enzyme

### Liver

Makes bile, a detergent for emulsifying fats

### Gallbladder

Stores & secretes bile

### Pancreas (beneath stomach)

Makes enzymes for digesting all energy-yielding nutrients  
Releases bicarbonate to neutralize stomach acid

## Primary Organs

### Mouth

Chews & mixes food w/saliva

### Esophagus

Passes food to stomach

### Stomach

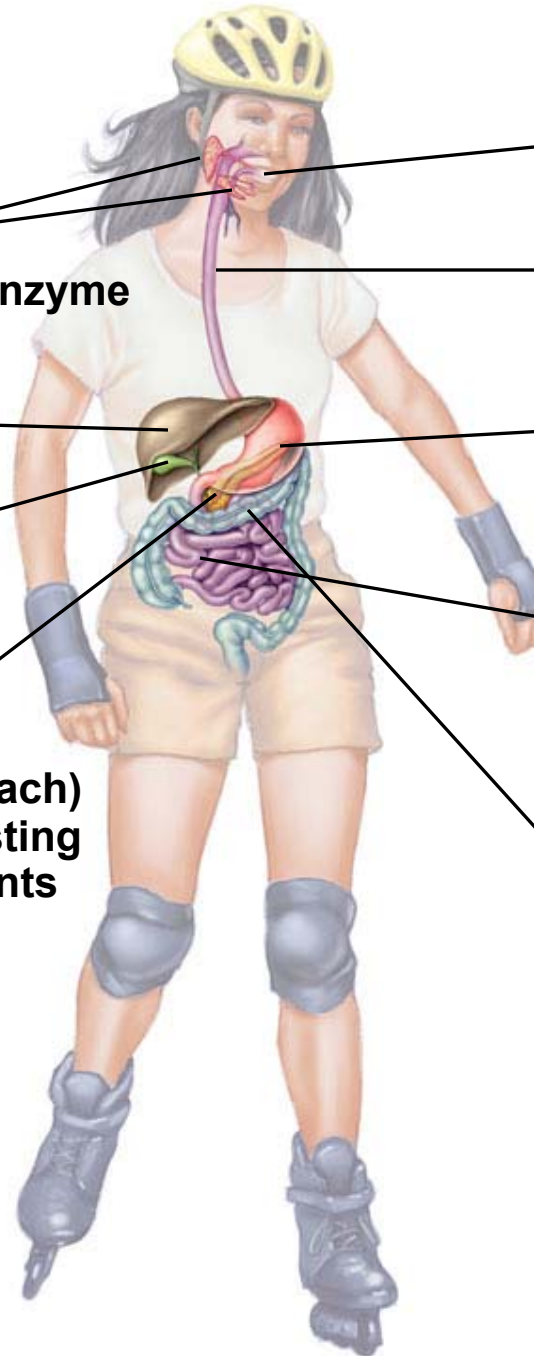
Adds acid, enzyme for protein  
Churns, mixes food to chyme

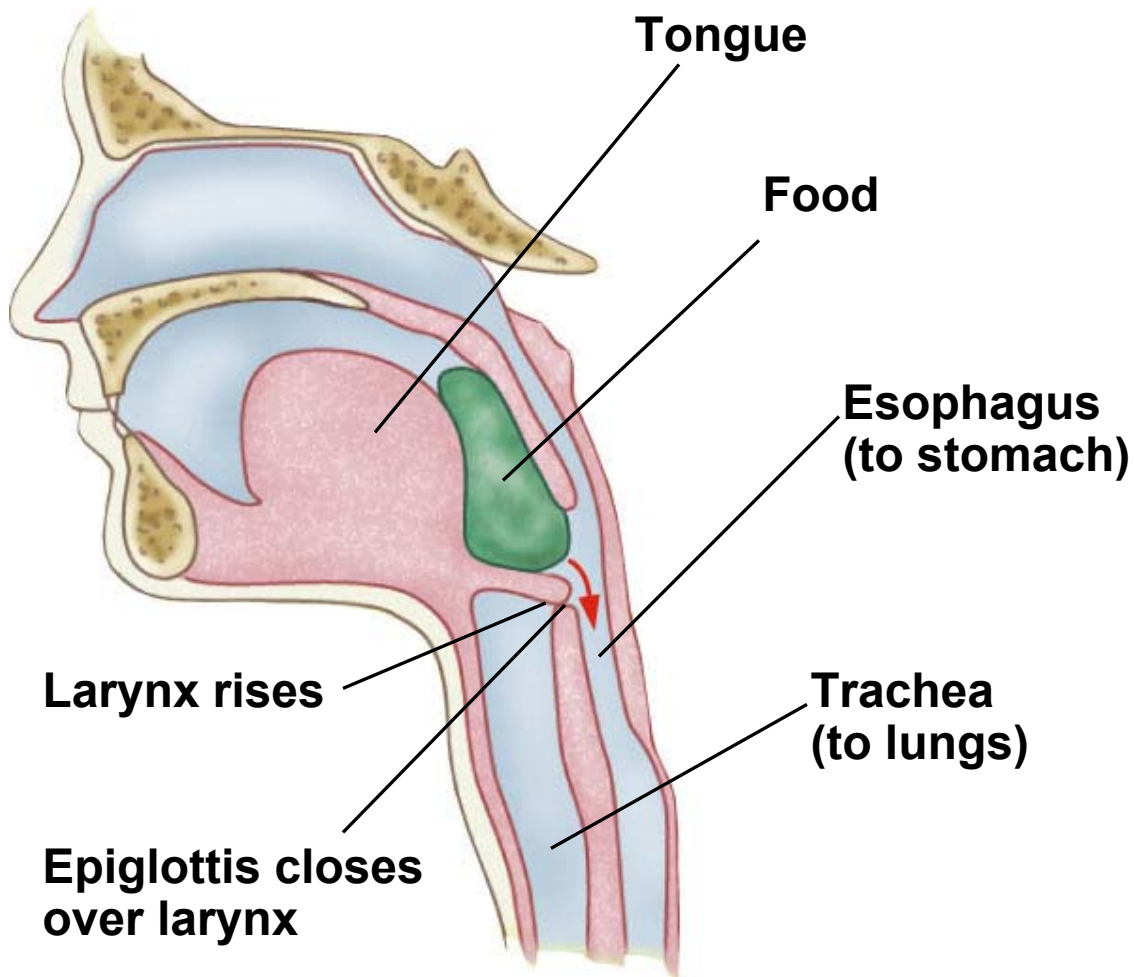
### Small Intestine

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

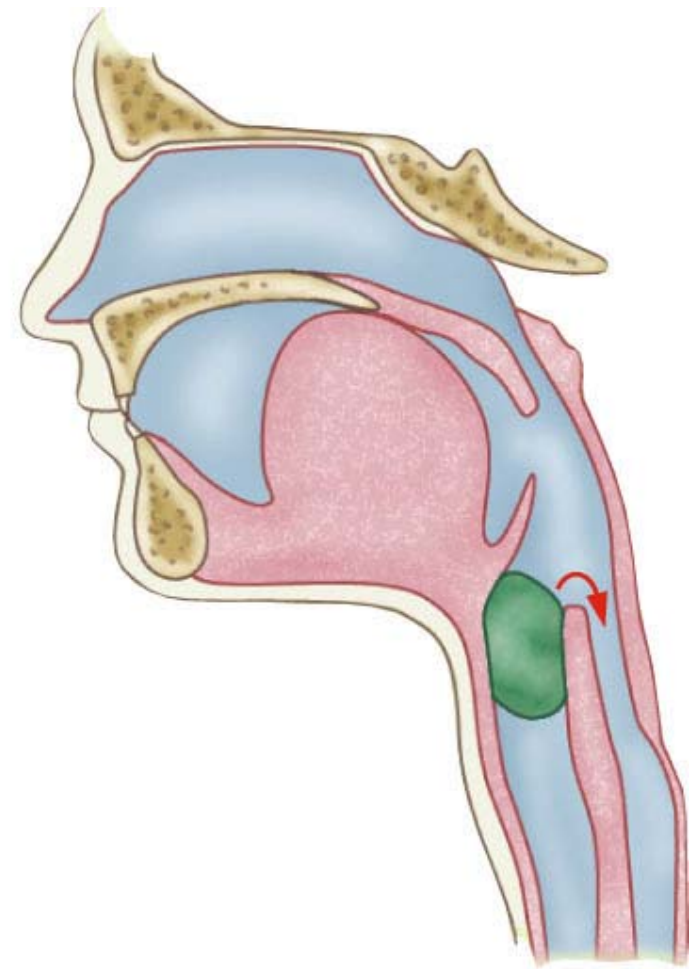
### Large Intestine

Reabsorbs water & electrolytes  
Storage chamber for feces



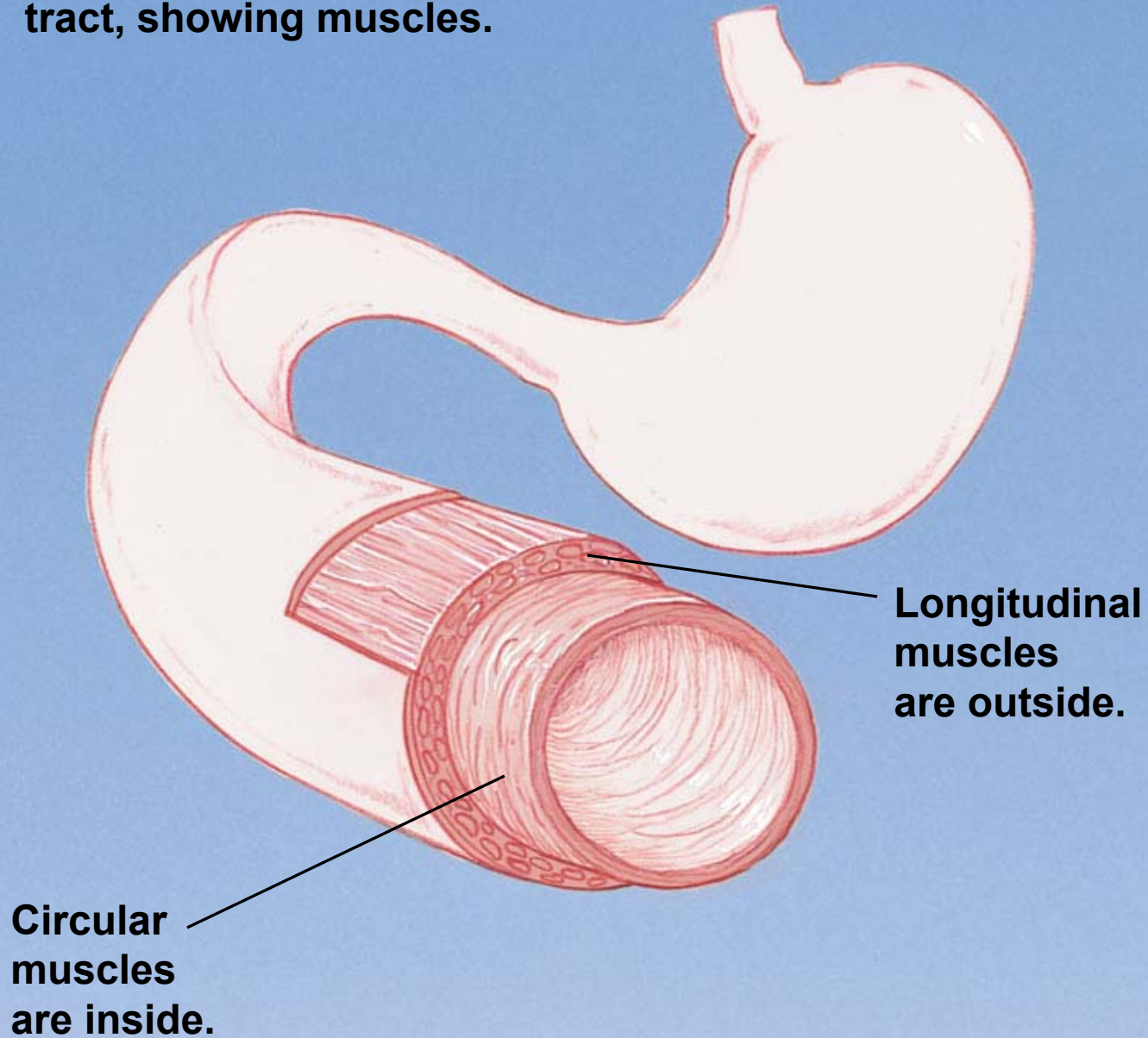


**Normal swallowing**



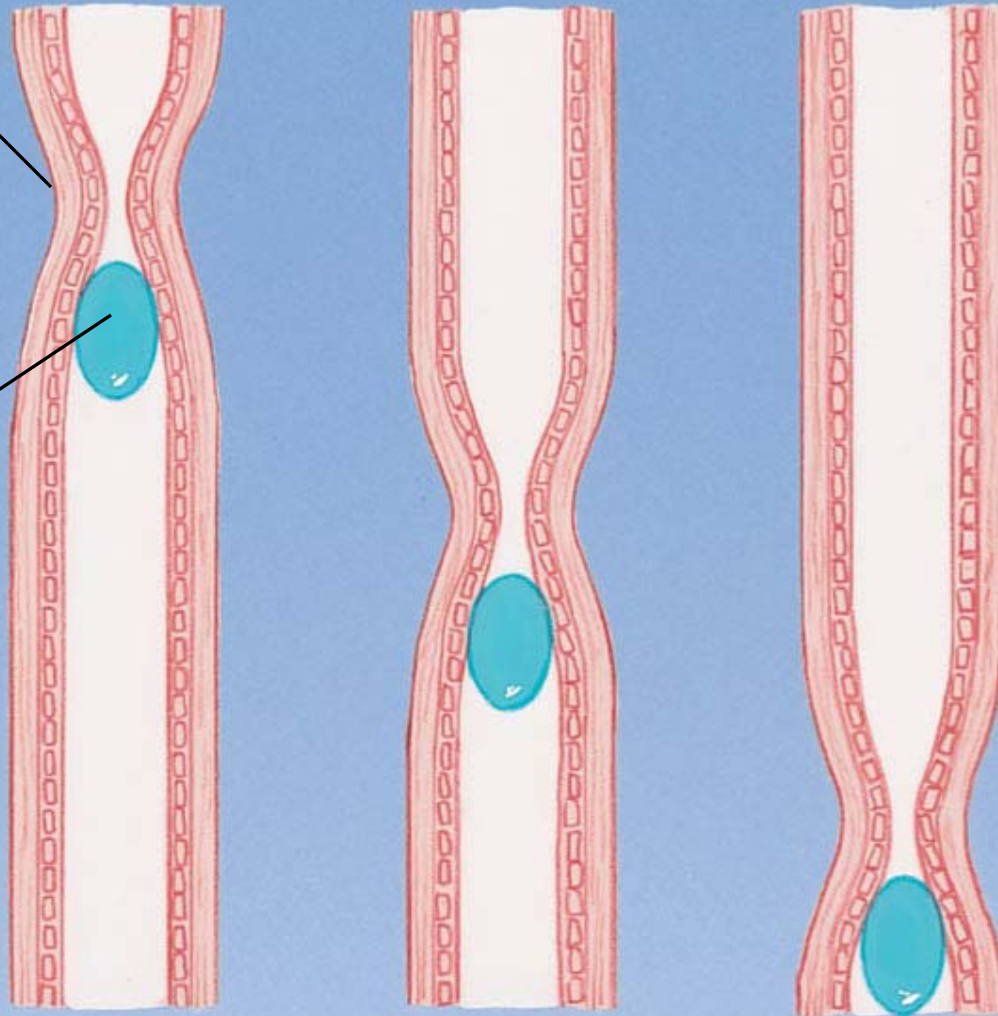
**Choking!**

**Cross section of the digestive tract, showing muscles.**

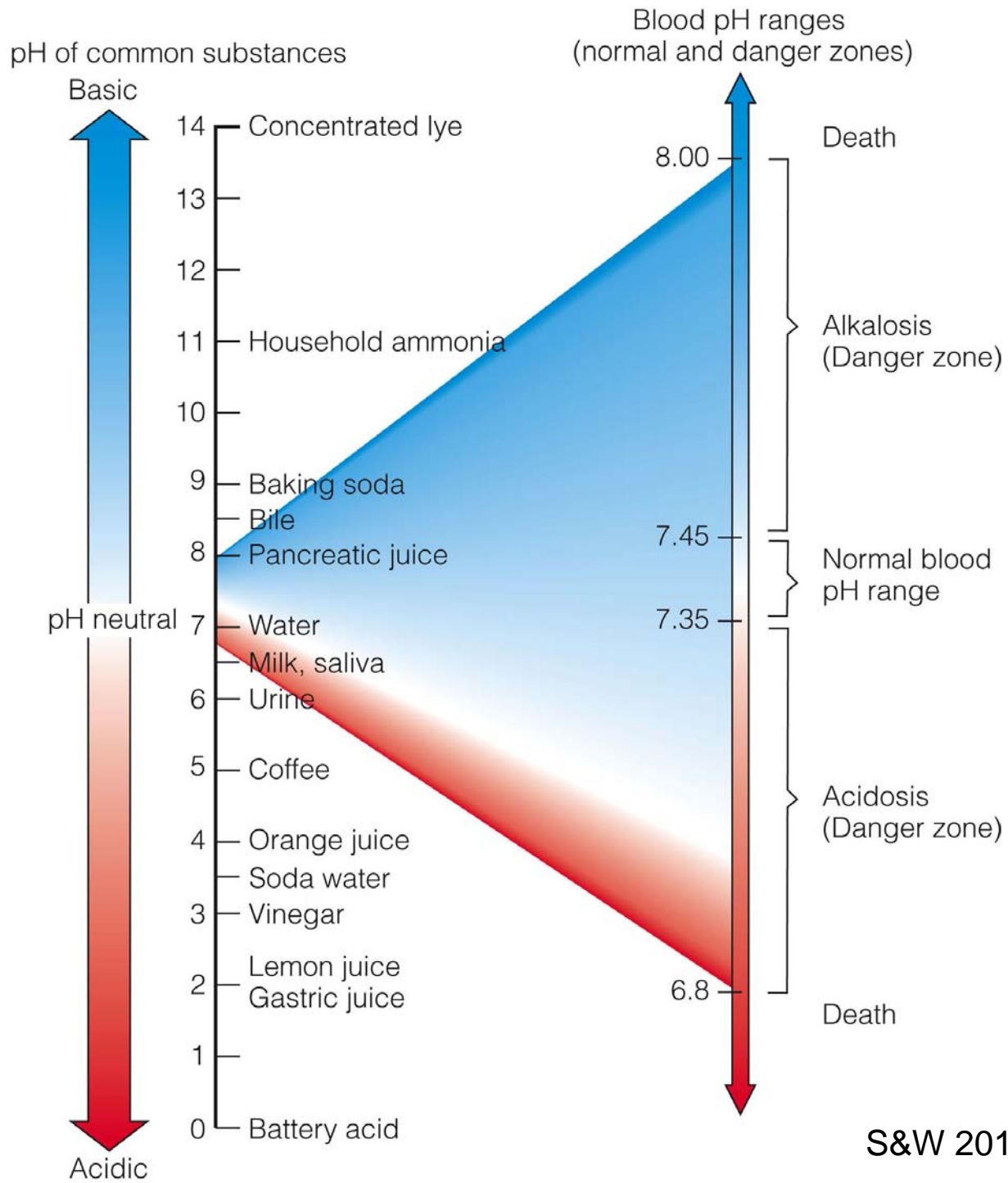


**As the circular and longitudinal muscles tighten and relax, the food moves ahead of the constriction**

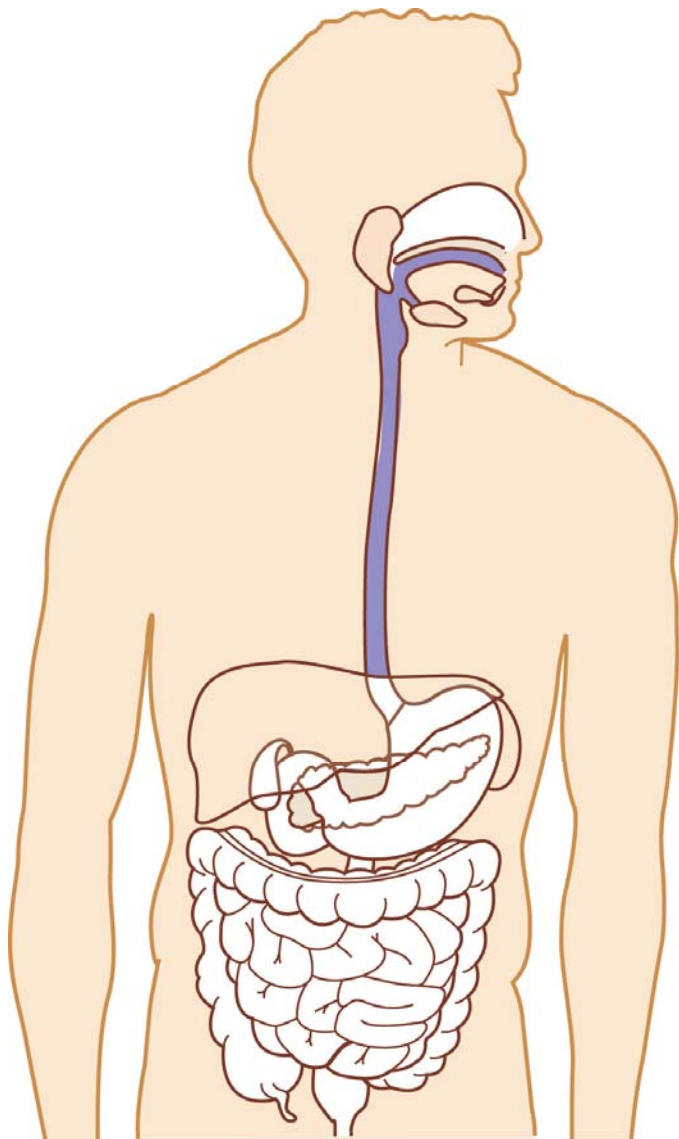
**Swallowed food**



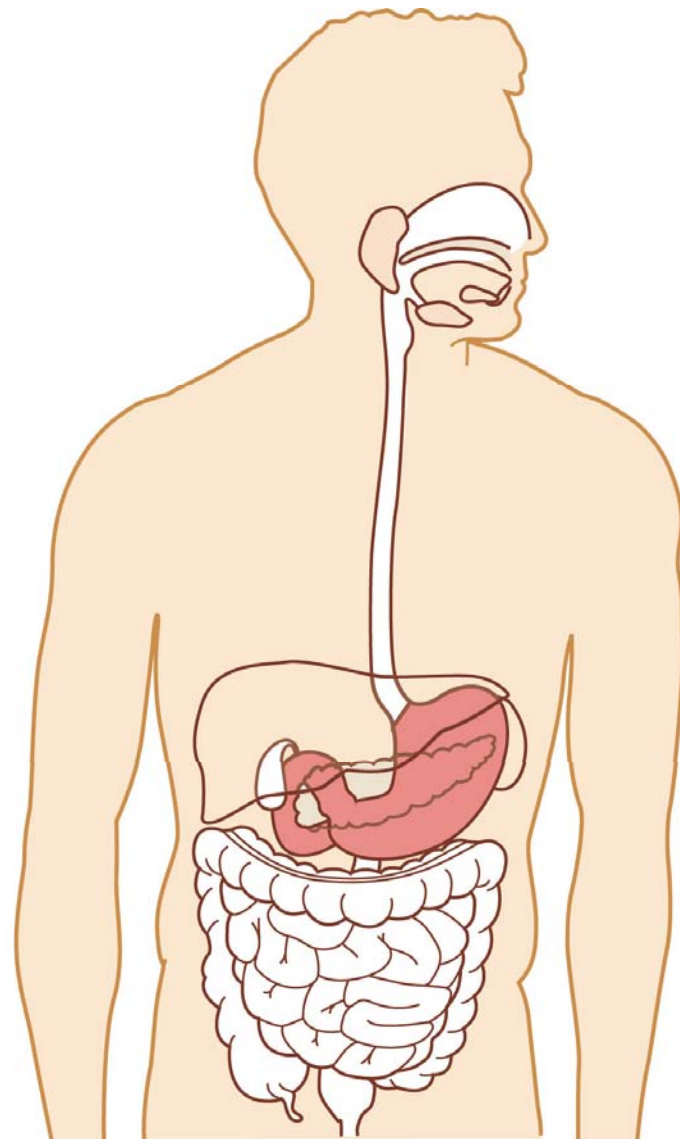




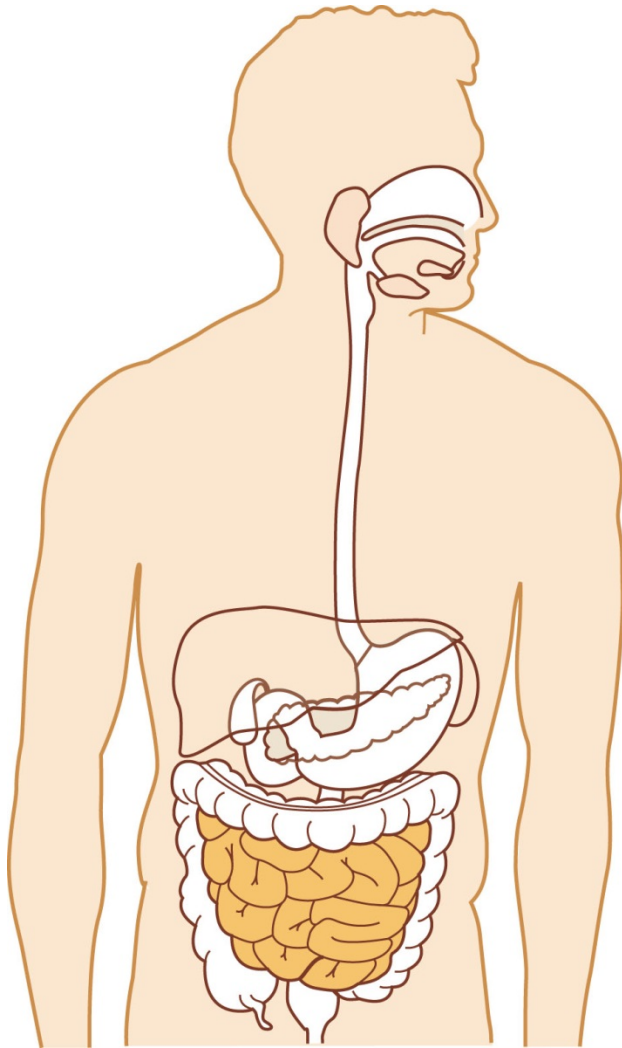
S&W 2014 fig 3-12 p 87



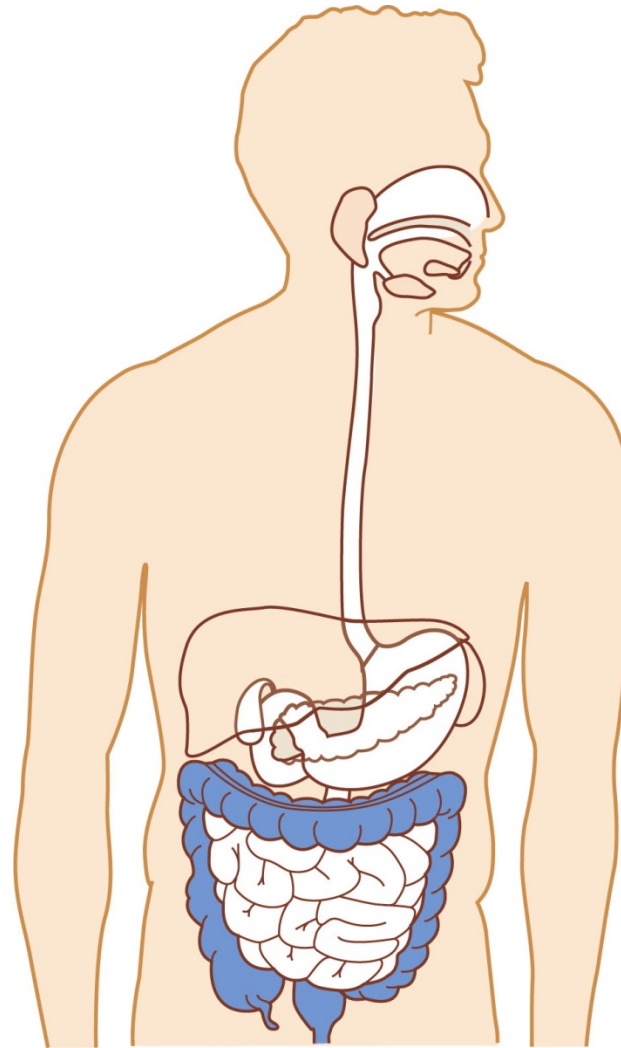
**Time in mouth < 1 min**



**Time in stomach ~1–2 hr**



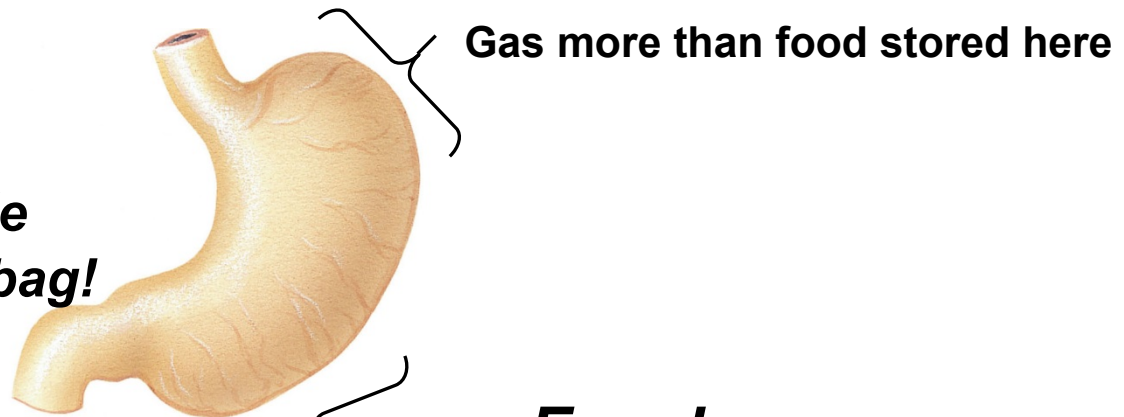
**Time in small intestine  
~7–8 hr\***



**Time in large intestine  
~12–14 hr\***

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

**Stomach** - a flexible  
mixing bag!

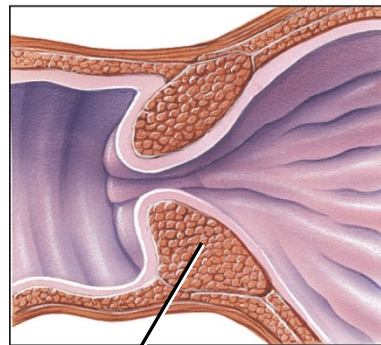


Food is mixed &  
churned here

**Esophagus** - a rapid  
transit  
tube!

GE strictor m.

The pyloric valve  
controls the flow  
of chyme



Muscle cross section

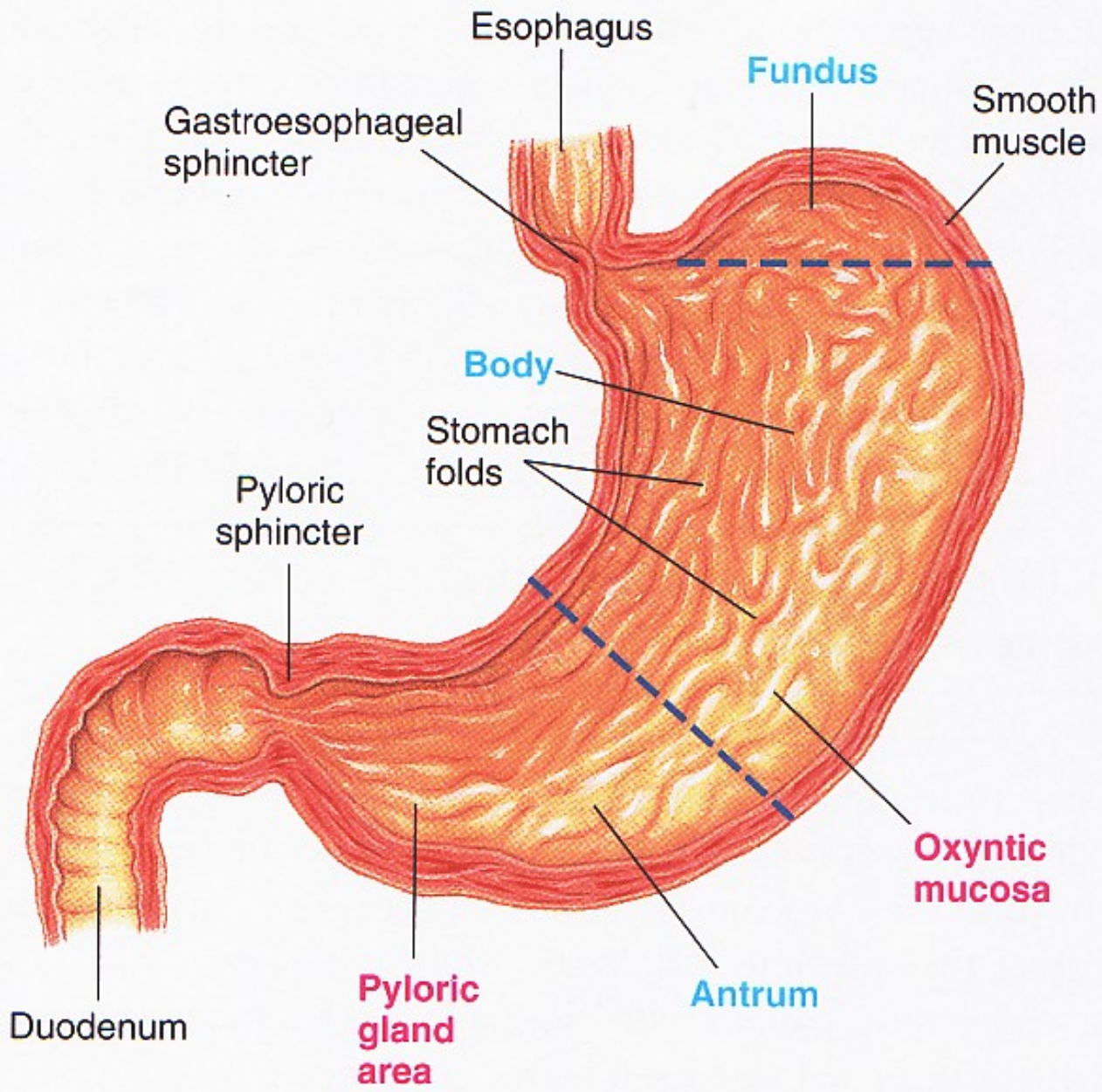
Crisscrossed  
muscle layers  
create churning  
and mixing  
motions.

***Small Intestine***  
(Duodenum)

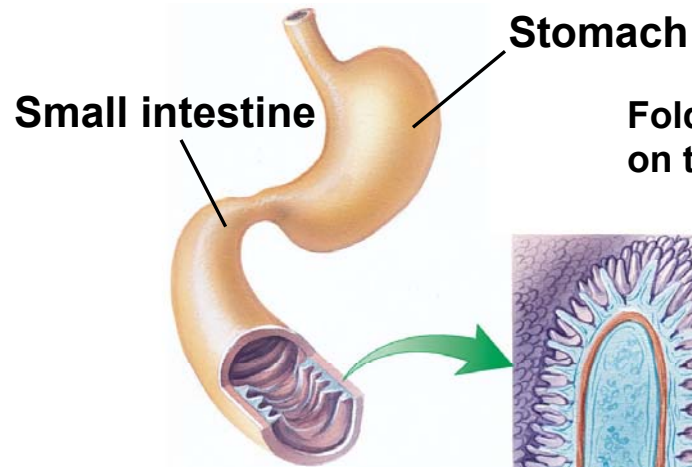
inner

middle

outer



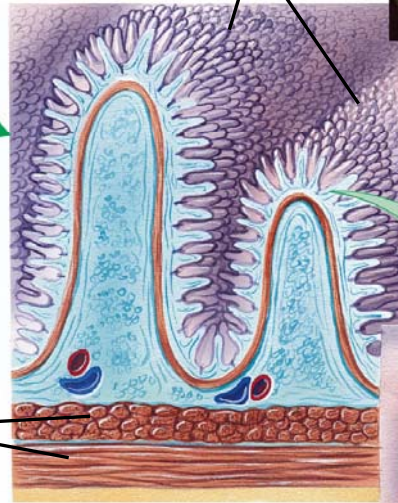
● **FIGURE 15-7**



**Intestinal villi move like a sea anemone with constant motion**

**Small intestine wall has 1000s of folds & is carpeted with villi**

Folds with villi on them

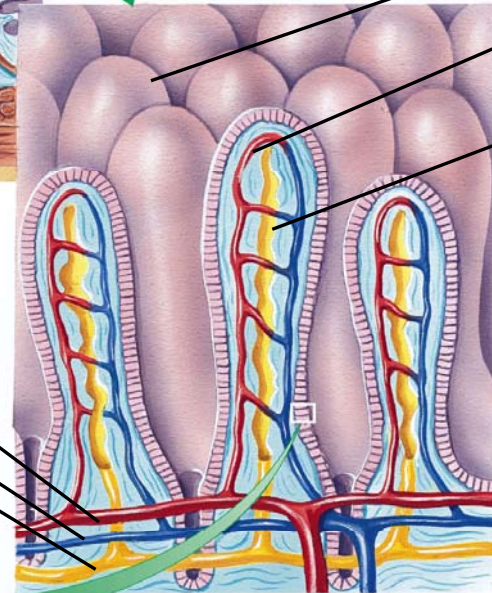


Muscle layers beneath folds

A villus

Capillaries

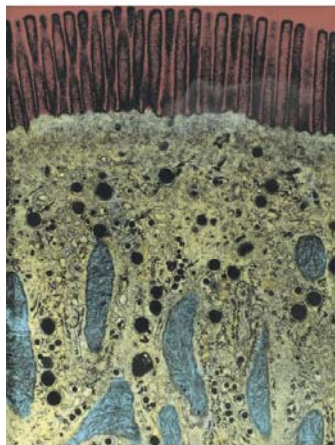
Lymphatic vessel



Artery

Vein

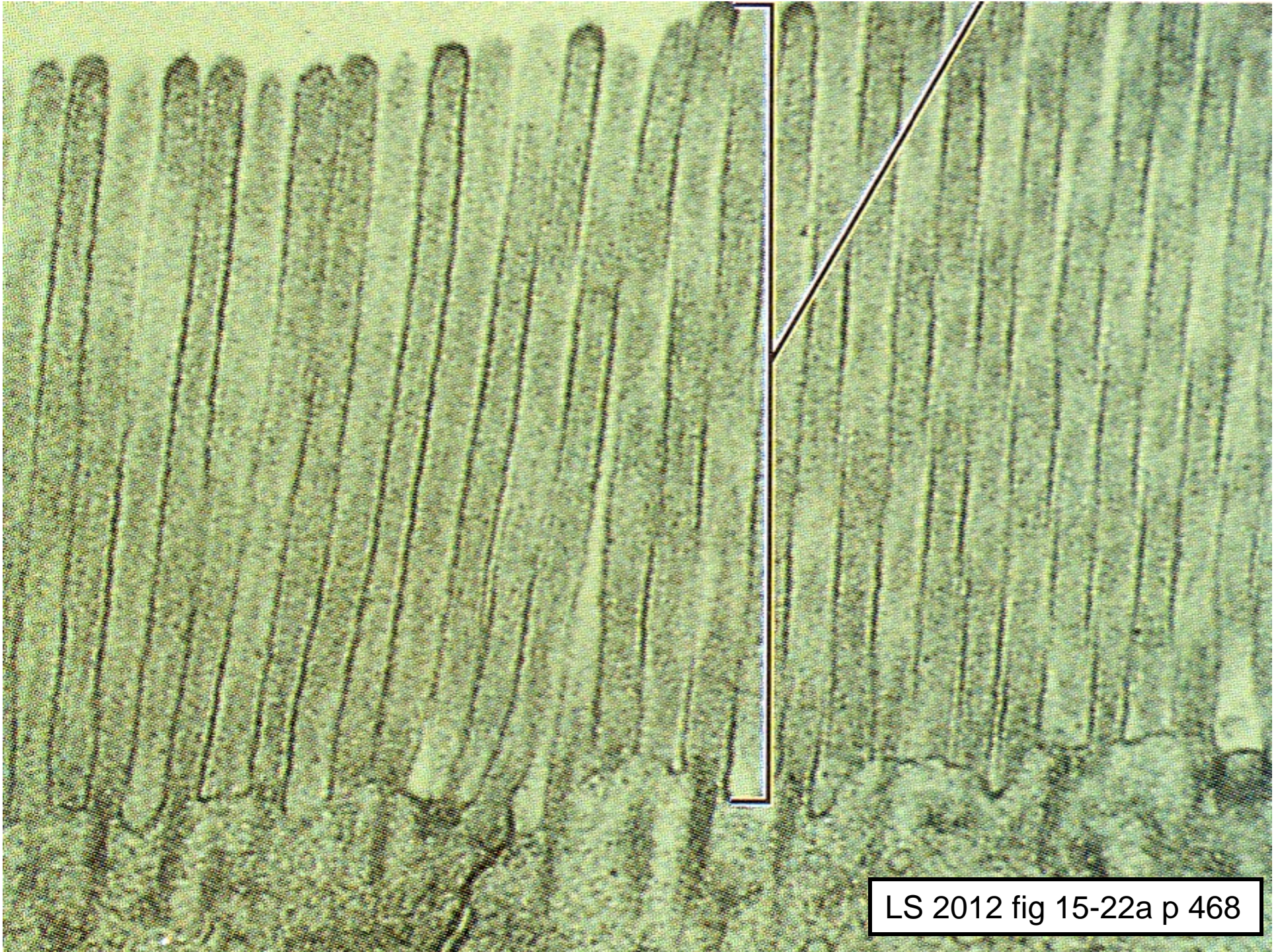
Lymphatic vessel



**EM photo of human intestinal cell w/microvilli**

Microvilli

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



LS 2012 fig 15-22a p 468

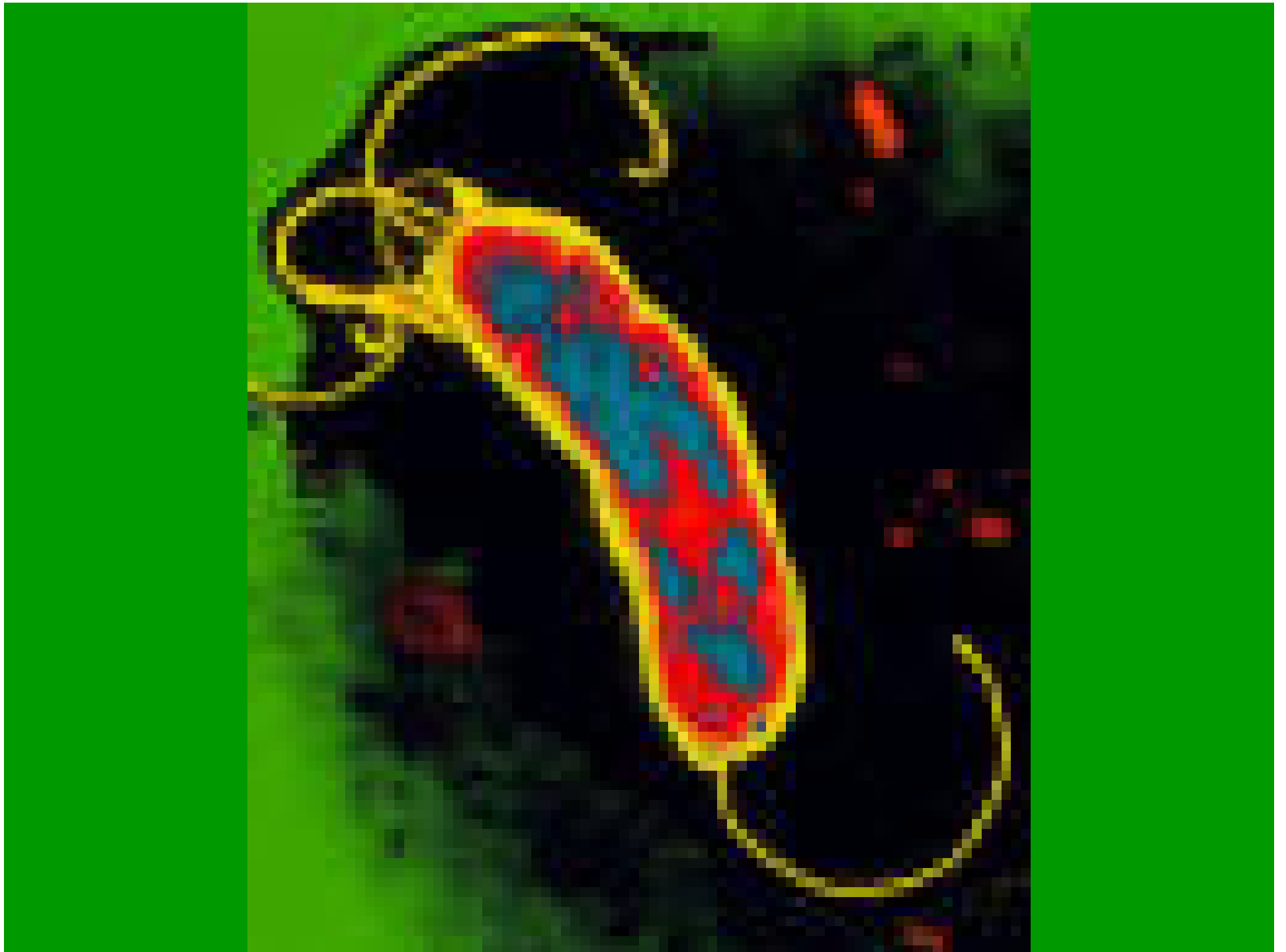
What is the major  
function of the  
small intestine?

*Absorption!!*





<http://www.cdc.gov/ulcer/>



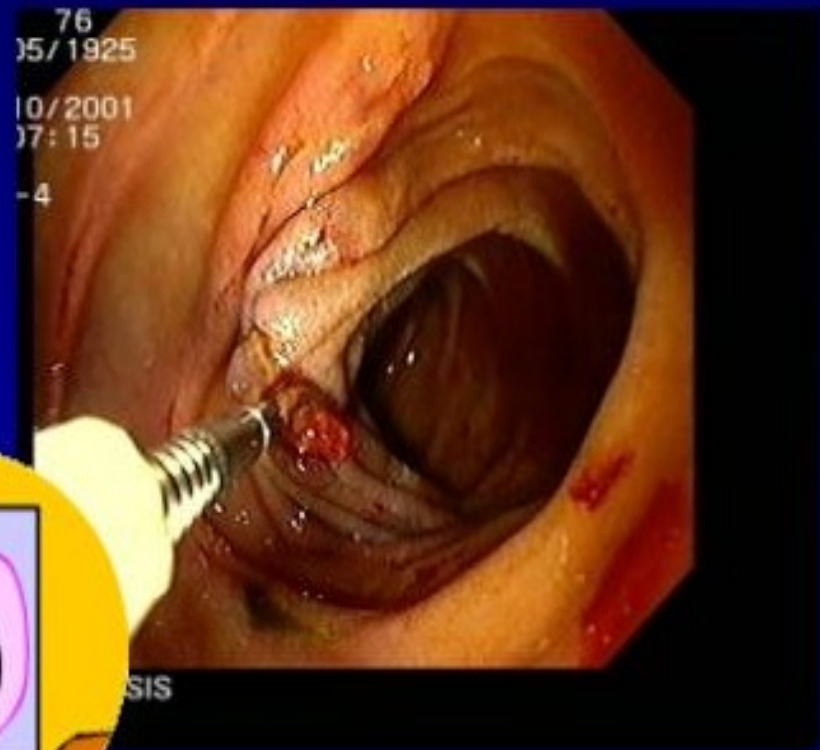
## Ulcer Facts

- 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.

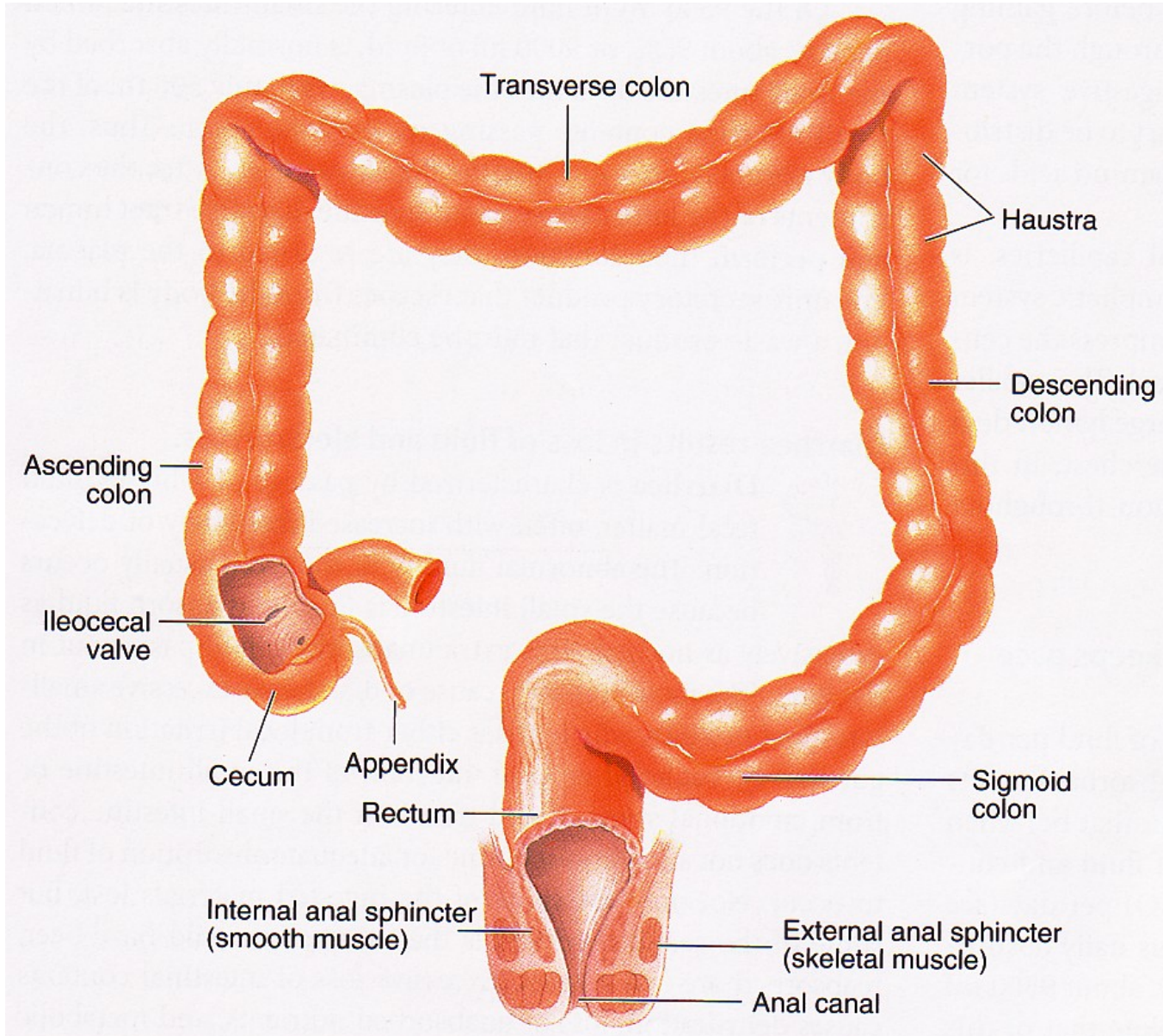
# Clipping a Duodenal Ulcer

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 ≡ Dehydration Chamber*



## Quiz Bowl, Chapter 3: Group Competition

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

## Quiz Bowl, Chapter 3: Group Competition

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 ( $\geq 4$  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 homicides...**
- 7. ...65% of all domestic violence incidents.**





**TABLE  
C3-6**

## **Myths and Truths Concerning Alcohol**

Myth:	A shot of alcohol warms you up.
Truth:	Alcohol diverts blood flow to the skin making you feel warmer, but it actually cools the body.
Myth:	Wine and beer are mild; they do not lead to addiction.
Truth:	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.
Myth:	Mixing drinks is what gives you a hangover.
Truth:	Too much alcohol in any form produces a hangover.
Myth:	Alcohol is a stimulant.
Truth:	Alcohol depresses the brain's activity.
Myth:	Alcohol is legal; therefore, it is not a drug.
Truth:	Alcohol is legal, but it alters body functions and is medically defined as a depressant drug.

# ***What's a drink? $\equiv$ $\frac{1}{2}$ oz of pure ethanol (ETOH)***



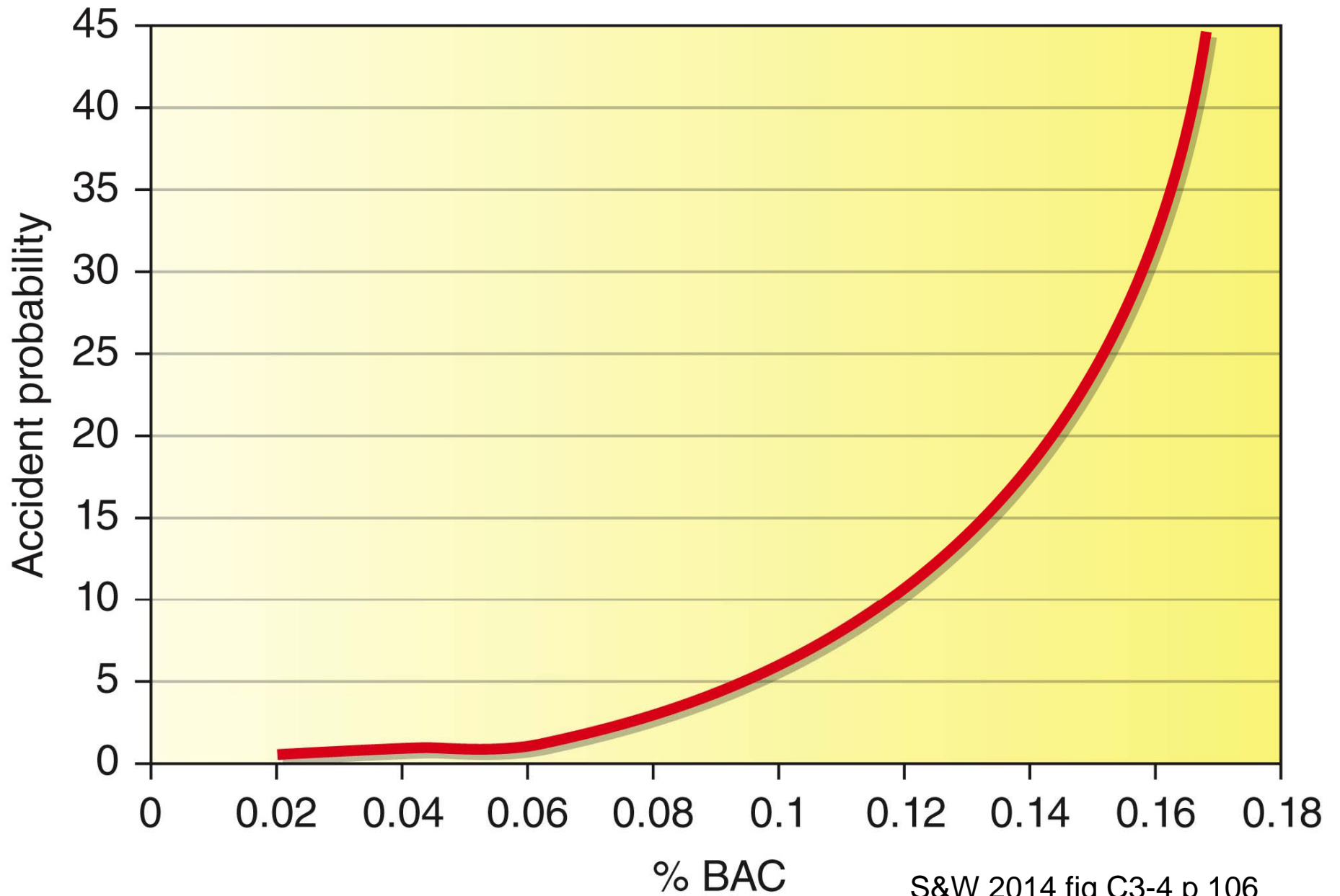
## Women & Blood Alcohol [ BAC ]

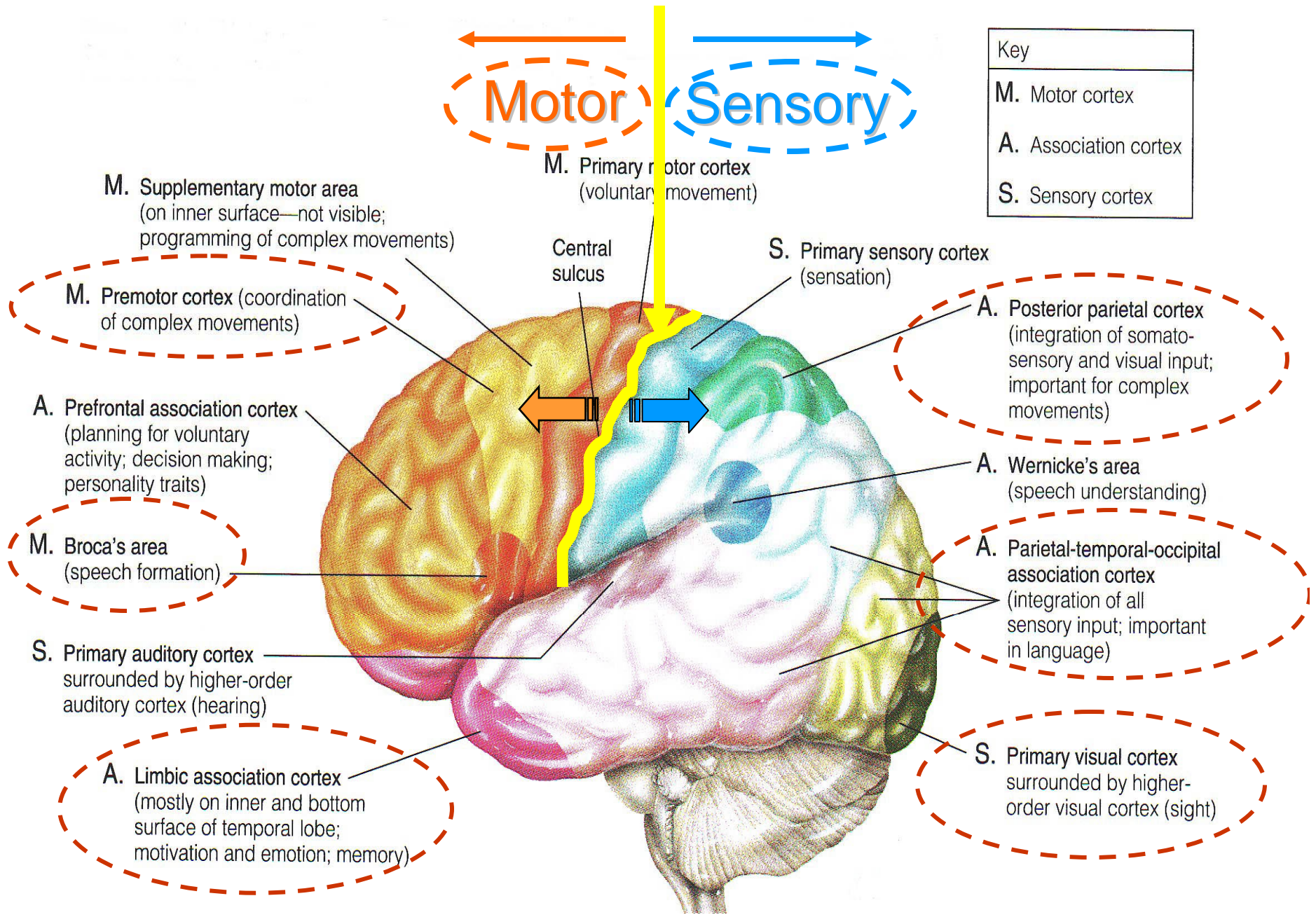
Drinks <sup>a</sup>	Body Weight in Pounds—Women									
	90	100	120	140	160	180	200	220	240	
	00	00	00	00	00	00	00	00	00	ONLY SAFE DRIVING LIMIT
1	.05	.05	.04	.03	.03	.03	.02	.02	.02	IMPAIRMENT BEGINS
2	.10	.09	.08	.07	.06	.05	.05	.04	.04	DRIVING SKILLS SIGNIFICANTLY AFFECTED
3	.15	.14	.11	.10	.09	.08	.07	.06	.06	
4	.20	.18	.15	.13	.11	.10	.09	.08	.08	
5	.25	.23	.19	.16	.14	.13	.11	.10	.09	LEGALLY INTOXICATED
6	.30	.27	.23	.19	.17	.15	.14	.12	.11	
7	.35	.32	.27	.23	.20	.18	.16	.14	.13	
8	.40	.36	.30	.26	.23	.20	.18	.17	.15	
9	.45	.41	.34	.29	.26	.23	.20	.19	.17	
10	.51	.45	.38	.32	.28	.25	.23	.21	.19	

## Men & Blood Alcohol [ BAC ]

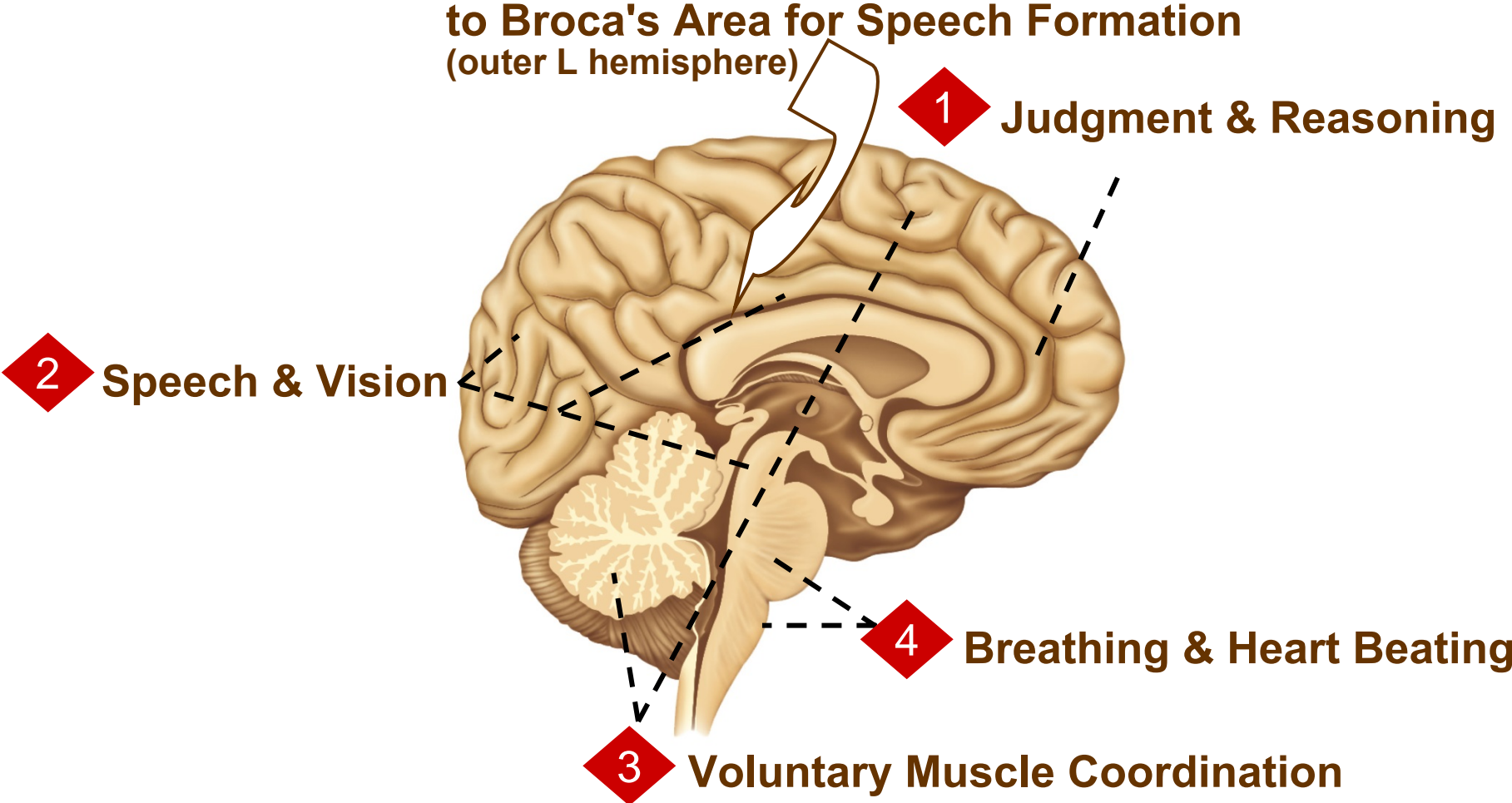
Drinks <sup>a</sup>	Body Weight in Pounds—Men								
	100	120	140	160	180	200	220	240	
	00	00	00	00	00	00	00	00	ONLY SAFE DRIVING LIMIT
1	.04	.03	.03	.02	.02	.02	.02	.02	IMPAIRMENT BEGINS
2	.08	.06	.05	.05	.04	.04	.03	.03	
3	.11	.09	.08	.07	.06	.06	.05	.05	DRIVING SKILLS SIGNIFICANTLY AFFECTED
4	.15	.12	.11	.09	.08	.08	.07	.06	
5	.19	.16	.13	.12	.11	.09	.09	.08	
6	.23	.19	.16	.14	.13	.11	.10	.09	
7	.26	.22	.19	.16	.15	.13	.12	.11	LEGALLY INTOXICATED
8	.30	.25	.21	.19	.17	.15	.14	.13	
9	.34	.28	.24	.21	.19	.17	.15	.14	
10	.38	.31	.27	.23	.21	.19	.17	.16	

# ***Blood Alcohol [ ] (BAC) & Accident Probability***

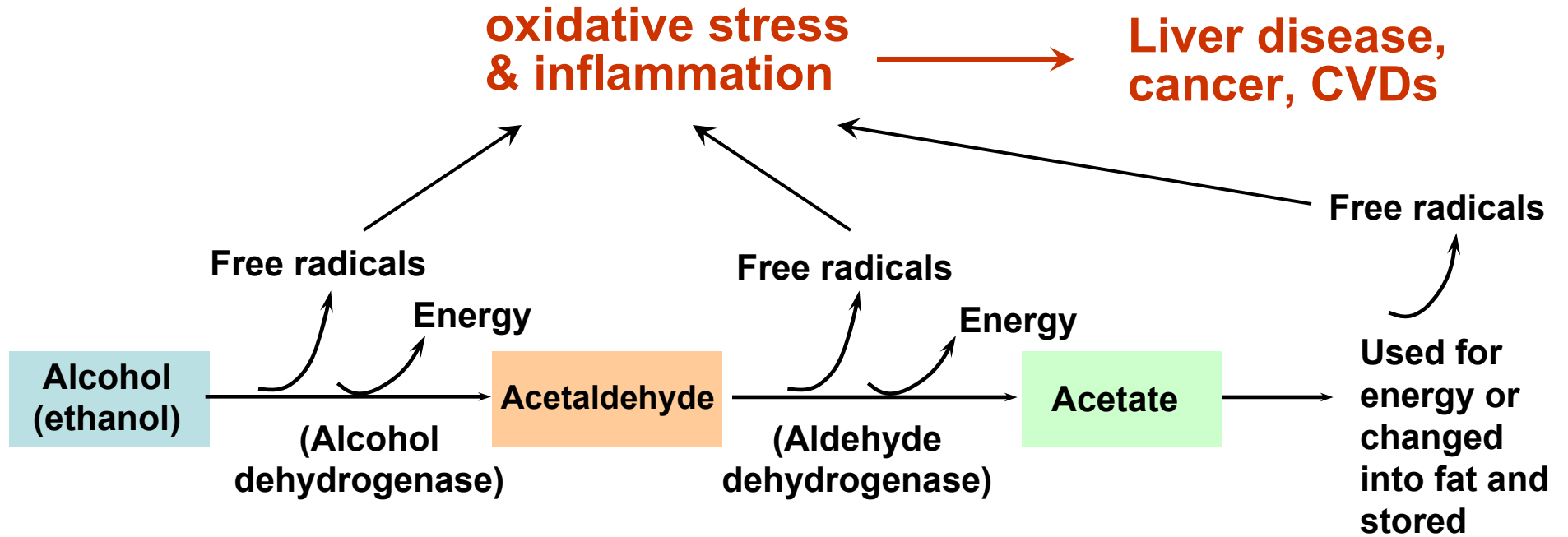




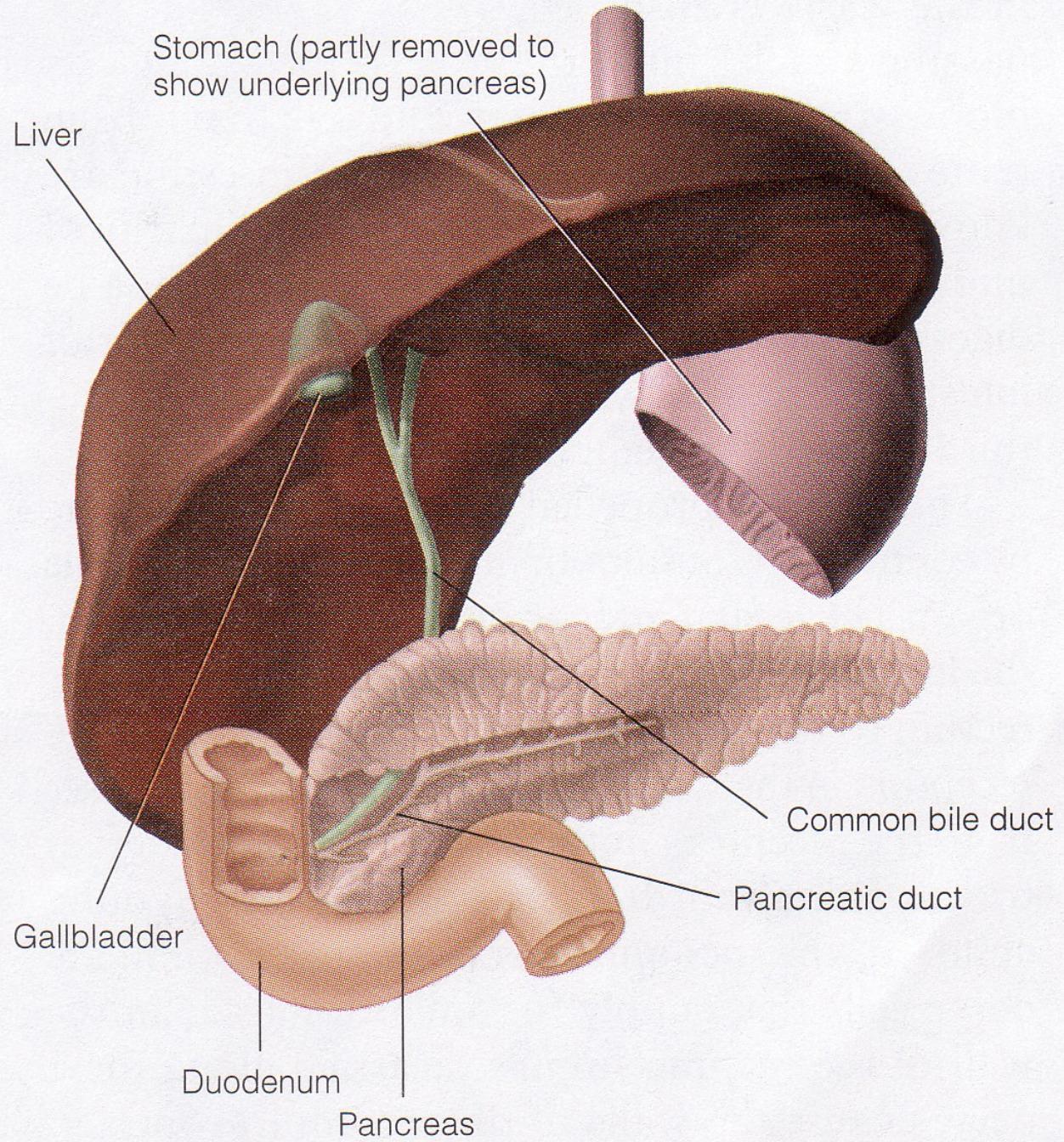
# Alcohol's Progressive Effects on the Brain

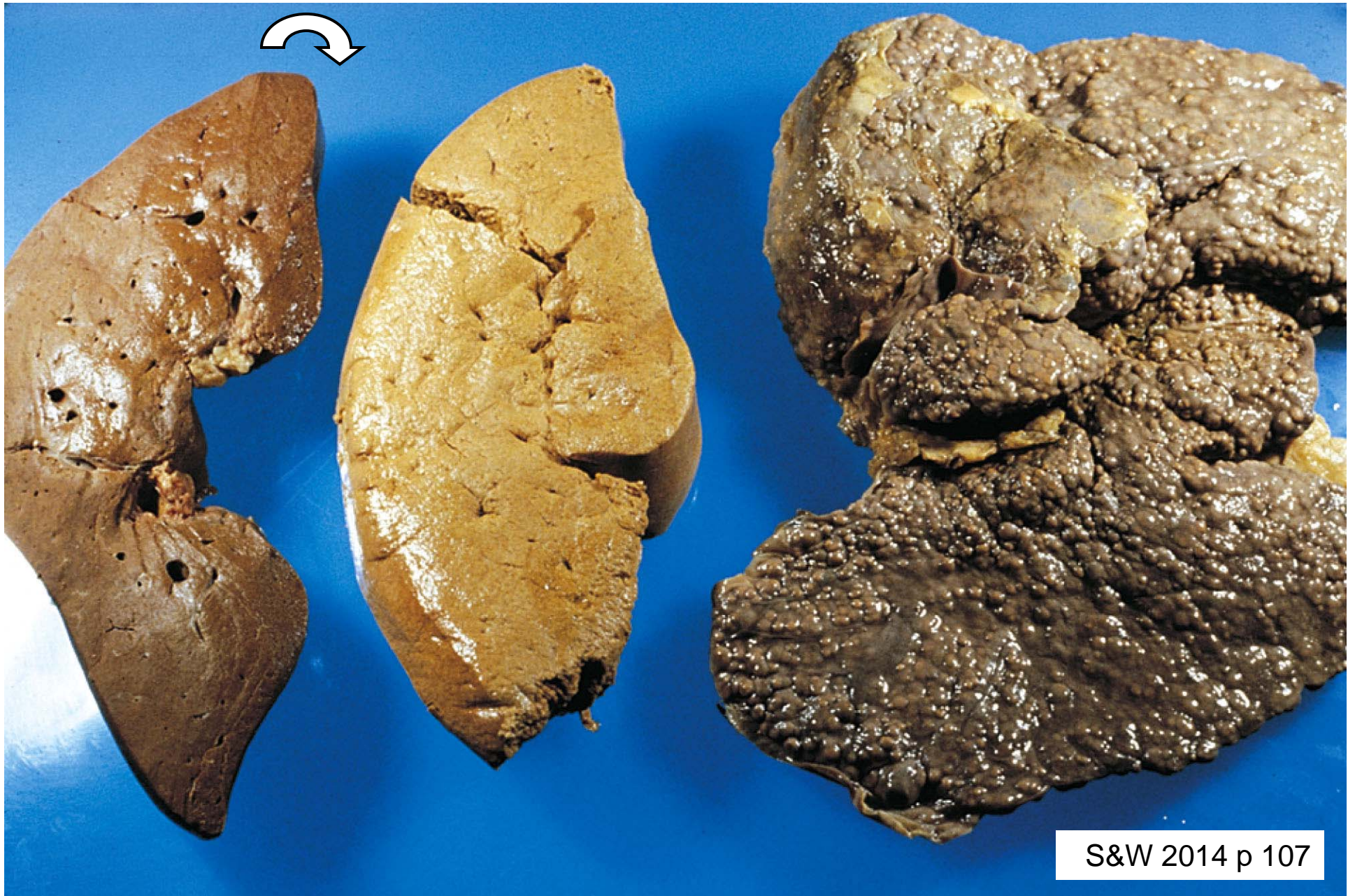


# Alcohol Metabolism & Disease Progression





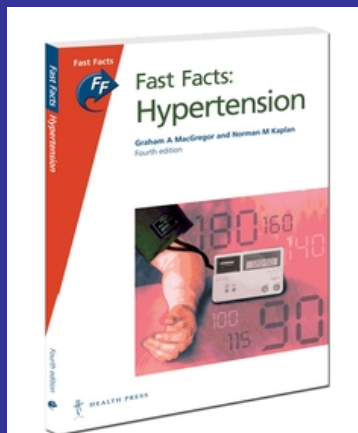
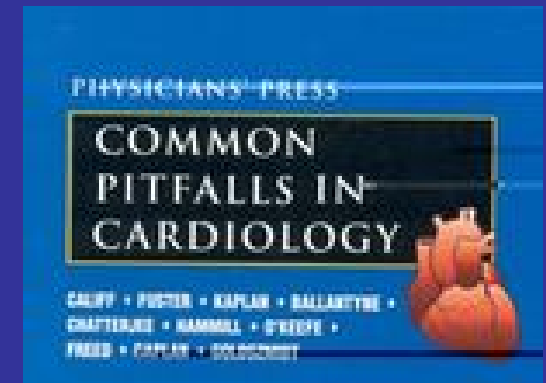
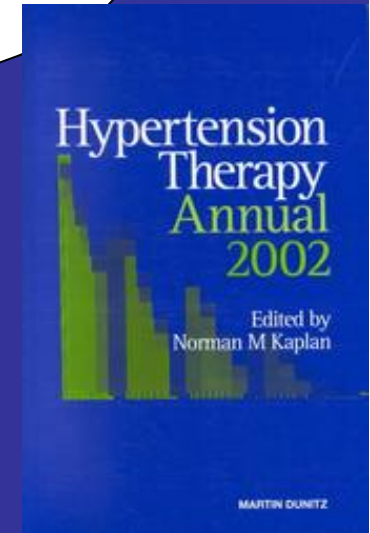
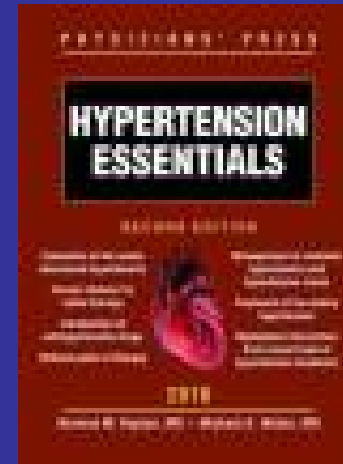
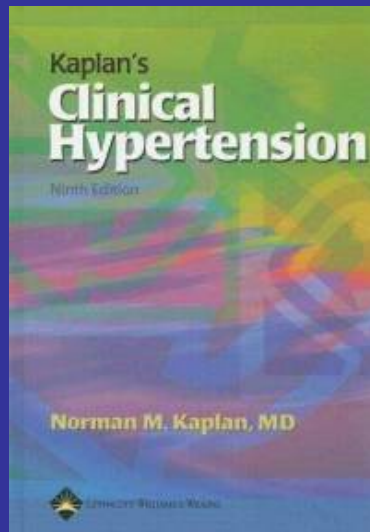




**Normal** → **Fatty** → **Cirrhosis**

cf:

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!



Dr. Norman Kaplan, SW Medical Center, Dallas TX