

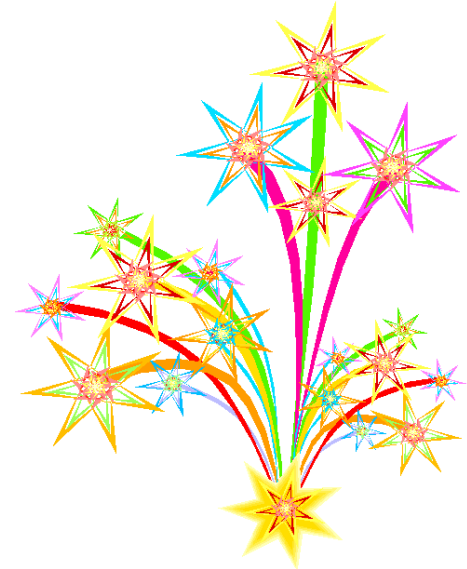
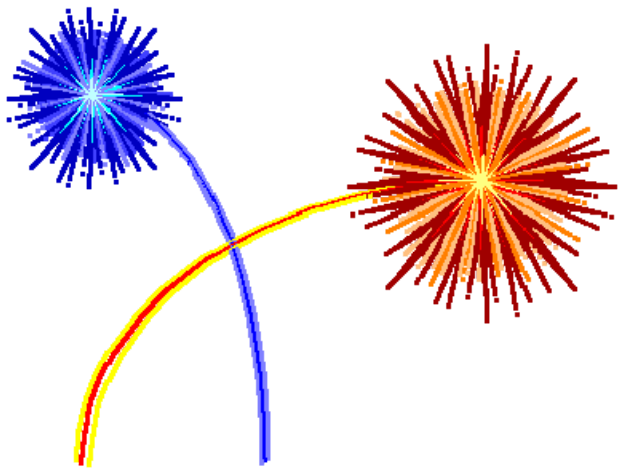
*Hey – I'll be ready
because I book it!!*



BI 121 Lecture 6 + Q + ½ Midterm Review

- I. Announcements Next session Q? ~½ review, then Midterm.**
Fun Lab 3 Nutrition today! Sample Suisse Calculation? Q?
- II. Nutrition in the News Be a whiz at healthy grilling!**
American Institute for Cancer Research, Grilling Quiz!
- III. Digestion Connections LS ch 15, DC Module pp 17-23**
 - A. Histology of the gut LS fig 15-2, 15-3 p 442-3
 - B. Stomach protein digestion + zymogens? LS fig 15-7, 15-9
 - C. Accessory organs: Pancreas & Liver + Recycling!
LS pp 457-63
 - D. Small intestine? Ulcers? LS fig 15-20, 15-22 pp 467-8
<http://www.cdc.gov/ulcer> Beyond the Basics LS p 456
 - E. Summary of chemical digestion LS tab 15-5 p 466
 - F. Large intestine? LS fig 15-24 pp 472-4
- IV. Midterm Review Discussion + Q?**

Stay focused now!
Later, have fun &
be safe!!



% Calories?

Know:

Carbohydrate? 4 kcal/g

Fat? 9 kcal/g

Protein? 4 kcal/g



**Chocolat / Schokolade 16%, Noisettes entières / ganze Haselnüsse 12%,
Fourré-praliné / Pralinen-Füllung 72%**

INGRÉDIENTS: sucre, noisettes, pâte de cacao, beurre de cacao, graisse végétale, poudre de lait entier, farine de soja, beurre fondu, poudre de lait écrémé, émulsifiant (lécithine de soja), vanilline. Peut contenir des traces d'amandes.

ZUTATEN: Zucker, Haselnüsse, Kakaomasse, Kakaobutter, Pflanzenfett, Vollmilchpulver, Sojamehl, Butterreinfett, Magermilchpulver, Emulgator (Soja-Lezithin), Vanillin. Kann Spuren von Mandeln enthalten

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No 7119

PRODUIT EN SUISSE

HERGESTELLT IN DER SCHWEIZ
MADE IN SWITZERLAND

| 100 g contiennent / 100 g enthalten: | |
|--------------------------------------|-------------------|
| Valeur énergétique / Energiewert | 2360kJ (565 kcal) |
| Protéines / Eiweiss | 8 g |
| Hydrates de carbone / Kohlenhydrate | 46 g |
| Matière grasse / Fett | 39 g |

25g e



How Do I Calculate the % of Total Calories from Carbohydrate, Fat & Protein?

Carbohydrate 46 g x 4 kcal/g = 184 kcal

% Carbohydrate = $184/567 = 0.326 \equiv \sim 33\%$

Fat 39 g x 9 kcal/g = 351 kcal

% Fat = $351/567 = 0.619 \equiv \sim 62\%$

Protein 8 g x 4 kcal/g = 32 kcal

% Protein = $32/567 = 0.056 \equiv \sim 6\%$

$\Sigma = 567$ kcal

Be a Whiz at Healthy Grilling

Summertime is grilling time for Americans. Unless you take some simple precautions, however, grilling food can raise the risk of cancer. Take this multiple-choice quiz to see if you know the dos and don'ts of grilling for great taste and good health. Questions may have more than one correct answer.

1. Grilling can raise cancer risk because:

- A. The grill is usually dirty.
- B. Flies and pollution from the air can land on the food.
- ✓ C. Red meat, poultry or seafood can form carcinogenic compounds called heterocyclic amines (HCAs) when exposed to high heat. HCAs can damage the DNA of our genes, beginning the process of cancer development.
- ✓ D. Fat from red meat, poultry and seafood can drip, creating a cancer-causing substance called polycyclic aromatic hydrocarbons (PAHs). Smoke and flare-ups deposit the PAHs back on the meat.

2. What are the best choices for grilling?

- ✓ A. Vegetables and fruits because they don't form HCAs.
- ✓ B. Vegetables because natural phytochemicals in them stimulate enzymes that can convert HCAs to an inactive form that is easily eliminated from the body.
- ✓ C. Lean meats, like skinless chicken and fish, because they drip less fat.
- ✓ D. Small portions of red meat, like kebabs, because they cook fast.

3. A marinade can decrease carcinogens that form during grilling up to 96 percent because:

- A. It acts as a barrier, keeping flames from directly touching the meat.
- B. Typical marinade ingredients, like vinegar, citrus juices and olive oil, have special protective powers.
- ✓ C. Scientists aren't sure why.

4. If you decide to grill meat, which simple cooking adjustment(s) will reduce the formation of carcinogens?

- ✓ A. Covering the grill with punctured aluminum foil.
- ✓ B. Turning the gas down or waiting for charcoal to become low-burning embers.
- ✓ C. Raising the grilling surface.

- ✓ D. Placing meats to the side of the heat source.

5. Flipping meat every minute can also reduce the formation of carcinogens for the following reason(s):

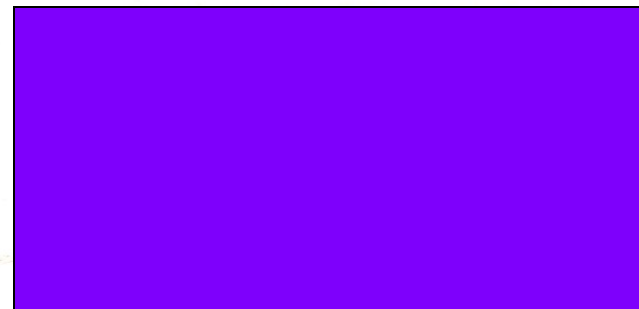
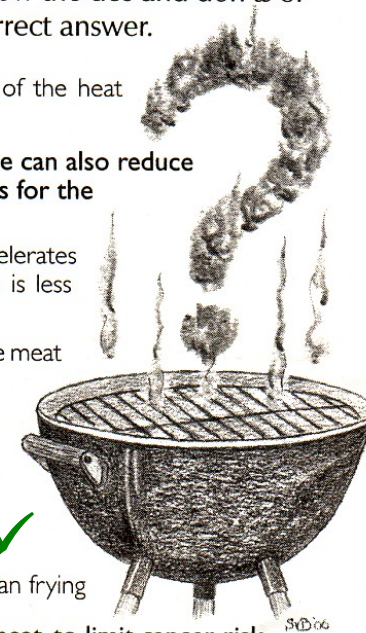
- A. Turning the meat often accelerates the cooking process, so there is less exposure to heat.
- B. Flipping propels HCAs off the meat into the air.
- ✓ C. Charring is less likely.

6. Safer methods of cooking meat than grilling include:

- ✓ A. Microwaving
- ✓ C. Stewing
- ✓ B. Roasting
- D. High-heat pan frying

7. If you decide to grill red meat, to limit cancer risk you should eat no more in a day than what amount?

- A. 22 ounces
- C. 10 ounces
- B. 1 pound
- ✓ D. 3 ounces



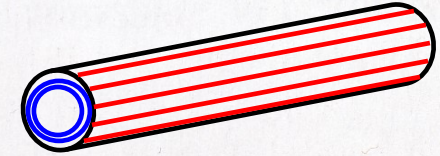
FREEFACTS ▶ For more information about safe grilling, order a free copy of AICR's brochure, "The Facts About Grilling." Check box 4 on the Free Information Request card, or contact AICR national headquarters.

American Institute for Cancer Research (AICR) Healthy Grilling Quiz Summary

1. Marinade, marinade, marinade! By doing so, you can decrease carcinogens formed during grilling by $\leq 96\%$!
2. Cover the grill with aluminum foil, turn gas down or wait for low-burning embers, cook to the side.
3. Best choices for grilling include vegetables and fruits (no HCAs + enzymes to inactivate HCAs!), and lean meats (e.g., fish & skinless chicken ↓ PAHs).
4. Flip meat every minute to reduce charring & remove charred portions prior to eating.
5. To limit cancer risk, eat no more than 3 oz grilled red meat. Cook small portions/kebabs.

LS 2012 fig 15-2 p 442

Longitudinal → Shortens L



Outer longitudinal muscle } Muscularis externa
Inner circular muscle }

Circular → ↓d or Width

Body wall

Serosa

Submucosa

Duct of large accessory digestive gland (i.e., liver or pancreas) emptying into digestive-tract lumen

Outer longitudinal muscle

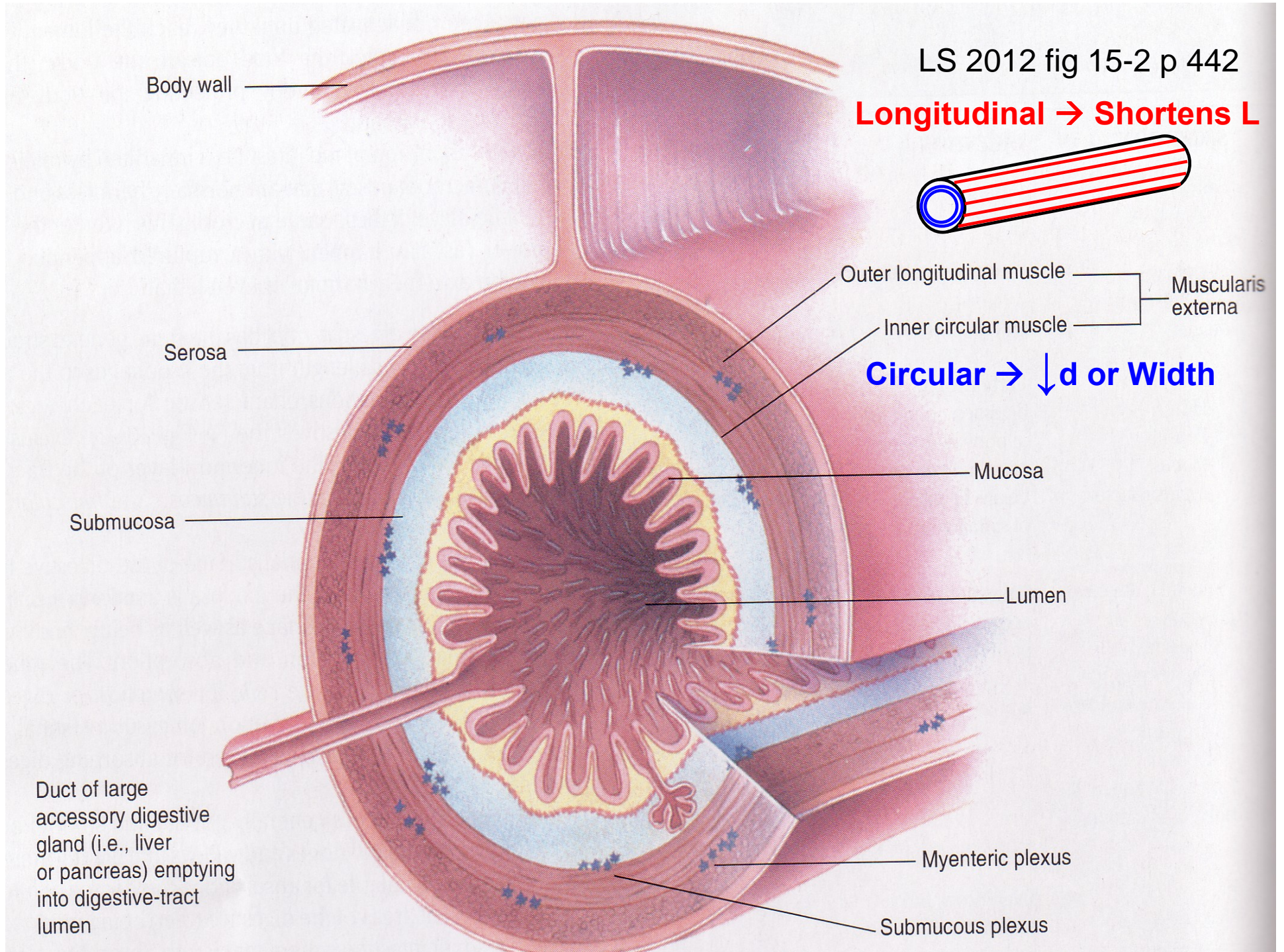
Inner circular muscle

Mucosa

Lumen

Myenteric plexus

Submucous plexus



★ Myenteric motor plexus!

Serosa

cf: G&H fig 62-2

LOCAL

Epithelium

Submucosa

Lumen

Lamina
Propria

Muscularis
Externa

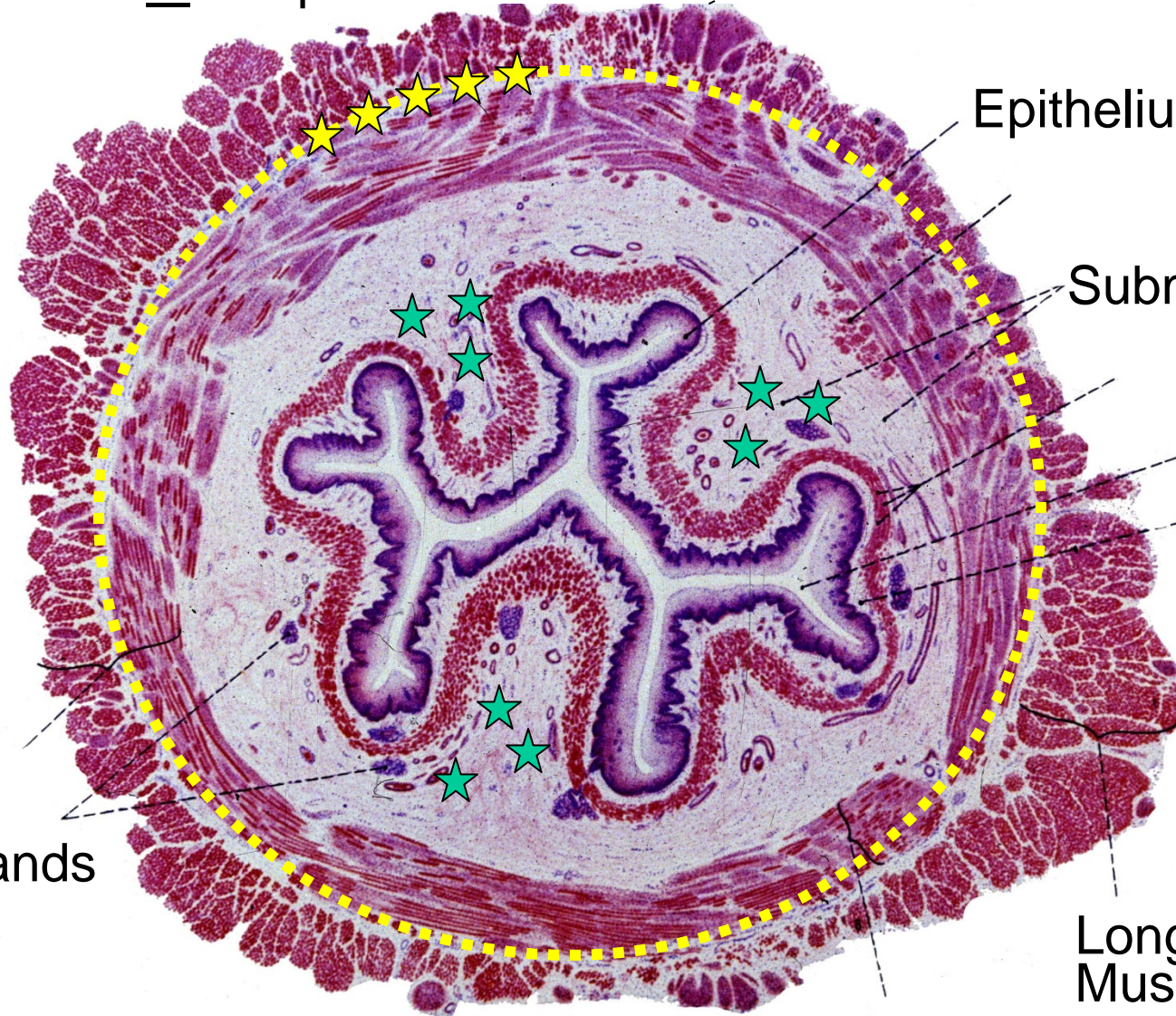
Glands

Longitudinal
Muscle

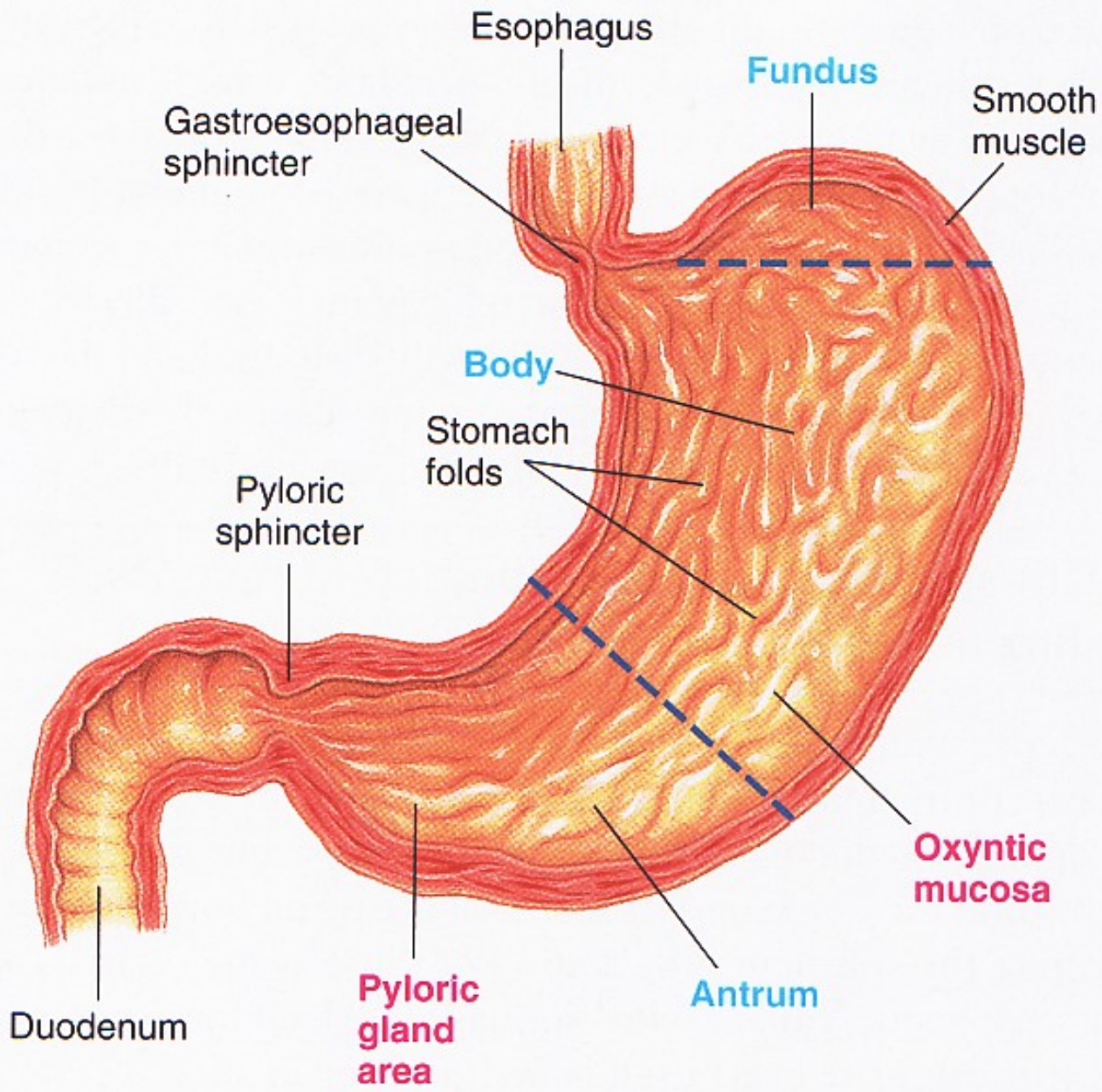
★ Meissner's sensory &
secretory plexus!

Circular
Muscle

H Howard 1990

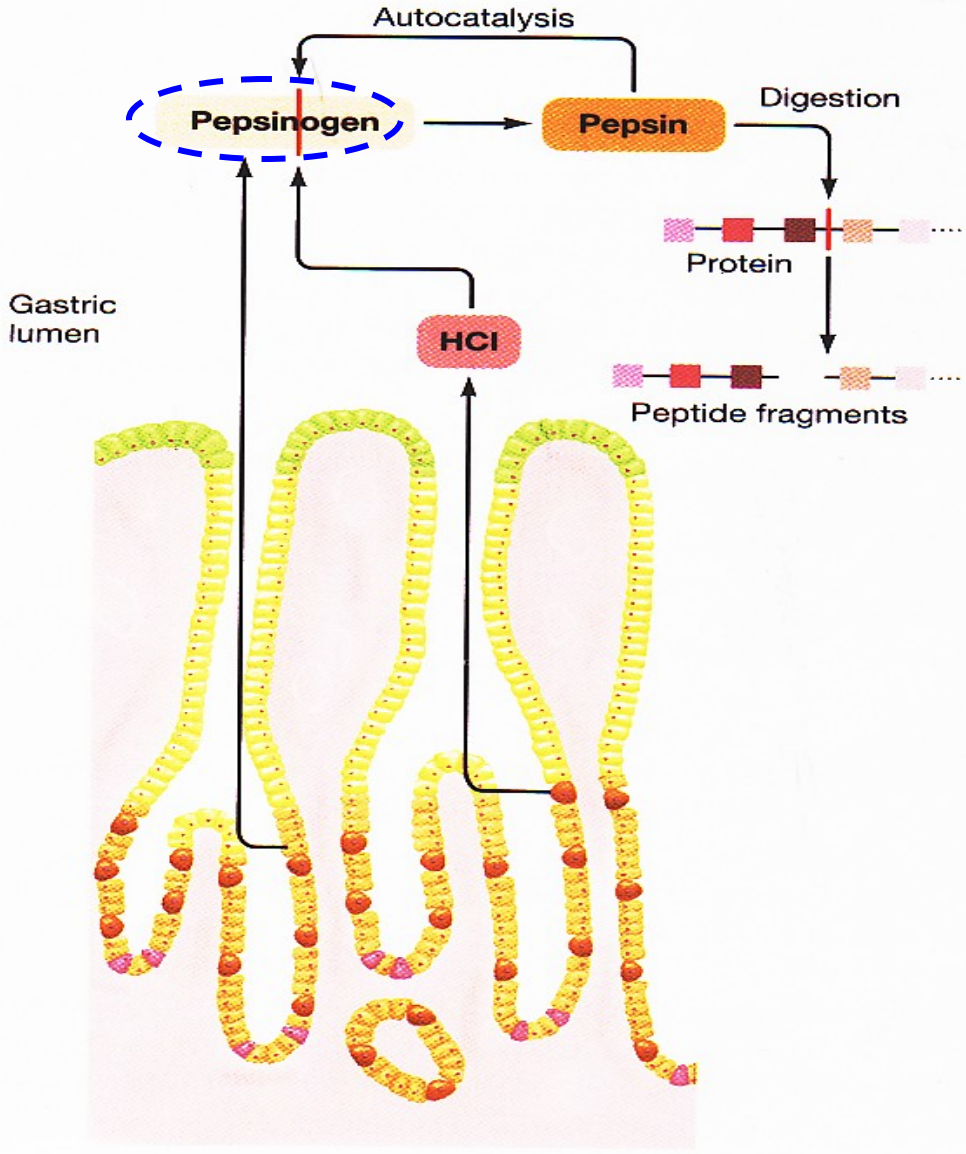


**Where does
enzymatic
digestion of
protein
begin?**



● **FIGURE 15-7**

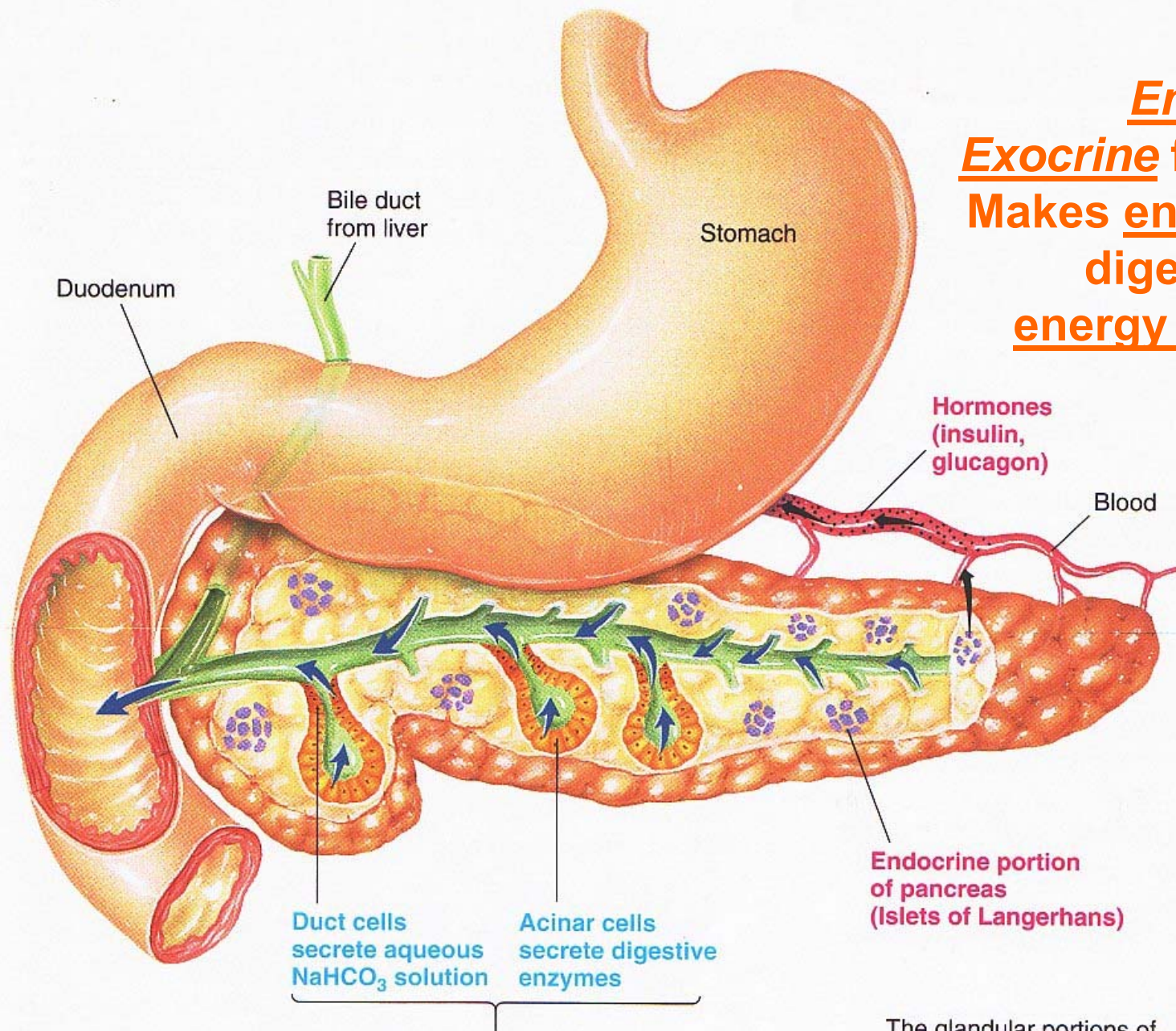
**Zymogen =
an inactive
precursor**



■ ■ ■ = Various amino acids
| = Enzymatic splitting of a chemical bond

**Why is the
pancreas so
unique?**

**Endocrine + Exocrine functions;
Makes enzymes for
digesting all 3
energy nutrients!**



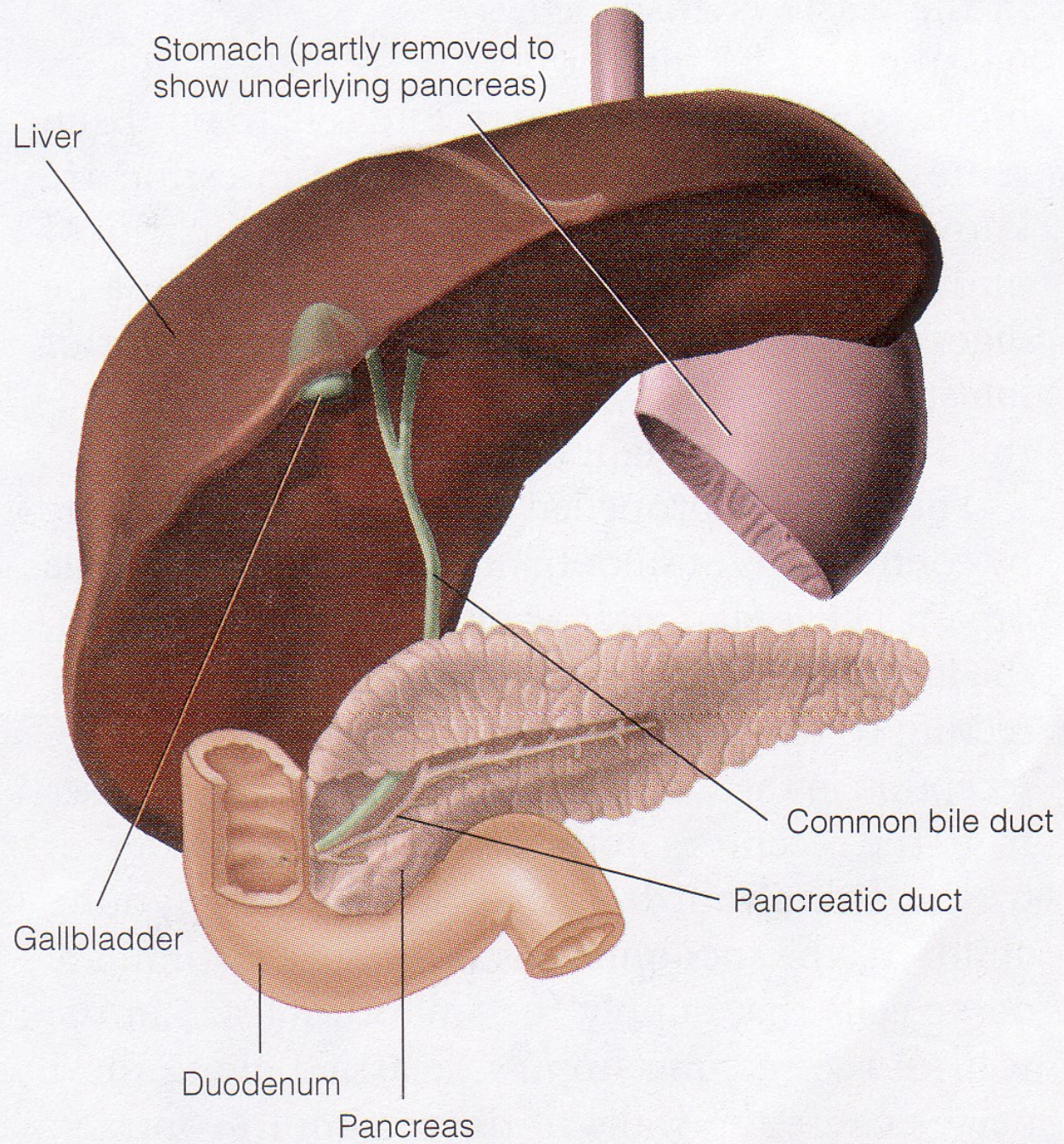
**Endocrine portion
of pancreas
(Islets of Langerhans)**

**Duct cells
secrete aqueous
 NaHCO_3 solution**

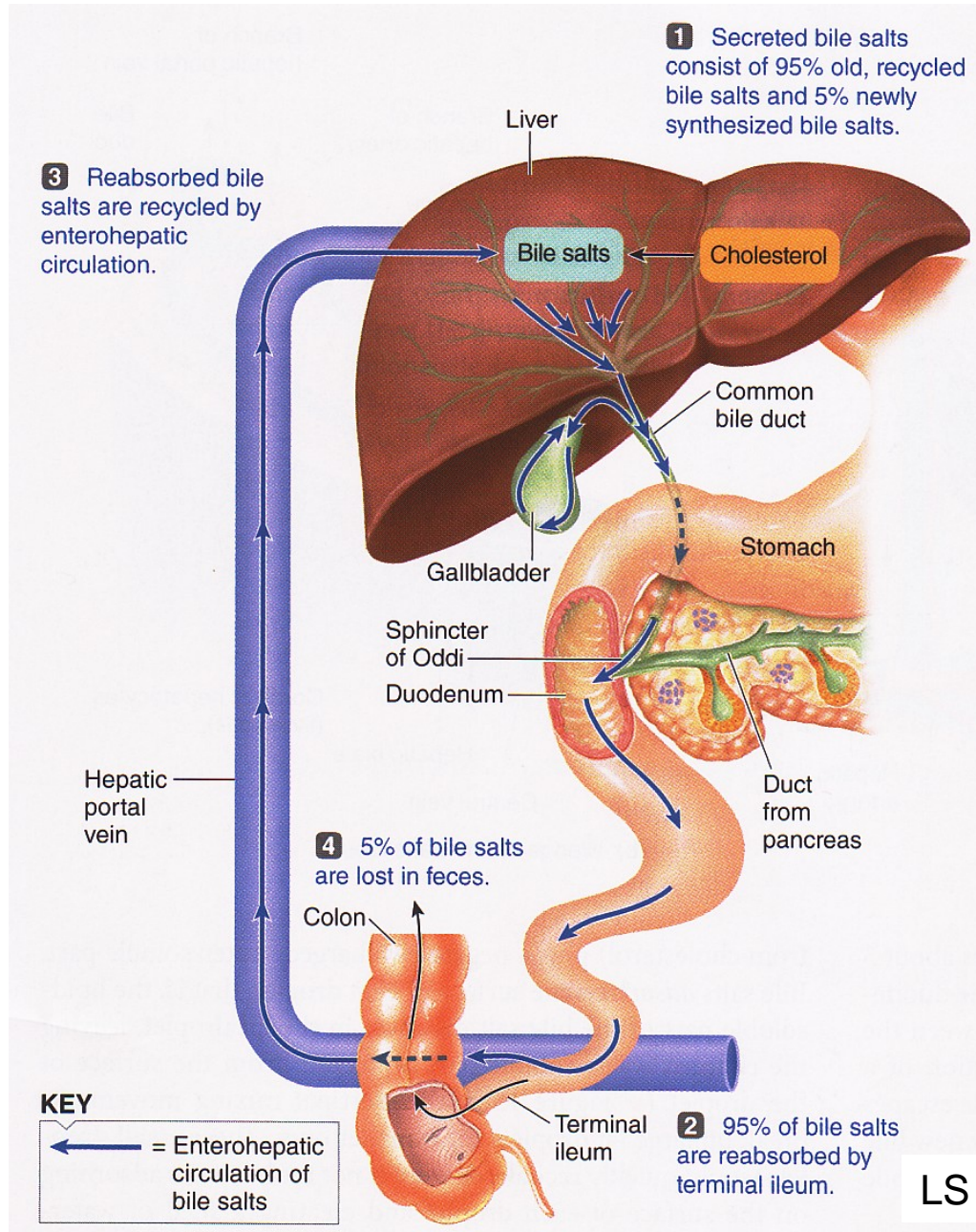
**Acinar cells
secrete digestive
enzymes**

**Exocrine portion of pancreas
(Acinar and duct cells)**

The glandular portions of the pancreas are grossly exaggerated.

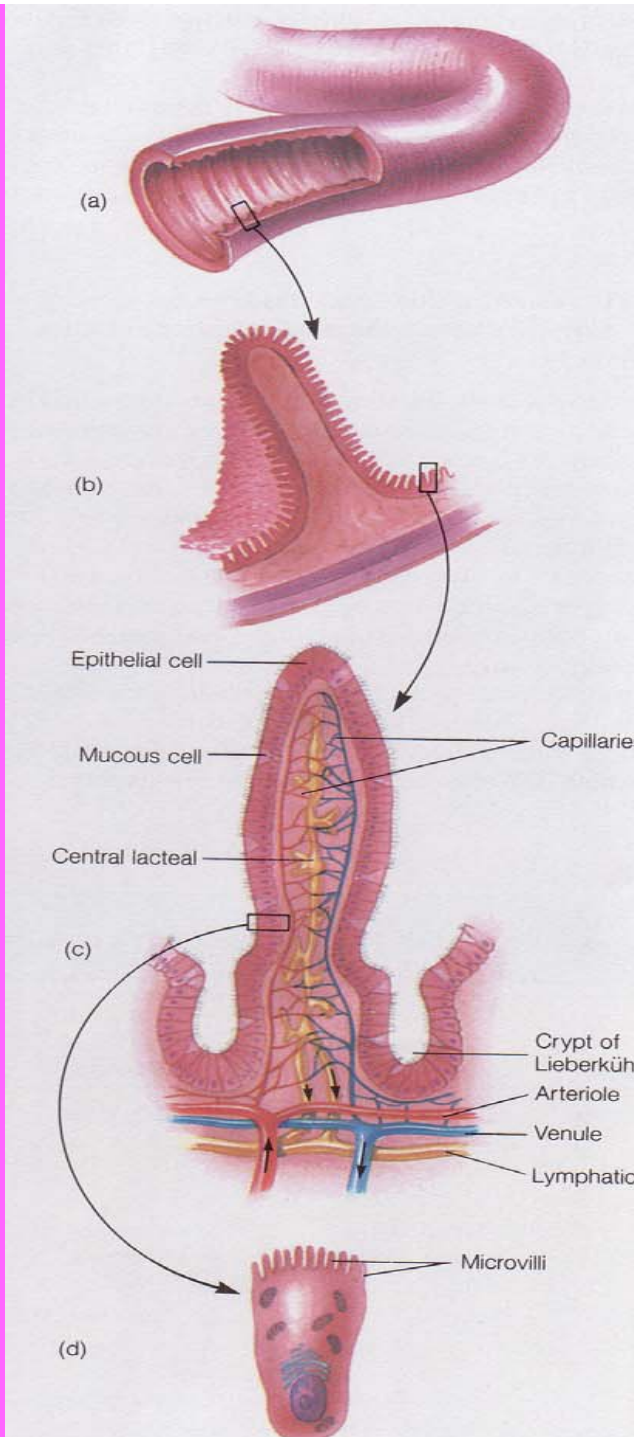


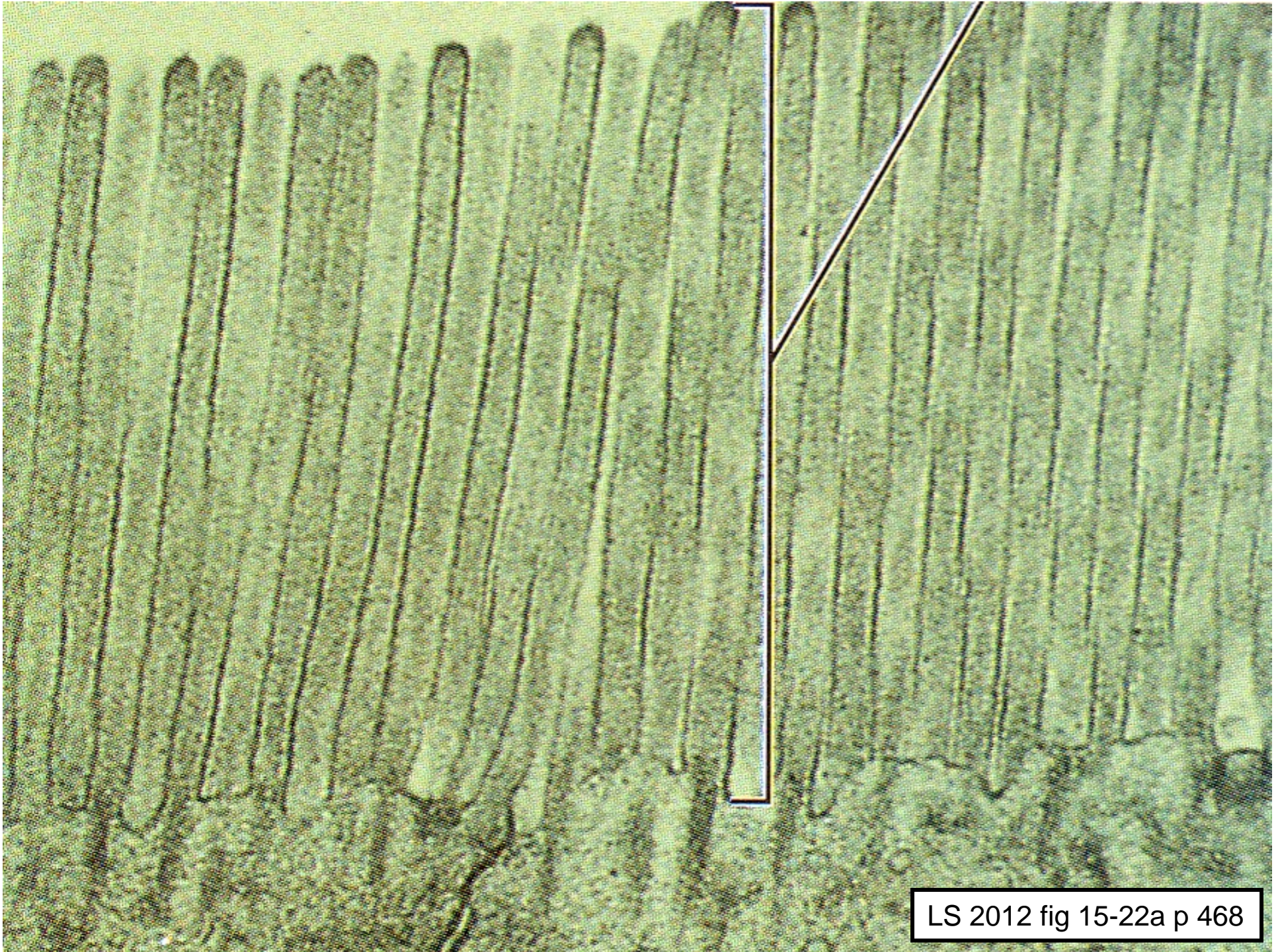
Liver: Amazing Recycling of Bile Salts!



What is the major
function of the
small intestine?

Absorption!!

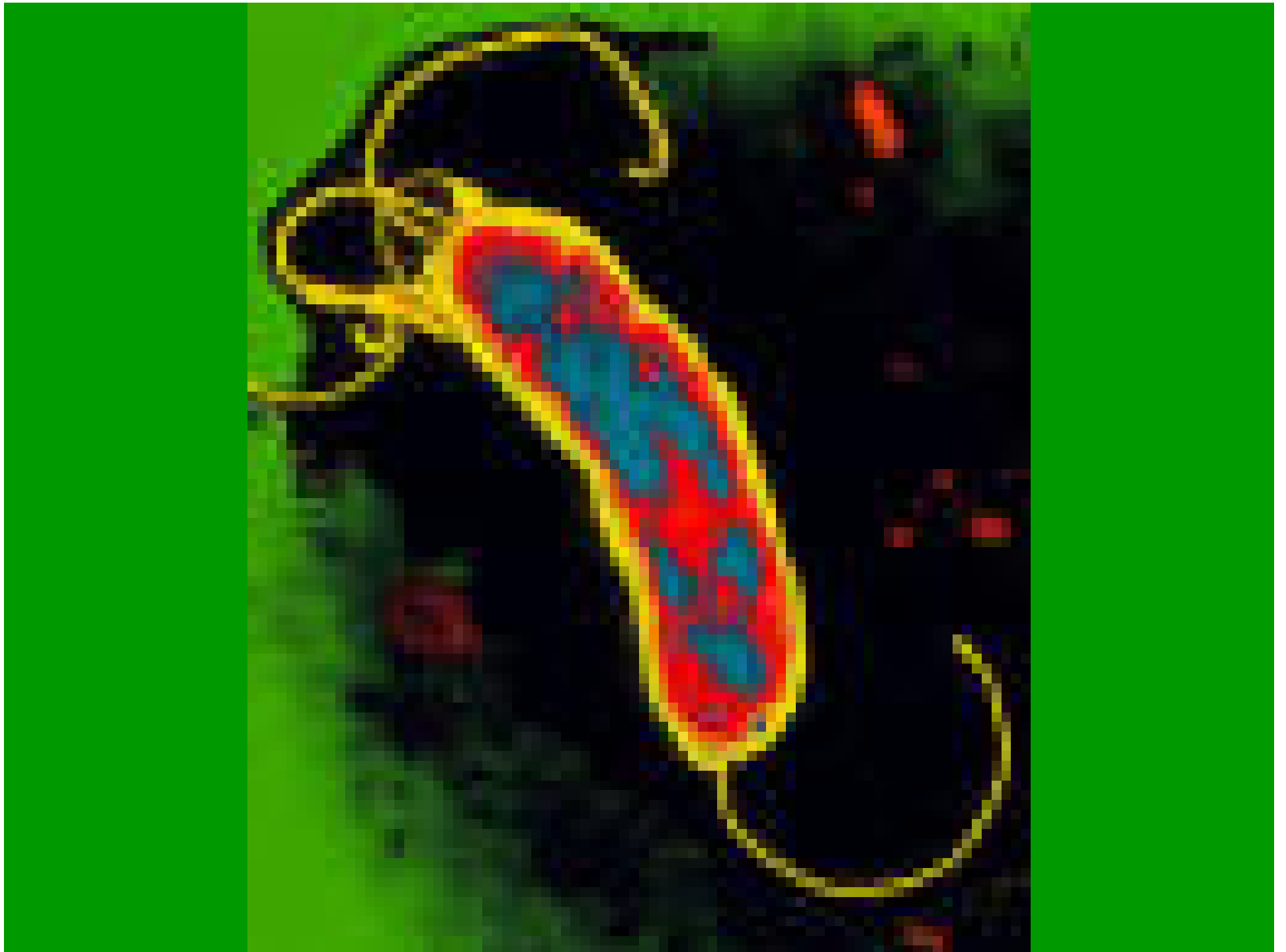




LS 2012 fig 15-22a p 468



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



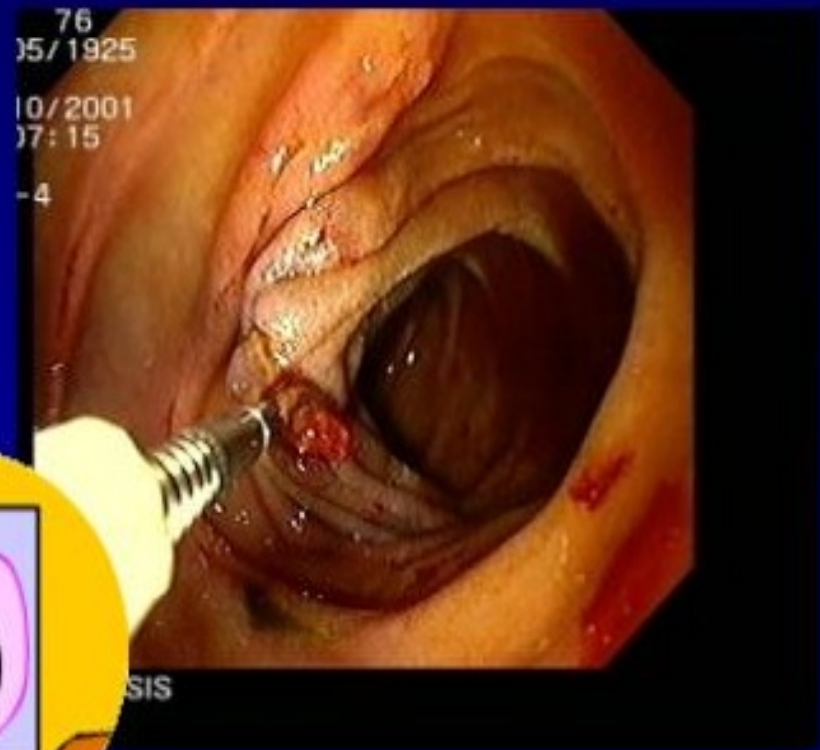
Ulcer Facts

- 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.

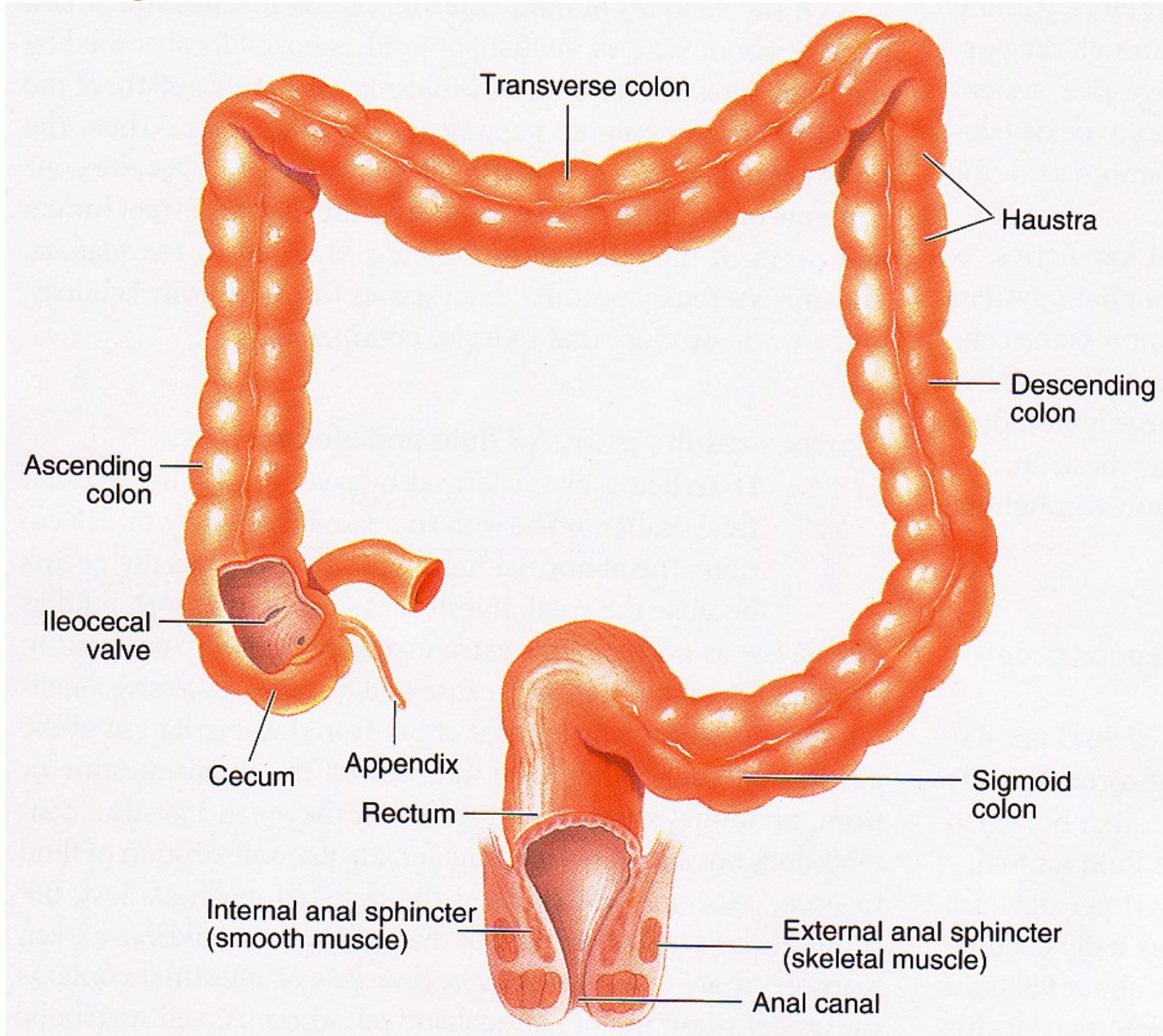
In the second photograph, a disposable metal clip is applied to the ulcer. The patient remained well and left hospital three days later.



▲ **Table 15-5 Digestive Processes for the Three Major Categories of Nutrients**

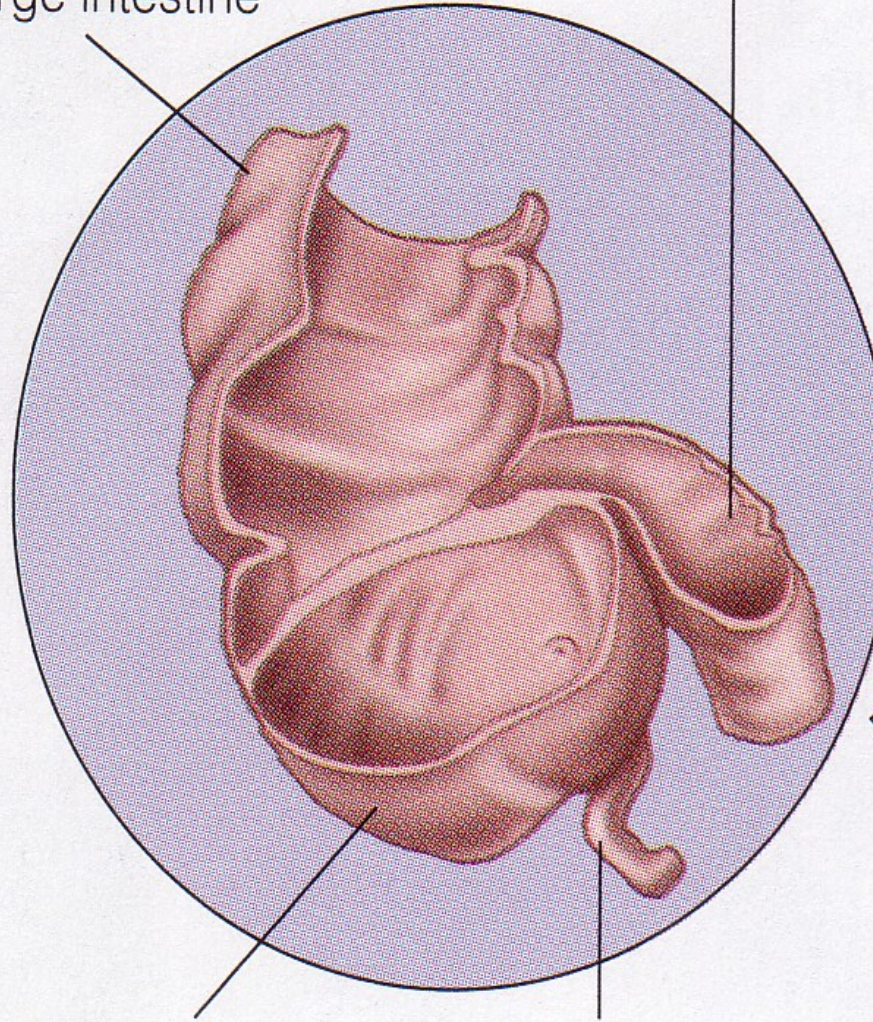
| Nutrients | Enzymes for Digesting the Nutrients | Source of Enzymes | Site of Action of Enzymes | Action of Enzymes | Absorbable Units of the Nutrients |
|----------------------|---|----------------------------------|------------------------------------|---|-------------------------------------|
| Carbohydrates | Amylase | Salivary glands | Mouth and (mostly) body of stomach | Hydrolyzes polysaccharides to disaccharides (maltose) | |
| | | Exocrine pancreas | Small-intestine lumen | | |
| | Disaccharidases (maltase, sucrase, lactase) | Small-intestine epithelial cells | Small-intestine brush border | Hydrolyze disaccharides to monosaccharides | Monosaccharides, especially glucose |
| Proteins | Pepsin | Stomach chief cells | Stomach antrum | Hydrolyzes protein to peptide fragments | |
| | Trypsin, chymotrypsin, carboxypeptidase | Exocrine pancreas | Small-intestine lumen | Attack different peptide fragments | |
| | Aminopeptidases | Small-intestine epithelial cells | Small-intestine brush border | Hydrolyze peptide fragments to amino acids | Amino acids |
| Fats | Lipase | Exocrine pancreas | Small-intestine lumen | Hydrolyzes triglycerides to fatty acids and monoglycerides | Fatty acids and monoglycerides |
| | Bile salts (not an enzyme) | Liver | Small-intestine lumen | Emulsify large fat globules for attack by pancreatic lipase | |

Large Intestine Structure & Function



Ascending
portion of
large intestine

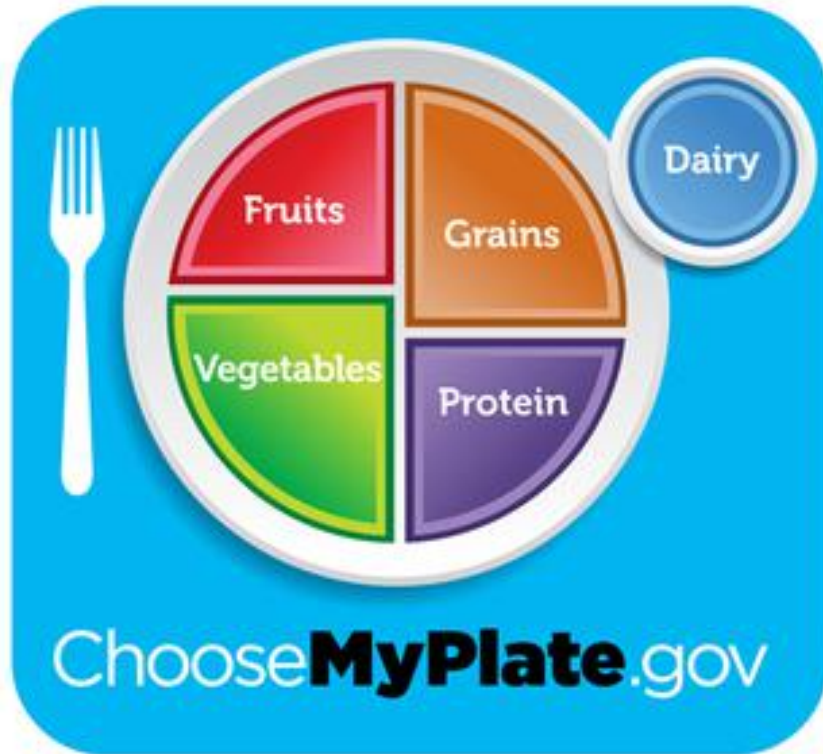
Ileum
of small
intestine



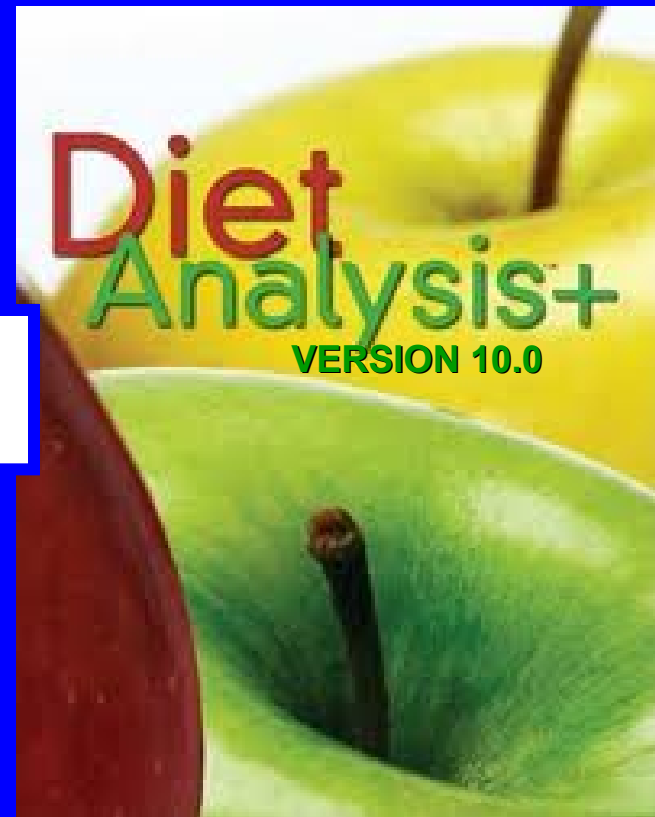
Cecum

Appendix

Lab 3: Nutritional Analyses via 2 Programs



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<https://www.supertracker.usda.gov/>