BIO 228 RRM MH Chapter 26 Digestion and some of Ch 27, Nutrition

Focus on T 26.2 and CH 27 Nutrition

Intro: Recall the "conducting zone" of the respiratory system is a series of tubes? The digestive tract is also a series of tubes, called the Alimentary Canal. This AC could not do what it does without the Accessory Organs which are

1. **26.1 a** What are the 6 functions of the digestive system? (who knew?)

   Ingestion, Motility, Secretion, Digestion, Absorption, Elimination.

2. **26.1 d** You already know that when our bodies are under stress, the SNS (Sympathetic NS) nervous system is working overtime, sending glucose to our skeletal muscles in preparation for running, and keeping us awake at night. When the SNS is in overdrive, the PSNS (ParaSympathetic NS) is not working. This means our "rest and digest" system. What is the enteric nervous system and which branch of the NS controls it?

   The enteric nervous system is an array of sensory and motor neurons that extend from the esophagus to the anus. It is controlled by the autonomic nervous system, with both sympathetic and parasympathetic innervation.

3. **26.1 e** Please distinguish between Intraperitoneal and retroperitoneal. What is the acronym for organs that are retroperitoneal?

   The organs that are found within/are completely surrounded by the visceral peritoneum are called the intraperitoneal organs (stomach, most of the small intestine, parts of the large intestine, and most of the liver). Whilst the organs that are outside of the parietal peritoneum are known as the retroperitoneal organs. These organs are remembered by the acronym (SAD PUCKER).

4. See T 26.1. What is CCK and what does it do?

   Cholecystokinin: Stomach- Inhibits motility and gastric secretions. Gallbladder- Stimulates the release of bile. Pancreas- Stimulates the release of pancreatic juice. Relaxes the hepatopancreatic sphincter and ileocecal valve.

5. See p. 1035. We all crave carbs on occasion, especially when we are in stress. At these times a Venti Pumpkin spice latte or a donut sounds amazing. It makes sense as these carbs are broken down in our mouth immediately and send a quick signal to our brain of dopamine. What enzyme starts digestion of such foods immediately in the mouth?
   Salivary Amylase. The bolus is formed in the <u>oral cavity.</u>

6. Recall the book I suggested in our Respiratory Unit? We know that we may need our "wisdom teeth" (called this as they finally emerge when we are in late teens or early twenties) removed as the typical jaw is often too small. It is interesting to note that lack of chewing (think: smoothies, rather than tough plant parts, meats or nuts) has shrunk our jaws and impacted our ability sleep! Please name the upper teeth from most anterior to posterior that we develop BEFORE we learn to drive.
   2nd, 1st Molar. 2nd, 1st Pre-Molar. Canine. Lateral Incisor. Central incisor.

7. Please see Clinical View 26.4. What are two reasons for a gastric bypass? Fill in, please: a. “so the individual… eats smaller portions ” b. “so fewer…. Nutrients are absorbed. _Do you think this makes sense? I’m curious….why or why not? Any other suggestions for your patients?

   Speaking as someone who has performed and maintained a large weight loss (70-90lbs). It takes a lot of willpower to stop eating junk food, and eat smaller portions. The advantage of gastric bypass is that it would make it easier to consume fewer calories. However, the drawbacks should be obvious, as this is not a *minor* surgery. My suggestion would be to consume less calorically dense foods in place of more calorically dense ones, and then transition to smaller portion sizes over a gradual period. Of course, this is not an easy suggestion for most people to follow, and speaking from experience, requires a lot of willpower.

   Protein is digested in our stomach via some very acidic chemicals produced and secreted here. Please read p. 1042, 1043 and explain why these chemicals (tell me about 2) don’t just eat through our stomach, which of course is made of protein?

   a. Pepsin

   b. Hydrochloric acid

   The stomach is lined with Surface Mucous Cells which secrete and alkaline substance into the stomach lining which prevents the breakdown of the stomach wall.

8. In regard to this low-acid environment, how is the digestive process “facilitated”? (4 things)

   Food breakdown. Protein denaturation. Pepsin activation. Enhanced enzymatic activity.

9. Food, as it changes consistency and chemical composition is called a *bolus* as well as *chyme*. Where does it become “chyme”? Food becomes Chyme within the stomach as it is mixed with the gastric secretions.

10. Imagine you are a server/waiter/waitress, working a huge wedding event. It is your job to bring out the huge, steaming platters of food. Your stomach growls but you cannot eat until 11 pm. What is the cephalic phase of digestion? What happens in the nervous system?

The cephalic phase of digestion is when the brain sends the signals to the body that it is time to begin eating. This is done in order to prepare the body for the process of eating and digesting the meal to come.

11. You need to have that surgery on a hiatal hernia that you have been postponing. Your pre-surg. orders state "no eating or drinking for 12 hours before surgery". See Clinical View 26.6 and explain *in detail,* please.

The goal of having a patient go NPO for 12 hours before a surgery is to ensure that there is nothing in their digestive tract that could be expelled (vomited) during the surgery.

12. The small intestine is about 20 feet long. The large intestine is about 5 feet long. Why are they called small/large then?

It refers to the overall width of the respective organs. With the "large" intestine being significantly wider than the small intestine.

13. Please put these components of the small intestine in order from *most inferior* to *most superior: jejunum, duodenum, ileum. duodenum, jejunum, ileum.*

14. Recall our unit on metabolism, health and cell chemistry? Foods high in fiber are very very important, due to villi and microvilli. Please explain.

Dietary fiber increases the bulk of stool, and allows it to travel within the intestine at an increased rate. This allows for the food to be expelled faster, and thus preventing any potential toxins from not being allowed to fester on the wall of the colon, which could potentially lead to cancerous growth.

15. Recall that the alveoli cover space approximate to the size of a tennis court? Same thing for our small intestine. What is the purpose of this vast amount of surface area? Can you answer in one word? Absorption. Increased surface area = Increased room for absorption.

16. Please see Clinical View 26.7. As a wise anatomy and physiology student, you do about ten minutes of deep calming breathing each day before you go into work, and each evening before falling asleep. You know the huge benefits to your nervous system, brain and….family. At work, you encounter a seemingly fatigued and undernourished (due to intermittent long-term diarrhea) and stressed out 20 yo young mom (Beth) and fellow student with abdominal cramping, bloating, constipation and pain. What is your diagnosis? See in the text "For reasons that are unclear…". What *could* this issue be caused by?

    A form of IBD, possibly Chrons or Ulcerative Colitis. There's no known direct cause, though diet can have an influence.

17. Skip ahead to p. 1056. What is the role of the large intestine, rather than simply motility of digested food out of the body? removal of water (80%!), absorption of Na and Cl, synthesis of Vitamins B and K. Lets go back to Beth, above. Look up Vitamins B and K and their role in the body.
    B: Important for metabolic function.

    K: Assisting in blood clotting.

18. Explain her fatigue and lack of nourishment. Her body likely has a vitamin B deficiency, and thus can not perform normal metabolic function.

19. Check out "Fecal transplant in Clinical View 26.13. (I know….crazy….). What can cause *C. difficile?* (OK, that's crazy too…) C-diff (the plague of nurses everywhere) is a spore that thrives in the immune systems of those who've been hit with large quantities of antibiotics, which kill off the potential competition. The condition itself is the most foul-smelling diarrhea a person will ever encounter (often the first indication of a c-diff infection is the smell).

    What is this (quite successful, for health and mental health!) oddball procedure?

    Implanting another's, healthy, stool in the intestine.

20. See Clinical View 26.16. Hybridized wheat, as a result of WW2 mass production is not always tolerated by the bacteria in our intestine. What disease can result in eating hybridized (mass marketed-everywhere) wheat, and what is happening in the body?

    Celiac disease is a condition where the body is unable to digest the protein known as gluten. It can cause abdominal pain, bloating, and chronic diarrhea.

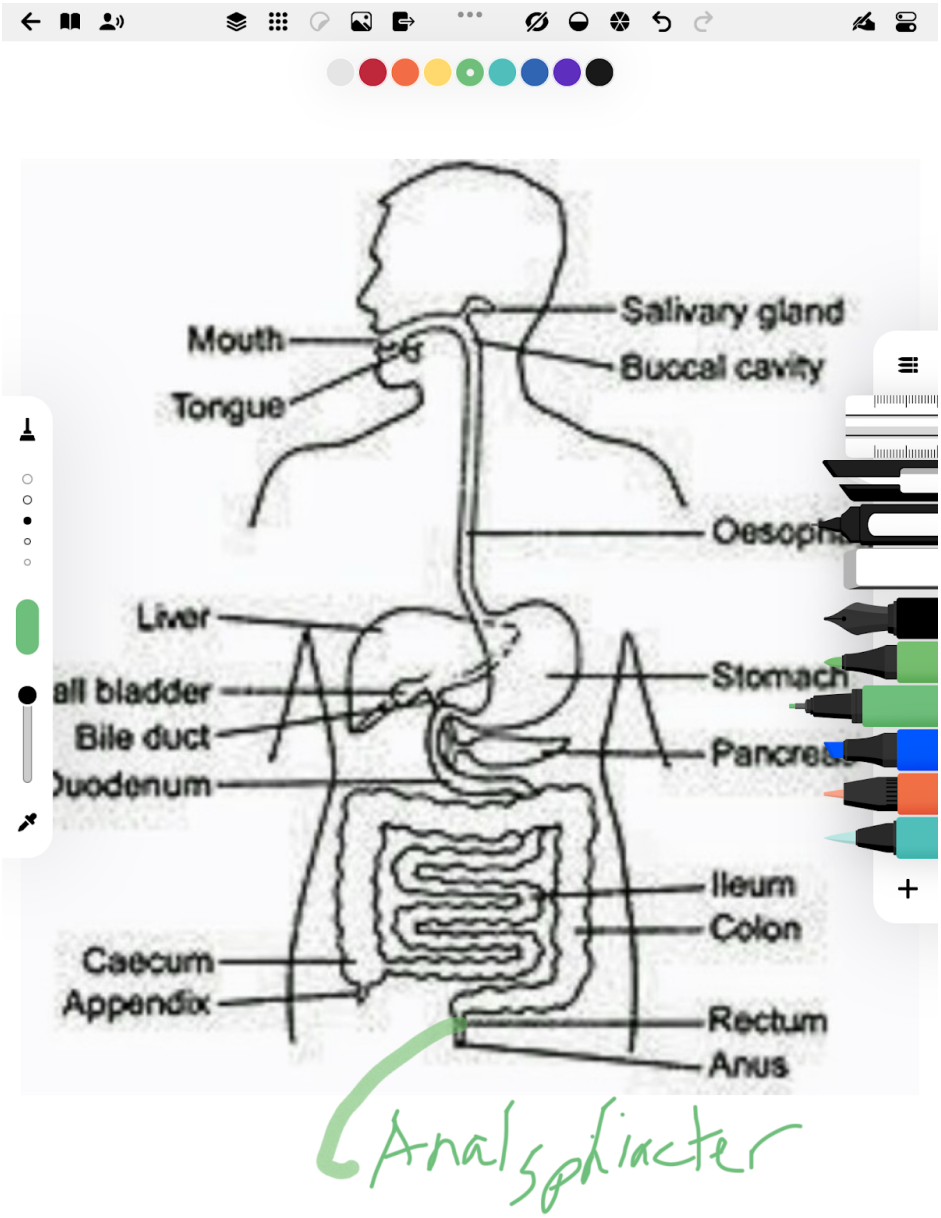
21. Using Table 26.2, please label the diagram below. NO CUTTING AND PASTING of online diagrams, please. There are two parts to your work here (organ and macromolecule list).
    a. You will add in the name of the <u>accessory organ</u> as it impacts food that moves from the mouth out the anus.
    b. You will also add in -what macromolecule is digested where?

Keep going….

Fats: Primarily digested in the stomach and small intestine.

Carbohydrates: The oral cavity, stomach, with tertiary digestion occurring in the small intestine.

Proteins: In the stomach/small intestine.


Salivary gland
Mouth
Buccal cavity
Tongue
Oesoph
Liver
Stomach
all bladder
Bile duct
Pancreas
Duodenum
Ileum
Colon
Caecum
Appendix
Rectum
Anus
Anal sphincter