**Review questions for Digestive system lecture**

**Multiple choice review questions**

1) Which of the following is part of the digestive system, but not the gastrointestinal tract?

A) liver

B) stomach

C) large intestine

D) small intestine

2) Which of the following is an accessory organ of the digestive system?

A) pancreas

B) small intestine

C) stomach

D) large intestine

3) The circular layer and the longitudinal layer are layers of the \_\_\_\_ layer of the digestive tract.

A) lumen

B) muscularis mucosa

C) submucosa

D) muscularis

4) The \_\_\_\_\_\_\_ is the inner layer of the gastrointestinal tract which functions in absorption and secretion.

A) muscularis

B) serosa

C) submucosa

D) mucosa

5) Regurgitation (or reflux) of stomach contents is normally prevented by the actions of the

A) esophageal sphincter.

B) epiglottis.

C) trachea.

D) glottis.

6) These cells secrete digestive enzyme in the stomach.

A) parietal cells

B) chief cells

C) goblet cells

D) G cells

7) To enter the small intestine, partially digested food must pass through the

A) esophageal sphincter.

B) pyloric sphincter.

C) ileocecal valve.

D) anal sphincter

9) The absorptive surface area of the small intestine is increased by all of the following except

A) villi.

B) microvilli.

C) ruga.

10) The shortest part of the small intestine is the

A) duodenum.

B) jejunum.

C) ileum.

D) cecum.

11) Lactose, salt, or other solutes that increase the osmolarity of the contents of the colon tend to cause

A) acid reflux

B) pyloricstenosis

C) diarrhea.

D) ulcers

16) Glucagon is a hormone secreted by the \_\_\_\_\_ which promotes \_\_\_\_\_\_\_\_\_\_ of glycogen.

A) Liver; degradation

B) Pancreas; degradation

C) Small intestine; synthesis

D) Stomach; synthesis

18) Uncorrected diabetes mellitus may result in

A) decreased fatty acid utilization by the cells for energy.

B) decreased urine production.

C) dehydration.

D) decreased blood sugar.

19) Insulin promotes all of these effects except the

A) cellular uptake of plasma glucose.

B) synthesis of glycogen (glycogenesis) in the liver.

C) digestion of liver glycogen, releasing free glucose molecules into the blood.

23) Cells can use all of the following as a source of energy except

A) carbon dioxide.

B) glucose.

C) fatty acids.

D) amino acids.

24) Cholesterol is packaged in \_\_\_\_\_\_ by the liver for delivery to cells of the body.

A) chylomicrons

B) Fatty acids

C) low-density lipoproteins

D) high-density lipoproteins

25) Basal metabolic rate

A) is increased by physical exercise.

B) is decreased in younger people.

C) can be measured based on oxygen consumption.

D) decreases in an individual with hypothyroidism.

Answers to multiple choice review questions:

1) A

2) A

3) D

4) D

5) A

6) B

7) B

9) C

10) A

11) C

16) B

18) C

19) C

23) A

24) D

**Fill-in-the-blank review questions**

1) Carbohydrates, proteins, lipids, and nucleic acids are called the four \_\_\_\_\_\_\_\_\_; Each is a large molecule that is composed of many smaller molecules called \_\_\_\_\_\_\_\_.

2) \_\_\_\_\_ means breaking things down into smaller pieces, such as when macromolecules in foods are broken down into monomers.

3) The digestive system organs fall into two major groups: the \_\_\_\_\_ and the \_\_\_\_\_.

4) After being swallowed, ingested food becomes a pasty material known as \_\_\_\_\_. The gastrointestinal tract is sometimes called the \_\_\_\_\_.

5) Smooth muscles in the gastrointestinal tract are responsible for propelling chyme from mouth to anus via processes called \_\_\_\_\_.

6) Smooth muscles in the gastrointestinal tract are also responsible for \_\_\_\_\_ contractions, which churn and mix the chyme.

7) There are two types of digestion: \_\_\_\_\_\_\_\_ digestion and \_\_\_\_\_\_\_\_ digestion.

8) \_\_\_\_\_\_\_ digestion is when digestive juices (such as acids and bile) break apart the chyme through chemical reactions.

9) Although acid and bile play important roles in chemical digestion, the most active molecules made by the digestive system for chemical digestion are proteins called digestive \_\_\_\_\_\_\_\_.

10) \_\_\_\_\_ digestion refers to using physical forces to break chyme into smaller parts.

11) One example of mechanical digestion is \_\_\_\_\_\_\_\_, which takes place in the oral cavity. Another example is \_\_\_\_\_\_\_, which is when the smooth muscle in the GI tract repeatedly contracts on the chyme to break it apart. It is sometimes called “churning”.

12) The central hollow area of the gastrointestinal tract is called the \_\_\_\_\_, the same term that is used to describe the hollow region in many other tubular organs.

13) The GI tract has four major tissue layers. From the lumen outward, the first three are the \_\_\_\_\_, \_\_\_\_\_, and the \_\_\_\_\_.

14) The \_\_\_\_\_ layer of the gastrointestinal tract is lined with simple columnar epithelial cells. Its two functions are \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_.

15) Most blood vessels and nerve fibers of the GI tract are found in the \_\_\_\_\_ tissue layer of the GI tract. This layer is made of \_\_\_\_\_\_\_\_ tissue.

16) The GI tract has a tissue layer of smooth muscle.

a) What is this layer called? \_\_\_\_\_\_\_\_\_\_\_

b) What are the two functions of this layer?

17) The inner layer of the muscularis externa consists of smooth muscle cells which are oriented in a circle around the lumen and are therefore called the \_\_\_\_\_ layer of the muscularis externa. This layer is responsible for \_\_\_\_\_\_. The outer layer of the muscularis externa has smooth muscle cells are oriented up and down the GI tract and are therefore called the \_\_\_\_\_ layer of the muscularis externa. It is responsible for \_\_\_\_\_\_.

18) The organs of the digestive system which are found in the abdominal cavity are surrounded and cushioned by a \_\_\_\_\_ membrane, a term that means **any** fluid-filled membrane in the body. The name of the **specific** fluid-filled membrane that surrounds the GI tract is the \_\_\_\_\_\_\_\_\_.

19) The sheet-like extensions of the peritoneum which connect the abdominal organs to the abdominal walls are the \_\_\_\_\_ and the \_\_\_\_\_.

20) The first section of the GI tract is the oral cavity. After the food in the oral cavity is swallowed, the next section of the GI tract that it moves through is the \_\_\_\_\_\_\_.

21) The \_\_\_\_\_\_\_ is the next section of the GI tract after the pharynx. It is posterior to the trachea (the windpipe). Chyme and beverages do not enter the trachea because the \_\_\_\_\_\_\_\_, a cartilage flap, blocks the trachea when we swallow.

22) Which GI tract organ passes through the thoracic cavity?

23) In certain regions of the GI tract, the muscles of the muscularis externa form doughnut shaped rings called \_\_\_\_\_\_\_\_ that are capable of closing to prevent movement of chyme through the tract.

24) As chyme reaches the bottom of the esophagus, the \_\_\_\_\_ sphincter opens. This sphincter is also known as the \_\_\_\_\_. It controls the entrance of chyme into the \_\_\_\_\_ (an organ).

25) The interior of the empty stomach is extremely wrinkled: these wrinkles, or folds, are called \_\_\_\_\_. These folds increase surface area and allow the stomach to expand and stretch when storing food or drink.

26) The \_\_\_\_\_ cells of the stomach are responsible for secreting hydrochloric acid.

27) Digestive enzymes in the stomach are secreted by \_\_\_\_ cells.

28\*) The stomach and other GI tract organs contain \_\_\_\_\_\_\_\_ cells which make mucus. The mucus lubricates the passage of chyme and protects the organs from digesting themselves.

29) The stomach’s digestive juice (acid and digestive enzymes) is secreted into the lumen of the stomach from microscopic pit-like **inward** folds of its mucosa called \_\_\_\_\_; their entrances, the \_\_\_\_\_, appear as microscopic pores on the stomach's interior surface.

30) The \_\_\_\_\_\_ cells and \_\_\_\_\_\_ cells are the cells that line the gastic glands.

31) Unlike the muscularis externa in other regions of the GI tract, that of the stomach has \_\_\_\_\_ (a number) of layers

32) A malfunction of the esophageal sphincter causes \_\_\_\_\_\_\_. .

33) After several hours of digestion in the stomach, the \_\_\_\_\_ sphincter will open to allow passage of chyme out of the stomach and into the \_\_\_\_\_\_\_\_ (an organ).

34) The most digestion and absorption in the GI tract takes place in the \_\_\_\_\_\_\_ (an organ).

35) The small intestine is divided into three sections. Write the names of the three sections in the blanks below. List them in their correct order.

Circle the one where the most digestion and absorption takes place.

Put a star next to the one where the digestive juices from the accessory glands enter the small intestine.

Put a box around the one that contacts the ileocecal valve.

Draw a triangle next to the one that contacts the pyloric sphincter.

37) The small intestine mucosa has small finger-like projections called \_\_\_\_\_\_\_\_\_\_\_\_\_\_. These are easily seen using a microscope set at low magnification.

38) The smallest folds in the small intestine are folds of the plasma membranes of the\_\_\_\_\_ cells of the small intestine mucosa. These folds are called \_\_\_\_\_\_\_ and are so small that they can only be seen using a microscope set at high magnification.

39) The passage of chyme from the small intestine into the large intestine is controlled by the \_\_\_\_\_ sphincter.

40) Another name for the large intestine is the \_\_\_\_\_\_\_.

41) The major function of the large intestine is absorption of \_\_\_\_\_ and \_\_\_\_\_.

42) The large intestine is divided into four regions, the \_\_\_\_\_\_\_\_ on the right side of the abdomen, the \_\_\_\_\_\_\_\_\_\_ which crosses the abdomen from right to left, the \_\_\_\_\_\_\_\_\_\_\_on the left side of the abdomen, and the \_\_\_\_\_\_\_\_ which is the final region before the anus.

43) The \_\_\_\_\_ is a vestigial organ roughly the size of one's index finger, suspended from the ascending colon.

44) Once chyme has entered the large intestine it is now referred to as \_\_\_\_\_\_.

45) The elimination of feces from the gastrointestinal tract is called \_\_\_\_\_\_\_\_.

46) Bacteria are mostly found in the \_\_\_\_\_\_ organ of the digestive system.

47) Overly rapid transit of feces through the large intestine does not allow time for water resaborption; the result is \_\_\_\_\_.

48) The organs of the GI tract, taken in order, after the mouth, include the \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_, which ends with the anus.

49) Match the descriptions on the right with the GI tract organs on the left. Some descriptions may match more than one organ. Write the letters of all matching descriptions.

Stomach: a) The pyloric sphincter

separates it from another

organ

b) Most digestion and

absorption take place here

c) Has gastric pits

Small intestine:

d) The longest organ of the

alimentary canal

e) Contains folds called villi

f) The appendix is

located at its beginning

Large intestine:

g) Contains many bacteria

50) The pancreas is a long, roughly triangular organ located just inferior to the \_\_\_\_\_ (a GI tract organ).

51) One major function of the pancreas is to make several different \_\_\_\_\_\_\_ (a type of protein), which become mixed with the chyme.

52) Another major function of the pancreas is to make a \_\_\_\_\_\_\_ which is needed because of the high acidity of the chyme that leaves the stomach. This pancreatic substance \_\_\_\_\_\_\_ the acids in the chyme.

54) The digestive juices of the pancreas are secreted into the \_\_\_\_\_ region of the \_\_\_\_\_\_ (an organ).

55) In the blank space after each digestive system structure on the left, write the letters of all descriptions on the right that match it. Some descriptions may match more than one structure. Write the letters of all matching descriptions.

Small intestine: ­ a) Located in the thoracic cavity

Stomach: b) An alimentary canal organ

Esophagus: c) A serosa

Peritonium \_\_\_\_\_\_\_\_\_\_\_ d) An accessory organ

Pancreas \_\_\_\_\_\_\_\_\_\_\_\_\_ e) Has a sphincter at its entrance

56) The gallbladder stores \_\_\_\_\_ .

57) The liver is mostly on the left/right (circle one) side of the abdominal cavity.

58) \_\_\_\_\_ is the digestive juice that is produced by the liver, and which functions to \_\_\_\_\_\_\_ fat globules, a term that means to break apart fat globules into smaller water-soluble globules.

59) Bile is made by the liver mainly from which lipid molecule? \_\_\_\_\_\_.

61) Excessively high concentrations of bile in the blood (such as can occur when the liver is diseased) can cause an abnormal yellow skin color called \_\_\_\_\_\_.

62) The two organs that produce the most digestive enzymes are the \_\_\_\_\_ organ and the \_\_\_\_\_\_ organ.

63) Below is a partial list of digestive system structures. Write an A in the blank next to all parts that are accessory organs. Write a G in the blank for all that are parts of the GI tract. Also write a number in the blank next to all GI tract parts to indicate the correct order that chyme passes through them.

Large intestine: \_\_\_\_\_\_\_

Oral cavity\_\_\_\_\_\_

Stomach\_\_\_\_\_\_

Esophageal sphincter\_\_\_\_\_\_

Pancreas\_\_\_\_\_

Duodenum\_\_\_\_\_\_

Liver\_\_\_\_\_\_

Gall bladder\_\_\_\_\_\_

64) Triglycerides (fats and oils) in foods are digested by enzymes into \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_ molecules.

65) Large carbohydrates are called polysaccharides. They are polymers of the monosaccharide \_\_\_\_\_.

66) When a large carbohydrate molecule, such as starch, is eaten, the first digestive enzyme breaks it down into \_\_\_\_\_\_\_, which is a carbohydrate made of two glucose sugars linked together.

67) The polysaccharide from plants that provides most of our calories is called \_\_\_\_\_. Major sources are potatoes, bread, pasta, and rice. The polysaccharide our bodies make and store in our liver and muscles is called \_\_\_\_\_.

68) One of the major reasons we eat is to provide “fuel” molecules (such as glucose) for our cells. Our cells usually use a process called cellular aerobic respiration to convert the energy in fuel molecules into cellular energy. Write the complete chemical reaction of cellular aerobic respiration of one molecule of glucose. Include all reactant and product molecules in the chemical reaction.

69) Cellular aerobic respiration is used to recharge the cell’s supply of an energy-rich molecule inside the cell. Name that energy-rich molecule: \_\_\_\_\_\_\_ (hints: It is not glucose. The molecule is the direct energy source that powers the cell’s proteins).

70) We lack enzymes to digest cellulose, a plant carbohydrate abundant in stems and leaves. When eaten, cellulose ends up in the feces, undigested. On food labels, cellulose molecules are referred to as \_\_\_\_\_ or \_\_\_\_\_\_.

71) Although we cannot digest fiber, it benefits use in two ways. It lowers the level of \_\_\_\_\_\_ (a lipid found in the blood) and it also lowers the risk of \_\_\_\_\_\_\_ (an organ) cancer.

72) “Fiber” or “bran” are terms for cellulose, a plant carbohydrate that the body is not able to digest. You are a fiber molecule (yes, you are). Make a numbered list of the parts of the alimentary canal (in the correct order) you pass through starting with the oral cavity and ending with the anus. Include all sphincters, tubes, and the sub-sections of major organs (if the organ is divided into sub-sections) that you pass through. Do not include organs that you do not pass through.

73) Once absorbed from the GI tract, many glucose molecules are transported to the \_\_\_\_\_ organ for storage.

74) The endocrine (hormone secreting) portion of the pancreas consists of clusters of cells. These cluster are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

75) The pancreatic islets contain two kinds of cells: cells which secrete the hormone \_\_\_\_\_\_\_\_, and cells which secrete the hormone \_\_\_\_\_\_\_\_\_.

76) Most cells respond to insulin by taking in blood glucose for energy, but one major organ responds to insulin by storing the blood glucose as glycogen. This organ is the \_\_\_\_\_\_.

77) The hormone from the pancreas that raises the plasma glucose concentrations, such as during periods of fasting, or starving is called \_\_\_\_\_\_.

78) Glucagon is secreted in response to low/high (circle one) glucose in the blood, and its major target is the \_\_\_\_\_ (an organ).

79) In response to glucagon, the liver does \_\_\_\_\_\_\_\_, which increases the glucose concentration in the blood.

80) Fill in the blanks in the following paragraphs. Be as specific as possible in your answers.

If you ate a meal consisting of pasta and potatoes, the major macromolecule nutrient you are consuming is \_\_\_\_\_\_\_\_\_\_\_\_\_. This nutrient will first be broken down by an enzyme into the disaccharide \_\_\_\_\_\_\_\_\_\_\_\_\_, then another enzyme will digest the disaccharides into the monosaccharide \_\_\_\_\_\_\_\_\_\_\_.

The monosaccharide will travel in the hepatic portal vein to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (an organ), which will store it in the form of a polysaccharide known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_. When blood sugar levels are low (such as between meals) the liver breaks down the polysaccharide into the monomer \_\_\_\_\_\_\_\_\_\_ to keep your blood sugar levels from declining.

81) Blood glucose levels stay more or less constant (at around 70-100 mg/100 ml). This steady level of glucose is maintained mainly by two hormones with opposing effects. For the hormone that is secreted **just after** a carbohydrate-rich meal is eaten, answer the following questions:

a) Hormone name:

b) Which organ secretes this hormone?

c) Name the region within this organ that secretes the hormone:

e) The hormone raises/lowers (circle one) blood sugar.

f) What is the target organ/tissue of the hormone?

g) What is the response of the target organ/tissue to the hormone?

82) Blood glucose levels stay more or less constant (at around 70-100 mg/100 ml). This steady level of glucose is maintained mainly by two hormones with opposing effects. For the hormone that is secreted between meals (**many hours after** the last meal is eaten) answer the following questions:

a) Hormone name:

b) Which organ secretes this hormone?

c\*) Name the region within this organ that secretes the hormone:

e) This hormone raises/lowers (circle one) blood sugar.

f) What is the target organ/tissue of the hormone?

g) What is the response of the target organ/tissue to the hormone?

83) The major three symptoms of uncontrolled diabetes are \_\_\_\_\_\_, \_\_\_\_\_\_\_, and \_\_\_\_\_\_\_.

84) Diabetes mellitus results from the inadequate secretion or action of the hormone \_\_\_\_\_.

94) \_\_\_\_\_\_\_\_ molecules (which is the correct term for fat and oil molecules) are digested into into \_\_\_\_\_ and \_\_\_\_\_ molecules.

95) \_\_\_\_\_ are fatty acids, or fats containing fatty acids, which do not contain any double

bonds between their carbon atoms. These are considered less healthy fats.

96) \_\_\_\_\_ are fatty acids which contain one or more double bonds between their carbon atoms. These are considered more healthy fats.

97) Cholesterol and fats in the bloodstream, since they are not soluble in water, do not simply float freely: instead they are bound to proteins and surrounded by polar phospholipids. These fat-protein combinations are called \_\_\_\_\_.

98) There are two types of lipoproteins: \_\_\_\_\_\_\_ lipoproteins (abbreviated as \_\_\_\_\_\_) and \_\_\_\_\_\_ lipoproteins (abbreviated as \_\_\_\_\_).

99) LDLs carry cholesterol and other lipids from the \_\_\_\_\_ to the \_\_\_\_\_, where they will be used in membranes and to make steroid hormones.

100) HDLs carry cholesterol and other lipids from the \_\_\_\_\_ to the \_\_\_\_\_ where they will be converted into bile.

101) What are the three major macromolecule nutrients?

Circle the one that is more healthy to get from animals (than plants)

Box the one that is less healthy to get from animals (than plants)

Put a star around the one that is supposed to be our major source of calories

102) Below is a list of factors that can change the metabolic rate (the calories expended per hour by the body). In the blank space after each factor, write I if it is associated with increased metabolic rate, and write D if it is associated with decreased metabolic rate.

a) Thyroxin\_\_\_\_\_\_\_

b) Being male\_\_\_\_\_\_

c) Being elderly\_\_\_\_\_\_

d) Being a large person\_\_\_\_\_\_

e) Exercising\_\_\_\_\_\_

103) The main substance that controls basal metabolic rate is \_\_\_\_\_\_\_\_\_.

104) Although there are hundreds of different weight-loss diet plans, weight loss can only be achieved by \_\_\_\_\_\_, which decreases the amount of energy brought into the body, or by \_\_\_\_\_\_, which raises the amount of energy the body expends, or both together.

**Answers to fill-in-the-blank review questions:**

1) Macromolecules

Monomers

2) Digestion

3) Gastrointestinal tract organs

Accessory organs

4) Chyme

Alimentary canal

5) Peristalsis

6) Segmentation

7) Mechanical

Chemical

8) Chemical

9) Enzymes

10) Mechanical

11) Chewing/mastication

Segmentation

12) Lumen

13) Mucosa

Submucosa

Muscularis externa

14) Mucosa

Secretion

Absorption

15) Submucosa

Dense connective tissue

16) a) Muscularis externa

b) Peristalsis and segmentation

17) Circular

Segmentation

Longitudinal

Peristalsis

18) Serosa

Peritoneum

19) Mesenteries and omentum

20) Pharynx

21) Esophagus

Epiglottis

22) Esophagus

23) Sphincters

24) Esophageal

Cardiac

Stomach

25) Rugae

26) Parietal

27) Chief

29) Gastric glands

Gastric pits

30) Parietal

Chief

31) Three

32) Acid reflex/Heartburn

33) Pyloric

Small intestine

34) Small intestine

35) Duodenum (star, triangle)

Jejunum (circled)

Ileum (boxed)

37) Villi

38) Epithelial/Mucosa

Microvilli

39) Ileocecal

40) Colon

41) Water

Ions

42) Ascending colon

Transverse colon

Descending colon

Sigmoidal colon

43) Appendix

44) Feces

45) Defecation

46) Large intestine

47) Diarrhea

48) Pharynx

Esophagus

Stomach

Small intestine

Large intestine

49) A, C

A, B, D, E

F, G

50) Stomach

51) Digestive enzymes

52) Buffer

Neutralizes

54) Duodenum

Small intestine

55) B, E

B, E

A, B

C

D

56) Bile

57) Right

58) Bile

Emulsify

59) Cholesterol

61) Jaundice

62) Pancreas

Small intestine

63) G5

G1

G3

G2

A

G4

A

A

64) Glycerol

Fatty acids

65) Glucose

66) Maltose (a disaccharide)

67) Starch

Glycogen

68) C6H12O6 + 6O2 -> 6CO2 + 6H2O

69) ATP

70) Fiber

Bran

71) Cholesterol

Colon cancer

72) Oral cavity

Pharynx

Esophagus

Esophageal sphincter

Stomach

Pyloric sphincter

Duodenum

Jejunum

Ileum

Ileocecal valve

Ascending colon

Transverse colon

Descending colon

Sigmoidal colon

Rectum

Anus

73) Liver

74) Pancreatic islets

Islets of Langerhans

75) Glucagon

Insulin

76) Liver

77) Glucagon

78) Low

Liver

79) Glycogenolysis (breaks glycogen into glucose monomers)

80) Starch

Maltose

Glucose

Liver

Glycogen

Glucose

81) a) Insulin

b) Pancreas

c\*) Islets of Langerhans/Pancreatic

islets

e) Lowers

f) All cells, tissues, and organs

g) Take in glucose from the blood

82) a) Glucagon

b) Pancreas

c\*) Islets of Langerhans/Pancreatic islets

e) Raises

f) The liver

g) Glycogenolysis

83) High blood sugar

Sugar in urine

Large frequency and volume of urine

84) Insulin

94) Triglyceride

Glycerol

Fatty acid

95) Saturated

96) Unsaturated

97) Lipoproteins

98) High density

HDL

Low density

LDL

99) Liver

Cells

100) Cells

Liver

101) Carbohydrates (star)

Proteins (circled)

Lipids (boxed)

102) I

I

D

D

I

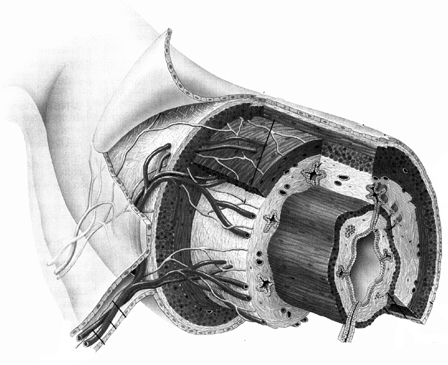
103) Thyroxin

104) Eating fewer calories

Exercising/Increasing calories burned

**Short answer review questions:**

Problem 1) A cross section of the GI tract is shown below. After each letter below the drawing, give each part’s name, its tissue type, and its function. (For part E, just give its name and function).



A

B

C

D E

A: *Hint: Churns chyme*

B: *Hint: Contains blood vessels and nerves*

C: *Hint: Innermost tissue layer*

D: *Hint:Cushions the GI tract*

E: *Hint: The hollow space inside*

2) Describe the tissue type, location, and function of the pyloric sphincter:

3) List the cells of the stomach mucosa and what they secrete:

4) Name and describe all structures that increase the surface area of the small intestine:

5) What substances are absorbed by the large intestine mucosa?

6) Explain the function of buffer in pancreatic juice.

7) The drawing below represents the digestion of a large nutrient macromolecule in the digestive system. Each circle represents one monomer molecule. The arrow represents a digestive enzyme.

a) The product molecules of this reaction will/will not (circle one) be absorbed

into the body.

b) Justify your answer to question (a).

c) If the circles represent amino acids, the proper term for the molecule on the left is a \_\_\_\_\_\_\_\_\_\_\_ and the proper term for the molecules on the right is \_\_\_\_\_\_\_\_\_\_\_.

c) Person X eats a starchy meal (like pasta). Person Z eats a meal with lots of table sugar (sucrose). Which person’s blood sugar will increase faster? \_\_\_\_\_\_\_ Justify your answer using concepts about how digestion of food molecules is carried out by enzymes.

8) The nutrient monomers that are absorbed into the body by the digestive system (such as monosaccharides, amino acids, and fatty acids) serve two major purposes. What are those two purposes? In other words, why do we need to eat?

9) Explain how the liver helps maintain a constant blood glucose concentration:

10) Explain how the liver provides cholesterol to cells throughout the body:

11) Explain how the liver removes excess cholesterol from the body

12) Name the endocrine structures of the pancreas and list the names and actions of the hormones they secrete.

13) Describe the steps involved in the digestion of fat and oil.

14) The table below lists the three major macromolecule nutrients on the top row and some traits on the left hand column. Fill in the table.

Protein Carbohydrates Fats

It is first digested

into a smaller

molecules called

It is then digested

into monomers

called

Are its monomers

a major cell energy

source? (Yes/No)

**Answers to short answer review questions:**

1) A = Muscularis externa; smooth muscle tissue; propels chyme through GI tract (peristalsis) and churns chyme within GI tract (segmentation)

B = Submucosa; dense connective tissue; supports mucosa, contains blood vessels to carry away absorbed nutrients, and contains nerves to sense chyme and control smooth muscles.

C = Mucosa; simple columnar epithelial tissue; secretes digestive juices and absorbs nutrient monomers and water.

D = Peritonium; a serosa (a fluid-filled membrane of epithelial and connective tissue); surrounds, cushions, and protects the GI tract organs.

E = Lumen; Hollow space for chyme

2) The pyloric sphincter is a donut-shaped ring of smooth muscle tissue. It acts as a valve that controls the flow of chyme from the exit of the stomach to the entrance of the small intestine. It opens only briefly so that the small intestine is not damaged by large volumes of acidic chyme.

3) Chief cells = Make a digestive enzyme.

Parietal cells = Make hydrochloric acid

4) Villi = Finger-shaped folds of the mucosa can be seen at low microscopic magnification.

Microvilli = Finger-shaped folds of the cell membranes of epithelial cells of the mucosa. Microvilli can be seen at high microscope magnification.

5) Water, ions, and some vitamins.

6) The buffer from the pancreas neutralizes the acid chyme which enters the small intestine from the stomach.

7) a) Will not.

b) In general, only monomer molecules can be absorbed into the body from the GI tract. The product molecules shown in the diagram are not monomers (they are polymers: Monomers linked together). The product molecules will require further digestion into monomers before they can be absorbed into the body.

c) Protein, Peptides

8) The monomers are used for two purposes: (1) As fuel molecules to provide energy for our cells, or (2) As monomers for the construction of our own macromolecules (such as proteins, polysaccharides, triglyceride lipids, and nucleic acids).

9) The liver lowers blood glucose when glucose is high. The liver lowers blood glucose by absorbing it from the blood and storing it in the form of a glucose polymer called glycogen.

The liver raises blood glucose when glucose is low. The liver raises blood glucose by degrading the glycogen into individual glucose molecules then releasing them into the blood.

10) The liver manufactures cholesterol and packages it with proteins into spheres called low density lipoproteins (LDLs). The liver releases LDLs into the blood so that cholesterol is available to all cells that require it.

11) When cells of the body have too much cholesterol, the cells package it with proteins into spheres called high density lipoproteins (HDLs). The cells release the HDLs into the blood. The liver receives the HDLs and uses the cholesterol as a main ingredient in the manufacturing of bile. The bile secreted by the liver enters the GI tract (where it is used to emulsify fats) and exits the body in the feces.

12) The pancreatic islet (also known as islets of Langerhans) are the endocrine structures of the pancreas. These structures contain beta cells that release the hormone insulin when blood glucose is high. Insulin signals all cells of the body to take in glucose from the blood. The islets also contain alpha cells that release the hormone glucagon when blood sugar is low. Glucagon signals the cells of the liver to release glucose into the blood.

13) Fats and oils aretriglyceride molecules. They are hydrophobic and therefore they don’t dissolve in water. Instead, they form ball-shaped “fat globules” in the GI tract. The first step in fat digestion is for bile to emulsify the fat globules into much smaller globules that are small enough to disperse in the watery chyme. The second step of fat digestion is for the enzyme lipase to digest the triglyceride molecules into fatty acids and glycerol. The fatty acids and glycerol are absorbed into the body.

14) Protein Carbohydrates Fats

It is first digested

into a smaller

molecules called Peptides Disaccharides Triglycerides

It is then digested

into monomers

called Amino acids Monosaccharides Glycerol and fatty acids

Are its monomers

a major cell energy

source? (Yes/No) No Yes Yes