

Bio& 242, A & P 2: Study Guide

Unit 1: Digestive System and Metabolism

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Chapter 25: Digestive System

1. Be able to identify the organs of the digestive system and their associated structures on charts, models, pictures and where indicated microscope slides:
 - a. **Oral cavity and Pharynx:** Superior labial frenulum, Gingivae, Palatoglossal arch, Palatopharyngeal arch, Hard palate, Soft palate, Uvula, Cheek, Inferior labial frenulum, Vestibule, Oropharynx, Nasopharynx, Laryngopharynx, Epiglottis, Fauces, Esophagus
Tonsils: Lingual tonsils, Pharyngeal tonsils, and Palatine tonsils
Salivary Glands: Parotid glands, Parotid duct, submandibular glands, Submandibular duct, Sublingual glands, Lesser sublingual duct
Tongue: Body, root, dorsum, apex, margin, lingual frenulum, intrinsic tongue muscles, and extrinsic tongue muscles. (Review the types of papillae, taste buds and innervations)
Teeth: Types and numbers of teeth (primary and secondary dentition), crown, root, neck, dentin, pulp cavity, pulp, enamel, cementum, periodontal ligament, root canal, alveolar process, periosteum, apical foramen
 - b. **Basic tissues layers of the GI Tract.** Also know the specializations of these layers for the different parts of the GI tract.
Mucosa: Nonkeratinized Stratified Squamous (Oral cavity, Pharynx, Esophagus and Anus), Simple Columnar (Stomach, Small Intestine, and Large Intestine), specialized cells (Goblet cells, Parietal cells, Chief cells, D cells Enteroendocrine cells, and Brush border cells), microscopic folds of the mucosa (Gastric pits, Crypts of Lieberkuhn, Intestinal crypts), and macroscopic or gross folds (Small Intestine - villi and Stomach - rugae)
Lamina Propria: Loose connective tissues containing capillaries and lacteals.
Muscularis Mucosae: Thin layer of smooth muscle
Submucosa: Dense irregular connective tissue, glands (Brunner's glands and Submucosal Mucus glands), lymph nodes (MALT or Peyer's Patches), innervations (Submucosal or Meissner's plexus)
Muscularis externa: smooth muscle layers (Circular layer, Longitudinal layer and, in stomach only, the Oblique layer), and innervation (Myenteric or Auerbach plexus)
Serosa: Visceral Peritoneum (Stomach, Small Intestine, and Large Intestine) and Adventitia around the Esophagus and Anus.
 - c. **Esophagus:** upper Esophageal Sphincter and Lower Esophageal Sphincter
 - d. **Stomach:** Cardiac, Fundus, Body, Lesser Curvature, Greater Curvature, Rugae, Pylorus, Pyloric Antrum, Pyloric canal, Pyloric Sphincter, Greater Omentum, Lesser Omentum
 - e. **Small Intestine:** Duodenum, Jejunum, Ileum, Ileocecal Sphincter, Plicae Circularis, Duodenal papilla, Sphincter of Oddi, Mesentery
 - f. **Liver:** Right lobe, Left lobe, Quadrate lobe, Caudate Lobe, Falciform ligament, Diaphragm, Round ligament or Ligamentum teres, Lobules, Hepatocytes, Central vein, Sinusoids, Kupffer's cells, Bile Canaliculi, right Hepatic duct, Left Hepatic duct, Common

- Hepatic duct, Cystic duct, Common Bile duct, Portal Triad, Hepatopancreatic ampulla or Ampulla of Vater, Gallbladder, Coronary ligament, Hepatic vein, Hepatic Portal vein
- g. **Pancreas:** Head, Body, Tail, Pancreatic duct or duct of Wirsung, Accessory duct or duct of Santorini, Acini, Islets of Langerhans (Beta, Alpha, Delta, and F-cells, see page 606)
- h. **Large Intestine:** Mesocolon, Cecum, Appendix, Ascending Colon, Transverse Colon, Descending Colon, Hepatic flexure, Splenic flexure, Sigmoid colon, Rectum, Anal canal, Anus, External and Internal Anal Sphincters, Mesoappendix, Taenia coli, Haustra, Epiploic appendages
2. Understand the physiology of salivation and digestion in the mouth. (volume and makeup of saliva, control of salivation, enzymes- Lingual lipase and Salivary amylase)
 3. Understand the physiology of deglutition and the two stages (pharyngeal and esophageal). Primary peristaltic waves, secondary peristaltic waves, and bolus
 4. Understand the physiology of digestion in the stomach. (Chyme, Peristaltic movements, Pepsin, rennin, Pepsinogen, Gastric Lipase, HCl, Intrinsic factor)
 5. Understand gastric secretion and peristalsis of the Stomach. (Cephalic phase, Gastric phase, and Intestinal phase, enterogastric reflex)
 6. Know the hormones of the digestive system: Where they are produced, their interactions, their control, and their target tissues. (Gastrin, Somatostatin, Secretin, Pancreatic polypeptide, Gastric inhibitory peptide, Cholecystokinin, Insulin, Glucagon, Vasoactive Intestinal Peptide)
See PowerPoint presentation for a summary
 7. Understand the physiology of pancreatic juice production and secretion.
(**Enzymes:** Know substrates and products: Pancreatic amylase, Trypsin, Chymotrypsin, Carboxypeptidase, Elastase, Pancreatic lipase, Ribonuclease, Deoxyribonuclease, Trypsinogen, Enterokinase, Chymotrypsinogen, Procarboxypeptidase, Proelastase)
See Table 24.4, Pages 927 for a summary
 8. Understand the physiology of the liver in production of bile, how bile functions, and the role of the Gallbladder in bile storage and modification (Bile salts, Bilirubin, Cholesterol, Emulsification, Enterohepatic circulation)
 9. Understand the functions of the liver in carbohydrate, lipid, and protein metabolism, hormone and drug removal, storage, phagocytosis, and activation of vitamin D. (Glycogenolysis, Gluconeogenesis, Glycogenesis, Lipogenesis, Beta oxidation, Ketogenesis, Transamination, Deamination, Apoferritin, Ferritin)
 10. Understand the physiology of the small intestine including enzyme production, chemical digestion, and absorption.
(**Enzymes:** Know substrates and products: Brush border enzymes, Dextrinase, Maltase, Sucrase, Lactase, Aminopeptidase, Dipeptidase, Nucleosidases, Phosphatases)
(**Terms:** Segmentation, Micelles, Secondary active transport, Facilitated diffusion, Active transport, simple diffusion, Chylomicrons)
 11. Know the digestive enzymes of the GI tract including their specific source, inactive forms, where they are active, and their specific substrate and products. See Table 24.4, Pages 927 for a summary

12. Understand the physiology of the large intestine including mechanical and chemical digestion, absorption, and the physiology of defecation. (**Terms:** Gastroileal reflex, Haustral churning, Mass peristalsis, Gastrocolic reflex, defecation reflex)
13. Understand the role of the digestive system in water balance. (volumes of water secreted and absorbed)
14. Know the definitions and how to use the following medical terminology.
Terms: Ascites, Borborygmus, Balimia, Canker sore, Cholecystitis, Cholera, Cirrhosis, Colitis, Colonoscopy, Constipation, Dental carie, Dysphagia, Diarrhea, Diverticulitis, Diverticulosis, Flatus, Gastrectomy, Gastritis, Hepatitis (A, B, C), Halitosis, Hemorrhoids, Hernia, Pancreatitis, Peptic Ulcer, Periodontal disease, Peritonitis, Pulpitis, Tooth impaction, Crohn's disease, Ulcerative colitis, Irritable bowel syndrome

Chapter 26: Metabolism

1. Have a good understanding of the basic overview of metabolism: (catabolism, anabolism, metabolic turnover, maintenance, growth, secretions, nutrient reserves, feeding center, anorexia, satiety center, hyperphagia)
2. Understand the basic physiology of carbohydrate metabolism including the fate of carbohydrates. (anaerobic and aerobic respiration, Glycogenesis, Gluconeogenesis, Glycogenolysis)
 - a. **Glycolysis:** Molecules involved-(Glucose, Glucose-6-phosphate, Glyceraldehyde 3-phosphate, Pyruvic acid, NAD).
Know where these reactions occur in cells, the number of ATP used and produced, and number of NADH produced.
 - b. **Formation of Acetyl CoA:** Molecules involved – (Pyruvic acid and Coenzyme A, NAD)
Know where these reactions occur in cells and what products are formed
 - c. **Krebs cycle** (Also called the Tricarboxylic acid (TCA), or Citric acid cycle):
Molecules involved –(Oxaloacetic acid, Citric acid, NAD, FAD, GTP)
Know where these reactions occur in cells and products produced by this cycle.
 - d. **Electron Transport Chain:** Terms-(Oxidative Phosphorylation, Oxidation, Reduction),
Molecules involved-(FMN, Coenzyme Q, Cytochromes b, c, a, a₃)
Know where these reactions occurs in cells, how many ATP are produced from NADH and FADH, and the end products (water and Carbon Dioxide).
5. Have a basic understanding of lipid metabolism including the fate of lipids and their storage: (Lipolysis, Lipogenesis, Beta oxidation, Chylomicrons, VLDL, IDL, LDL, HDL)
6. Have a basic understanding of protein metabolism including catabolism and anabolism: (Deamination, Transamination, Amination, Essential amino acids, Uric acid)
7. Understand metabolic interactions between different tissues and the events of the absorptive state and the postabsorptive state. (Ketone bodies, Ketoacidosis, Ketosis, Ketonemia, Ketouria)
8. Have a basic understanding of bioenergetics and thermoregulation.
 - a. Bioenergetics: (Calorie, BMR)
 - b. Thermoregulation: Core temperature, Shell temperature, hypothermia, hyperthermia
Heat production: Exercise, Hormones, Nervous system, Body temperature, Ingestion of food, Age

Mechanisms of heat transfer: radiation, conduction, convection, evaporation

Regulation centers: hypothalamic thermostat, peripheral thermoreceptors, heat-loss center, heat-gain center,

Energy Homeostasis: shivering thermogenesis, Nonshivering thermogenesis

9. Know the following clinical terms: Heat exhaustion, Heat stroke, Hypervitaminosis, Hypothermia, Malnutrition, Malabsorption, Obesity, Phenylketonuria
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