

## BIO 1640 Lecture 4: Respiratory and Digestive Systems

1. List organs of respiratory system in order of air flow.

**Nasal Cavity → Pharynx (Nasopharynx → Oropharynx → Laryngopharynx) → Larynx → Trachea → Bronchi → Lungs**

2. Epithelium lining most conducting passages? **Columnar epithelium with goblet cells and cilia**

Lining the walls of alveoli? **Simple squamous**

3. Internal respiration is? **Movement of oxygen from blood to tissue and carbon dioxide from tissue to blood**

External respiration? **Movement of oxygen from lung alveoli to the blood vessels**

4. The function of the nose: **providing an airway for respiration; moistening and warming the entering air; filtering inspired air and cleaning it with foreign matter; serving as a resonating chamber for speech; housing the olfactory(smell) receptor**

Locate the opening of the eustacean tube: **nasopharynx**

5. The function of the epiglottis: covers **the top part of the larynx(glottis) when swallowing;**

What is the function of the uvula(including the soft palate and roof of the mouth)? **Close off the nasopharynx so that food doesn't go to the nose**

6. If the tension on the vocal folds increases, the pitch of the sounds goes *up* or down?

7. The boundaries of the trachea is from the **larynx to the fifth thoracic vertebra**

8. Landmarks for performing a tracheostomy: **thyrocricoid/cricothyroid ligament or as low as second trachea linings.**

9. What is the pleura? **Lining of lung cavity**

What is between the pleura? **Pleural cavity; but not much because they stick together**

10. C-shaped cartilage support what organ: **trachea**

11. What happens during inspiration?

- **Inspiratory muscles contract; diaphragm descends/contract and rib cage rises**
- **Thoracic cavity volume rises.**
- **Lung stretched; intrapulmonary volume increases.**
- **Intrapulmonary pressure drops.**
- **Air flows to the lungs**

12. The diaphragm is stimulated to contract by? **Phrenic nerve**

13. Contraction of the external intercostals cause? **Rib cage to go up and out**

14. How do low levels of surfactant affect compliance? **Low compliance**

15. Emphysema has decreased surface area for diffusion – *true* or false

16. Oxygen diffusing capacity is decreased during pneumonia because? **You have more layers of materials to go through.**

What is anemic hypoxia? **There is not much of oxygen because something is wrong with the blood**

17. Airway resistance is altered by? **Size of bronchiole tubes**

18. In anaphylactic hypersensitivity, histamine affects airway resistance by **constricting the bronchioles**

19. Define residual volume, tidal volume

**Residual volume is the quantity of air in the lung alveoli that you can't get rid off.**

**Tidal Volume is the quantity of air that you breath in and out when at rest.**

20. What does not occur in the anatomical dead space? **No transfer of oxygen to the blood; anatomical dead space is the volume of air in the conducting respiratory passages**

21. Where in the body is carbon dioxide the highest? **Tissue**

Where is oxygen the highest? **Atmosphere, alveoli, pulmonary veins, tissue cells or pulmonary arteries**

22. How are oxygen and carbon dioxide transported in the blood? **Oxygen is transported by hemoglobin while carbon dioxide is transported by plasma**

High carbon dioxide will result in an increase in what ions? **Increase in H<sup>+</sup> resulting in low pH**

23. Carbonic acid is formed from **carbon dioxide and water** in the body.

24. High quantities of oxygen **increase** or decrease the oxygen in the hemoglobin?

High pH permits **more** or less oxygen on the hemoglobin?

25. The oxygen - hemoglobin dissociation curves compares? **The quantity of oxygen available to go into the blood versus the actual oxygen that goes in there.**

26. In metabolically active tissue, the % saturation of hemoglobin at the cells is more or **less** than in less active tissue.

27. Chemoreceptors are located where? **Aorta and carotid bodies**

These receptors increase firing when? **There's low pH and increase concentration of CO<sub>2</sub>**

28. Location of apneustic and pneumotaxic centers. **Respiratory center in the medulla oblongata**

The function of these centers? **Apneustic start the process of breathing in; Pneutaxic start the process of breathing out.**

29. The receptors in the hering-breuer reflex responds to? **Stretch receptors**

The result of the Hering-B reflex is? **Starting to breath out when the lungs are filled to capacity with air to protect the lungs from exploding**

## Digestive

1. List the organs of the digestive system in order of digestion. **Mouth → pharynx (oropharynx → laryngopharynx) → esophagus → stomach → small intestine → large intestine**  
Where is the pancreas, esophagus? **Pancreas lies deep to the greater curvature of the stomach; Esophagus is from laryngopharynx to the stomach**
2. List accessory organs of the digestive system. **Teeth, tongue, gall bladder, salivary gland, liver, pancreas**
3. Mastication is an example of mechanical digestion – true or false? **The largest salivary gland is located in? parotid gland in front of ear**
4. Name and locate the 4 layers of the walls of the organs of the G.I. tract. Pg. 887
  - a. **Mucous membrane**
    - Epithelium – columnar except mouth, pharynx, and upper esophagus, anus are stratified squamous**
    - Lamina propria – connective tissue (areolar) where Peyer’s patches in the small intestine are located**
    - Small layer of muscle**
  - b. **Submucosa – connective tissue**
  - c. **Muscle – longitudinal and circular layer**
  - d. **Visceral Peritoneum – serous layer; outer covering of the organ**
5. What epithelium lines organs which are specialized for absorption? **Simple columnar**
6. What attaches the liver to the stomach. **Lesser omentum**  
Parts of the small intestine are attached to each other by? **mesentery**
7. What are the components of the pulp of the tooth? **Blood vessels and nerves; no lymphatic vessels**
8. The nasal cavity is closed off by **uvula** during swallowing.
9. The movement of food from mouth to anus is called? **Peristalsis**  
What kind of muscle tissue makes up wall of the digestive tract? **Smooth muscle**  
Where is there skeletal muscle tissue in the digestive tract? **Mouth, pharynx, anus**

10. The major enzymes in saliva, stomach small intestine

These enzymes are produced by?

What do these enzymes digest and what are the products of digestion?

	Major enzymes	Enzymes are produced by	Enzymes digested	Products of digestion
Saliva/Mouth	Salivary Amylase	Salivary gland	Carbohydrates	Simple sugars (glucose for ATP)
Stomach	Pepsin, Gastric lipase	Gastric glands in the stomach	Protein Fats	Amino acids → urea Glycerol and fatty acids → ketone
Small Intestine	Amylase Peptidase Lipase	Pancreas	Carbohydrates Protein Fats	Simple sugars Amino Acids Glycerol and fatty acids → ketone

What is the role of bicarbonate in pancreatic juice? **Neutralize the acid in the stomach**

Which of all enzymes requires the lowest environmental pH to function? **Pepsin which to the pH of lemon juice**

What happens in the large intestine? **Mostly absorption of water ; bacterial digestion of wastes and no enzymes**

11. How long is food kept in the stomach? **Four hours after meal**

12. Where is the pyloric sphincter? **Between the stomach and small intestine**

13. Distinguish villi, rugae, haustra, and plicae circularis.

**Villi is an extension of the plicae circularis;**

**Rugae is a temporary ridges in the stomach;**

**Haustra are pocketlike sacs in the large intestine;**

**Plicae circularis are permanent ridges in the small intestine**

14. The effect of the sympathetic nervous system on the activity of to the digestive system. **Slows it down, including the reproductive and urinary system**

15. The function of the gall bladder, function of bile, why is it green? **Gall bladder is the storage for bile; bile emulsifies fats; it is green because it contain biliverden (a product from the breakdown of hemoglobin)**

16. Most absorption of nutrients occur in? **small intestine**

17. What organ produces the greatest variety and amount of digestive enzymes? **Pancreas**

18. The function of the reticuloendothelial cells of the liver. **Phagocytosis**

Urea comes from what process. **Deamination – breakdown of amino acids**

Define gluconeogenesis. **the making of glucose from a non-carbohydrate (fats or protein)**

19. The normal color of the feces is due to the presence of? **stercobilin**

20. Receptor in the defecation reflex are what kind? **Stretch receptors**

21. Described the function of gastrin and secretin

**Gastrin – stimulates the stomach to secrete digestive juices; its stimulus is the food particularly partially digested proteins**

**Secretin – is made in the duodenum to stimulate the pancreas and intestinal glands to secrete intestinal enzymes; its stimulus is the acidic chyme.**

### **HIGHLIGHTED PAGES:**

Function of Respiratory system is to supply the body with oxygen and dispose of carbon dioxide:

- **Pulmonary ventilation** – moving air into and out of the lungs
- **External respiration** – gas exchange between the lungs and the blood
- **Transport** – transport of oxygen and carbon dioxide between the lungs and tissues
- **Internal respiration** – gas exchange between system blood vessels and tissues (i.e. capillary)

**Nasal Cavity** – is divided by a midline nasal septum; opens posteriorly into the nasal pharynx via internal nares; the ethmoid and sphenoid bones form the roof; the floor is formed by the hard and soft palate (separate the oral and nasal cavity)

**Pharynx** – commonly called the throat

Nasopharynx, Oropharynx, Laryngopharynx (serves as passageway of food and air but food has the right of way during swallowing)

**Larynx** – function as voice production and act as a switching channel mechanism to route air and food into the proper channels

**Trachea** – tube from larynx into the mediastinum

**Right/Left Primary Bronchus** – last tracheal cartilage marks the end of the trachea and the beginning of the right and left bronchi; tube that go to each lungs

**Right/Left Lung with alveoli** (gas exchange takes place)

- Infection of the parotid gland would result to mumps.
- Opening of the parotid gland is right above the second molar teeth.
- Gastroesophageal/cardiac sphincter prevents the backflow of food from the stomach to esophagus.
- Pulp is the lifeline of a tooth that contain blood vessels and nerves and it has no lymphatic vessels
- Gluconeogenesis is the making of glucose from a non-carbohydrate (fats or protein)

Function of the liver:

- Makes bile, gets rid of bilirubin in the breakdown of RBC
- Detoxifies/filter the blood; stores blood
- Stores all digested food including glycogen, protein, and changes digested food to amino acid to urea
- Stores iron, fat soluble vitamin ADEK
- Makes all plasma protein for clotting, albumin, and angiotensinogen
- Liver is the first place where all digested food enters into and it is the largest gland in the body.

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- Bile functions for physical breakdown of fats into small drops/ emulsification of fats
- Pepsin is produced by the chief cells of the stomach.
- Low PH and HCl provide chemicals for pepsin to work.
- Pepsin whose PH is equal to lemon juice PH 1 or 2 requires the lowest environmental pH to function
- Stratified Squamous Epithelium lines the mouth, anus and esophagus
- Mesentery is part of the small intestine that attaches them together
- Lesser Omentum is an extension of the visceral peritoneum that attaches the liver to the stomach.
- Skeletal muscle makes up the wall of the mouth, pharynx and anus
- The role of the bicarbonate in pancreatic juice neutralize the acid of the stomach
- In the large intestine is mostly water absorption, bacterial digestion of wastes and there are no enzymes
- The parietal cells secrete HCl and intrinsic factor
- The food is kept in the stomach for four hours however, the larger meals and the more liquid, the faster the stomach empties
- Reticuloendothelial cells of liver function as macrophages in the liver sinuses that helps phagocytize bacteria to keep the liver healthy
- Urea is the product of deamination – the breakdown of amino acids
- The normal color of feces is due to the presence of stercobilin
- Receptors in the defecation reflex are stretch receptors
- Gastrin – stimulates the stomach to secrete digestive juices; its stimulus is the food particularly partially digested proteins
- Secretin – is made in the duodenum to stimulate the pancreas and intestinal glands to secrete intestinal enzymes; its stimulus is the acidic chyme.
- Physical digestion includes chewing or churning while chemical digestion includes enzymatic hydrolysis
- Plicae circularis are permanent ridges in the small intestine; Villi is an extension of the plicae circularis; Rugae is a temporary ridges in the stomach; haustra are pocketlike sacs in the large intestine
- The danger pose by ulcers is the perforation of the stomach wall followed by peritonitis and perhaps, massive hemorrhage. Factors for ulcer formation include hypersecretion of hydrochloric acid, hyposecretion of mucous, and acid resistant, corkscrew shaped *Helicobacter pylori* bacteria, which burrow beneath the mucus and the destroy the protective mucosal layer.
- Bile is a yellow-green, alkaline solution containing bile salts, bile pigments, cholesterol, neutral fats, phospholipids and variety of electrolytes but only bile salts and phospholipids aid the digestive process.
- Too much cholesterol or too few bile salts leads to cholesterol crystallization, forming gallstones