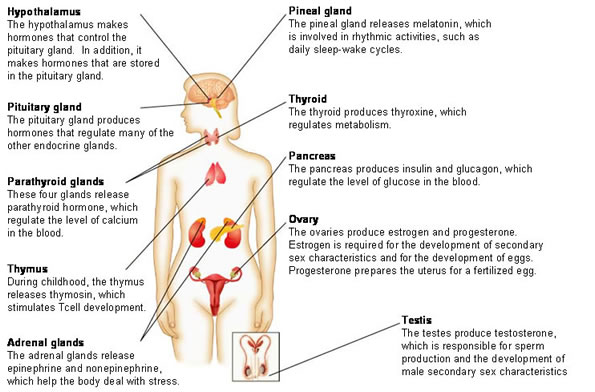
# Chapter 31 – Human Anatomy and Physiology

1. Endocrine System
   1. Overview
2. The endocrine system is made up of \_\_\_\_\_ that release their products into the \_\_\_\_\_.
3. These products deliver \_\_\_\_\_ throughout the body.
4. The chemicals released by the endocrine system can affect almost every \_\_\_\_\_ in the body.
5. Endocrine and Nervous Systems specialize in the inter-systemic communication needed to maintain body \_\_\_\_\_.
6. Nervous system acts faster and more locally than Endocrine System
7. Endocrine System includes:
   * 1. G\_\_\_\_\_
     2. H\_\_\_\_\_
   1. Glands
      1. An organ that produces and releases a \_\_\_\_\_.
      2. Two kinds of glands:
8. \_\_\_\_\_ glands 🡪 Release secretions through \_\_\_\_\_ directly to the organs that use them.
9. \_\_\_\_\_ glands 🡪 Release their secretions \_\_\_\_\_ into the \_\_\_\_\_.
   1. Endocrine system Control
10. In the endocrine system, \_\_\_\_\_ signals called \_\_\_\_\_ regulate body functions.
11. Hormones are chemicals released in \_\_\_\_\_ of the body that travel through the bloodstream and affect the activities of cells in \_\_\_\_\_ parts of the body.
12. Are released into the bloodstream by endocrine cells.
13. Are carried to \_\_\_\_\_ locations in the body.
14. Affect only \_\_\_\_\_ Cells that have receptors for that \_\_\_\_\_ hormone.
15. \_\_\_\_\_ travels everywhere via the bloodstream.
16. \_\_\_\_\_: Limited to cells that have the \_\_\_\_\_ for the signal.
    1. H\_\_\_\_\_
       1. Maintains the body at a balanced level.
       2. Produces and releases \_\_\_\_\_.
       3. Regulates many body \_\_\_\_\_, including sleep, memory, and appetite.
       4. Hypothalamus secretes hormones which make other \_\_\_\_\_ glands secrete hormones.



* 1. P\_\_\_\_\_ Gland

1. Secretes hormones which make other endocrine glands secrete hormones, “releasing hormones”; Releases FSH (menstrual cycle), LH (ovulation), ACTH (metabolism), TSH (thyroid), GH (growth).
2. The pituitary hormones help control some of the following body processes:
3. G\_\_\_\_\_.
4. \_\_\_\_\_ Pressure.
5. Some aspects of pregnancy and childbirth including stimulation of uterine contractions during childbirth.
6. Breast milk production.
7. \_\_\_\_\_ organ functions in both women and men.
8. \_\_\_\_\_ gland function.
9. The conversion of food into energy (\_\_\_\_\_).
10. \_\_\_\_\_ and osmolarity \_\_\_\_\_ in the body.
    1. P\_\_\_\_\_ Gland

* Releases \_\_\_\_\_, regulates rhythmic activities (\_\_\_\_\_ cycles, etc.).
  1. T\_\_\_\_\_ Gland

1. Produces \_\_\_\_\_ to regulate \_\_\_\_\_, involving iodine.
2. \_\_\_\_\_ reduced blood \_\_\_\_\_ levels (opposes parathyroid gland).
   1. P\_\_\_\_\_ Gland

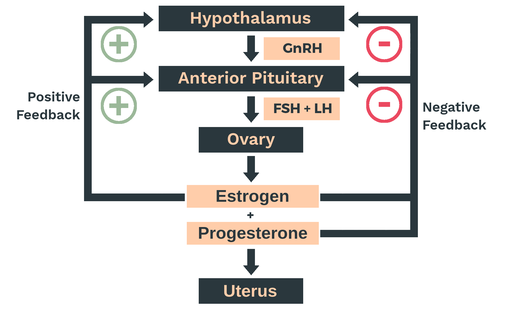
* Controls \_\_\_\_\_ blood levels (nerves / muscles).
  1. Adrenal Glands

1. Adrenal \_\_\_\_\_ 🡪 \_\_\_\_\_, \_\_\_ hormones, \_\_\_\_\_ (stress & glucose levels).
2. Adrenal \_\_\_\_\_ 🡪 \_\_\_\_\_, norephinephrine, epinephrine; \_\_\_\_\_ reactions.
   1. P\_\_\_\_\_
3. Regulates \_\_\_\_\_ levels in the blood.
4. Produces \_\_\_\_\_ (causes glucose \_\_\_\_\_) & \_\_\_\_\_ (releases glucose into the blood.
   1. T\_\_\_\_\_ 🡪 produce testosterone
5. \_\_\_\_\_ production
6. development of male “\_\_\_\_\_ sex characteristics” (\_\_\_\_\_, \_\_\_\_\_ hair, voice box).
   1. O\_\_\_\_\_
      1. produce *estrogen* and *progesterone.*
      2. \_\_\_\_\_ is required for the development of female \_\_\_\_\_ sex characteristics (breasts, hips) and the development of \_\_\_\_\_.
      3. \_\_\_\_\_ prepares the \_\_\_\_\_ for a fertilized egg.

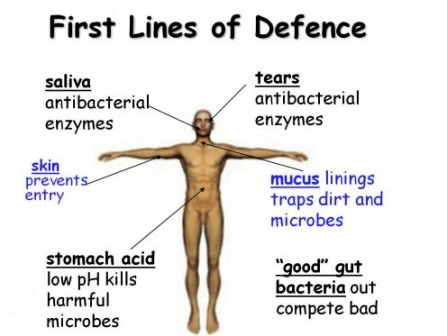
|  |  |  |
| --- | --- | --- |
| GLAND | HORMONE | ACTION |
| Pineal | Melatonin | Circadian Rhythm |
| Anterior Pituitary | Growth Hormone | Cell Growth |
| Posterior Pituitary | ADH (Antidiuretic Hormone) | Water Balance |
| Thyroid | T3/T4 | Metabolism |
|  | Calcitonin | Decreases Blood Calcium |
| Parathyroid | Parathyroid Hormone (PTH) | Increases Blood Calcium |
| Pancreas | Insulin | Decreases Blood Sugar |
|  | Glucagon | Increases Blood Sugar |
| Adrenal Cortex | Glucocorticoids | Anti-Inflammatory |
| Adrenal Medulla | Epinephrine (Adrenaline) | Fight or Flight |
| Ovary | Estrogen | Female Sex Characteristics |
| Testes | Testosterone | Male Sex Characteristics |

* 1. Control of the Endocrine System

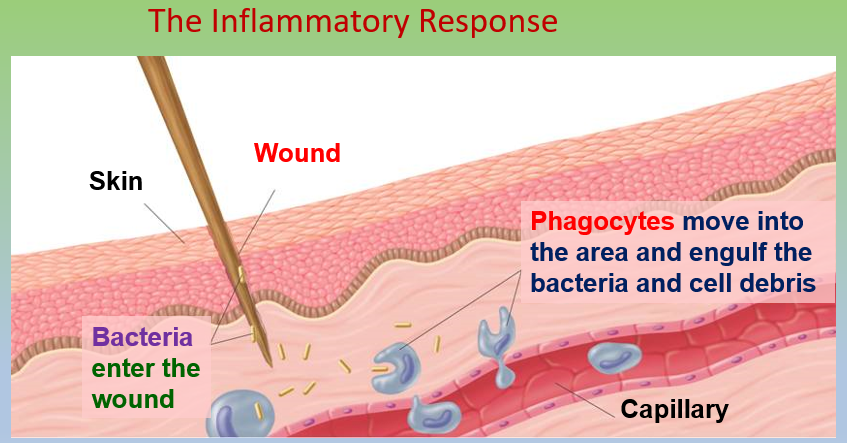
1. The endocrine system is regulated by \_\_\_\_\_ mechanisms that function to maintain \_\_\_\_\_.
2. \_\_\_\_\_ feedback
   1. (more product sends the signal for even \_\_\_\_\_ \_\_\_\_\_)
   2. Alarm or panic can spread by positive feedback among a herd of animals to cause a stampede.
3. \_\_\_\_\_ feedback controls the rate of a process to \_\_\_\_\_ accumulation of a product.



1. Immune System
   1. Overview
   2. \_\_\_\_\_ the body against \_\_\_\_\_ and \_\_\_\_\_ cells.
   3. The immune system recognizes, attacks, destroys, and “remembers” each type of pathogen that enters the body.
   4. \_\_\_\_\_ 🡪 The immune system fights infection by producing cells that inactivate foreign substances or cells.
   5. \_\_\_\_\_ Blood cells that play major roles in the \_\_\_\_\_.
      * 1. M\_\_\_\_\_ 🡪 Phagocytes – cells that \_\_\_\_\_ bacteria and debris.
      1. \_\_\_ Lymphocytes:
         1. Mature in the \_\_\_\_\_.
         2. When activated the turn into \_\_\_\_\_.
         3. They produce \_\_\_\_\_.
      2. \_\_\_ Lymphocytes:
         1. Mature in the \_\_\_\_\_.
         2. Two main kinds
   6. Helper (activate other parts of immune system).
   7. Cytotoxic (kill infected cells).
   8. Two General Categories
      1. Innate (nonspecific) Defenses 🡪 Provide \_\_\_\_\_ protection against all pathogens.
      2. \_\_\_\_\_ (\_\_\_\_\_) Immunity
2. Directed against specific pathogens.
3. Produces “memory” that protects against future exposure to a previously encountered pathogen.
   1. \_\_\_ Line of Defense
      * 1. \_\_\_specific
        2. Act Early (\_\_\_\_\_, mucous, \_\_\_\_\_, tears)
        3. Prevent pathogens from entering body.



* 1. \_\_\_ Line of Defense
     1. \_\_\_\_\_, Destroy, or \_\_\_\_\_ \_\_\_\_\_ that have entered the body.
     2. Macrophages: consume pathogens, promote \_\_\_\_\_, and activate the immune response.
     3. Antimicrobial Proteins: communicate with immune system cells and stimulate \_\_\_\_\_.
     4. \_\_\_\_\_ (nonspecific response): \_\_\_\_\_, warmth, \_\_\_\_\_, pain.



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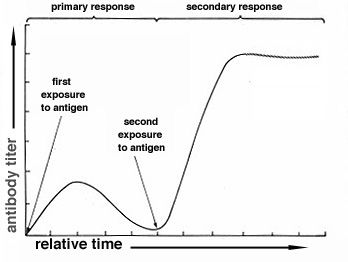
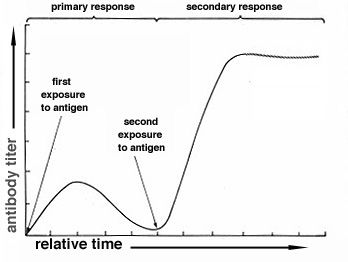
* + 1. Nonspecific Defenses 🡪 Fever:

1. The immune system releases chemicals, pyrogens (inflammatants), that \_\_\_\_\_ the core body \_\_\_\_\_.
2. This high temperature \_\_\_\_\_ or stops the growth of \_\_\_\_\_.
3. Increases heart rate, \_\_\_\_\_s get to the site of infection faster.
   1. Specific Defenses 🡪 \_\_\_ Line of Defense
4. Immune Response
   * + If a pathogen gets past the nonspecific defenses, the immune system reacts with a series of specific defenses.
5. \_\_\_\_\_ 🡪 substance that causes an immune response.
6. \_\_\_\_\_ 🡪 protein that tags/flags antigen.
7. \_\_\_\_\_ (WBC)
8. Made in bone \_\_\_\_\_.
9. B cells – produce \_\_\_\_\_ (target \_\_\_\_\_).
10. T cells – helper cells/killer cells (target \_\_\_\_\_ and abnormal cells).
    1. Acquired Immunity
11. \_\_\_\_\_ Immunity
    1. Body develops immunity after \_\_\_\_\_ to a microbe (antigen).
12. \_\_\_\_\_ – exposed to the disease organism
13. Artificial - \_\_\_\_\_

2. \_\_\_\_\_ Immunity

* 1. Body develops immunity after being given \_\_\_\_\_ to the antigen.
  2. \_\_\_\_\_
  3. Ex: Nursing infants receive antibodies from mom.
  4. Ex: Person bitten by raccoon gets antibodies to help defend against potential rabies infection.

* 1. Primary and Secondary Immune Responses
     + 1. \_\_\_\_\_ encounter with an antigen provokes the \_\_\_\_\_ immune response which is relatively slow.
       2. Its legacy is \_\_\_\_\_ Cells that greatly speed the \_\_\_\_\_ Immune Response on subsequent exposure to the \_\_\_\_\_ antigen



* + - 1. \_\_\_\_\_ Immune Response is \_\_\_\_\_ and \_\_\_\_\_.
      2. Primary Response:

1. \_\_\_\_\_ response after first exposure to an antigen.
2. begins about 5 -10 days after exposure.

5. Secondary Response:

1. Antibody response after second exposure to an antigen.
2. begins \_\_\_\_\_ and response is greater (than primary response).
   1. Immune Diseases
      1. \_\_\_\_\_ is cancer affecting the \_\_\_\_\_ and bone marrow.

* It occurs when the body produces abnormal \_\_\_\_\_ blood cells that don’t function properly and can’t fight off infection.
  + 1. \_\_\_\_\_ is an autoimmune deficiency (the body attacks itself by mistake), a chronic condition in which the \_\_\_\_\_ produces little or no \_\_\_\_\_.
    2. Rheumatoid \_\_\_\_\_ is an autoimmune deficiency (the body attacks its own tissue), including \_\_\_\_\_.
* A chronic inflammatory disorder affecting many joints, including those in the hands and feet.
  + 1. \_\_\_\_\_ usually occurs due to an overactive immune system, reacting to environmental triggers and causing inflammation in the \_\_\_\_\_ and symptoms such as coughing, wheezing, and shortness of \_\_\_\_\_.

# Human Anatomy and Physiology – Chapter 33

1. Digestive System
   1. \_\_\_\_\_ 🡪 Substances in food your body uses to produce energy and raw materials for growth and repair.
      1. Vitamins
   2. \_\_\_\_\_ **molecules** that are vital to maintaining a healthy body.
   3. Ex: \_\_\_\_\_ A, B, C ,D , E, K
   4. Sources: variety of foods
      1. \_\_\_\_\_
   5. \_\_\_\_\_ chemical elements needed for proper body function.
   6. Ex: iron, potassium, calcium, sodium, phosphorus, zinc, iodine
   7. Sources: variety of foods
   8. “You are What you Eat” – Food is processed in four stages:
      1. \_\_\_\_\_ is the act of eating.
      2. \_\_\_\_\_ is the breaking down of food into molecules small enough for the body to absorb.

a. M\_\_\_\_\_ (physical)

b. C\_\_\_\_\_

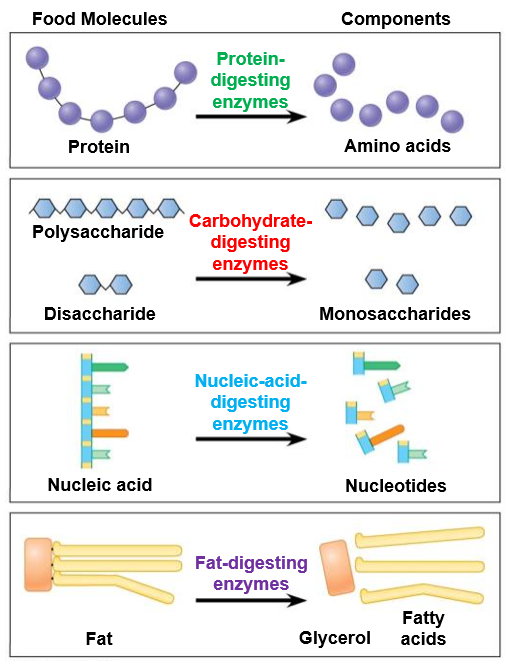
1) Intracellular

2) Extracellular

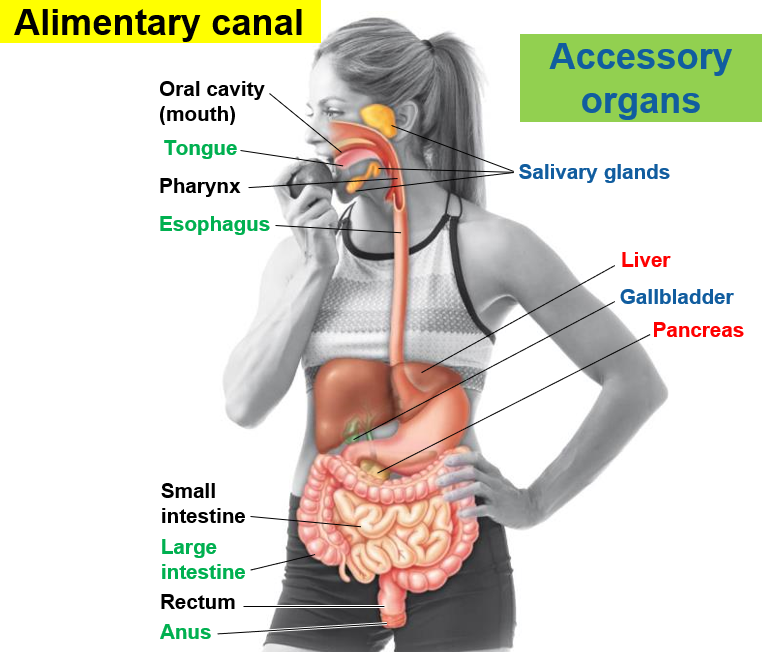
3) H\_\_\_\_\_

4) Enzymes

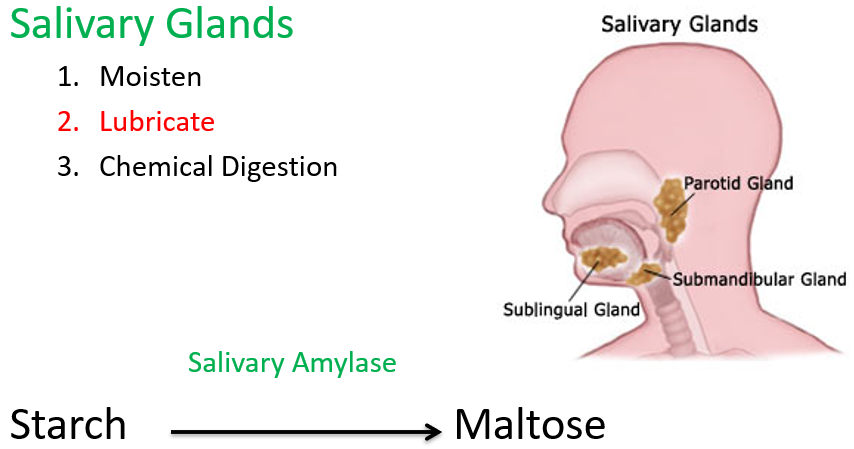
* + 1. \_\_\_\_\_ is the take-up of the products of digestion by the cells lining the digestive tract.
    2. \_\_\_\_\_ is the removal of \_\_\_\_\_ materials from the digestive tract.
  1. Two methods of Digestion
     1. \_\_\_\_\_ Digestion: involves grinding of food and mixing it with digestive juices.
* \_\_\_\_\_ and \_\_\_\_\_
  + 1. \_\_\_\_\_ Digestion: involves chemically breaking down the food into soluble substances that the body can use.
* \_\_\_\_\_ and Digestive Juices



* 1. Organs of the Digestive System are divided in two groups:
     1. \_\_\_\_\_ Canal: tube about 9 m (30 feet) long that runs from the mouth to the anus.
        1. Mouth, Pharynx, Esophagus, Stomach, Intestines
        2. \_\_\_\_\_: type of \_\_\_\_\_ contractions by which food is moved along the alimentary canal.
     2. \_\_\_\_\_ Organs: organs attached to the alimentary canal by ducts (tubes).
* Salivary glands, gallbladder, Liver and Pancreas

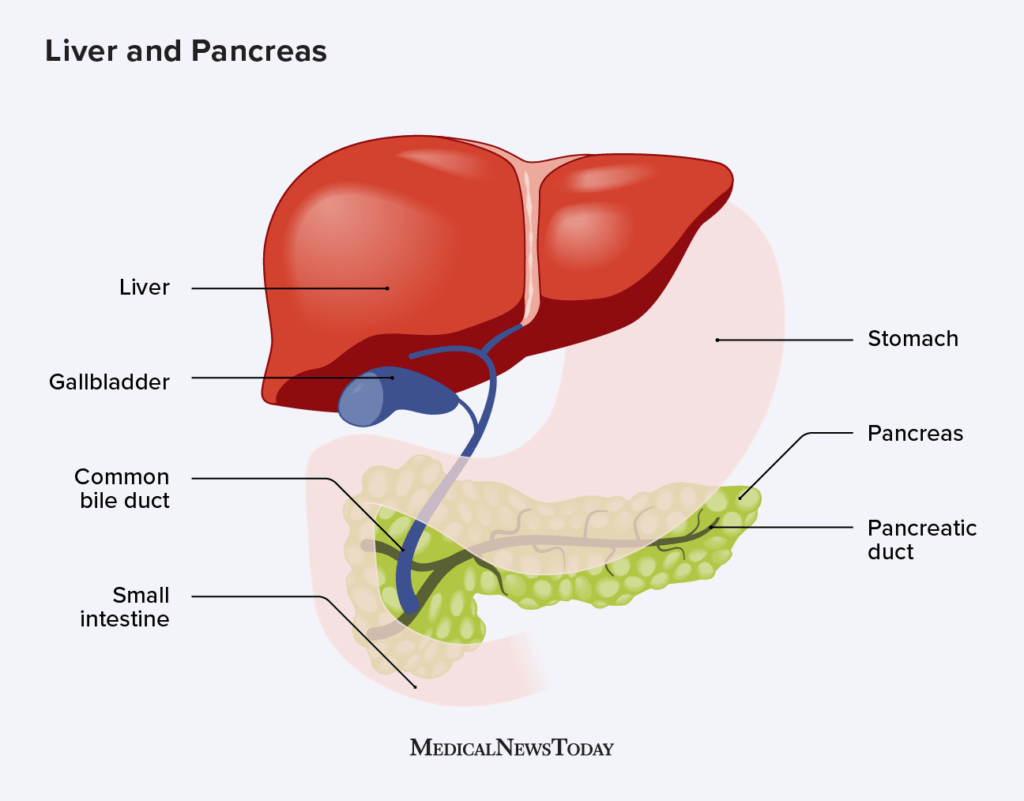


* 1. Path food takes in digestion
     1. M\_\_\_\_\_
        1. \_\_\_\_\_ (physical) digestion begins in the mouth as the tongue moves the food between the teeth for chewing
        2. \_\_\_\_\_ contains the enzyme \_\_\_\_\_ for chemically digesting Starch into maltose.
        3. Tongue forms a \_\_\_\_\_ for swallowing.



* + 1. E\_\_\_\_\_

1. The tongue moves the chewed food into the \_\_\_\_\_ at the back of the mouth where \_\_\_\_\_ starts.
2. Trachea is blocked by the Epiglottis
3. Swallowing begins the \_\_\_\_\_, wave-like \_\_\_\_\_ of \_\_\_\_\_ that pushes the food through the \_\_\_\_\_.
   * 1. S\_\_\_\_\_
        1. \_\_\_\_\_ digestion.
4. Closed \_\_\_\_\_ at each end of the stomach keep the food inside while \_\_\_\_\_ in the wall of the stomach carry on \_\_\_\_\_.
5. Food is churned for up to \_\_\_\_\_.
   * + 1. \_\_\_\_\_ Digestion
6. \_\_\_\_\_ in the stomach lining produce fluids that contain
7. \_\_\_\_\_: enzyme that digests \_\_\_\_\_.
8. \_\_\_\_\_ acid, which helps to \_\_\_\_\_ certain foods and also kills some \_\_\_\_\_ that enter the stomach.
9. \_\_\_\_\_ continue the digestive process.
10. Acid and enzymes do not digest the stomach itself because it is protected by a thick layer of \_\_\_\_\_.
11. In the stomach, the mixture of food, enzymes and acid becomes a semiliquid called \_\_\_\_\_.
    * 1. Small Intestine
         1. Materials from liver, gall- bladder and pancreas are delivered to small intestine.
         2. Liver and gallbladder
      2. \_\_\_\_\_ – produced by the \_\_\_\_\_ and stored in the \_\_\_\_\_.
         1. Bile contains \_\_\_\_\_, bile salts, broken down \_\_\_\_\_ blood cell pigments.
         2. Bile aids digestion by \_\_\_\_\_ (mechanical) digestion.
         3. \_\_\_\_\_ (break down of fat)
         4. Bile enters the small intestine through the \_\_\_\_\_ \_\_\_\_\_ duct.
      3. G\_\_\_\_\_
         1. are \_\_\_\_\_ deposits of \_\_\_\_\_ possibly caused by too much cholesterol (fatty diet) or bilirubin (which breaks down RBCs).
         2. Treated by surgery or medication to dissolve the gallstones.



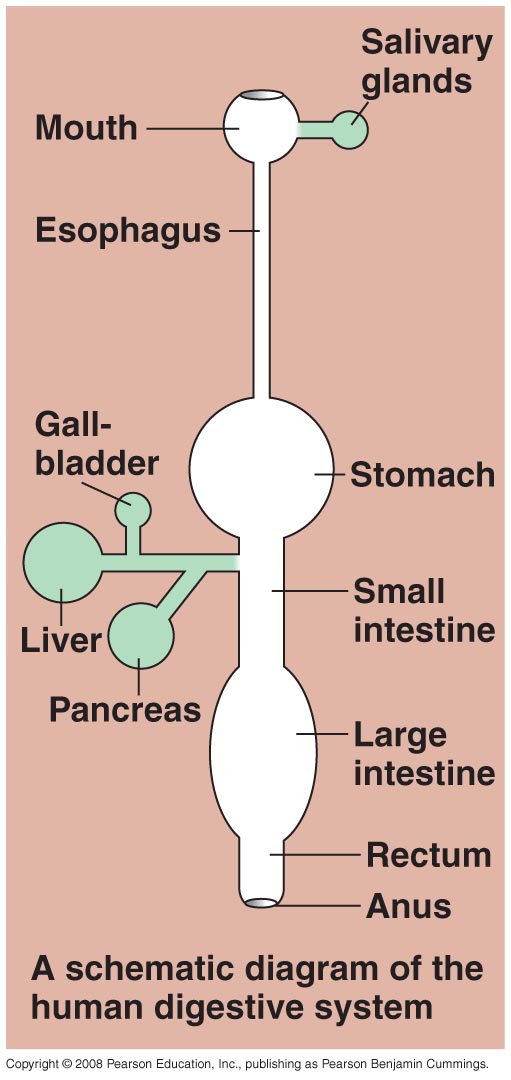
* + - 1. L\_\_\_\_\_
      2. The liver is an \_\_\_\_\_ digestive organ.
      3. The “Master Chemist of the Body” (>500 functions).
      4. Adjust the contents of the blood to meet the body’s needs.
      5. The liver receives blood from the Hepatic Portal Vein and various arteries.
      6. This blood carries food and other substances absorbed by the small intestine.
      7. The main function of the liver within the digestive system is to process the \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ the small intestine.
      8. \_\_\_\_\_ from the liver secreted into the small intestine also plays an important role in digesting \_\_\_\_\_ and some vitamins.
      9. The liver takes the raw materials absorbed by the intestine and makes all the various chemicals your body needs to function.
      10. Digested food in the small intestine is absorbed into the capillaries inside the \_\_\_\_\_.
      11. Blood then carries these absorbed molecules to the \_\_\_\_\_.
      12. P\_\_\_\_\_

1. The pancreas has two main functions: an \_\_\_\_\_ function that helps in digestion and an \_\_\_\_\_ function that regulates blood \_\_\_\_\_ (insulin & glucagon).
2. Releases \_\_\_\_\_ to neutralizes stomach \_\_\_\_\_.
3. Releases Pancreatic ‘Juice’ for digestion.
4. \_\_\_\_\_ (\_\_\_\_\_)
5. \_\_\_\_\_ & chymotrypsin (\_\_\_\_\_)
6. \_\_\_\_\_ (\_\_\_\_\_)

4) Pancreatic ‘juice’ enters the small intestine as the pancreatic duct joins the \_\_\_\_\_ \_\_\_\_\_ duct.

* + - 1. Small Intestine

1. Characteristics and function
2. Small \_\_\_\_\_ (up to 23 feet long!)
3. Among others, it releases sodium bicarbonate to neutralize acid in \_\_\_\_\_.
4. \_\_\_\_% of chemical digestion occurs there.
5. Absorption – \_\_\_\_\_ and microvilli increase Surface Area (SA).
6. Peristalsis
7. Three sections
8. \_\_\_\_\_ – absorbs \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
9. Jejunum – absorbs sugars, amino acids and fatty acids.
10. Ileum – absorbs nutrients (B-12) & bile. Connects to colon.
11. Duodenum receives
12. \_\_\_\_\_: from liver
13. \_\_\_\_\_ Juice: from Pancreas. Pancreatic Juice contains:
14. Trypsin and Chemotrypsin digest proteins.
15. Lipase digests fats.
16. Pancreatic Amylase digests starch.
17. Nucleases: digest nucleic acids.
    * 1. \_\_\_\_\_ Intestine
18. At the end of the small intestine, the remaining undigested foods and fluids enter the Large Intestine.

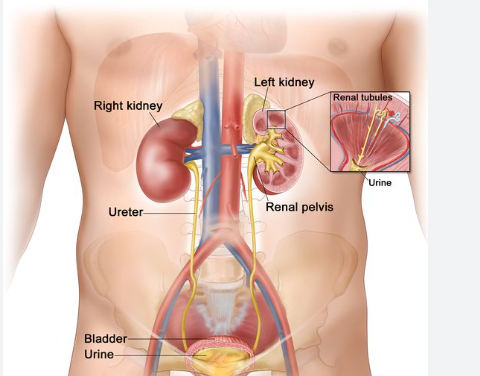


1. 1.5 m (5 ft.) long
2. Little or no digestion occurs here.
3. \_\_\_\_\_ \_\_\_\_\_, \_\_\_\_\_ and some vitamins.
4. Many friendly \_\_\_\_\_ live and reproduce in the large intestine (e. coli).
5. Usually, they do not cause disease.
6. They produce certain \_\_\_\_\_ (K) and digest food that humans cannot digest.
   * 1. Rectum and Anus
7. Material left after large intestine absorbs most of the water is called \_\_\_\_\_ (food debris and bacteria).
8. Peristalsis moves feces from the large intestine to the \_\_\_\_\_ through the \_\_\_\_\_, the last valve of the alimentary canal.
   * 1. \_\_\_\_\_ occurs when too little water is reclaimed from the contents of the large intestine.
     2. \_\_\_\_\_ occurs when too much water is reclaimed.

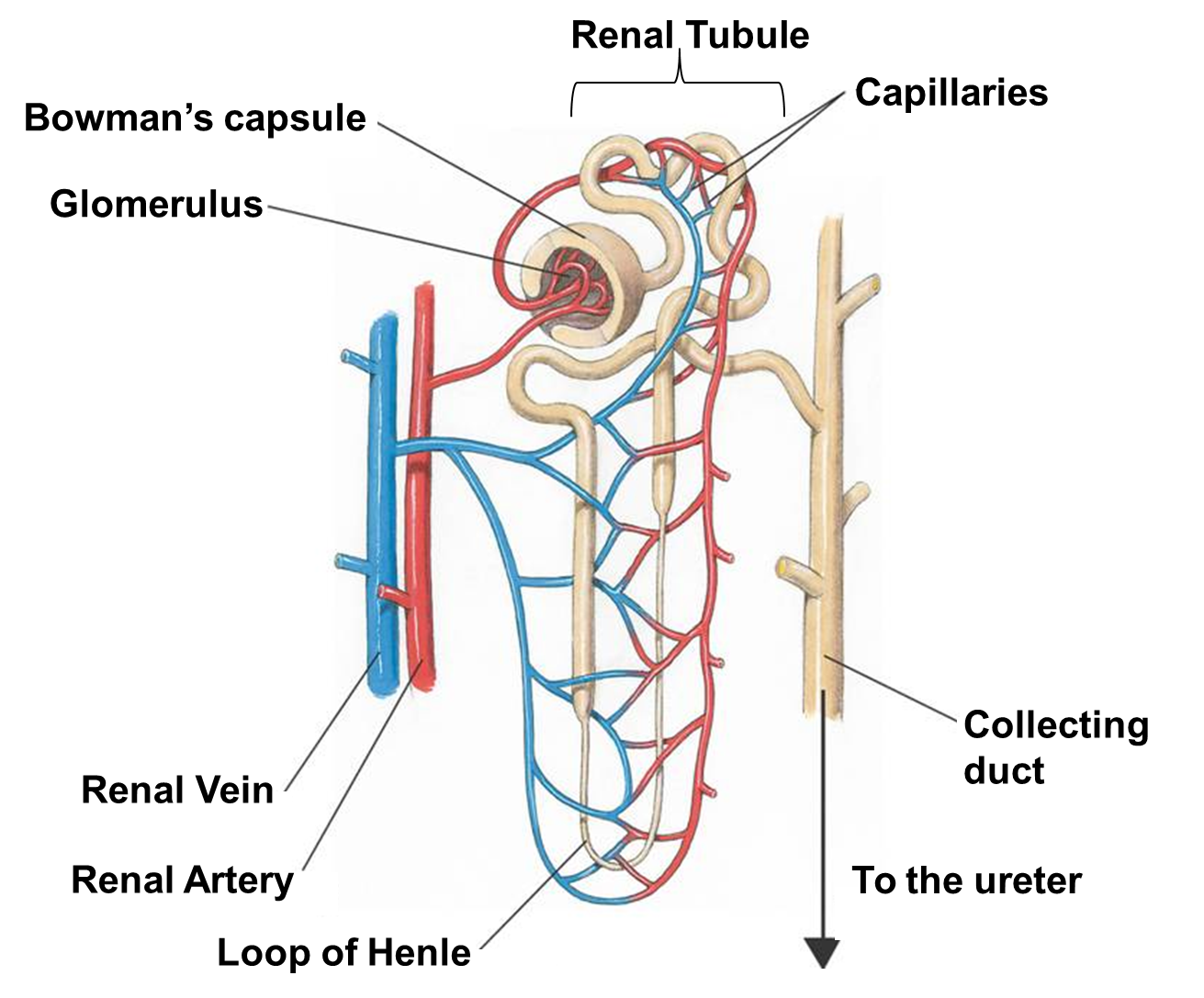
IV. Excretory (\_\_\_\_\_) System

* 1. Main Functions

1. \_\_\_\_\_ the body of \_\_\_\_\_ \_\_\_\_\_.
2. Types of waste in humans:
3. CO2
4. Excess water
5. \_\_\_\_\_
6. \_\_\_\_\_ – Nitrogenous waste formed from \_\_\_\_\_ of amino acids.
   1. Organs of the Excretory System
7. \_\_\_\_\_: excretes ‘sweat’ – excess water, salts and small amount of urea.
8. \_\_\_\_\_: excrete CO2
9. \_\_\_\_\_: detoxifies the blood and converts harmful substances into urea.
10. \_\_\_\_\_
11. The \_\_\_\_\_ excretory organ in humans (part of urinary system).
12. excrete water, urea, salts and other wastes from the blood.
13. maintain blood \_\_\_.
14. regulate \_\_\_\_\_ content and blood \_\_\_\_\_.
    1. Urinary System Anatomy
       1. Kidneys:



1. Primary excretory organ in humans.
2. produces urine.
   * 1. \_\_\_\_\_: tube that leaves each kidney, carrying urine to the bladder
     2. Urinary \_\_\_\_\_: saclike organ where \_\_\_\_\_ is stored before being excreted.
     3. \_\_\_\_\_: tube that leaves the bladder and delivers urine to the \_\_\_\_\_ environment.
   1. Kidney function
3. Blood enters the kidney through the \_\_\_\_\_ \_\_\_\_\_.
4. The kidney removes waste products and passes them to the \_\_\_\_\_.
5. The clean, filtered blood leaves the kidney through the \_\_\_\_\_ vein and returns to circulation.
6. Three parts:
7. Renal Cortex
8. Renal Medulla
9. Renal Pelvis
10. \_\_\_\_\_ – Functional unit of the kidney that \_\_\_\_\_ the \_\_\_\_\_.
11. \_\_\_\_\_ – Ball of capillaries



1. \_\_\_\_\_’s capsule – Cup-like structure that surrounds glomerulus.
2. Renal \_\_\_\_\_
3. Tube connecting Bowman’s capsule to collecting duct.
4. Includes \_\_\_\_\_ of \_\_\_\_\_ – site of \_\_\_\_\_.
5. Capillaries intertwined
6. \_\_\_\_\_ duct – collects \_\_\_\_\_ from several nephrons.
7. Nephrons are primarily located in the renal cortex except for their Loops of Henle, which descend into the renal medulla.
   1. Urine Formation
      1. \_\_\_\_\_ is formed by two key processes:
8. Filtration
9. Reabsorption
   * 1. F\_\_\_\_\_
10. \_\_\_\_-selective process of pushing fluid through the glomerulus into Bowman’s capsule.
11. Blood cells are too large to pass so they remain in the blood.
12. Filtered liquid is now called filtrate (\_\_\_\_\_, \_\_\_\_\_, glucose, \_\_\_\_\_, salts).
    * 1. R\_\_\_\_\_
13. \_\_\_\_\_ process of removing ‘good stuff’ from the \_\_\_\_\_.
14. Occurs in the \_\_\_\_\_ of \_\_\_\_\_.
15. ‘Good stuff’ moves from Loop of Henle back to capillaries.
    * 1. \_\_\_\_\_ = excess water + urea + excess salts
16. Collects in the \_\_\_\_\_ ducts, empties into renal pelvis then \_\_\_\_\_ the kidneys via the ureters.
17. \_\_\_\_\_ in the urinary \_\_\_\_\_ before exiting the body via the \_\_\_\_\_.

F. Summary: Pathway of Excretory (Cellular) Waste

1. Produced in \_\_\_\_\_.

2. Diffuses into blood stream.

3. Carried by blood to \_\_\_\_\_ of kidney.

4. Enters \_\_\_\_\_.

5. Filtered into bowman's \_\_\_\_\_ and passes to renal tubule.

6. Travels from renal tubule (including Loop of Henle) to collecting duct.

7. Enters renal pelvis from collecting duct.

8. \_\_\_\_\_ (in form of urine) then passes through \_\_\_\_\_.

9. Urine is stored in \_\_\_\_\_ until released by passing through \_\_\_\_\_.

G. Control of Kidney Function

1. When you drink a liquid, it is absorbed into the blood through the digestive system.
2. The concentration of \_\_\_\_\_ in the blood \_\_\_\_\_;
3. \_\_\_\_\_ the rate of kidney water \_\_\_\_\_.
4. Less water is returned to the blood.
5. Excess \_\_\_\_\_ is excreted as \_\_\_\_\_.
6. When the kidneys detect an increase in salt … they respond by returning less \_\_\_\_\_ to the blood by reabsorption.
7. The excess salt is excreted in urine, thus maintaining the composition of the blood.