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# **UNDERSTANDING THE HUMAN BODY**

### I. DIABETES

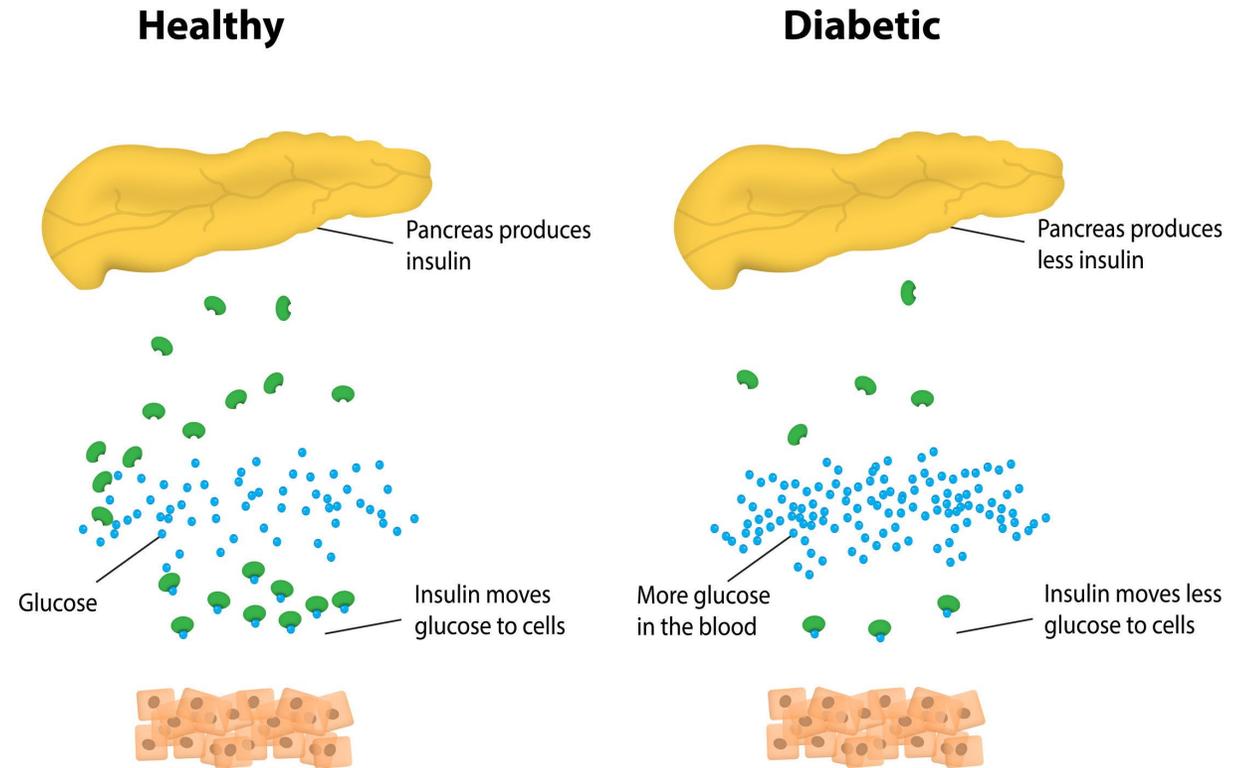
#### A. What is Diabetes?

Diabetes is a metabolic disorder manifested by elevated levels of blood sugar in which the cells of the body can not use the sugar circulating in the blood because of lack of insulin.

#### B. How Does Diabetes Work?

1. Sugar is the main source of fuel or energy for the body.
2. Most food consumed is transformed into glucose (a form of sugar) by the process of digestion.
3. After it is digested, glucose goes to the blood, and then through the blood vessels, to each cell.
4. Insulin, a hormone produced by the pancreas, is necessary to allow glucose to enter the cells and be used as energy.

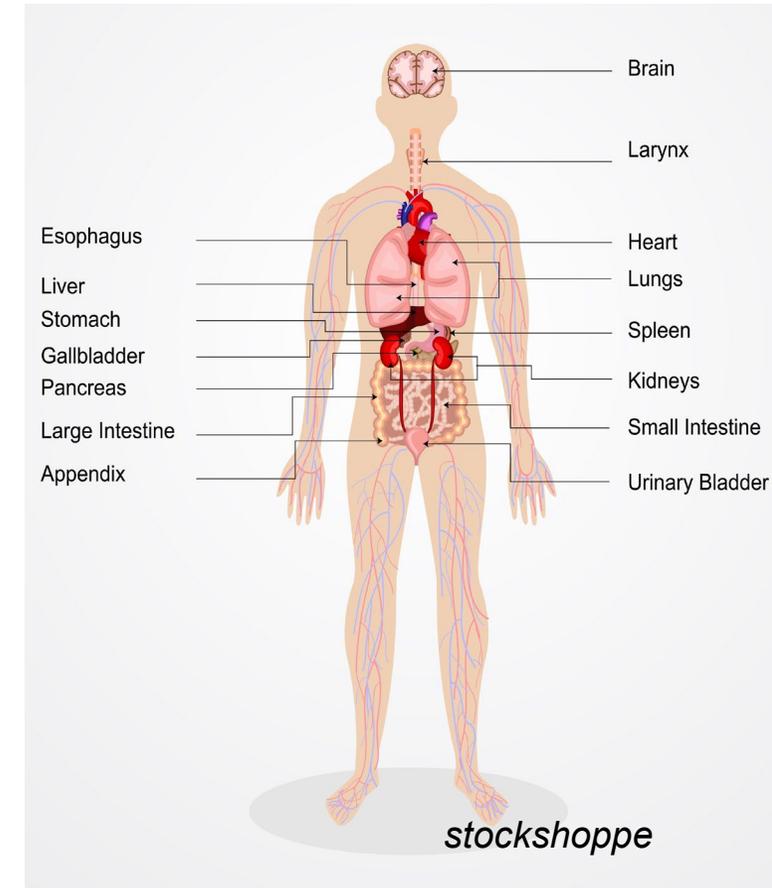
5. Diabetes affects the body's ability to produce insulin appropriately.
6. In diabetes, insulin is produced in large amounts but does not work properly, or it is not produced at all.
7. Therefore, sugar cannot enter the cells, and high levels of sugar remain in the blood.
8. The excess sugar in the blood damages the circulatory system and the organs.



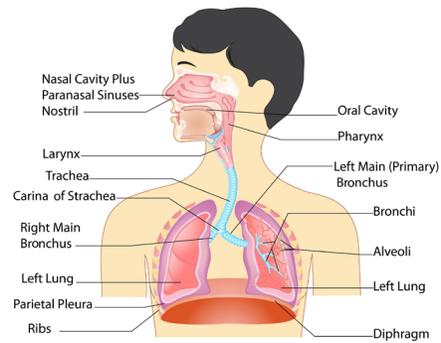
*Joshua Abbas*

## Group Activity: Building the Human Body

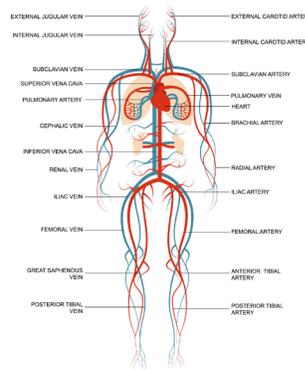
- Form small groups of 3 - 4 participants.
- Each group will receive from the instructor:
  - Paper to draw the outline of the body of an adult
  - A wide marker
  - A packet with outlines of the main organs
- Each group will draw an outline of the human body with the help of one volunteer who will use his or her body as a model on the paper.
- Tape the drawing up on the wall.
- Piece by piece, build the body and discuss each organ's function.



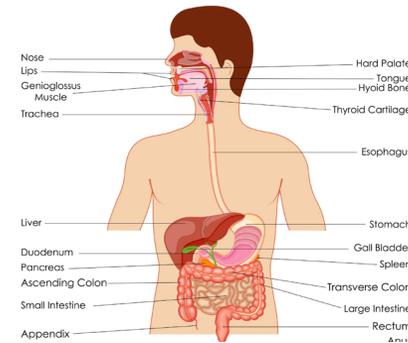
## II. THE HUMAN BODY – IMPORTANT SYSTEMS AND ORGANS



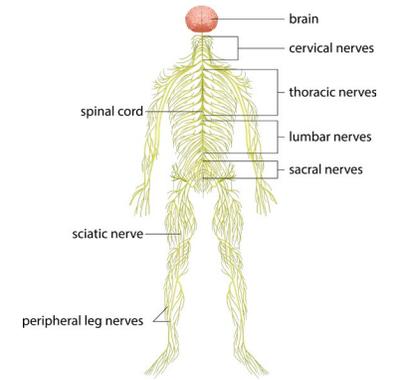
**Respiratory**



**Circulatory**



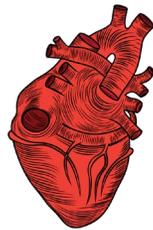
**Digestive**



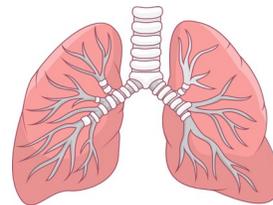
**Nervous**



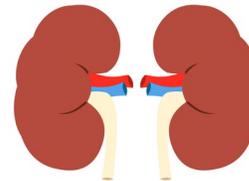
**Brain**



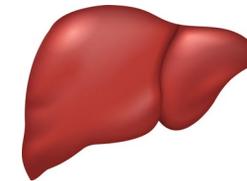
**Heart**



**Lungs**



**Kidneys**



**Liver**



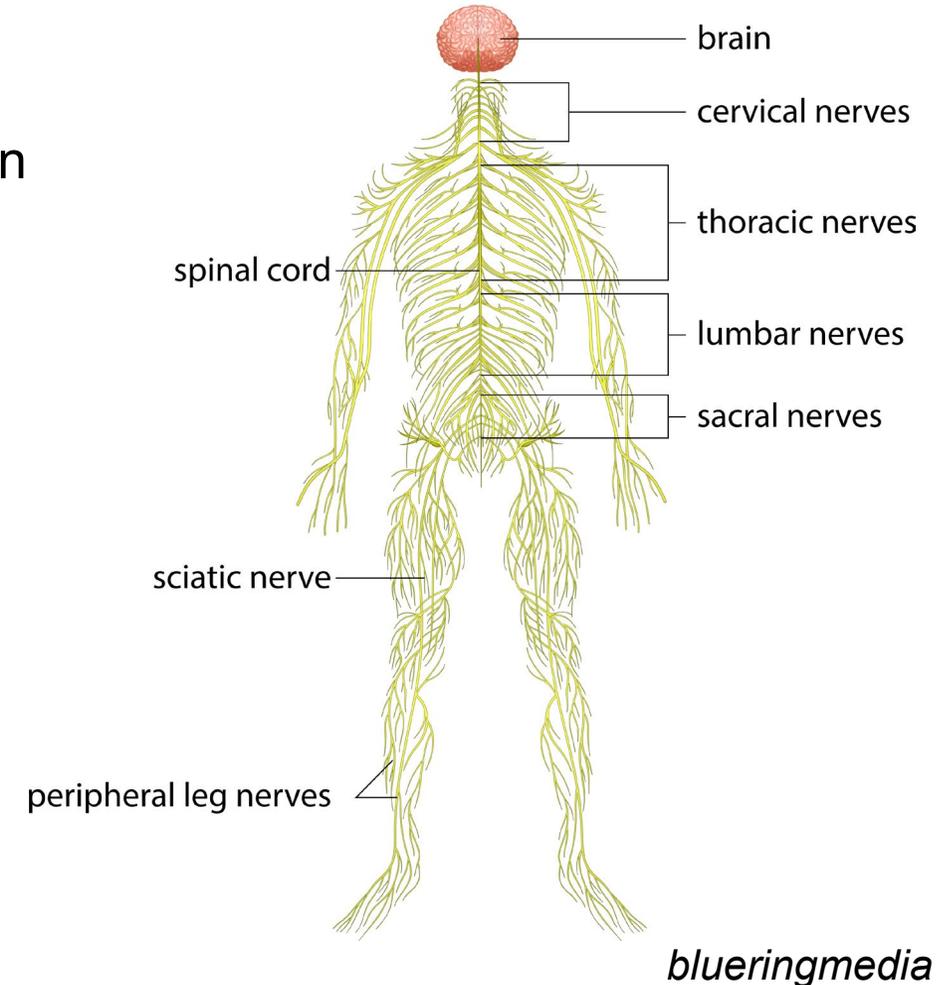
**Pancreas**

## A. Nervous System

Complex communication network that receives information from the environment and responds to it. Activates and controls all functions of the body.

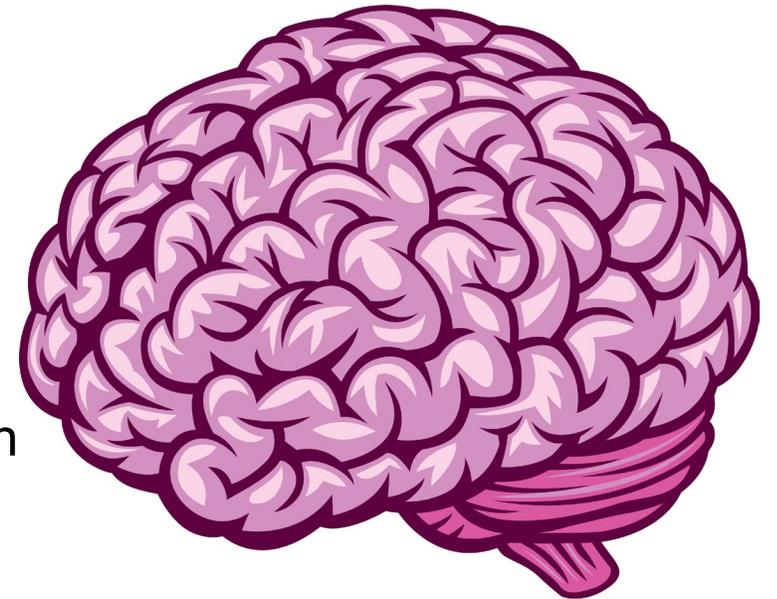
Consists of:

- Brain
- Spinal cord
- Nerves



## 1. Brain

- a. The brain processes sensations and controls responses of the body.
- b. It is responsible for intellectual functions:
  - i. Thinking and reasoning
  - ii. Memory
  - iii. Creativity
  - iv. Language
- c. Diabetes damages the blood vessels (capillaries) that nourish the brain → stroke.
- d. High or low levels of glucose (sugar) in the blood can damage the brain and can cause death.



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## 2. Spinal Cord

- Located inside the spinal or vertebral column.
- Connects the brain to different parts of the body through the nerves.
- It can respond immediately without alerting the brain → *reflex response*

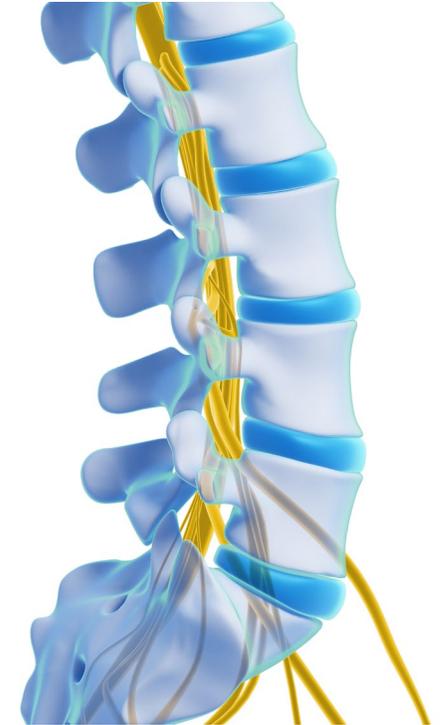
## 3. Nerves

There are three types of nerves:

- Motor
- Sensory
- Autonomous

### a. Motor nerves

Carry information from the brain or the spinal cord to the periphery in response to a sensation. Motor nerves are responsible for the contraction of the muscles that allow all types of motion.



*Sebastian Kaulitzki*

### b. Sensory nerves

Bring information from the periphery to the spinal cord and the brain. The sense organs are:

- i. Ears – receptors for hearing
- ii. Tongue – receptors for taste
- iii. Skin – receptors for touch, such as pain, heat
- iv. Eyes – receptors for sight
- v. Nose – receptors for smell

### c. Autonomous nerves

Involuntary nerves do not obey conscious will. Control functions of internal organs, such as:

- i. Heartbeat
- ii. Digestion
- iii. Urination

### 4. Nervous system complications

Diabetes affects the nerves producing Diabetic Neuropathy. Neuropathies include:

- a. Pain, burning, and numbness in hands and arms
- b. Abnormal sweating
- c. Dizziness
- d. Difficult urination
- e. Slower digestion
- f. Problems with sexual ability

## B. Cardiovascular (Circulatory) System

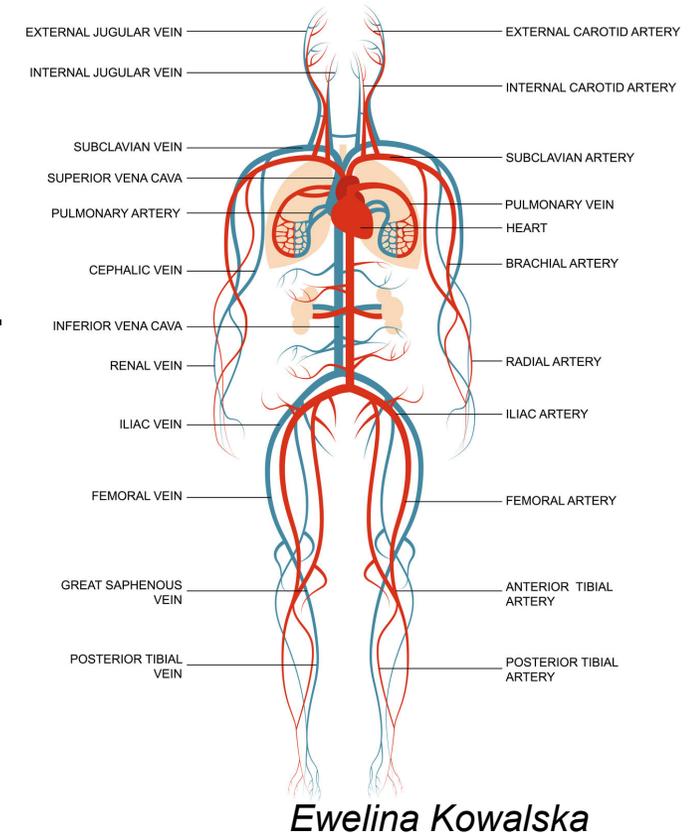
Interconnected system consisting of :

- Heart
- Blood vessels (arteries and veins)

Transports blood with nutrients and oxygen to different parts of the body.

### 1. Heart

- a. Hollow muscular organ
- b. Pumps blood toward lungs – so blood can receive oxygen – and then pumps oxygenated blood toward the periphery.
- c. Diabetes damages thin blood vessels that irrigate the heart  
→ myocardial infarction (heart attack.)

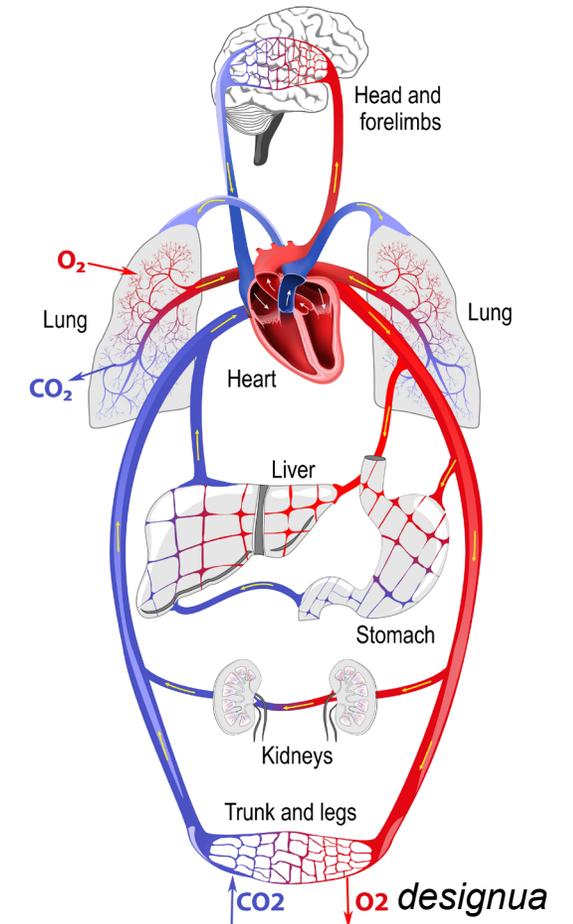


## 2. Arteries

- Vessels that go from the heart to the periphery.
- Transport oxygenated blood from the heart to rest of the body.
- Can be quite thick → aorta; or thin → capillaries.
- Diabetes damages capillaries that feed all organs of the body.

## 3. Veins

- Vessels that go from the periphery to the heart.
- Veins bring deoxygenated blood from tissues back to the heart.



### 4. Cardiovascular disease

#### a. Coronary heart disease

- i. In diabetes cardiovascular complications that result in premature death, occur at an earlier age.
- ii. Adults with diabetes are 2 to 4 times more likely to die from heart disease than adults without diabetes.
- iii. Smokers are 2 to 4 times more likely to develop coronary heart disease than non-smokers.
- iv. Exposure to secondhand smoke increases the risk of coronary heart disease by 25-30% in non-smokers.

### b. Stroke

- i. Adults with diabetes are 2 to 4 times more likely to suffer strokes than those without diabetes.
- ii. Having a stroke increases the risk of a second stroke by 2 to 4 times.
- iii. Smoking is a major cause of strokes.

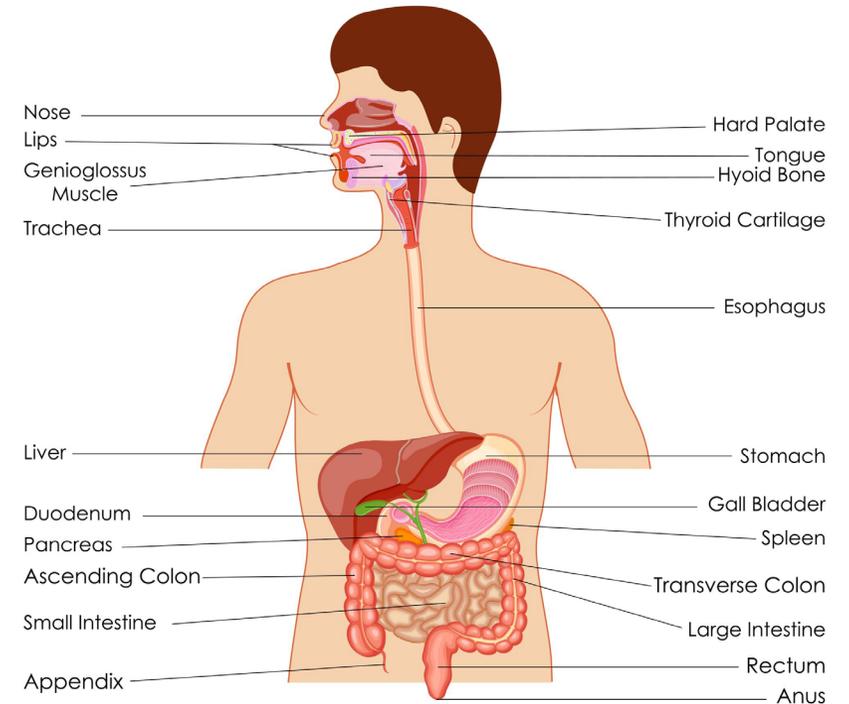


*Ghenadie*

## C. Digestive System

Set of organs that process and transport nutrients and waste through the body. Digests foods, absorbs nutrients and discards waste products. Consists of:

- Digestive Tube:
  - Mouth
  - Salivary glands
  - Esophagus
  - Small intestine
  - Colon
  - Rectum
  - Anus



*stockshoppe*

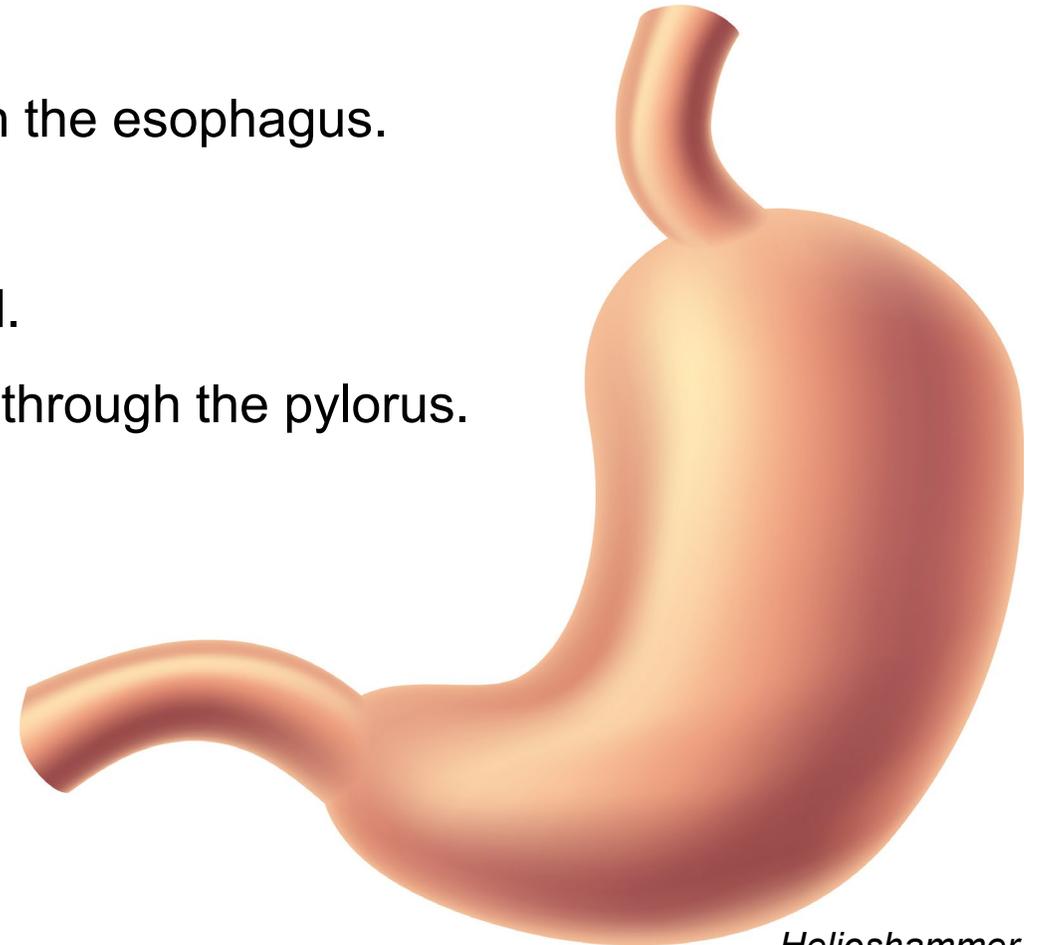
- Annex Glands:
  - Liver
  - Gallbladder
  - Pancreas
- 1. How the Digestive System works
  - a. Digestion breaks down the foods into nutrients (sugars, fats, proteins).
  - b. Nutrients are absorbed by the small intestine and pass to the blood to nourish the body.
- 2. Mouth and salivary glands
  - a. First step in the digestion of foods.
  - b. Food is chewed and mixed with saliva.
  - c. Saliva breaks down starches into simpler sugars.
  - d. Diabetes causes a risk of gum infections.



*Neokryuger*

## 3. Stomach

- a. Chewed food is taken to the stomach through the esophagus.
- b. Initiates digestion of proteins.
- c. Mixes and transforms food into a heavy liquid.
- d. Then, the liquid passes to the small intestine through the pylorus.



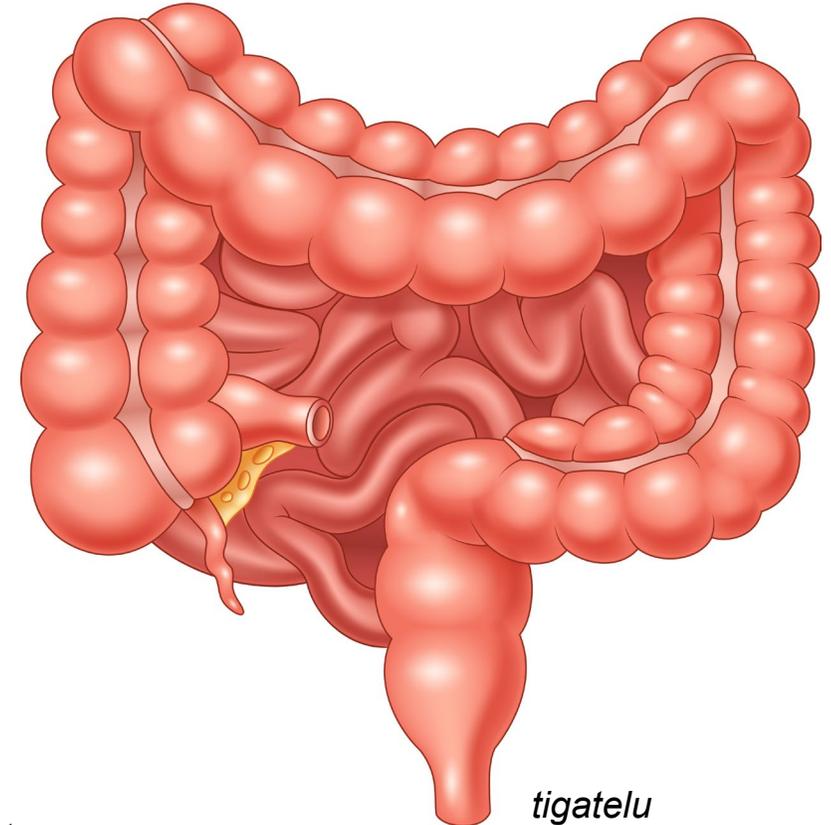
*Helioshammer*

## 4. Small intestine

- Receives food from the stomach and transports it to the large intestine.
- Digests fats from the foods.
- Finalizes transformation of food and passes nutrients to the blood.

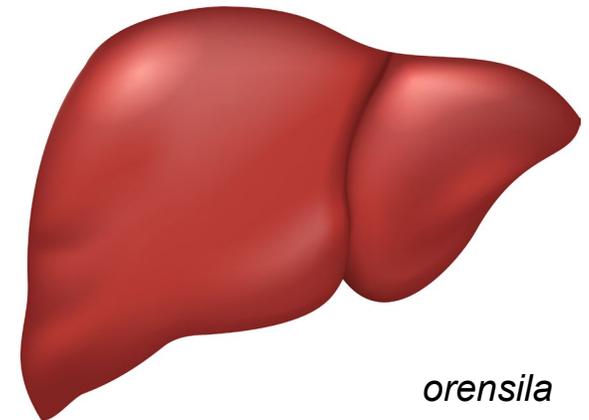
## 5. Large intestine

- Connects the small intestine and the anus.
- Absorbs water and minerals.
- Receives waste products and concentrates the waste into fecal matter to be eliminated through defecation.



## 6. Liver

- a. The largest gland of the human body.
- b. Located under the diaphragm on the right side of the abdomen.
- c. Secretes bile, which breaks down fats.
- d. Bile is stored in the gallbladder and passes to the small intestine when a person eats food containing fat.
- e. Produces and stores a starch called **glycogen**, which turns into glucose when the body needs energy.
- f. Helps in coagulation.
- g. Removes toxic substances from the body.
- h. Eliminates ammonia as urea.
- i. Stores iron and some vitamins.
- j. Protects the body from infections and other foreign organisms.

*orensila*

## 7. Pancreas

- a. Located behind the stomach.
- b. Produces pancreatic juice - a substance that helps digest proteins, fats and carbohydrates.
- c. Regulates levels of sugar in the blood:
  - i. Glucagon - increases glucose in the blood.
  - ii. Insulin - reduces glucose in the blood.



*Smoki*

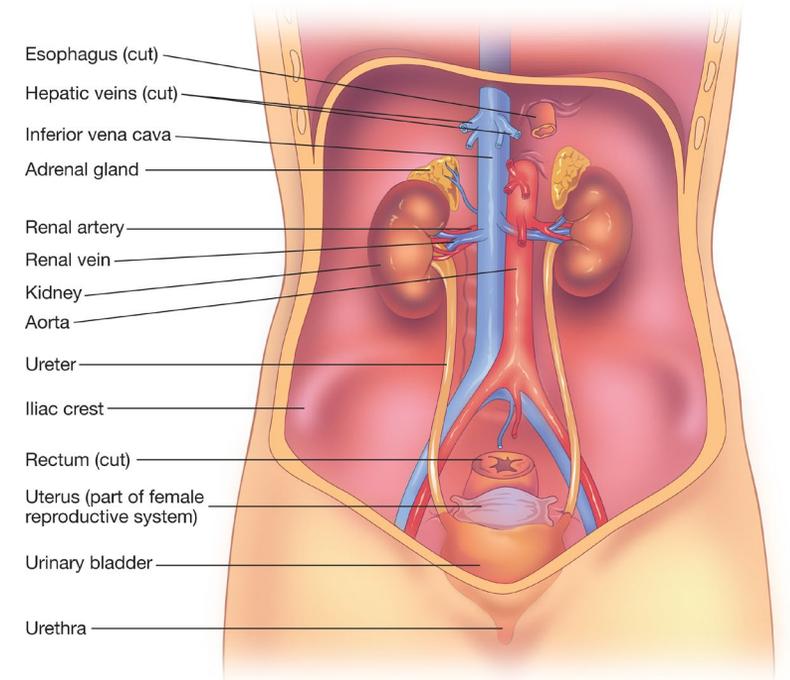
## 8. Insulin

- a. Hormone produced in beta cells.
- b. Necessary to transform sugars and starches into energy for daily life.
- c. Allows glucose to enter the cells.
- d. Liver, brain, kidney and red cells do not require insulin to use glucose.

## D. Urinary System

Filters blood and eliminates toxins through the urine. Consists of:

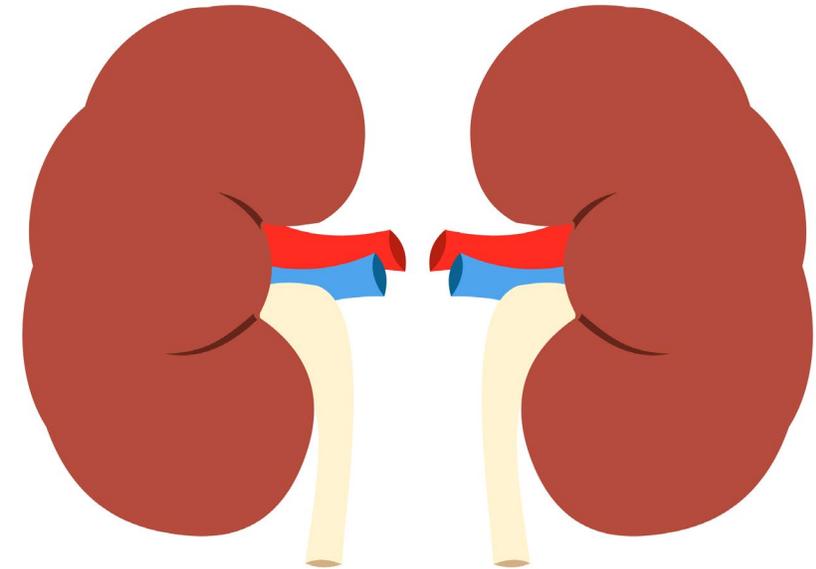
- Kidneys
- Ureters
- Bladder
- Urethra
- Reproductive organs



*MerlinPixi*

## 1. Kidneys

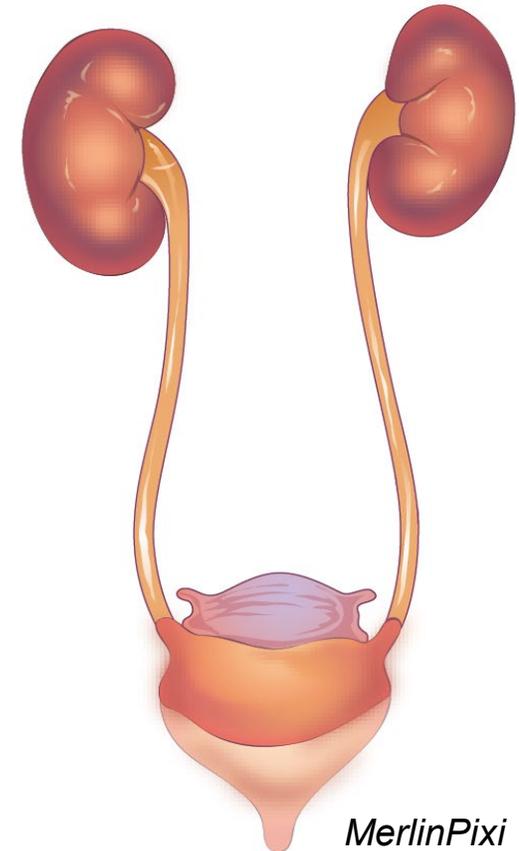
- a. Two bean-shaped organs located at each side of the back.
- b. Remove toxic substances and medications from the blood.
- c. Produce urine.
- d. Control amount of water, sodium, potassium and other salts in the blood.
- e. Diabetes damages vessels that filter the blood → kidney insufficiency and failure.



*JuliarS*

## 2. Bladder

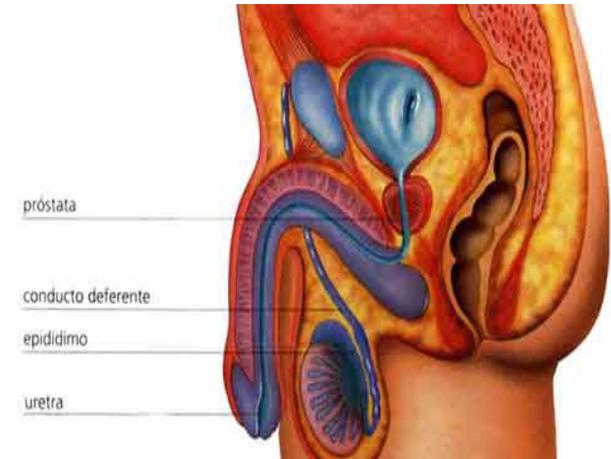
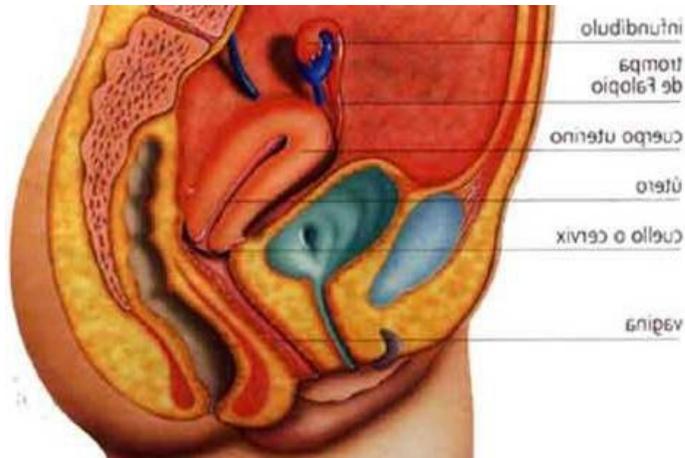
- Collects urine from the kidneys through tubes called ureters.
- Empties the contents through a tube called urethra.
- Diabetes affects bladder function producing changes in sensation → involuntary loss of urine.



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## 3. Reproductive Organs

- a. Sexual dysfunction in men and problems of incontinence.
- b. Lack of sensitivity in women.



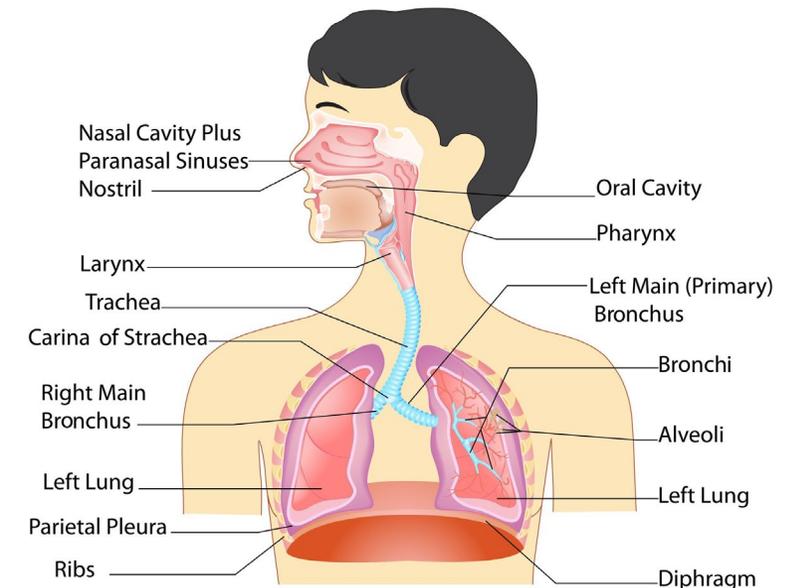
## E. Respiratory System

Oxygenates blood and eliminates carbon dioxide from the body. Consists of:

- Upper track: nose, sinuses and larynx
- Lower track: trachea, bronchi, and lungs

### 1. Lungs

- a. Two spongy organs located on both sides of the chest and protected by the ribs.
- b. Connected through arteries and veins to the heart.
- c. Bring oxygen in and remove carbon dioxide from the blood.
- d. Smoking damages lungs and worsens the damage produced by diabetes to the rest of the body.



*snapgalleria*

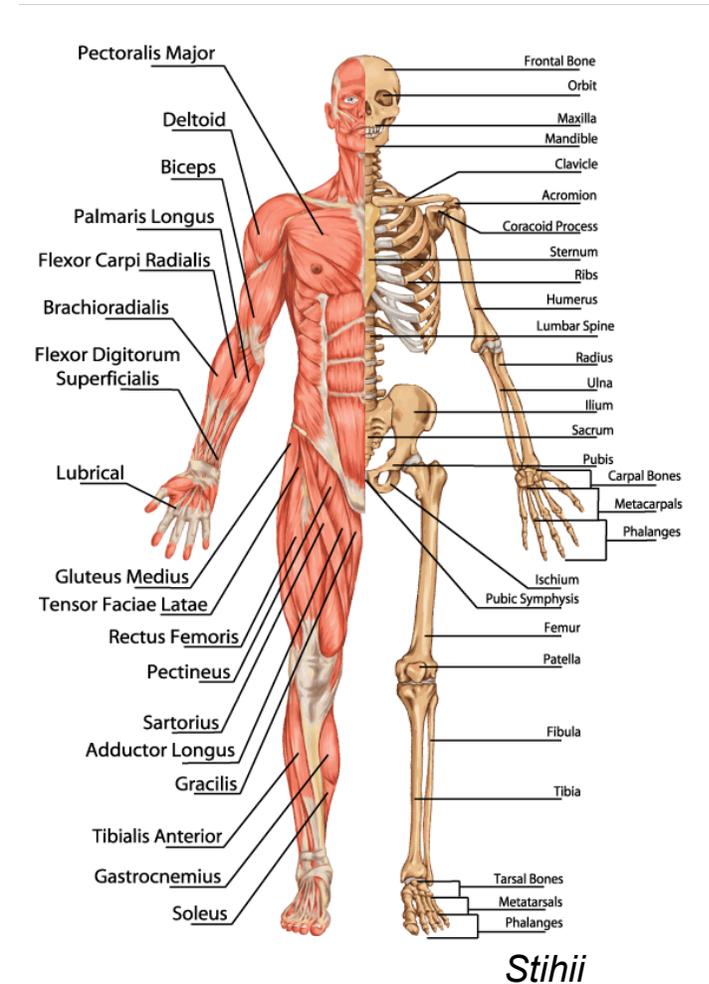
## F. Muscle and Skeletal System

Gives support and form to the body. Consists of:

- Skeleton (bones)
- Muscles

### 1. Skeleton

- Bones contain calcium.
- Center of the bone (medulla) produces red and white blood cells.
- Diabetes affects blood circulation and the flow of calcium, causing osteoporosis.



### 2. Muscles

- a. Muscles stretch and contract to make movement possible.
- b. Cover bones and internal organs and keep the body warm.
- c. Physical activity keeps muscles healthy and improves blood circulation.
- d. Muscles store glycogen and consume glucose.
- e. Movement provides oxygen to the whole body.
- f. Movement also helps the flow of glucose into muscles, preventing accumulation of glucose in the blood.

This concludes Module 1. For more information on this topic, please see the curriculum.



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