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Human Body

Circulatory System

Respiratory System

Digestive System

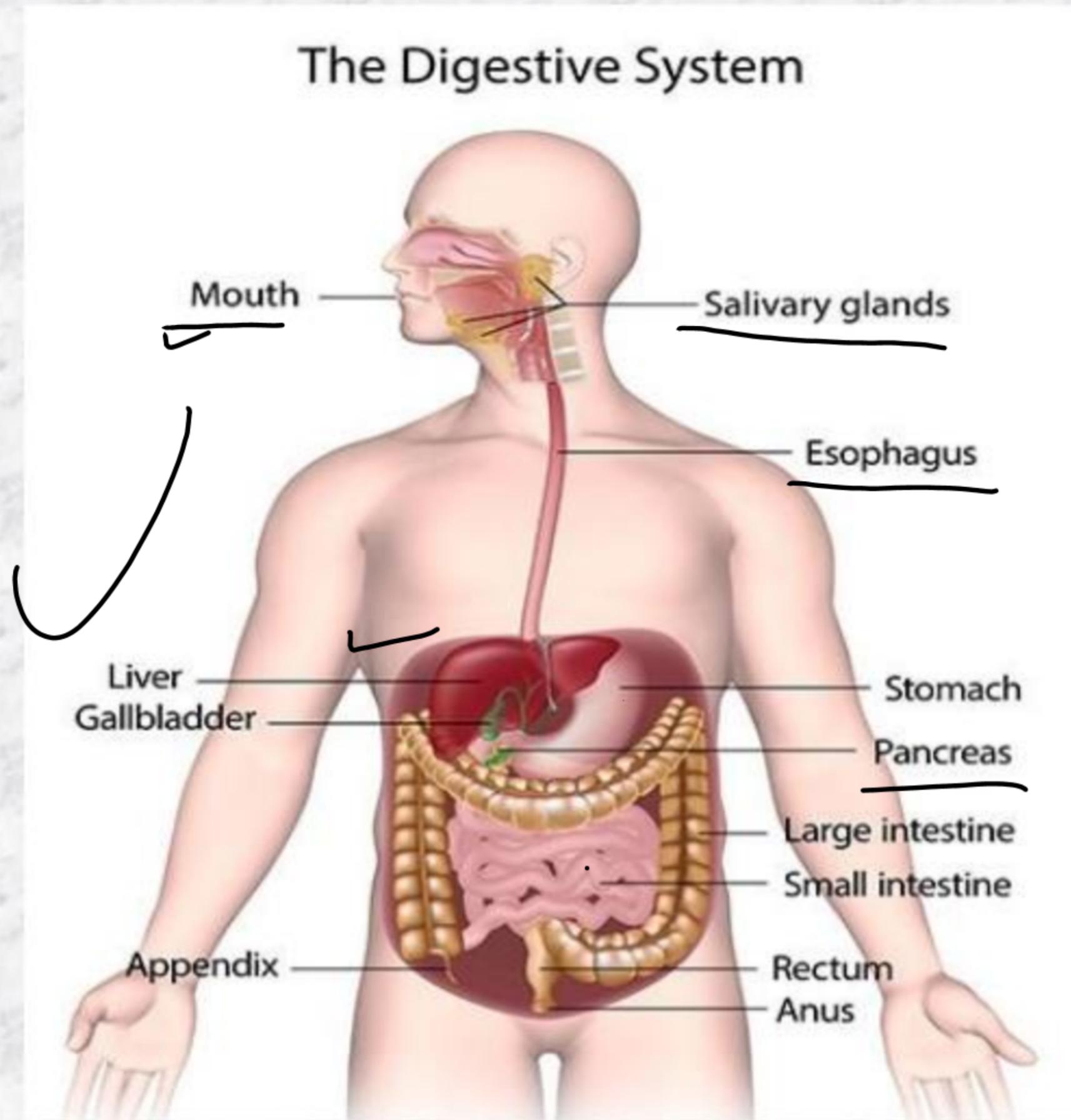
Nervous System

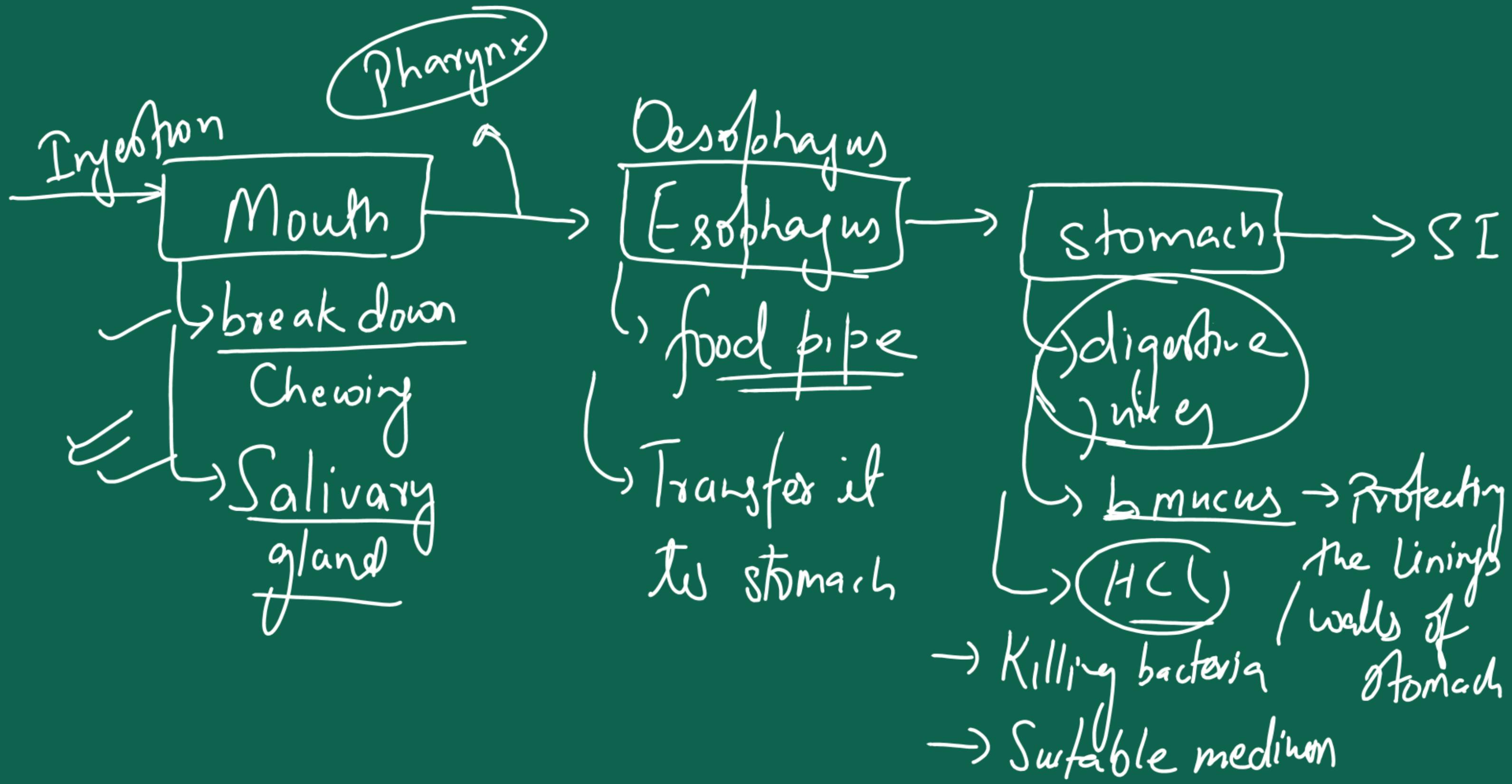
Excretory System

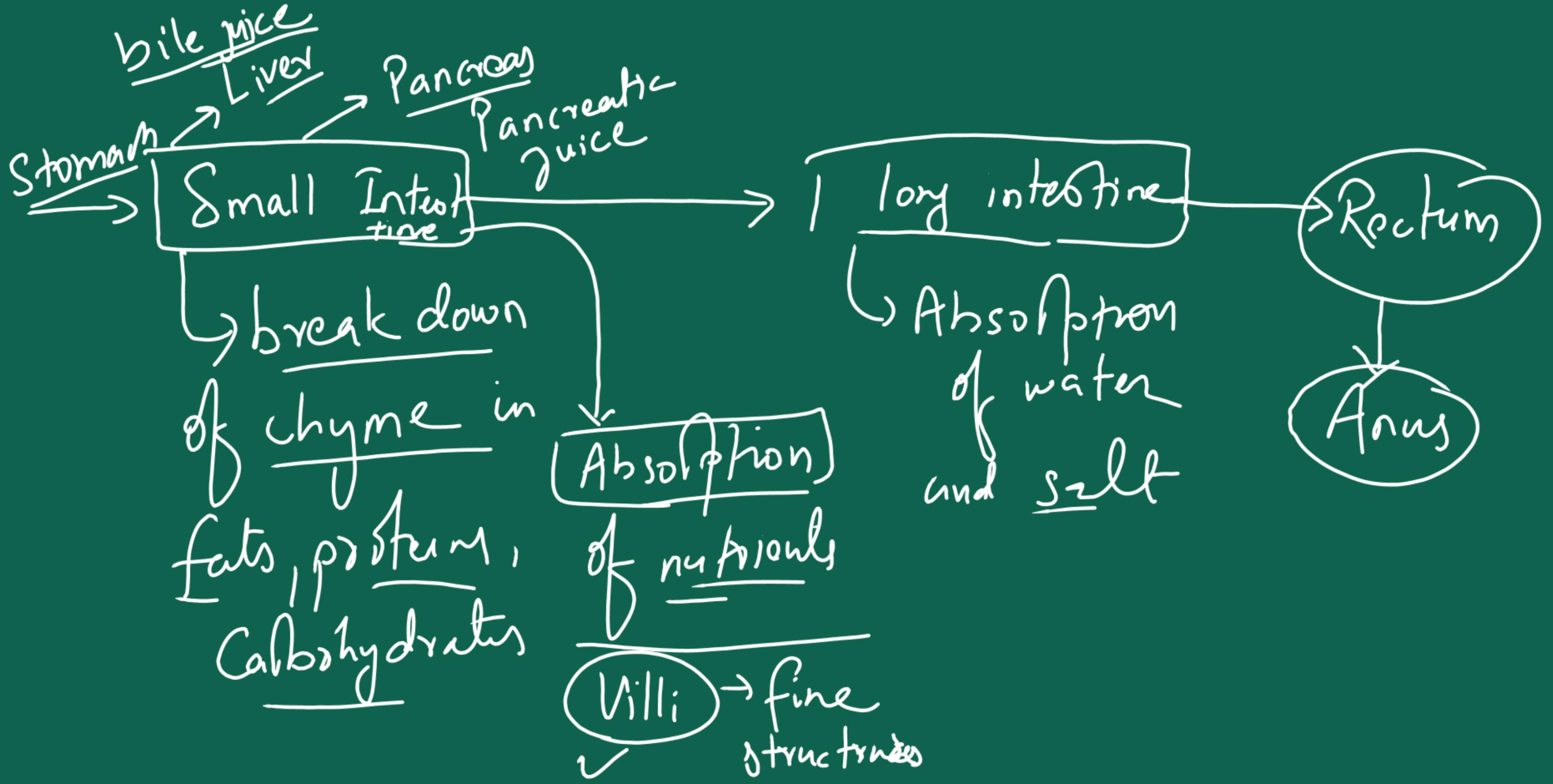
Human Digestive System

The human digestive system consists of the gastrointestinal tract plus the accessory organs of digestion.

Digestion involves the breakdown of food into smaller and smaller components, until they can be absorbed and assimilated into the body.







Digestive System

Ingestion

Digestion

Absorption

Assimilation

Egestion

INGESTION

Food is taken into body

DIGESTION

Carbohydrates, proteins and fats are broken down into soluble glucose, amino acids, fatty acids and glycerol.

ABSORPTION

Glucose, amino acids, fatty acids and glycerol are absorbed into body cells

ASSIMILATION

Absorbed nutrients are transported and utilized by the body

EGESTION

Removal of undigested food e.g. dietary fibre

Digestive System



Mouth & Buccal Cavity

Ingestion happens through the mouth.

The mouth leads to the buccal cavity or oral cavity where digestion starts.

Mouth has the salivary glands which secrete saliva.

The saliva breaks down the starch into sugars.

The saliva secreted into the oral cavity contains electrolytes and enzymes.

Salivary Amylase:

The chemical process of digestion is initiated in the oral cavity by the hydrolytic action of the carbohydrate-splitting enzyme, salivary amylase.

Lysozyme is also present in saliva and acts as an antibacterial agent that prevents infections.

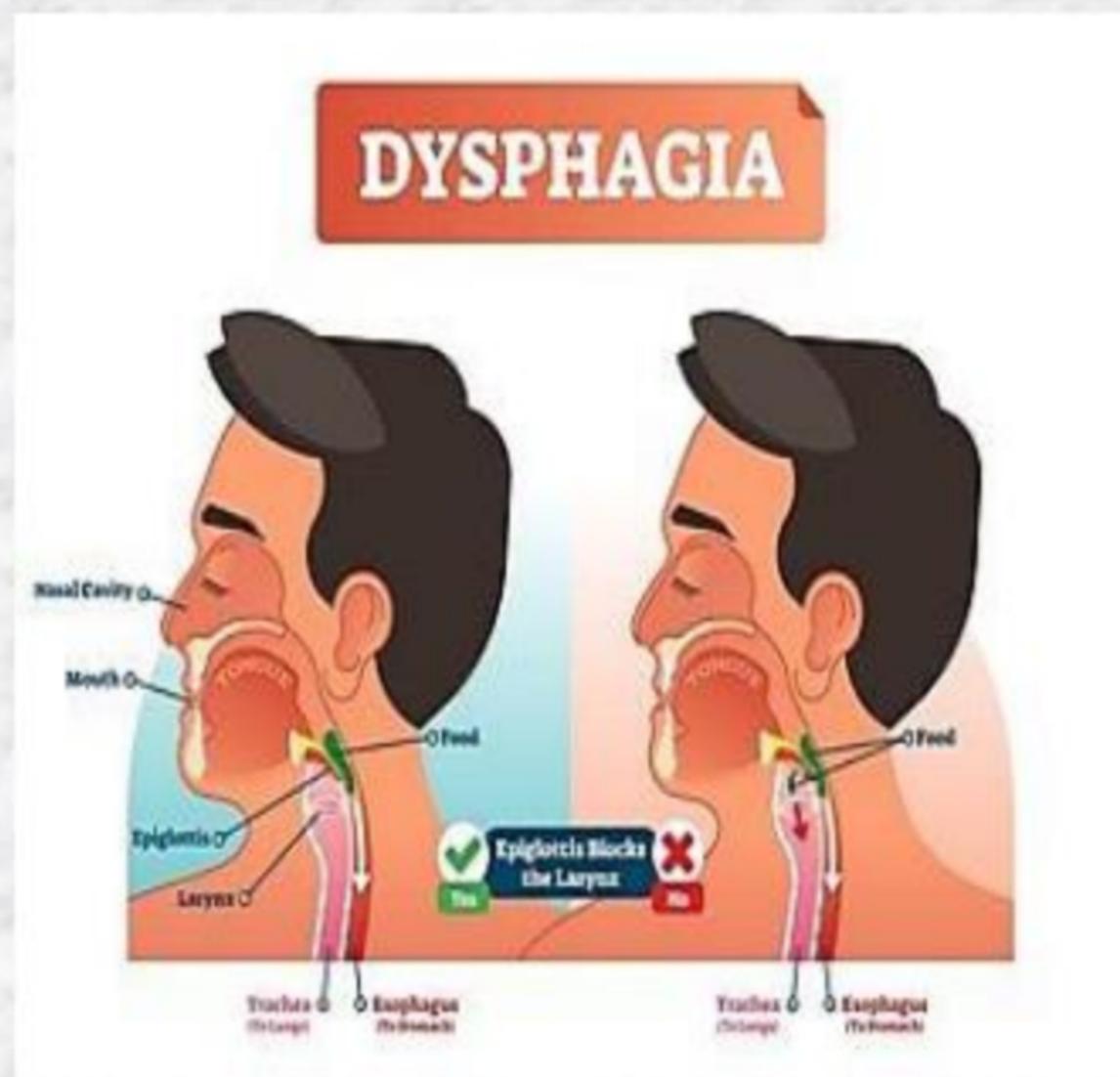
Mouth & Buccal Cavity

The oral cavity leads into a short pharynx which serves as a common passage for food and air.

The Oesophagus and the trachea (wind pipe) open into the pharynx.

Epiglottis prevents the entry of food into the glottis (opening of the wind pipe).

The swallowed food passes into the foodpipe or oesophagus then enter stomach.



Esophagus

The esophagus is a muscular tube that connects the pharynx (throat) to the stomach.

The esophagus contracts as it moves food into the stomach.

A “valve” called the lower oesophageal sphincter (LES) is located just before the opening to the stomach.

This valve opens to let food pass into the stomach from the esophagus and it prevents food from moving back up into the esophagus from the stomach.

Stomach

The inner lining of the stomach secretes mucous, hydrochloric acid and digestive juices. The mucous protects the lining of the stomach.

Why Stomach have an acidic pH?

The acidic nature of the stomach kills many bacteria that enter along with the food.

The digestive juices break down the proteins into simpler substances.

Small Intestine

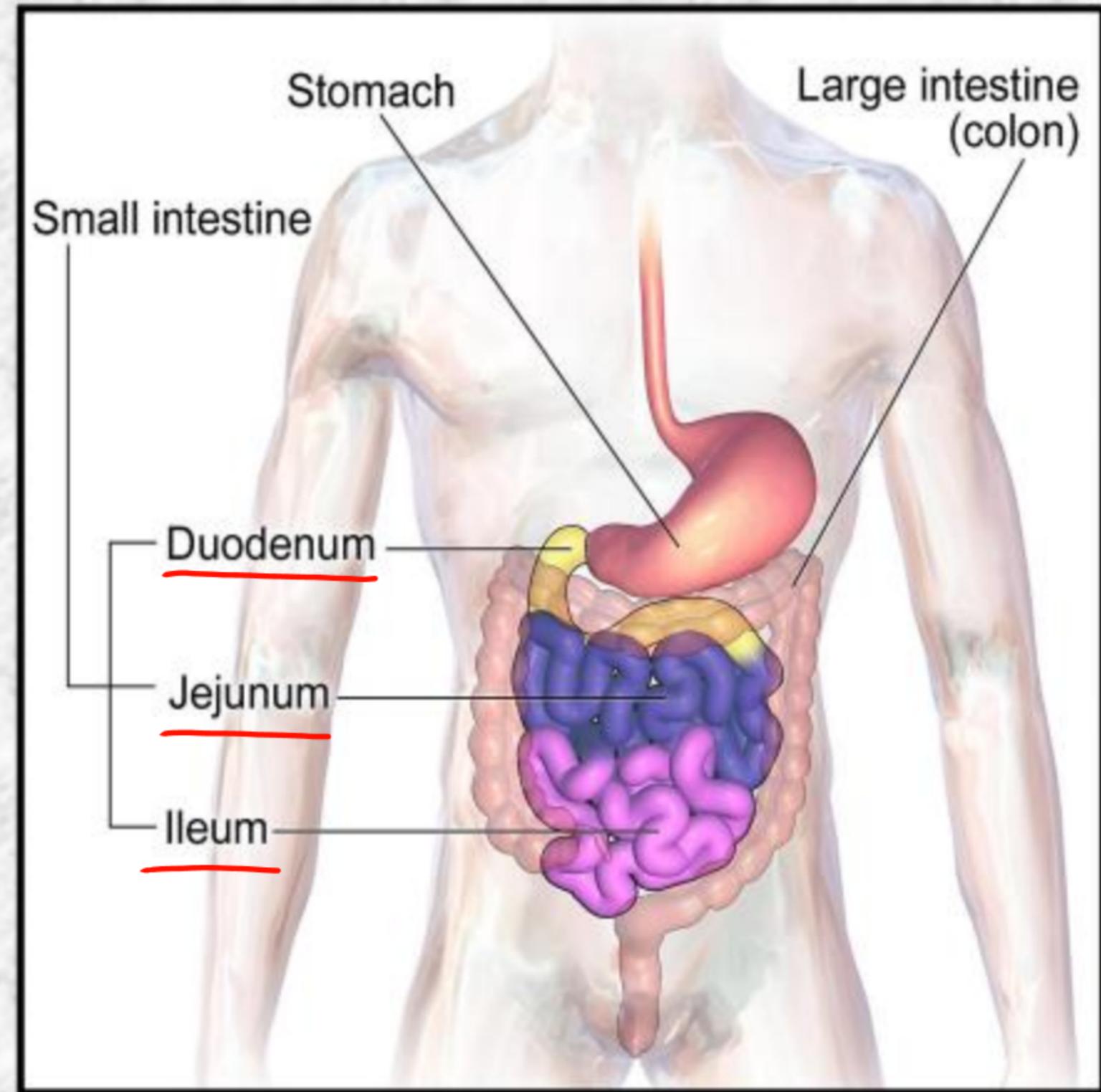
Small intestine is distinguishable into three regions

- 1. Duodenum**
- 2. Jejunum**
- 3. Ileum**

The small intestine is highly coiled and is about 5-6 meters long.

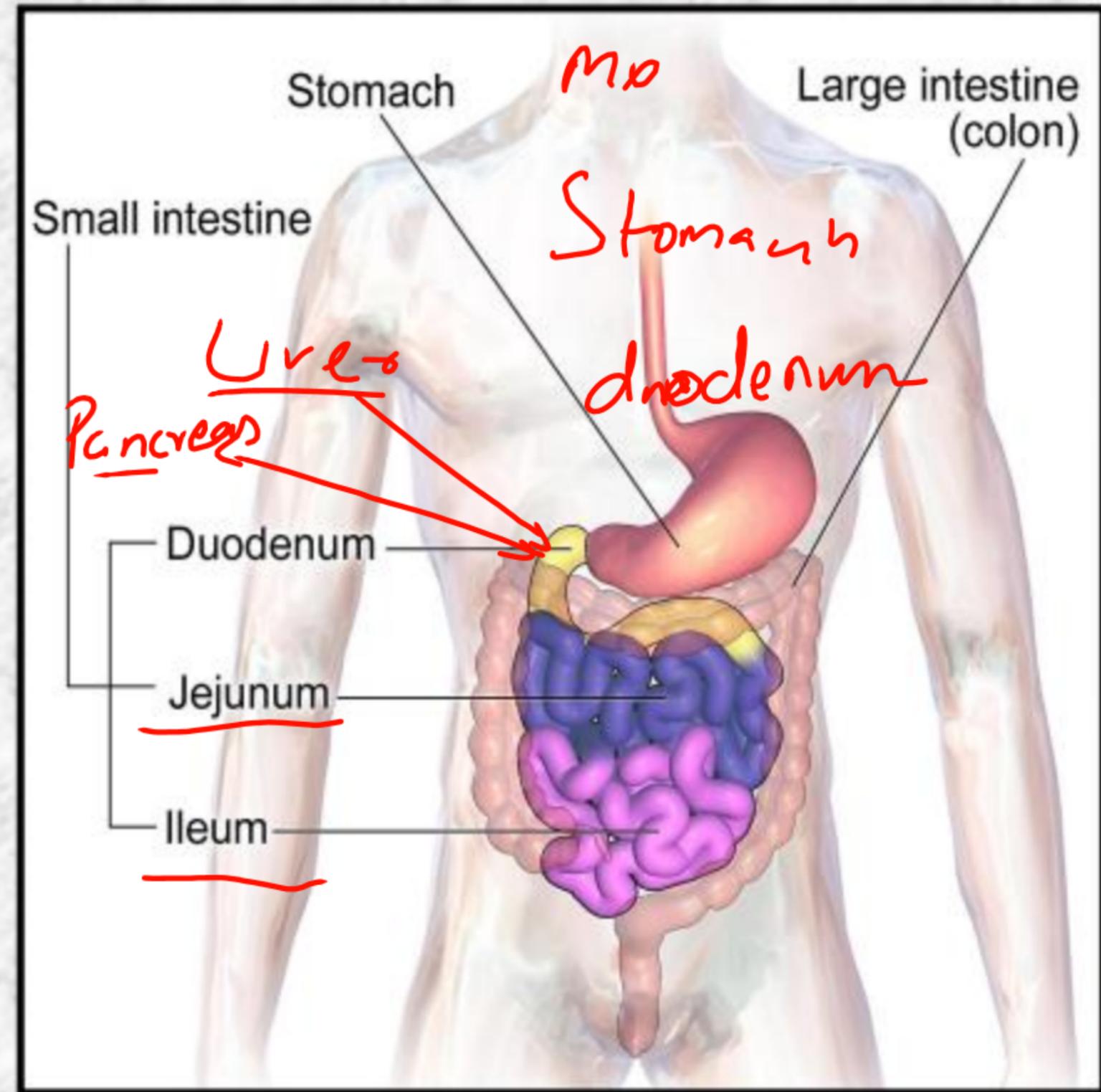
It also receives secretions from the liver and the pancreas.

Besides, its wall also secretes juices.



Small Intestine

- 1. Duodenum** : Initial portion of the small intestine and where absorption actually begins. It receives, Pancreatic enzymes and breaks down the chyme. It also receives bile from Gall which allows for the breakdown and absorption of lipids from food products.
- 2. Jejunum**: Primary function of the jejunum is to absorb sugars, amino acids, and fatty acids.
- 3. Ileum**: The ileum absorbs any remaining nutrients that did not get absorbed by the duodenum or jejunum, in particular vitamin B12, as well as bile acids that will go on to be recycled.
- 4. Duodenum < Jejunum < Ileum (In length 0.25m < 2.5m < 3m)**



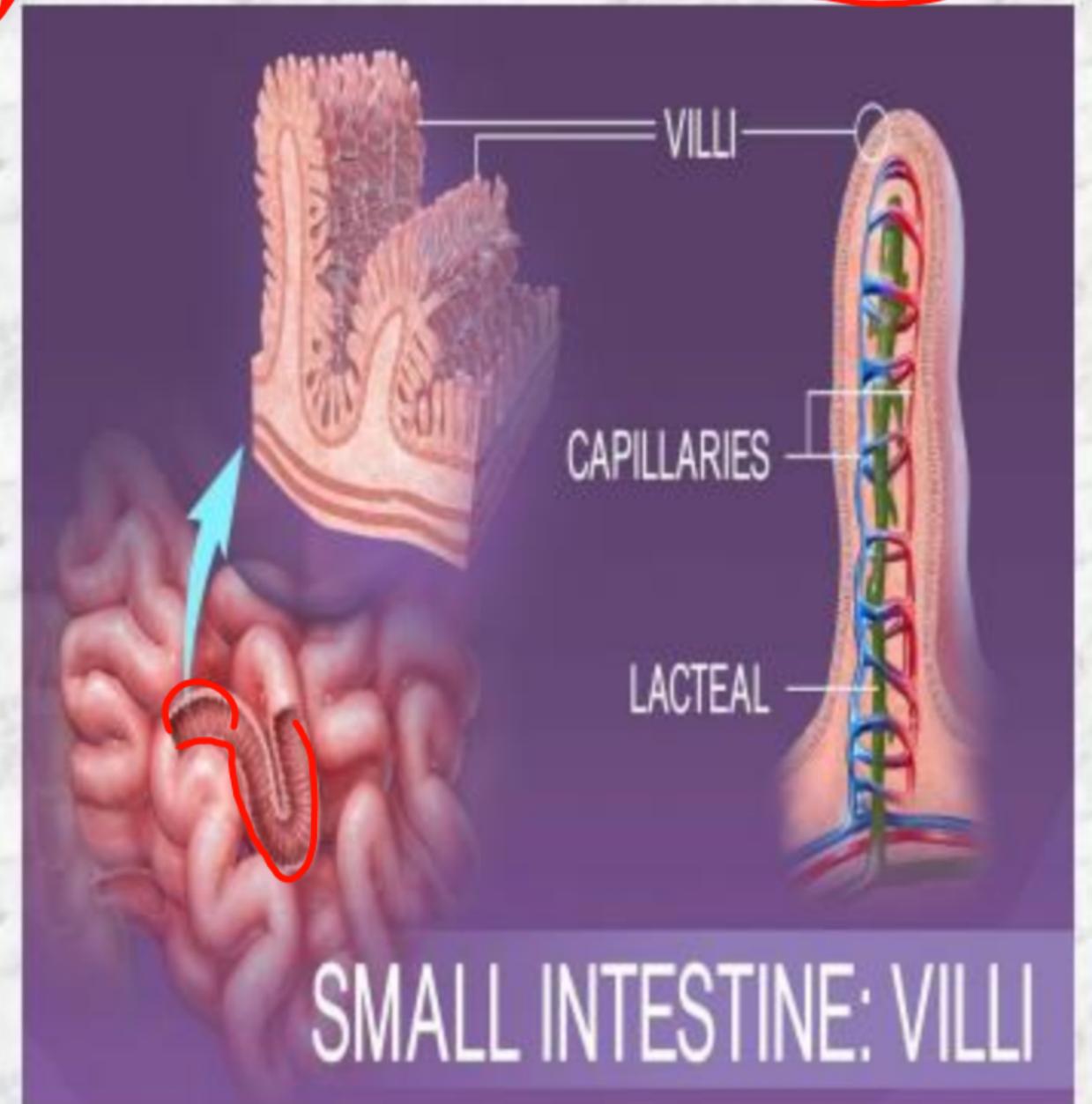
Small Intestine

The digested food passes into the blood vessels in the wall of the intestine. This process is called absorption.

The inner walls of the small intestine have thousands of finger-like outgrowths. These are called villi.

Villi increase the surface area for absorption of the digested food.

The absorbed substances are transported via the blood vessels to different organs of the body where they are used to build complex substances such as the proteins required by the body. This is called assimilation.



Small Intestine

Small intestine receives the secretions of two glands: Liver and pancreas.

Liver secretes bile.

Bile is a greenish yellow liquid made in the liver which is normally stored in the gall bladder.

Bile is alkaline and contains salts which help to emulsify or break the fats or lipids present in the food. It makes the acidic food alkaline which comes from stomach.

Alkaline medium makes it easy for the enzymes to act and digest them.

Pancreas is a large leaf like gland which lies parallel to and beneath the stomach.

Pancreas secretes pancreatic juice which contains digestive enzymes like pancreatic amylase, trypsin and lipase.

The walls of small intestine contain glands which secrete intestinal juice. The intestinal juice contains a number of enzymes which complete the digestion of complex carbohydrates into glucose, proteins into amino acids and fats into fatty acids and Glucose.

Large Intestine

The large intestine is wider and shorter than small intestine. It is about 1.5 metre in length.

Large intestine's function is to absorb water and some salts from the undigested food material.

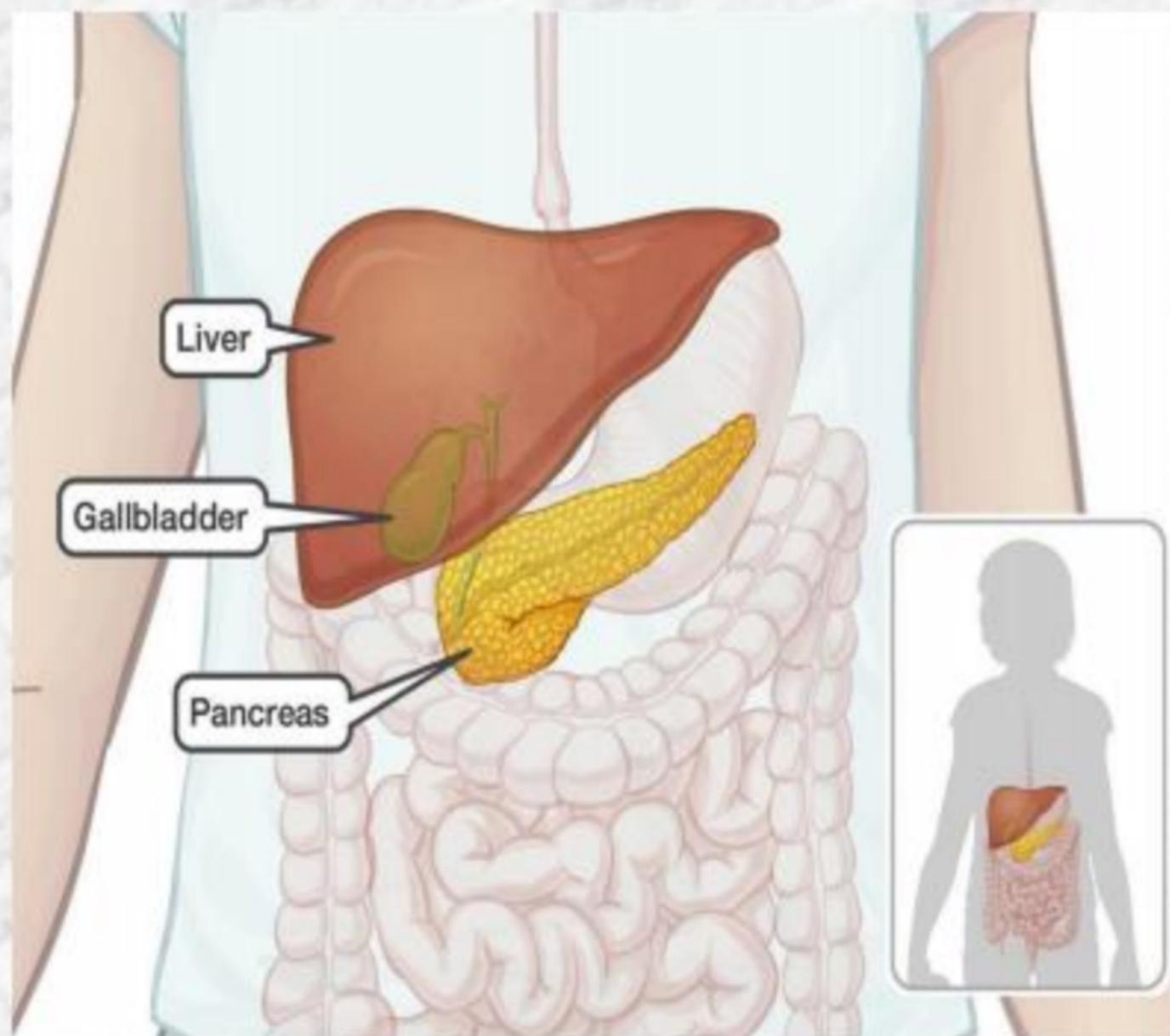
Rectum: An 8-inch chamber that connects the colon to the anus. The rectum receives stool from the colon, sends signals to the brain if there is stool to be evacuated, and holds stool until evacuation can happen.

Anus: The last part of the digestive tract, the anus, consists of pelvic floor muscles and two anal sphincters (internal and external). Together their jobs are to detect rectal contents, whether they are liquid, gas or solid, and then control when stool should and shouldn't be excreted from your body.

Liver, Pancreas & Gall Bladder

Liver

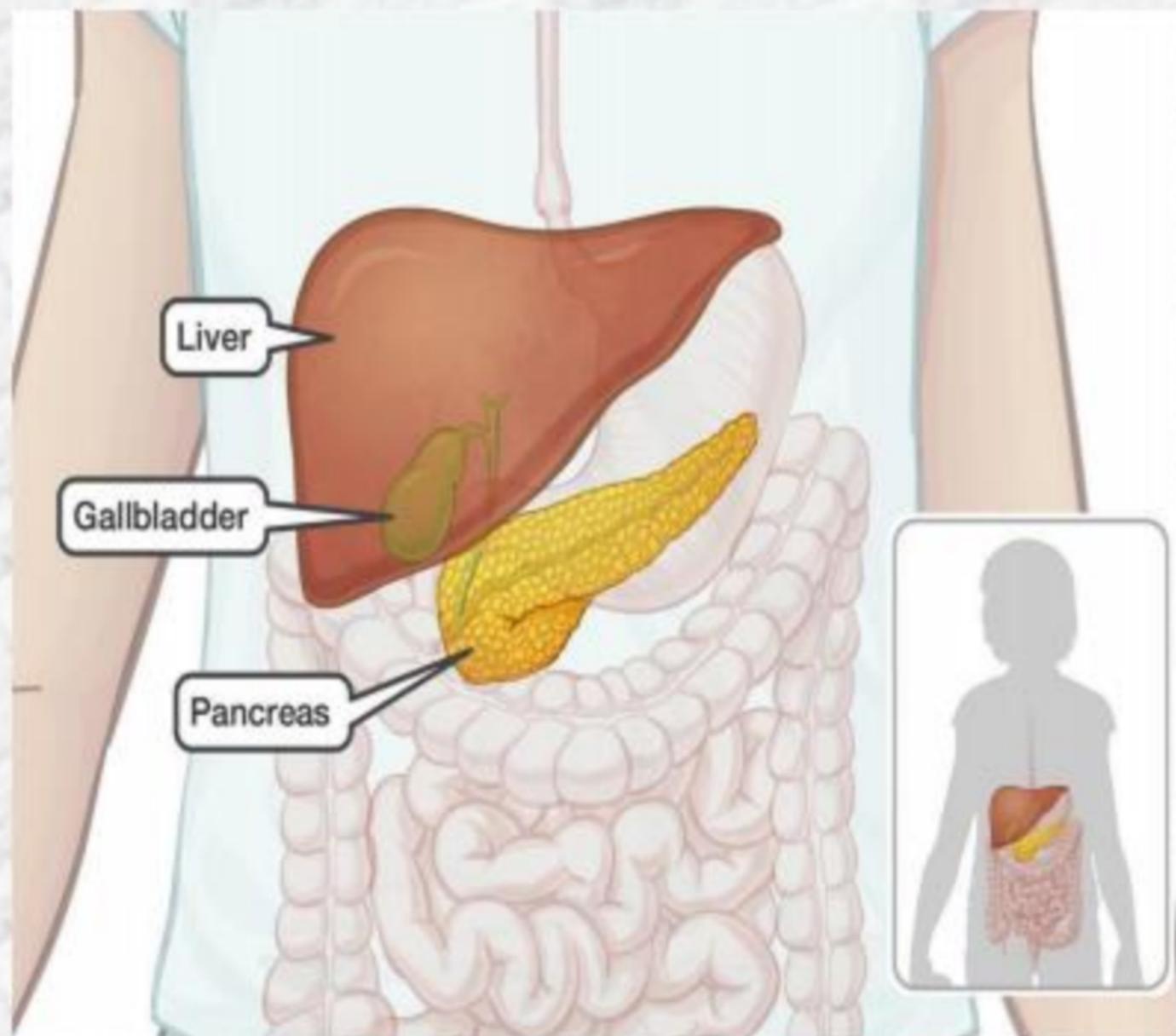
- The liver is the largest gland in the body, weighing about 1.5 kg (3.3 lb) in an adult.
- The liver has many roles in the digestive system.
- It produces a yellow-green fluid called bile, which breaks down fats and removes wastes and toxins from the body
- Bile is alkaline and contains salts which help to emulsify or break the fats or lipids present in the food.
- Bile also helps carry waste from the liver that cannot go through the kidneys.



Liver, Pancreas & Gall Bladder

Pancreas

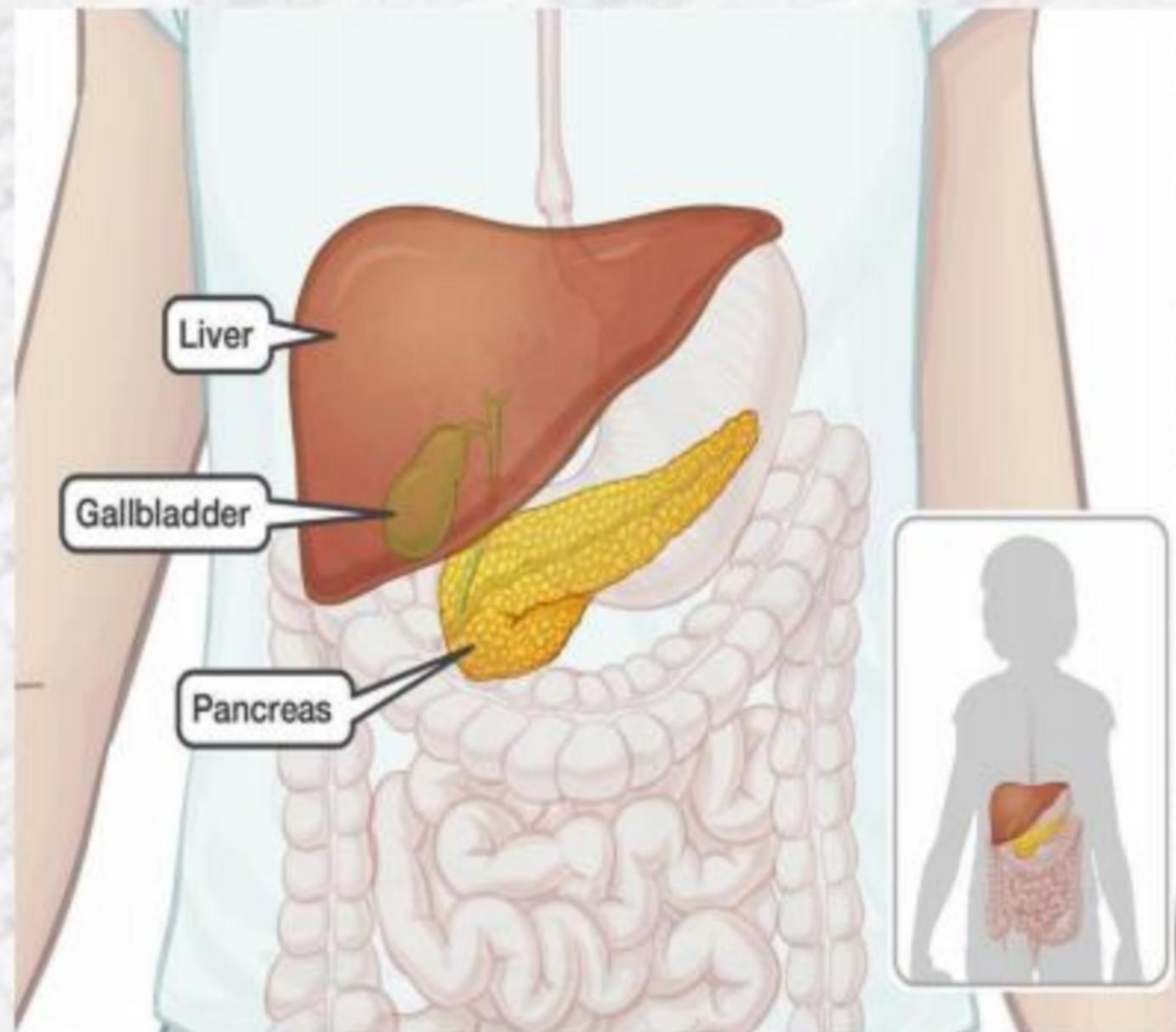
- The pancreas is located below the stomach.
- It produces a mix of enzymes that together are called pancreatic juice.
- The pancreas secretes pancreatic juice which contains digestive enzymes like pancreatic amylase, trypsin and lipase.
- This juice helps neutralize the very acidic chyme when it enters the small intestine.
- Pancreatic juice also helps us to digest proteins, fats and carbohydrates.
- Amylase breaks down the starch, trypsin digests the proteins and lipase breaks down the emulsified fats.



Liver, Pancreas & Gall Bladder

Gall bladder

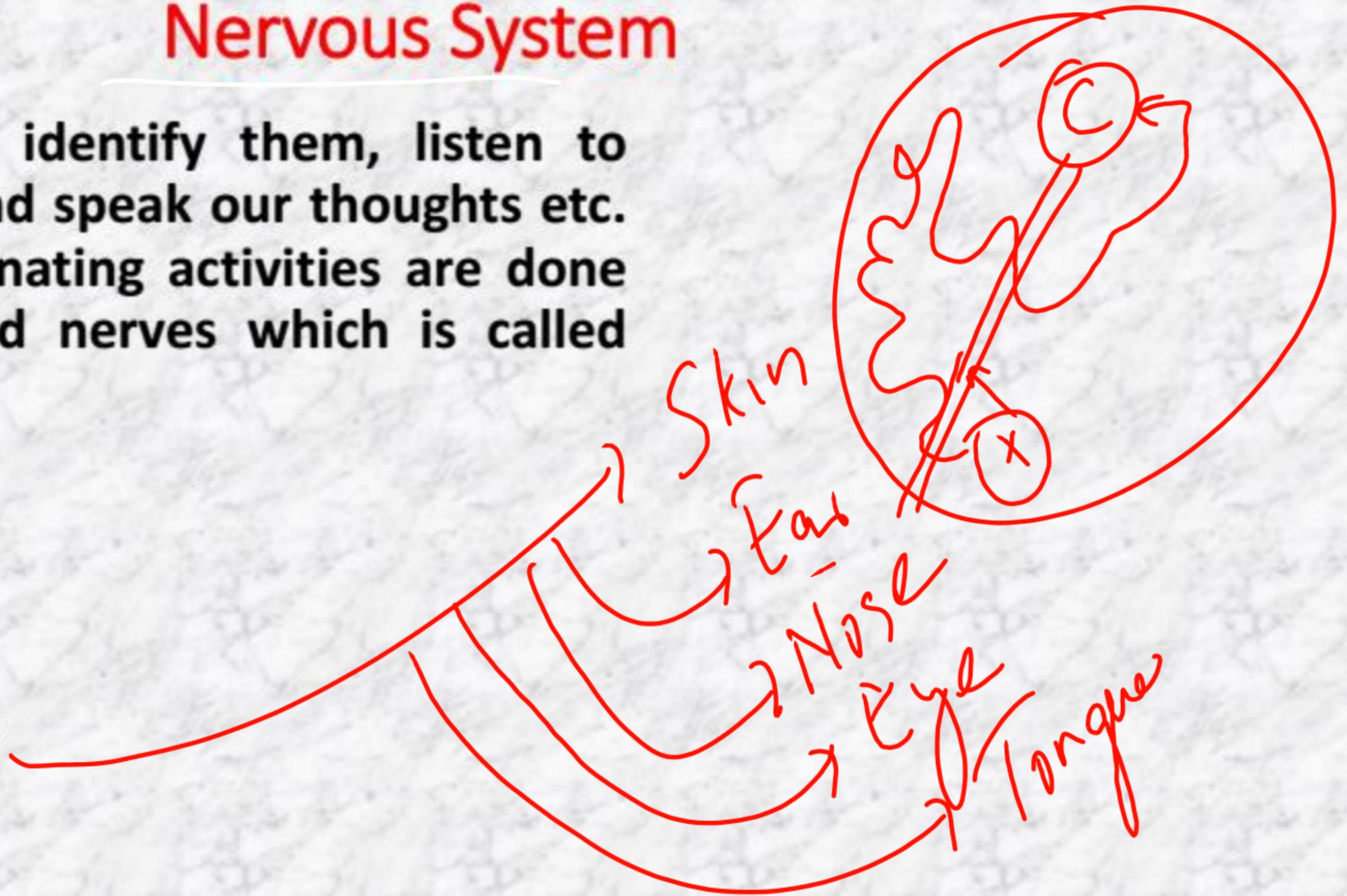
- The gall bladder is a pouch-shaped organ that stores the bile produced by the liver.
- The gall bladder shares a vessel, called the common bile duct, with the liver.
- When bile is needed, it moves through the common bile duct into the first part of the small intestine, the duodenum.
- It is here that the bile breaks down fat.



Nervous System

We see people, identify them, listen to their thoughts and speak our thoughts etc. All these co-ordinating activities are done by our brain and nerves which is called nervous system

1. brain
2. Spinal cord
3. nerves
4. sensory organs



Nervous System

brain - human brain is a soft and delicate part. It is around 3 to 5 kg kilograms in an adult. This part is safe in skull.

Human brain is the biggest size in all living organisms. It has the only secret of how humans can do all other works that other organisms cannot do.

Parts of brain:

Fore brain: this is the biggest part of brain. Its main function is to think and remember. This part is related to will power, intelligence and consciousness. It also gives us other areas related to knowledge centre like speaking, seeing, taste and smell.

Mid brain: this is a small part found below fore brain and back side of skull. Its function is to control various muscles.

Medulla oblongata - this is also known as pillar of brain. Its function is to control involuntary activities like heart rate and exhale breathing

✓ Fore
✓ Mid
✓ Medulla

Frontal Lobe

- Motor control (premotor cortex)
- Problem solving (prefrontal area)
- Speech production (Broca's area)

Temporal Lobe

- Auditory processing (hearing)
- Language comprehension (Wernicke's area)
- Memory / information retrieval

Brainstem

- Involuntary responses

Parietal Lobe

- Touch perception (somatosensory cortex)
- Body orientation and sensory discrimination

Occipital Lobe

- Sight (visual cortex)
- Visual reception and visual interpretation

Cerebellum

- Balance and coordination

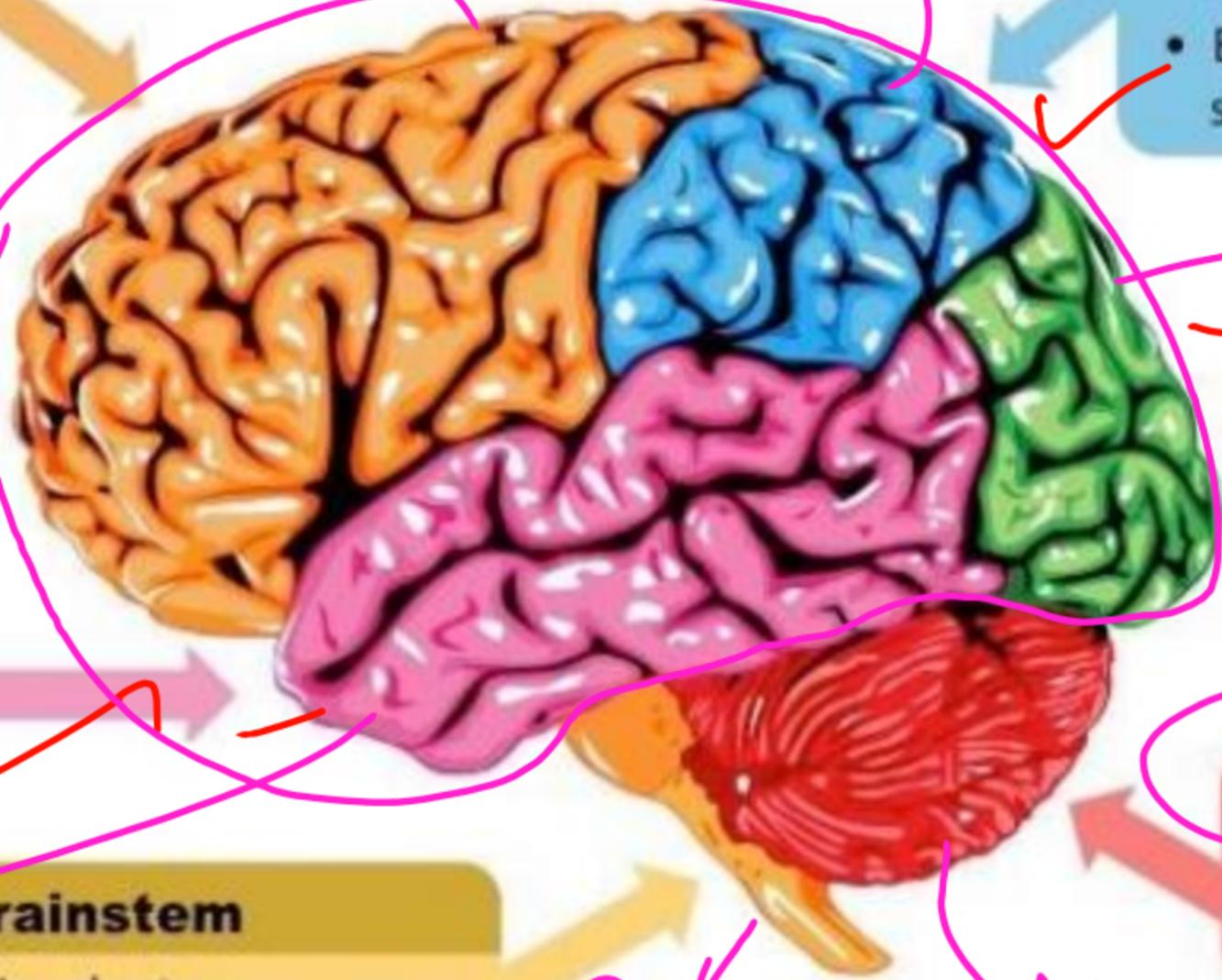
Thinking → *Touch/Sensory*

Vision

Memory Comprehension

Involuntary action

Balance and coordination



Nervous System

2. **Spinal cord** - this is a pipe like structure starting from brain and going to backbone internally in body. All message sent from brain to body reach by this pipe. This also helps in giving fast reaction like if a thorn pricks than we take our hand back internally.

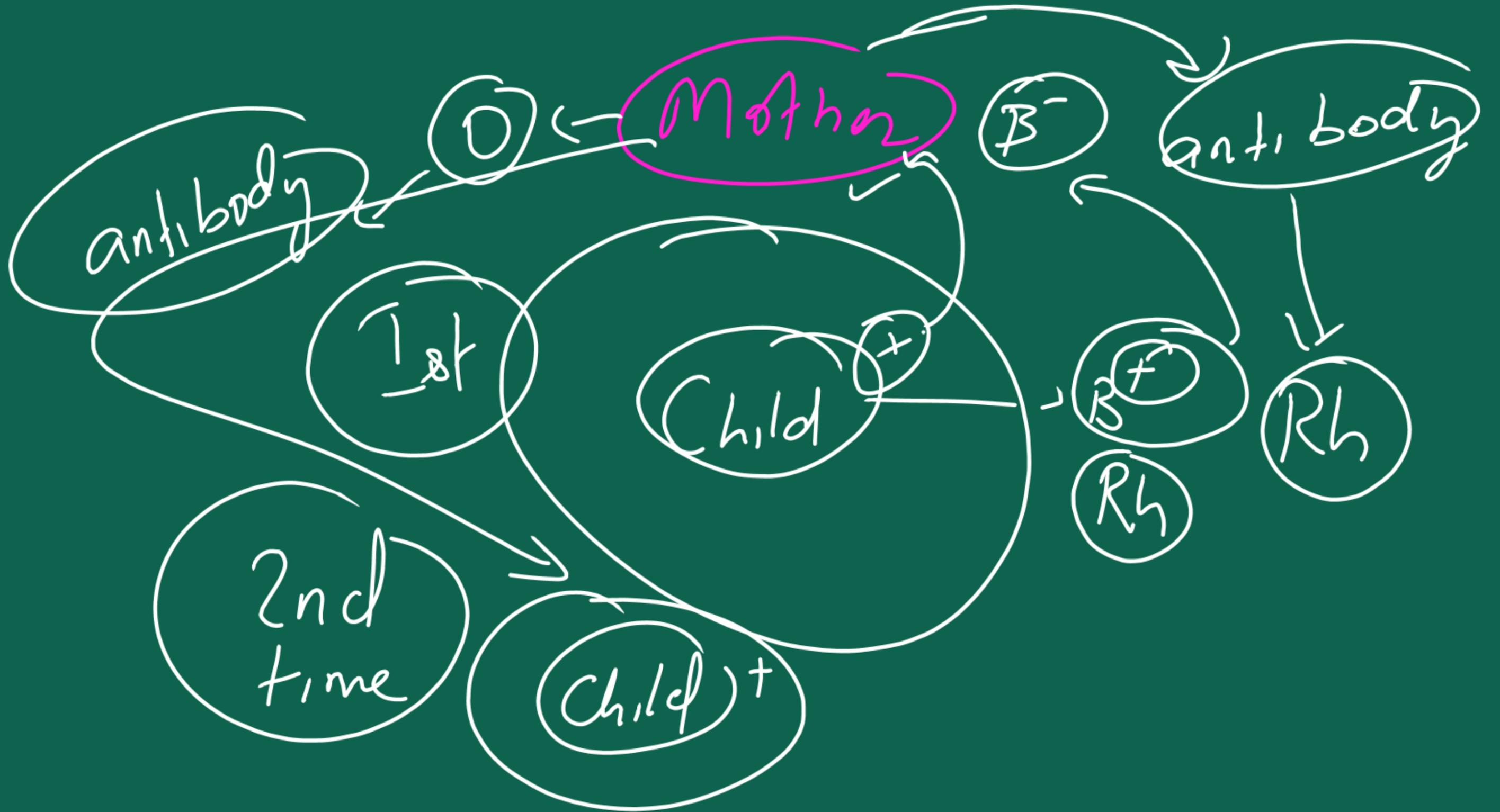
3. **Nerves**- Nerves carry electrical signals from brain that help you feel sensations and move your muscles. Nerves also control body functions like digesting food and maintaining your heart rate. Nerves are one of the foundational parts of your nervous system.

Disease in Human Body

Human Circulatory System

- Erythroblastosis foetalis

- A special case of Rh incompatibility (mismatching) has been observed between the Rh-ve blood of a pregnant mother with Rh+ve blood of the foetus.
- Rh antigens of the foetus do not get exposed to the Rh-ve blood of the mother in the first pregnancy as the two bloods are well separated by the placenta.
- However, during the delivery of the first child, there is a possibility of exposure of the maternal blood to small amounts of the Rh+ve blood from the foetus.
- In such cases, the mother starts preparing antibodies against Rh antigen in her blood.
- In case of her subsequent pregnancies, the Rh antibodies from the mother (Rh-ve) can leak into the blood of the foetus (Rh+ve) and destroy the foetal RBCs.
- This could be fatal to the foetus or could cause severe anaemia and jaundice to the baby. T
- his condition is called **erythroblastosis foetalis**.
- This can be avoided by administering anti-Rh antibodies to the mother immediately after the delivery of the first child.



Human Circulatory System

- **High Blood Pressure (Hypertension):**

120/80 → 140/90

- Hypertension is the term for blood pressure that is higher than normal (120/80).
- In this measurement 120 mm Hg (millimetres of mercury pressure) is the systolic, or pumping, pressure and 80 mm Hg is the diastolic, or resting, pressure.
- If repeated checks of blood pressure of an individual is 140/90 (140 over 90) or higher, it shows hypertension.
- High blood pressure leads to heart diseases and also affects vital organs like brain and kidney.

- **Coronary Artery Disease (CAD):**

- Coronary Artery Disease, often referred to as atherosclerosis, affects the vessels that supply blood to the heart muscle.
- It is caused by deposits of calcium, fat, cholesterol and fibrous tissues, which makes the lumen of arteries narrower.

Human Circulatory System

- **Angina:**
- It is also called 'angina pectoris'.
- A symptom of acute chest pain appears when no enough oxygen is reaching the heart muscle.
- Angina can occur in men and women of any age but it is more common among the middle-aged and elderly. It occurs due to conditions that affect the blood flow.
- **Heart Failure:**
- Heart failure means the state of heart when it is not pumping blood effectively enough to meet the needs of the body.
- It is sometimes called congestive heart failure because congestion of the lungs is one of the main symptoms of this disease.
- Heart failure is not the same as cardiac arrest (when the heart stops beating) or a heart attack (when the heart muscle is suddenly damaged by an inadequate blood supply)

Dengue

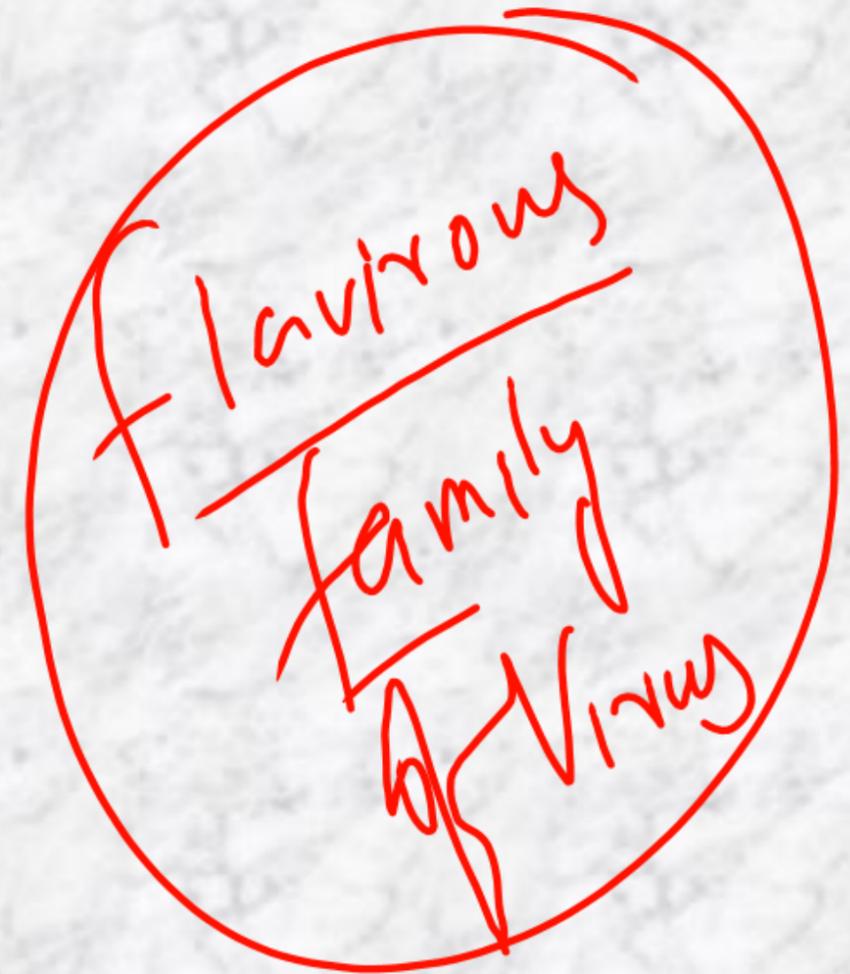
Dengue is an acute fever caused by virus. It is of two types: (i) Dengue fever, (ii) Dengue hemorrhagic fever.

Dengue fever is characterized by an onset of sudden high fever, severe headache, pain behind the eyes and in the muscles and joints.

Dengue hemorrhagic fever is an acute infectious viral disease.

It is an advanced stage of dengue fever.

It is characterized by fever during the initial phase and other symptoms like headache, pain in the eye, joint pain and muscle pain, followed by signs of bleeding, red tiny spots on the skin, and bleeding from nose and gums.



Dengue

How does Dengue spread?

Dengue spreads through the bite of an infected Aedes aegypti mosquito.

The transmission of the disease occurs when a mosquito bites an infected person and subsequently bites a healthy person.

In doing so, it transmits blood containing the virus to the healthy person and the person becomes infected with dengue.

Tuberculosis

Pathogen: A bacterium (Mycobacterium tuberculosis).

Mode of Transmission: airborne-discharged through sputum, cough and sneeze, of the infected person.

Incubation period: 2-10 weeks during which the bacteria produce a toxin, tuberculin.

Tuberculosis (TB) is caused by a bacterium called Mycobacterium tuberculosis.

The bacteria usually attack the lungs, but TB bacteria can attack any part of the body such as the kidney, spine, and brain.

TB bacteria spread through the air from one person to another.

When a person with TB disease of the lungs or throat coughs, speaks, or sings, TB bacteria can get into the air.

People nearby may breathe in these bacteria and become infected.

Malaria:

Malaria is a serious and sometimes fatal disease caused by a parasite that commonly infects a certain type of mosquito which feeds on humans.

People who get malaria are typically very sick with high fevers, shaking chills, and flu-like illness

Malaria is associated with the Anopheles mosquito, whereas the other two diseases (Chikungunya & Dengue) are caused due to an infection spread by the Aedes mosquito.

While dengue and chikungunya are insect-borne viral diseases, malaria, on the other hand, is caused by a parasite called Plasmodium.

Plasmodium
Anopheles
mosquito

Cancer:

Tumors can be cancerous or not cancerous (benign).

Cancerous tumors spread into, or invade, nearby tissues and can travel to distant places in the body to form new tumors (a process called metastasis).

Cancerous tumors may also be called malignant tumors.

Many cancers form solid tumors, but cancers of the blood, such as leukemias, generally do not.

Benign tumors do not spread into, or invade, nearby tissues.

When removed, benign tumors usually don't grow back, whereas cancerous tumors sometimes do.

Benign tumors can sometimes be quite large, however.

Some can cause serious symptoms or be life threatening, such as benign tumors in the brain.

Pneumonia

Bacteria like Streptococcus pneumoniae and Haemophilus influenzae are responsible for the disease pneumonia in humans which infects the alveoli (air filled sacs) of the lungs.

As a result of the infection, the alveoli get filled with fluid leading to severe problems in respiration.

The symptoms of pneumonia include fever, chills, cough and headache. In severe cases, the lips and finger nails may turn gray to bluish in colour.

A healthy person acquires the infection by inhaling the droplets/aerosols released by an infected person or even by sharing glasses and utensils with an infected person.

Respiratory Disorders



UPSC



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THANKS FOR WATCHING

