

ANATOMY ASSIGNMENT

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QUESTION NO 1.

Write a paragraph on the process of digestion? Highlight the functions of each organ involved?

- **DIGESTION**

INTRODUCTION:

Digestion is a process by which ingested foods are broken down into smallest parts so the body can use them to build and nourish cell and to provide energy.

The digestive system is made up of digestive tract – a series of hollow organs joined in a long, twisting tube from the mouth to the anus – and other organs that help the body to break down and absorb food.

Digestion involves mixing food with digestive juices, moving it through the digestive tract and breaking large molecule of food into smaller molecules . Digestion begin in mouth and completed in the intestine.

- **PROCESS OF DIGESTIVE SYSTEM:**

1.Ingestion : Taking food into gastrointestinal tract.

2.Propulsion : Mixes and move bolus along the alimentary tract.

3.Digestion : consist of,

Mechanical digestion of food – mastication .

Chemical digestion of food – help of enzymes .

4.Absorbtion : when food absorbed then nutrients get into the blood.

5.Elimination: food substances that cannot digested and absorbed excreted by alimentary tract by faeces called defecation.

ORGANS INVOLVED IN DIGESTIVE SYSTEM:

1. Mouth.
2. Pharynx.
3. Esophagus.

4. Stomach.
5. Small intestine.
6. Large intestine.

ACCESSORY ORGANS:

1. Liver.
2. Gallbladder.
3. Pancreas .
4. Salivary gland.

FUNCTION OF EACH ORGAN:

MOUTH

- Consist of buccal cavity /Oral cavity.
- Palate: for roof of the mouth, soft and hard palate and uvula.
- Lubricating the food particles.

TONGUE

- Muscular organ _manipulates food for mastication and help in swallowing and help in Mechanical digestion.
- Help to grind food in to bolus which contain partially digested food and saliva.
- Help to form words and sensory organ of taste.
- Tongue surface contain papillae.

TEETH

- Two incisors: for cutting.
- One canine: for tearing.
- Two premolar : for crushing.
- Three molar: for grinding.

SALIVARY GLAND

- Consist of pair of 3 glands **sublingual, sub mandibular, parotid gland.**
- Produces and secretes saliva.
- Dissolve food chemicals so they can be tasted.
- Moistens food, compacting it into bolus.
- Begin chemical digestion.
- Salivary amylase – convert starch.

PHARYNX

- Function of pharynx is deglutition = swallowing.
- Oropharynx is cone shape passage way for food.

ESOPHAGUS

- Known as food pipe, muscular tube connecting mouth with the stomach.
- The bolus passes through the esophagus by automatic contraction called peristalsis.
- Have two muscular sphincter, one at the top and other at the end.
- Diameter 2cm, length 2cm.
- Function: swallowing ,
- Reduces gastric reflux.

STOMACH

- Food enters the stomach from esophagus where physical and chemical break down of food begins, convert the food bolus to a pulp called chyme.
- Large stretchy bag situated in the middle of the chest behind liver.
- Have 4 region:
Cardiac region, funds region, body ,pylorus.
- FUNCTION OF STOMACH
- It stores food.
- It break down large fat and protein molecules.
- It empties the partially digested chyme into duodenum.
- Gastric cells are:

Mucus cells :: mucus releasing protect lining.

Parietal cells :: release HCl, intrinsic factor.

Chief cell :: pepsin for digestion of proteins.

D cells :: secretes somatostatin.

G cells :: release gastrin.

SMALL INTESTINE

- The small intestine where most chemical digestion takes place: peptides are broken down into amino acid, lipids into fatty acid and glycerol and carbohydrates into simple sugar.
- Chyme is mixed with digestive juices including bile from liver and pancreatic juices from pancreas.
- About 17 feet in length , diameter 3-4 cm.
- Consist parts of:
 - Duodenum:** chyme received from the stomach into duodenum.
Inside duodenum chyme mixed with bile and pancreatic juices convert chyme into smaller particles.
 - Jejunum:** where chemical break down of food completed .
 - Ileum :** last part of small intestine . Main function of ileum is to absorb bile and return to the liver.

FUNCTION OF SMALL INTESTINE

- Most of food nutrients absorb here.The intestinal wall of small intestine covered with folded wrinkles called **rugae** which are themselves covered in millions of finger like projection called microvilli
- Inside each villus is a series of lymph vessels and blood vessels where chyme nutrients get absorbed into blood stream.

LIVER

- Solid digestive organ: largest organ in human body.
- The liver has a multitude of important and complex function.

FUNCTION

- Help in metabolism

Carbohydrates metabolism, fat metabolism ,protein metabolism

- Detoxification

Liver own phagocytes which reside with in the lobules known as puffer cell

- Storage

Vitamin A, B12, k, D.

- Synthesized bile and stored in gall bladder.

PANCREAS

- The pancreas is elongated organ lies close to duodenum.
- Consist parts of: head, body and tail.

FUNCTION

- Pancreatic islets are involved to control sugar level.

Exocrine gland: has two components Acinar cells and ducts .

Acinar cells secretes enzymes, have network of ducts.

Endocrine gland: has nests of cells called Islets of Langerhans.

1.Alpha cell secretes **glycogen**.

2.Beta cell secretes **insulin**.

3.Delta cell secretes **somatostatin**.

4.Gyma cell secretes **pancreatic polypeptide**.

LARGE INTESTINE

- Large intestine is the thick tube of 5 feet in length
- Consist parts of:

Caecum: is a short pouch into which food enters from ileum and exit to colon.

Colon: largest part of large intestine.

Rectum: The rectum is final segment faeces formed in the colon and collected in the rectum.

Anus: the anal canal short passage of 1.5 inches long, terminating in two muscular sphincter rings , allow the faeces to discharge

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Question no 2

How kidneys involve in urine formation? Describe the process step by step?

EXCRETORY SYSTEM:

INTRODUCTION:

Metabolism of food and other chemicals in the body produces large amount of toxic by products. Excretory system consist of all organs that aid the body in removing waste products, excess water and salt from blood and maintaining PH

KIDNEYS

- The kidneys are dark red , slightly flattened, bean shaped organs about **12 cm** long ,**6 cm** wide, **4 cm** thick, weight **150 gms**.
- **LOCATION:**
kidneys are placed against the back wall of abdominal cavity just below the diaphragm between last thoracic and third lumbar vertebrae.Upper parts are protected by **11 and 12 ribs**.
- **INTERNAL STRUCTURE:**
Transverse section of kidney shows two distinct regions
.an outer **cortex**.
.an inner **medulla**.
- **NEPHRON**
Is the structural and functional important cell of kidney.
Cortex contains renal corpuscle and convoluted tubules of neurons.
Medulla contains conical structures called pyramids. All pyramids project into pelvis. The pelvis leads into the ureter.

URETER

- About 28cm long.
- In pair of narrow , muscular , tubular structure arise from hilus.
- Pass urine from kidney to urinary bladder.

URINARY BLADDER

- Pear shape sac situated in the pelvic region.
- Capacity about 1 litre.
- Urine pass out from bladder. The act of emptying the bladder called **micturition**.

URETHRA

- Male 20cm long.
- Female 2-3cm long.
- The urethra starts from the neck of urinary bladder and leads to the exterior.

KIDNEY INVOLVE IN URINE FORMATION.

Each kidney contain about **1 million** nephrons. Each nephron is composed of:

RENAL CORPUSCLE: is composed of a **glomerulus** and **Bowman's** capsule. It is the initial filtering component of nephron.

Glomerulus: is a capillary tuft that receives its blood supply from an afferent arteriole.

Bowman's capsule: is cup shape structure encloses glomerulus.

Podocytes: cell of Bowman's capsule wrap around capillaries. Pored and the gaps between podocytes are quite large to make blood plasma easily filtered here.

RENAL TUBULES: is composed of:

Proximal convoluted tubule: longest part of nephron which leads duct system of nephron from Bowman's capsule to Henle loop.

Loop of Henle: U shape tube of nephron filter out salt and maintain balance of water.

Distal convoluted tubule: distal part of nephron control blood PH.

Collecting duct: Each distal tubule lead to system of collecting.

MECHANISM OF URINE FORMATION

STEP 1:

GLOMERULUR FILTRATION

- It is filtration under pressure. Each nephron has a microscopic filter called glomerulus
- Glomerulus is a tuft of capillaries nestled inside a cup Bowman's capsule.
- Most capillaries beds are sandwich between arterioles and venules .

- The hydrostatic pressure develop as blood passes through capillaries bed.
- Afferent arterioles deliver blood in to glomerulus while efferent arterioles carry blood away.

The filter has to cross endothelium of glomerulus, basement membrane of capillaries and endothelium of Bowman's capsule.

- Endothelium has large pore approx. 70-100nm through which solutes, proteins and fluid can pass but blood cells cannot.
- Basement membrane of capillaries consist of 3 layers fused with endothelial layer. It's job is to prevent plasma proteins from being filtered out of blood stream.
- Epithelium of Bowman's capsule consist of specialized cell podocytes are attached to basement membrane by pedicels, leave slits called filtration slits.

Now filtrate has same chemical composition similar to that of blood plasma, contain glucose , amino acids, vitamins, ions nitrogenous wastes ,water.

Net filtration rate= outward glomerulus - inward force of plasma - inward force of capsular

$$= \begin{matrix} \text{hydrostatic pressure} & & \text{colloid osmotic pressure} & & \text{hydrostatic pressure} \\ + 60\text{mmHg} & - & (- 32\text{mmHg} & - & 18\text{mmHg}) \end{matrix} .$$

Net outward pressure = + 10mmHg.

Rate 180 litre/ day.

STEP 2:

TUBULAR REABSORPTION

PROXIMAL CONVOLUTED TUBULE

- Filtration produces about 125ml glomerulus filtrate per min but in 125 ml per min produced 124ml per min reabsorbed equivalent to 180 liter per day.
- Reabsorption process in tubules are selective .
- 80% of glomerulus filtrate is reabsorbed in proximal convoluted tubules .Here all glucose, vitamin, Nacl and water are reabsorbed.
- Water moves from proximal convoluted tubules to capillaries by osmosis.

LOOP OF HENLE

- Function of loop of Henle is to conserve water.
- The wall of descending limb is impermeable however sodium, chloride, potassium and other ions are absorb actively.
- The plasma becomes concentrated and fluid in ascending limb becomes dilute is highly permeable to water.
- The counter current multiplier system results to reabsorb water and solutes.

DISTAL CONVOLUTED TUBULE

- Have osmoregulatory role
- also control blood PH by secreting H ions

COLLECTING DUCT

- Impermeable collecting ducts.
- ADH opens water channels in collecting ducts to allow water to move out of filtrate.
- Reduces volume of urine making it more concentrated.

STEP 3:

TUBULAR SECRETION.

- Tubular secretion mainly occur by active transport
- Substances are secreted which are present in great excess or are natural poison.
- Many drugs, hydrogen ions are eliminated by tubular secretion.
- Hydrogen ion secretion are important in acid-base balance of the body.

