DIGESTIVE SYSTEM (lab)

By Dr. Heba Sharaf Eldin Associate Professor of Histology & Cell Biology

The digestive system is made up of:

- I- The oral cavity
- II- The gastro-intestinal tract (GIT).
- 1-Esophagus
- 2- Stomach
- 3- Small intestine; (duodenum, jejunum, and ileum)4-Large intestine

III- Glands associated with the digestive tract

- 1 Salivary glands (major and minor)
- 2 Pancreas
- 3 Liver and gall bladder

lips

The core of the lip consists of striated muscle fibers (orbicularis oris) and connective tissue

Each lip has 3 surfaces:

- Outer surface is skin
- Red margin is a transition zone. rich in blood vessels that cause redness of the lip margin.
- Inner surface is mucus membrane



lips

Outer surface

Orbicularis oris

Inner surface

Tongue

striated Muscle fibers are grouped in bundles arranged in 3 different planes and separated by C.T.

- Lower surface is smooth and covered by mucous membrane.
- Upper surface (dorsal surface): the anterior 2/3 of is separated from the posterior 1/3 by a V-shaped sulcus.
- a) The anterior two thirds are covered by a great number of small mucosal projections called lingual papillae.
- b) The posterior one third is irregular due to presence of lymphoid nodules in the lamina propria.



Lingual papillae

- Each papilla has a core of C.T covered with stratified squamous epithelium.
- There are four types:

a) Filiform b) Fungiform c) Circumvallate d) Foliate







Tongue



II- Gastrointestinal Tract

- □ From esophagus to rectum, the digestive tract is a hollow tube with common histological characteristics.
- □ There are regional variations based on functional differences.
- The wall of the tube is composed of 4 layers, concentrically arranged around a lumen.

I- Mucosa II- Submucosa III- Musculosa IV- Serosa (or adventitia)





Structure:

I- Mucosa:

- Epithelium: stratified squamous nonkeratinized (protective)

- Lamina propria: loose C.T.

- Muscularis mucosa: inner circular and outer longitudinal smooth muscle layers.

II- Submucosa:

Dense C.T. containing mucus secreting esophageal glands.

III- Musculosa:

- Inner circular and outer longitudinal layers of muscle fibers:

I- In the upper 1/3, it is formed striated muscle.

II- In the middle third, it is formed of both smooth and striated muscle fibers.

III- In the lower 1/3, it is formed of smooth muscle.

IV- Adventitia: The intra abdominal lower part of the esophagus has a serosa.



Oesophagus







Stomach

Histologically, 3 regions

- Cardiac region that surrounds the orifice.
- Fundus and body region.
- Pyloric region.



The wall of the stomach is formed of:

1- <u>Mucosa</u>:

It is folded forming *rugae*.

I) Epithelium: simple columnar mucus secreting cells lining the surface and is invaginated forming the pits (ducts) of gastric glands.

II) Lamina propria: contains gastric glands.

III) Muscularis mucosa: inner circular and outer longitudinal smooth muscle layers.

2- Submucosa:

It is formed of C.T rich in blood vessels, nerves, mast cells and lymphatics.

3- Musculosa:

It is formed of smooth muscle fibers.

- In the <u>fundus</u>: it consists of 3 layers of smooth muscle arranged as inner oblique, middle circular and an outer longitudinal layers.
- In the <u>pylorus</u>: the muscles are arranged into two layers; thick inner circular forming pyloric sphincter and an outer longitudinal layer.

4- <u>Serosa</u>:

• Loose C. T. covered by a serous membrane (peritoneum).

Stomach



Fundus of stomach





Small Intestine

The small intestine is composed of 3 parts: Duodenum, jejunum and ileum

General characteristics:

• The wall of the small intestine is formed of: Mucosa, submucosa, musculosa and serosa. I- <u>Mucosa</u>: The mucosa of the small intestine is covered by simple columnar absorptive epithelium with goblet cells. It shows:

<u>1-Villi</u>: Epithelial finger like projections

2- Crypts: These are epithelial invaginations in between the villi into the lamina propria forming intestinal glands (Cryps of Lieberkuhn).

3- Lamina propria: Loose C.T. containing intestinal glands. In the ileum, it contains large lymphoid follicles (Peyer's patches).

<u>4-Musclaris Mucosa</u>: smooth muscle fibers

inner circular & outer longitudinal.



II- <u>Submucosa</u>:

It is formed of loose C.T. rich in blood vessels, nerves and lymphatics.

- in the duodenum; it contains Brunner's glands that secrete mucus.
- The jejunum has no Brunner's glands or Peyer's patches.

III- Musculosa:

It is formed of 2 layers of smooth muscle, inner circular & outer longitudinal layers.

IV- <u>Serosa:</u>

It consists of loose C. T. covered by mesothelium.

Duodenum



lleum



Duodenum

Jejunum

lleum



Large Intestine

• Functions:

- Absorption of water.
- Secretion of protective mucus.
- Formation of fecal mass.
- It consists of caecum, appendix, ascending, transverse, descending and pelvic colons, and rectum.



Microscopic structure:

I- Mucosa:

It has no villi, only crypts are present.

- a) Epithelium: simple columnar absorptive cells with *numerous* goblet cells.
- The crypts (glands) are lined by simple columnar cells, large numbers of goblet cells, entero-endocrine cells (few) and undifferentiated stem cells.
- b) Lamina propria is rich in lymphocytes and lymphatic nodules.

c) Muscularis mucosa ":2 layers of smooth muscle; Inner circular and outer longitudinal.

II- Submucosa:

Loose connective tissue, lymph nodules may extend to it from mucosa. It has no glands.

III- Musculosa: It is formed of :

- continuous inner circular,
- while the outer longitudinal are collected into 3 bands called taenia coli.

IV- Serosa:

The serous membrane enclose adipose tissue in sac like structure called appendices epiploicae.



Large Intestine





Large Intestine





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Vermiform Appendix

- The lumen is small and irregular.
- Abundant lymphoid follicles in the wall.
- Few and short crypts.
- Muscularis mucosa is not well developed.
- No taeniae coli.



General structure of salivary Glands :

A) Stroma:

a) Capsule: Each gland is surrounded by C. T. capsule.

b) C. T. septa arise from the capsule containing blood vessels, nerves and ducts and dividing the gland into lobes and lobules.

c)Reticular network.

B) Parenchyma:

It is formed of <u>secretory part (acinus</u>) and <u>excretory part (duct)</u>

I-The secretory part (The acini) 3 types:

Serous acini:

- have narrow lumen.
- cells are pyramidal, with central rounded nuclei, basal basophilia and apical acidophilic cytoplasm.

Mucous tubules:

- have wide lumen.
- cells are cuboidal, with peripheral flat nuclei and apical foamy pale cytoplasm.

Mixed acini:

They are mucous **tubules t**hat have a crescent (demilune) of serous cells.

Myoepithelial cells

are present between the cells and the basement membrane.

II-<u>The excretory part (ducts):</u>

- Intralobular ducts include:

a) Intercalated ducts :started from the lumen of the acinus. lined with simple cubical epithelium.

b)Striated ducts

lined with simple columnar cell

- Extralobular ducts



* The parotid glands Have serous acini only.

* The submandibular glands:

mainly serous acini and some mucous tubules with serous demilunes.

*The sublingual glands:

mainly mucous tubules with some serous demilunes (no free serous acini).

parotid gland



Mixed salivary gland



Pancreas

- mixed exocrine and endocrine gland

<u>1- Stroma</u>: C. T. capsule and septa are very thin.
<u>II - Parenchyma</u>

- A) The exocrine portion:
- It is serous acini show:



- **Prominent** basal basophilia (more rER).
- Prominent apical acidophilic granules.
- **B)** <u>The endocrine portion</u>:
- It is called islets of Langerhans.

<u>They appear in H & E section</u> as pale rounded groups of cells in between the deeply stained serous acini.

LM Pancreatic acinus



Pancreas (islet of Langerhans)







Liver

<u>Structure</u>: The liver is composed of stroma and parenchyma.

1- Stroma:

a- Capsule of connective tissue

covered partially with peritoneum.

b- C.T. septa:



- The capsule sends C.T septa in between lobes and lobules.
- the amount of C.T. differs in different species of animals (very scanty in man, so the lobulation is indistinct).
- Reticular network formed of reticular fibers
- <u>2- Parenchyma (hepatocytes-Bile canaliculi -Blood</u> sinusoids)

Classic hepatic lobule

- Hepatic lobule is a polygonal mass of liver cells which drain into a vein in its center called *central vein*.
- The *cords* of liver cells are <u>directed from</u> the periphery of hepatic lobule to its central vein.
- At the corners of each hepatic lobule there are *portal areas (triad)* which are formed of connective <u>tissue</u> containing 3 structures.
- Branch of portal vein.
- Branch of hepatic artery.
- Bile duct.







Classical hepatic lobule









Classical hepatic lobule



Liver (Reticular fibres)



Gall bladder

It is a cyst (sac-like) organ present on the lower surface of the liver.

Its wall consists of:

1- Mucosa:

Epith: Simple columnar epithelium.

- LP: of loose C. T.
- 2- Muscle layer: of smooth muscle.
- **3- Perimuscular C.T**

Gall bladder

lined partially by peritoneum.

has no villi, no goblet cells, no glands and no muscularis mucosa.

Function: storage and concentration of bile

Gall bladder



