



THE



SYSTEM

Histology

Sheet

Slide

Handout

Number: **3**

Subject: **Large intestines, Liver, Gallbladder&pancreas**

Done By: **Lina I. Mansour**

Corrected By: **Abdullah Qaswal**

Doctor: **H. Mohtaseb**

Date: **0/0/2016**

Price:

Histology of the Large intestines

* Gray's Anatomy define the large intestine as the combination of the cecum, colon (ascending , transverse ,descending ..) , rectum, and anal canal.

Let me revise you with the most significant histological features of small intestines :

- ✓ Presence of microvilli & villi >>to increase the surface area
- ✓ Plicae circulares
- ✓ crypts of lieberkuhn (intestine glands within the lamina propria)
- ✓ Paneth's cells (secrete lysosomes)
- ✓ Peyer's patches (lymphoid tissue)

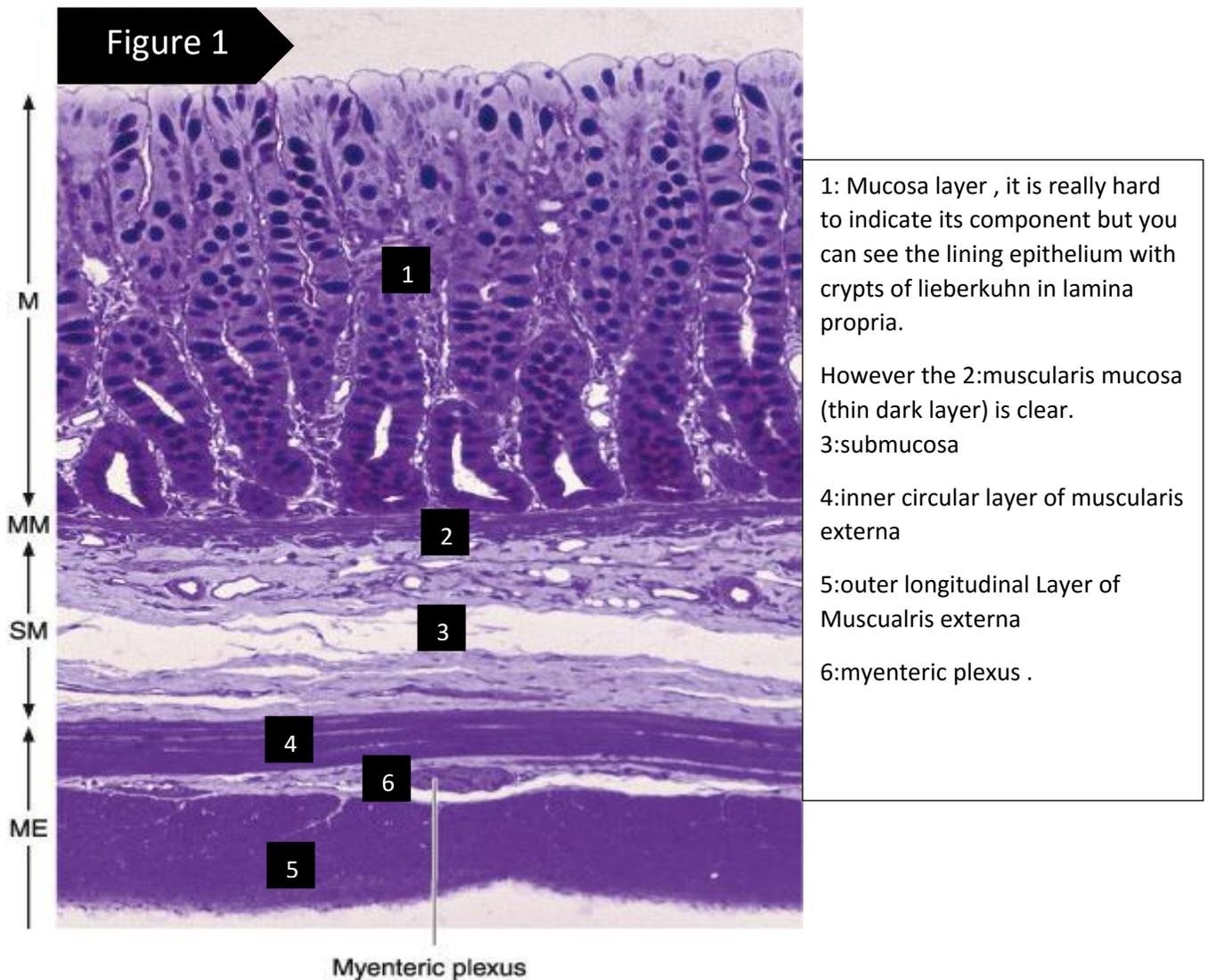
In Large intestine, see [figure1](#)

- ✓ smooth surface >> NO VILLI
- ✓ **Lining epithelium** : simple columnar epithelium Cells with numerous goblet cells for the sake of **Lubrication**.
- ✓ **Intestinal glands** : crypts of lieberkuhn (simple tubular gland).
Note :crypts of lieberkuhn = Intestinal glands (in both large and small intestines)

Large-Intestine-glands

- most of their cells are **mucous** .
- enteroendocrine cells present .

- stem cells present in the base (in the bottom third) of the gland , whereas they were at the neck of the small intestine glands .
- No Paneth's cells (remember under LM Paneth's cells appear orange-like at the base of small intestine glands)
- Goblet cells : present in both small and large intestines . however it is more numerous in the large intestines as they need a lot of lubrication to perform their function (indicated below).



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Main Functions of Large intestines:

- ✓ Absorption of water and electrolytes.
- ✓ Formation of feces .
- ✓ Production of mucus.

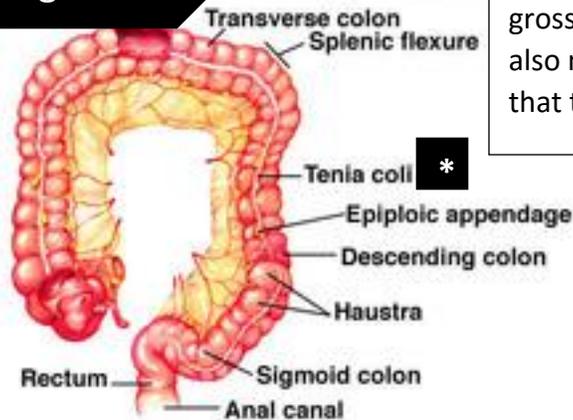
Muscularis externa of Large intestines figure 5

- ✓ Outer longitudinal muscular layer , inner circular .
- ✓ **Myenteric plexus** : In between these two layers .
- ✓ **teniae coli**: thickening of the outer longitudinal layer as three bands of smooth muscle >> these are responsible for the sacculatation (sac formation) in large intestines .
to understand the sac formation , imagine the presence of these bands at one side ,while not at the other >>
the first side will be short while the second will be long >> which mediate the formation of sacs in large intestines .
SACCULATION IS REALLY IDENTICAL FOR THE LARGE INTESTINES.(to distinguish large intestines from small intestines)
see figure2 (grossly) figure3histo.

Outer most layer in large intestines figure 5

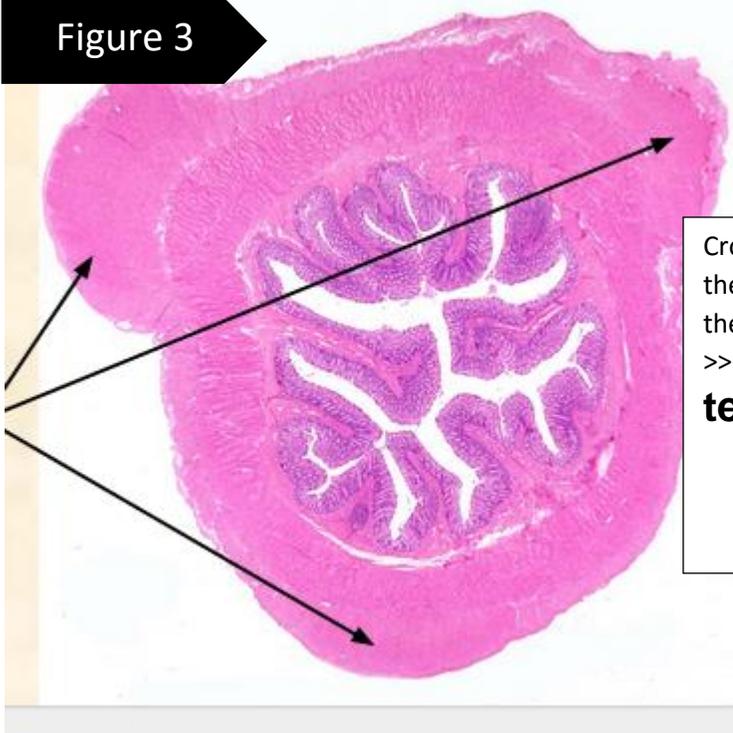
- ✓ Serosa or adventitia (the doctor did not mention exactly what is covered by which , however it is covered by serosa mainly whereas at rectum and parts of the ascending and descending colon have an adventitia)..
- ✓ **Appendices epiploicae**: tags of fat attached to serosa.

Figure 2



Notice how the tinea coli grossly appear . also notice the sacculation that they make

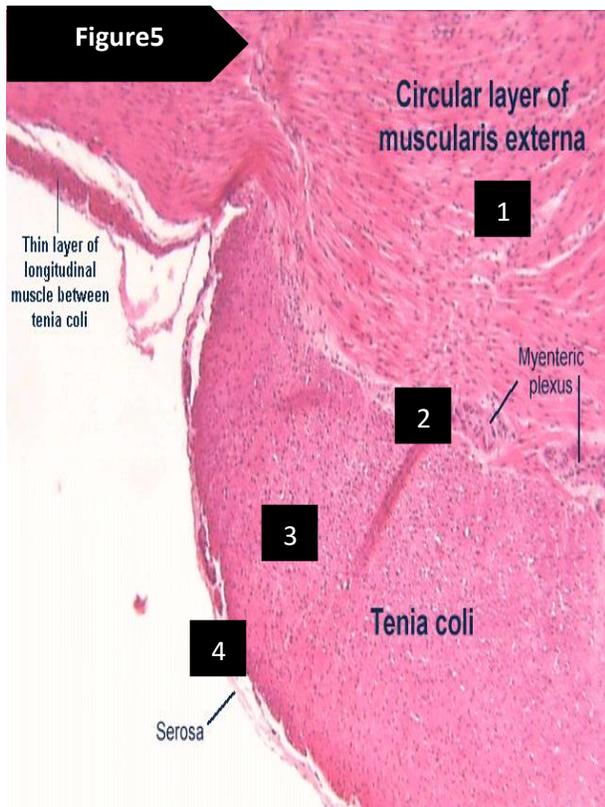
Figure 3



Cross section of large intestines the arrow indicate thickening of the longitudinal Outer ME layer >> **teniae coli.**

so ,the large intestines have these three identical histological features :

- ✓ **Sacculation.**
- ✓ **Appendices epiploicae.**
- ✓ **Tenea coli.**



Muscularis externa :

- 1: inner circular layer
- 2: Myenteric plexus
- 3: outer longitudinal Layer thickens to form **teniae coli**.

Covered by

- 4: serosa , attached to it

Appendices epiploicae

Lymphatic tissue in large intestines :

- ✓ **Solitary nodules** , in lamina propria and the submucosa.

Comparison between Small and Large intestines Histology

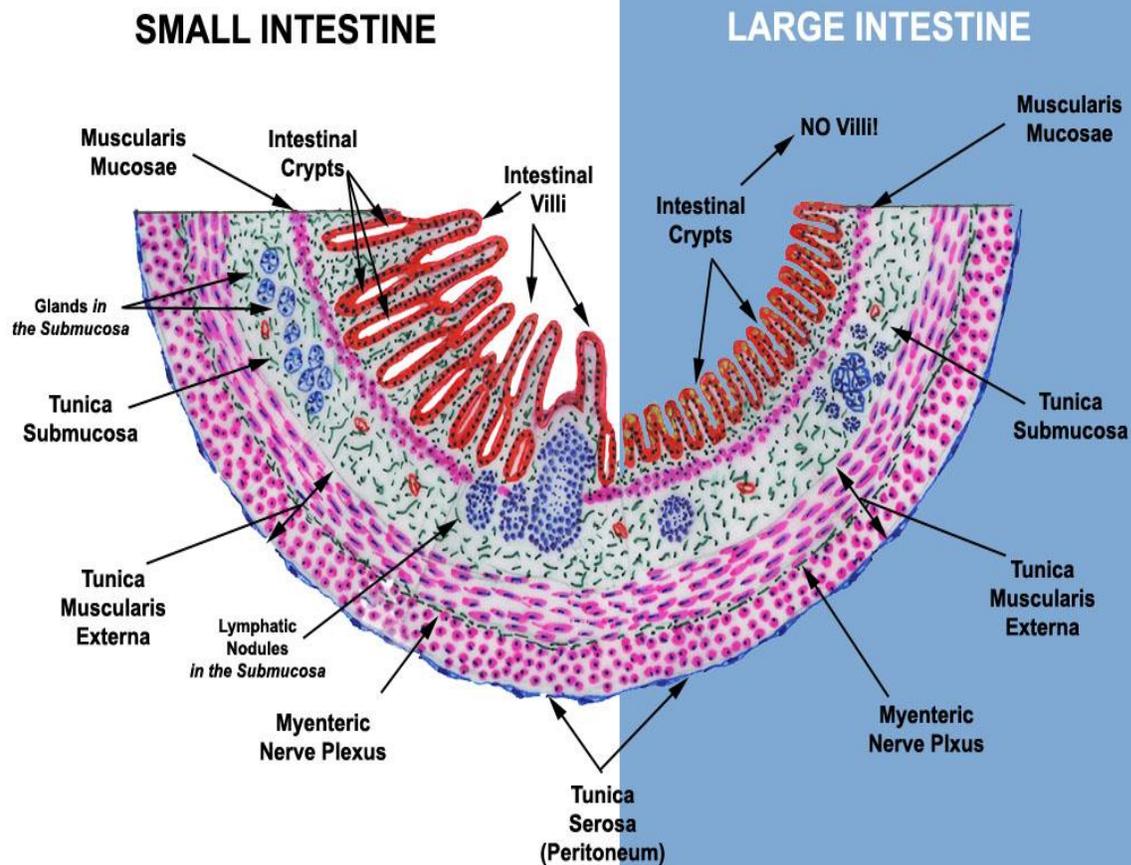


Figure 6

Small intestine :

- ✓ Villi and micro villi
- ✓ Glands **with paneth's cells** (anti bacterial role)
- ✓ **Lymphatics**: Peyer's patches (in the ileum)
- ✓ Muscularis externa without teniae coli.
- ✓ Serosa **without Appendices epiploicae (fat)**

Large intestine :

- ✓ No Villi
- ✓ Short and irregular microvilli.
- ✓ Simple tubular **Glands without paneth's cells (no anti bacterial role)**
- ✓ **Lymphatics** : Solitary nodules
- ✓ Muscularis externa thickened to form teniae coli.
- ✓ Serosa **with Appendices epiploicae (fat)**

Rectum and anal canal:

- ✓ At the end of the large intestines
- ✓ What's identical about them: the presence of **Longitudinal columns of mucosa**. We call the column **anal column**, and the end of the column **anal valve** and **sinuses** (will be discussed in GI anatomy)

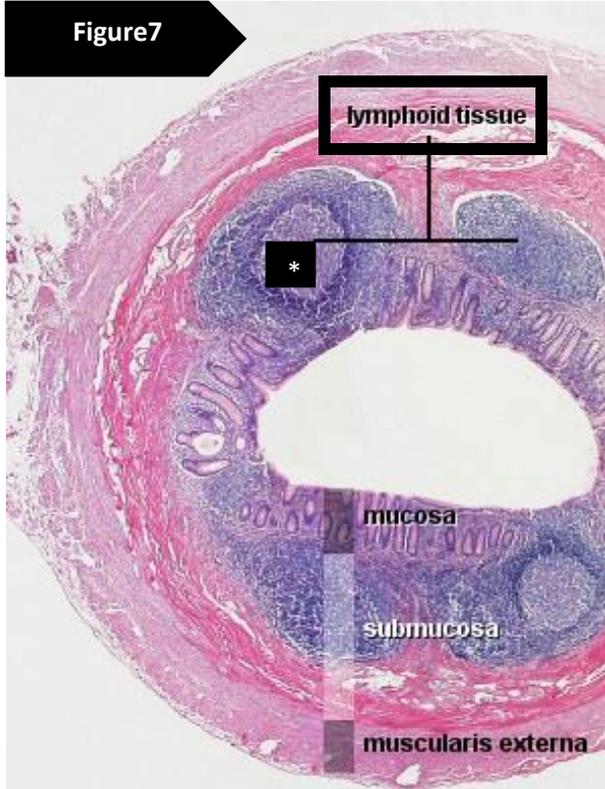
**a lot of details in the slides were not mentioned by the doctor.

To summarize all what you have taken in histology so far, refer to **Table 15-2 and the summary of Key points, pages (319-322), Junqueira's basic histology.**

Appendix figure7

- ✓ Considered as apart of large intestines .as it's attached to the cecum.
- ✓ It is a lymphoid tissue >> do not have a role in digestion .
that's why the mucosa (lamina propria) and the submucosa of the appendix is filled with lymphatic nodules (blue)
- ✓ **Lining epithelium** : simple columnar with Few goblet cells
- ✓ Very narrow lumen .
- ✓ Crypts of lieberkuhn , simple and few >> have no function >> remember the appendix has no role in digestion .
- ✓ Covered by Mesentery (serosa): here it's called Mesoappendix composed of two layers of peritoneum contain fat, lymphatic vessels and blood vessels (appendicular artery and appendicular vein).
- ✓ No teniae coli.

Figure7



Cell Renewal in the Gastrointestinal Tract

- ✓ Stem cells at the base(the bottom third) of glands of large intestine (in the small intestines they were at the neck)
- ✓ Renew every 3-6 days .

Histology of the Liver

See Figure8

- ✓ The largest gland in the body .
(it is an actual gland that has a duct , the hepatic duct , which Unitewith the cystic duct from the gallbladder to form the common bile duct that sheds in the **second part of the duodenum**.)
- ✓ Weight 1.5 Kg .
- ✓ As any gland , it is surrounded by a capsule : **Glisson's capsule**. Which divide the liver into lobes and lobules.

- ✓ What's really identical to the Liver' lobules is : their Hexagonal shape & in the center of the lobule , there is a central vein (to collect waste from cells)
- ✓ Actually numerous central veins gather to make hepatic veins that drain in the inferior vena cava.
Note :The cells of liver are called :hepatocytes :3 they have central rounded nuclei , you may find Bi-nucleated hepatocyte.
- ✓ The cells are arranged **radially in columns** with regard to the central vein.
- ✓ Between all of the anastomosing plates of hepatocytes of a hepatic lobule are important **vascular sinusoids** that emerge from the peripheral branches of the portal vein and hepatic artery and converge on the **lobule's central vein**, In these sinusoids the blood is mixed :

- 1) **Originated blood** ; from the **hepatic artery** (branch of the celiac trunk)
- 2) Blood Rich in **absorptive (nutritive)** materials ; from the **portal vein**
>>this blood helps the liver to make its function (making bile , hormones .. etc)

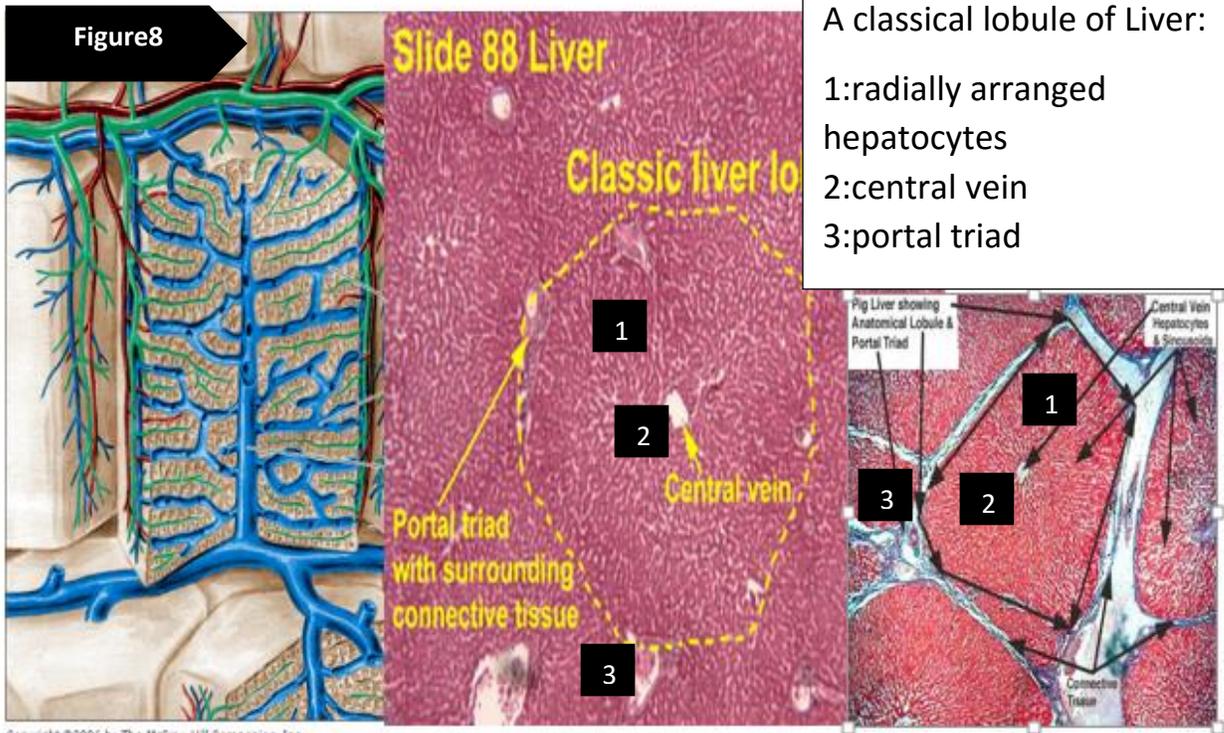
- ✓ Between the hepatocytes there are **Bile canaliculus** .
all the Bile drains in the **Hering's canal**>>porta hepatis then to the common bile duct >>to the duodenum (to digest fat)

so , let's sum up . the liver is a gland with a duct and capsule that divide it into lobes and lobules , the lobules are hexagonal with venous , arterial and bile (supply).

note : in the sinusoids the blood is directed to the liver, whereas the the Bile is directed out.

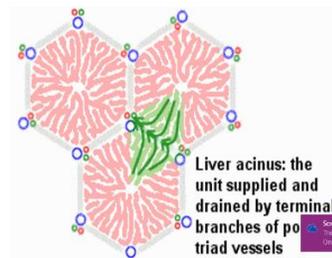
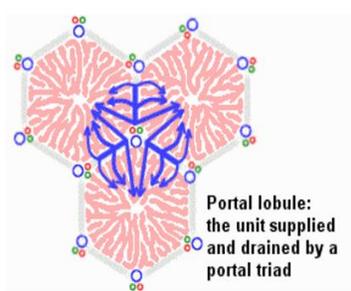
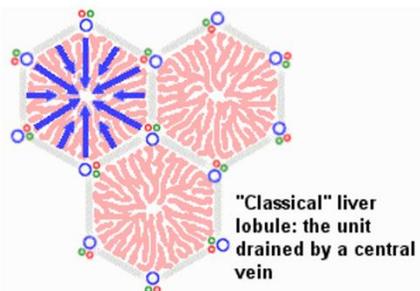
Portal triad:

space of connective tissue contains branch of the hepatic artery , branch of hepatic portal vein and branch of bile duct (collection of Bile canaliculi) , situated at the corners of the hexagonal lobule.



Arrangements at the Level of liver lobules :

- ✓ **Classical lobule** : its center is the **central vein** .
- ✓ **Portal lobule** : its center is the **portal triad** .
- ✓ **Liver acinus** : diamond in shape between **two portal triads** and **two central veins** .

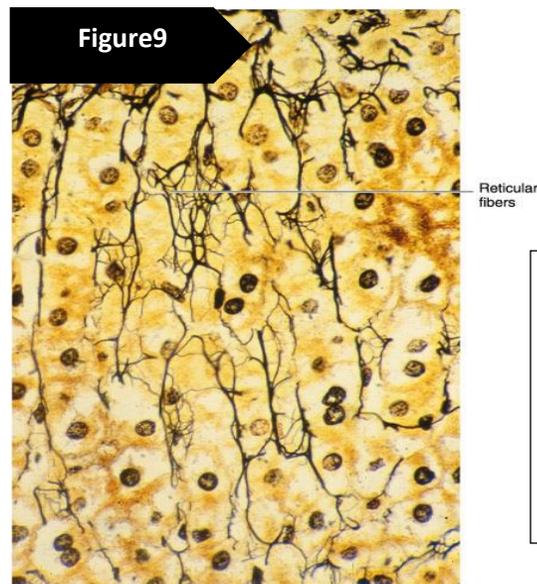


Macrophages cells of the liver:

- ✓ Called **Kupffer cells**
- ✓ Present at the wall of the blood sinusoids .
- ✓ **15%** of the liver cells .

Space of Disse (perisinusoidal space)

- ✓ Between blood sinusoids (endothelial cells) and hepatocytes
- ✓ Contains reticular fibers (that's why the space respond to **silver stain**) **figure9**
- ✓ Contains fatty-storing cells : store fats , secrete IgA and lysosomes.



Reticular fibers
>>stained black by
silver stain (special)
indicate **spaces of disse**

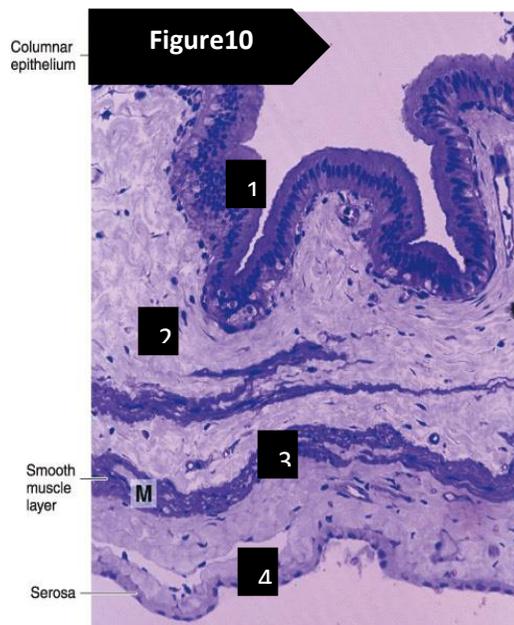
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Histology of the Gallbladder

Figure10

- ✓ **Function:** concentrate Bile. (so mainly it absorbs water to concentrate Bile)

- ✓ **Lining epithelium** : simple columnar epithelium **Without** goblet cells
- ✓ Folding mucosa form **Honey-comb appearance** .
- ✓ Muscularis mucosa is absent (or ill-defined)
- ✓ Submucosa is absent
- ✓ The muscularis externa is irregular .
- ✓ The gallbladder is embedded in the liver so , the embedded wall (posterior) is covered by connective tissue, whereas the anterior wall is covered by serosa .



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- 1:lining epithelium notice the Honey-comb appearance
- 2:lamina propria
- 3:Muscularis externa
- 4:serosa

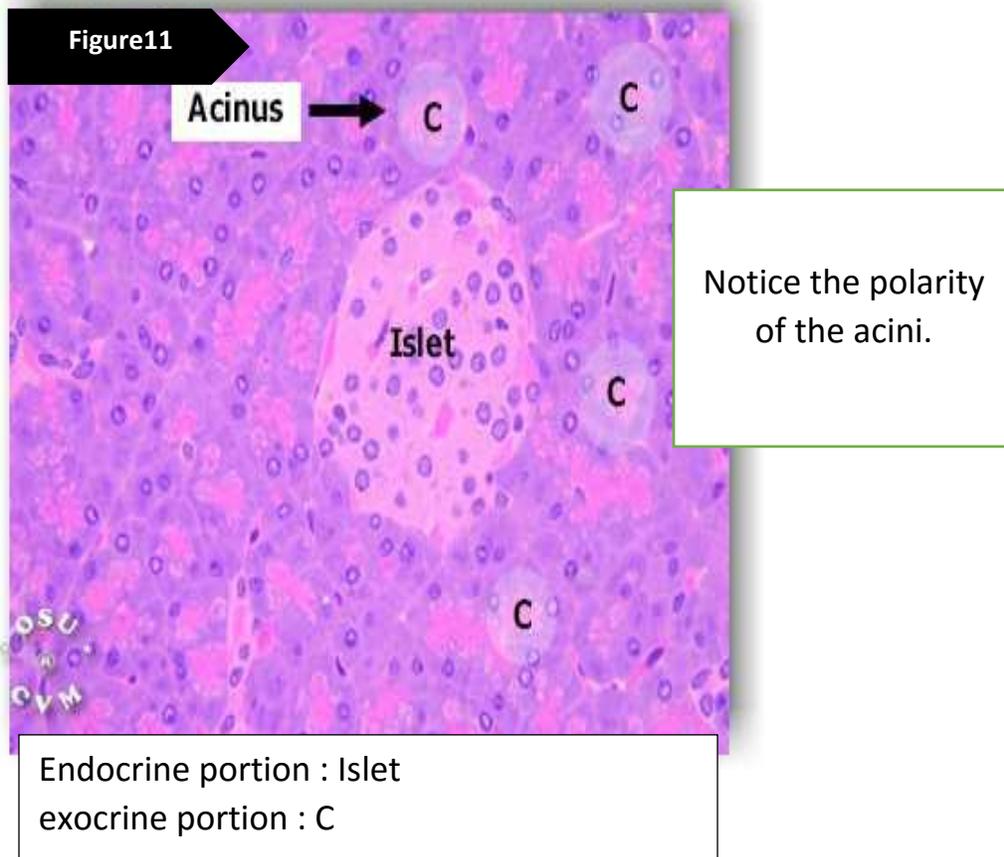
Histology of the Pancreas

Figure11

- ✓ Mixed gland , with both exocrine and endocrine .
- ✓ **Endocrine** : faint patches. Islets of Langerhans : consist of alpha , beta (secrete insulin) , gamma cells...
- ✓ **The exocrine** appear as **pancreatic acini** .
- ✓ Have intercalated ducts only **with no striated duct**(that's what really make you differentiate between the parotid gland

and the pancreas as they really look similar , it's important to differentiate between them for the sake of the EXAM)

- ✓ Centroacinar cells in the pancreatic acini (large nucleus , faint cytoplasm) .
 - ✓ The pancreatic acini is **highly polar** : the base is basophilic , the apex is acidophilic and has zymogenic granules.
- **the last three features used to differentiate between the parotid gland and the pancreas.



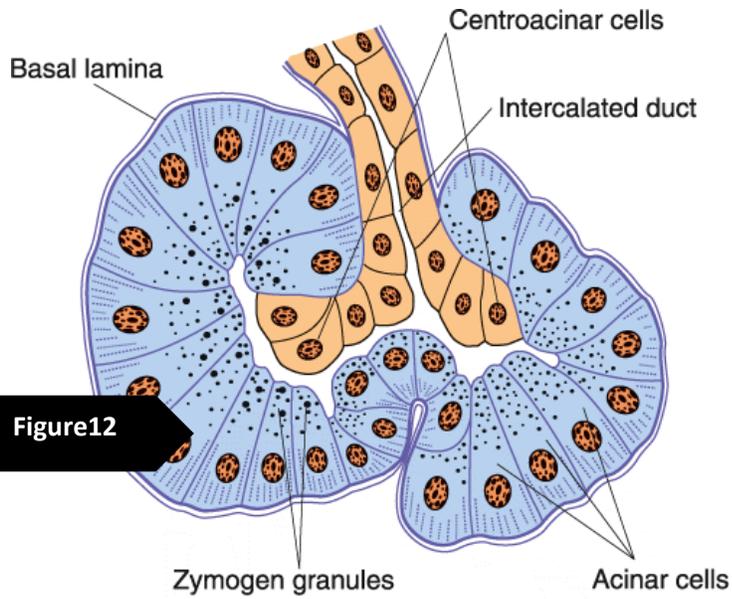


Figure12

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Exocrine gland of the pancreas

:

orange: intercalated duct with with centroacinar cells (notice the centrality of their nuclei)

Blue : Basal cells with basal nuclei (basophilic) and acidophilic apex filled with zymogen granules .

-END OF TEXT

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