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Liver-Hepatic Lobule

The liver is the largest gland in the body and is characterized by multiple, complex functions: excretion (waste products), secretion (bile), storage (lipids, vitamins A and B, glycogen), synthesis (fibrinogen, globulins, albumin, clotting factors), phagocytosis. (foreign particulate matter), detoxification (lipid-soluble drugs), conjugation (toxic substances, steroid hormones), esterification (free fatty acids to triglycerides), metabolism (proteins, carbohydrates, lipids, hemoglobin, drugs), and hemopoiesis (in the embryo and potentially in the adult). An understanding of the structure of the liver is vital to the interpretation of these processes.

The classic hepatic lobule is considered to be the functional unit of the organ.

Each is a roughly hexagonally shaped, three dimensional unit, demarcated by connective tissue and constructed of the parenchymal cells of the liver, hepatocytes, in large numbers

▲The portal areas include at least one each of the following elements: 1) a branch of the hepatic artery; 2) a branch of the portal vein; and 3) a bile ductile.

The hepatocytes are large polyhedral cells fairly uniform in size, the hepatic laminae consist of rows of hepatocytes. hepatocytes have six or

more surfaces that are of three different types: (1) microvillous surfaces that face the perisinusoidal space; (2) canalicular surfaces that border the bile canaliculi; and (3) contact surfaces between adjacent hepatocytes where apposed cell membranes may have tight junctions and desmosomes . Hepatocyte are further characterized by a centrally located spherical nucleus with one or more prominent nucleoli.

The hepatic sinusoids are blood capillaries, located between hepatic laminae, that course through the lobule carrying blood from terminal branches of the interlobular hepatic arteriole and interlobular portal venule to the central vein.

The sinusoids are irregular vascular channels between the plates, with numerous blood cells in them. A narrow space known as the space of Disse is located between the sinusoidal lining cells and the hepatocyte surface. Sinusoids are lined by two types of cells: endothelial cells and stellate macrophages (Kupffer cells) .

Bile is synthesized by all hepatocytes and is secreted into the bile canaliculi that drain towards bile collecting vessels located in the portal areas.

The Gall Bladder

The gall bladder is absent in rats, camels and horses as well as pigeon. Its function is to concentrate and store bile produced in the liver.

The mucosa is covered by a very regular simple columnar epithelium, with no goblet cells or glands. There is a scanty lamina propria. There is no muscularis mucosa..

The lamina propria-submucosa is formed of loose connective tissue containing solitary lymph nodules

The tunica muscularis is thin and is formed of circular layers of smooth muscle fibers

The serosal covering (i.e., visceral peritoneum) covers the portion of the organ that's not nestled up to the liver.

Pancreas

The pancreas is a highly lobulated compound tubuloacinar gland with both exocrine and endocrine portions; digestive enzymes including amylase, lipase, and trypsin, which act on the products of gastric digestion as they reach the duodenum,and the endocrine products enter the blood directly.

The pancreas is invested by a loose connective tissue capsule which sends delicate septa demarcating the pancreas into lobules.Each lobule is formed of exocrine serous secreting units, ducts and endocrine islets of Langerhans.

The bulk of the tissue in the pancreas is exocrine in nature. This is the pancreatic acinar tissue and its associated ducts.the endocrine part, pancreatic islets , produces mainly insulin and glucagon.

The glandular epithelial cells are generally pyramid shaped, with a spherical nucleus near the base of the cells The tubuloacinar secretory unit is continuous with a short intercalated duct. This duct begins with flattened cells that extend into the lumen of the acinus; therefore, they are referred to as centroacinar cells . intestinal contents, there by facilitating the action of intestinal digestive enzymes. Intercalated ducts join intralobular ducts, which are lined by low simple cuboidal epithelium. The intralobular ducts of the pancreas are not “striated,” as are the intralobular ducts of the parotid salivary gland. The intralobular ducts continue into interlobular ducts that are lined by simple columnar epithelium . Interlobular ducts converge to eventually form the pancreatic duct and the accessory pancreatic duct, both of which empty into the duodenum. Goblet cells may be present in the epithelium of larger ducts.

Salivary glands

The salivary glands are glands that produce the saliva. They are divided into two major groups; minor and major salivary glands.. The minor salivary glands are small clusters of seromucoid secretory units located in the submucosa of the oral cavity and they are named according to their locations e.g., labial, buccal, lingual and palatine glands.

The major salivary glands are located outside the oral cavity and their secretory products reach the oral cavity via excretory ducts. They include parotid, mandibular, sublingual, zygomatic (in carnivores) and molar (cat) glands.

General Structure of the Major Salivary Glands

The terminal secretory units**:** Formed by pyramidal shape cell with Basel nuclei , the cytoplasm of these cell have well develops rough E.R……

Each apex of the cell have granules , this granules zymogen that have many enzyme the basement membrane of each acini of my epithelial cell called (basket cell) the processes of these cell from a network around the acinous. The narrow lumen of the acinus open in to short canal called the intercalated ducts which are lined by low cuboidal epithelium. The intercalated ducts drain into larger ducts called striated ducts, so named because of their striated appearance in LM. Both the intercalated and striated ducts are located inside the lobule, hence they are collectively called intralobular ducts.

The striated ducts join the interlobular ducts which are located in the CT septa between the lobules. They are lined with simple columnar epithelium in the smaller ducts and with stratified columnar in the larger ones.

The main duct is lined by stratified columnar epithelium which changes

into stratified squamous type as it opens into the oral cavity. The salivary secretory units consist of branched tubuloacinar structures and are composed of either serous, mucous secretory cells or a mixture of both types.

Note:-Saliva is a mixture of both serous and mucous secretory products of salivary glands. It is important in the moistening of the ingested food and the lubrication of the surface of the upper digestive organs, thus enhancing the flow of ingesta into the stomach. Saliva dissolves water-soluble components of food, thereby facilitating access to the taste buds.

Parotid Salivary Gland

The parotid glands are large paired predominantly serous glands. Isolated mucous secretory units may occur in dog and cat.

Mandibular Gland

It consists of serous and mucous cells but the serous cells predominate. Mucous secretory units border the lumen and serous demilunes occur at the periphery.

Sublingual Gland

It is of mixed seromucoid type but the mucous cells predominate
The striated ducts are not well-developed and the duct system is formed mainly of interlobular ducts.

Zygomatic Glands (Carnivores)and Molar Salivary Glands

It is of mixed seromucoid type but mucous units predominate. The intercalated and striated ducts are almost non-existent. Isolated patches of tall striated cells are found within the low cuboidal epithelium of the interlobular duct.