

Liver (Digestive Gland)

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Liver is primarily a digestive gland, though it serves many other functions also. It is the largest gland in the body.

The liver is a large, generally dark-red lobed organ held in place by the folds of the peritoneum. Its shape varies according to the shape of the animal's body. It typically consists of right and left lobes, but may have more lobes or may be undivided. The liver is usually larger in herbivores than in carnivores.

The liver secretes bile, which is stored in a sac, the gall bladder. The gall bladder may be rounded, pyriform, elongated or V-shaped. A duct, called the cystic duct, drains the gall bladder and is joined by hepatic ducts from the liver lobes.

The duct formed thereafter is known as the common bile duct or ductus choledochus. It opens into the duodenum. It opens into the duodenum.

The opening (of the common bile duct into the duodenum) is guarded by a sphincter muscle called the sphincter of Oddi. In some cases like in frog, lizard, man etc, the pancreatic duct also joins the common bile duct to form hepato-pancreatic or common bile-pancreatic duct.

Liver plays an important role in digestion by the production of bile:

Composition and Function of Bile: It is an alkaline fluid secreted more or less continuously by liver cells. The bile is then carried to the gall bladder where it is stored and concentrated by the absorption of water and inorganic salts. Bile is released from the gall bladder under the influence of the hormone cholecystokinin produced by I-cells of the

duodenum. Bile contains no enzymes this has (2) no chemical action on food. It contains water, mucus, bile salts (sodium carbonate, sodium glycocholate and sodium taurocholate), lipids (cholesterol + lecithin) and bile pigments such as yellow bilirubin + green biliverdin.

Functions of bile

- (i) Its sodium carbonate (bile salt) neutralizes the acid of the chyme. This is essential as the enzymes of the pancreatic and intestinal juice act only in an alkaline medium (pH 8)
- (ii) The other salts emulsify fats i.e. break the large fat droplets into smaller ones. This provides more surface for better action of fat-splitting enzymes.
- (iii) The bile salts also help in the absorption of fats and fat soluble vitamins (A, D, E + K).
- (iv) Bile pigments are excretory products formed by the breakdown of haemoglobin of worn-out RBC's. They give bile its colour. Most of the bile pigments are reabsorbed in the intestine and are removed by the kidneys in urine. Colour of urine is due to these pigments.
- (v) Bile also prevents the decomposition of food by checking the growth of bacteria on it.

(Bile salts are reabsorbed in the intestine for reuse in bile secretion)

Liver in different vertebrates.

Cylostomes: Liver in cyclostomes is relatively small but bilobed. Adult lamprey lacks gall bladder + bile duct. But these structures are present in the ammocoete larva and disappear during metamorphosis.

In hagfish, bile ducts from two lobes of the liver open separately into the gall bladder

Fishes: Liver in fishes is relatively very large. It is lobed and has a gall bladder except a few sharks. The colour of liver and the form of gall bladder vary a great deal. *Scoliodon* has yellowish liver and V-shaped gall bladder. *Labeo* has brownish liver + elongated gall bladder.

Amphibians: Amphibians have relatively large liver. It is lobed and has a gall bladder.

Reptiles: Reptiles have lobed liver always with a gall bladder. In snakes, liver consists of a single elongated tube in correlation with their long narrow body.

Birds: Birds have lobed liver which lacks gall bladder in some cases. Pigeon's liver consists of two lobes: large right and small left. Each lobe has its own bile duct. The left bile duct opens into the descending limb of the duodenum and the right bile duct opens into the ascending limb of the duodenum. The pigeon lacks gall bladder. Its embryo has a transitory gall bladder.

Mammals: Mammals liver is often many lobed. Liver of rabbit is 5 lobed, that of man is 4 lobed. Some even have six or seven lobes. Gall bladder is lacking in some like Hyrax, whales etc.

Diagrams: same as in pancreas where liver is also depicted