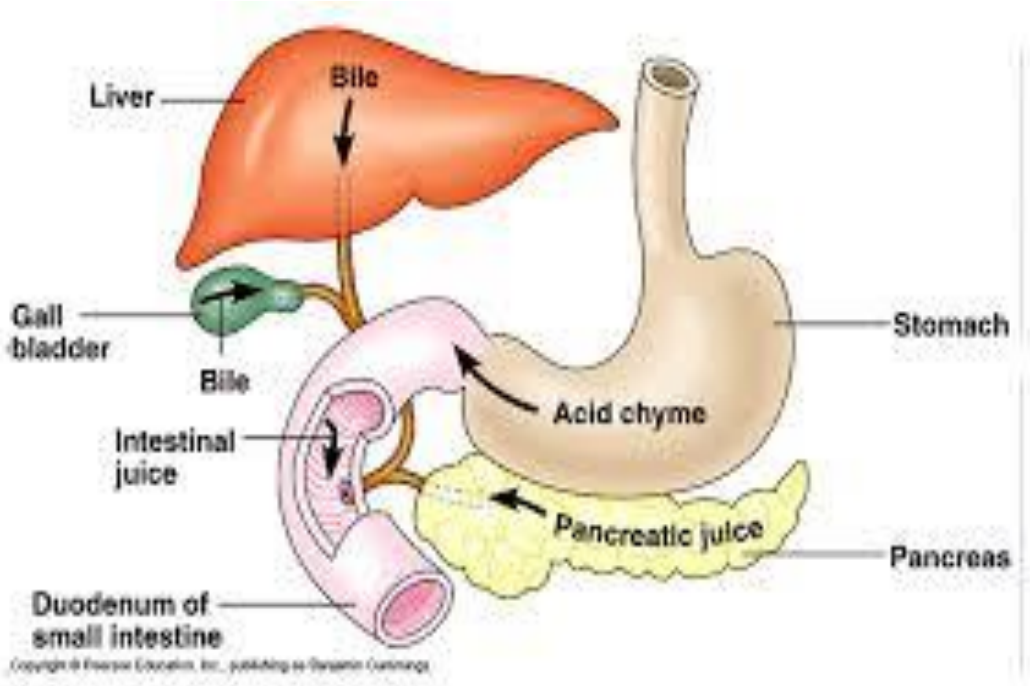
بسم الله الرحمن الرحيم

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Accessory Organs in Digestion:

Chemical digestion in the small intestine relies on the activities of three accessory digestive organs: the liver, pancreas, and gallbladder.



The liver: is the largest gland in the body, it is the large reddish-brown organ, weighing about three pounds in an adult. In addition to being an accessory digestive organ. The liver lies inferior to the diaphragm in the right upper quadrant of the abdominal cavity and receives protection from the surrounding ribs. The liver produces bile, but it is stored in the gallbladder

for secretion when needed. The **liver** is an exocrine gland that secretes bile into the intestine is also an endocrine gland and a blood filter. The liver is divided into two primary lobes: a large right lobe and a much smaller left lobe. It is also one of the most important organs and plays a number of roles in metabolism and regulation.

The primary functions of the liver are:

- Bile production and excretion.
- Excretion of bilirubin, cholesterol, hormones, and drugs.
- Metabolism of fats, proteins, and carbohydrates.
- Enzyme activation.
- Storage of glycogen, vitamins, and minerals.
- Synthesis of plasma proteins, such as albumin, and clotting factors.

Bile is a mixture secreted by the liver to accomplish the emulsification of lipids in the small intestine. The hepatocytes process the nutrients, toxins, and waste. Hepatocytes secrete about one liter of bile each day. A yellow-brown or yellow-green alkaline solution (pH 7.6 to 8.6), bile is a mixture of water, bile salts, bile pigments, phospholipids (such as lecithin), electrolytes, cholesterol, and triglycerides. Its functions are to help with digestion and the absorption of fats, monitors blood in digestive organs, processes the absorbed nutrients, removes toxins, produces blood proteins, stores fat-soluble vitamins and excretion bilirubin.

The Pancreas: Pancreas lies transversely in the retro peritoneum behind the stomach. The small islands of endocrine cells of Langerhans, these vital cells produce the hormones pancreatic polypeptide, insulin, glucagon, and somatostatin. The pancreas secretes several enzymes. Lipase breaks down the smaller fat globules into fatty acids and triglycerides. Trypsin and chymotrypsin catabolize proteins into peptides. Carboxypeptidase then breaks those peptides into individual amino acids. The pancreas also releases amylase to digest any remaining carbohydrates.

The pancreas produces over a liter of pancreatic juice each day. Pancreatic juice drains into the common bile duct and then into the small intestine.

The gallbladder: Is a green pear-shaped sac, hollow structure about 10 cm long on the posterior aspect of the right lobe of the liver, when stimulated, propels the bile into the duodenum. The gallbladder is accessory digestive organ that stores bile, if bile is not immediately needed for digestion.

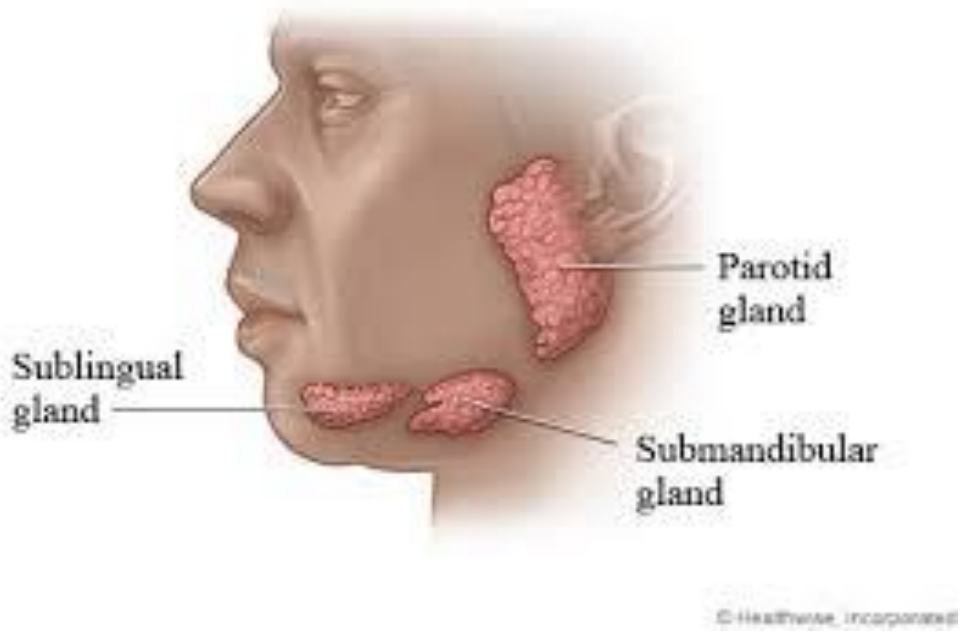
The gallbladder's absorbent lining concentrates the stored bile. When food enters the small intestine, a hormone called cholecystokinin is released, signaling the gallbladder to contract and secrete bile into the small intestine through the common bile duct. The bile helps the digestive process by breaking up fats. It also drains waste from the liver into the duodenum.

Secretion and role of accessory organs in Digestion:

The digestive system includes the organs of the alimentary canal and accessory structures. The organs of the alimentary canal are the mouth, pharynx, esophagus, stomach, small intestine, and large intestine. The accessory digestive structures include the teeth, tongue, salivary glands, liver, pancreas, and gallbladder.

The salivary glands, liver, pancreas and gall bladder, have exocrine secretion. These organs aid the processes of ingestion, digestion, and absorption. Each of organs either secretes or stores substances that pass through ducts into the alimentary canal.

The **salivary glands**: Saliva moistens food and begins the chemical digestion process. Six salivary glands, located around the oral cavity, secrete saliva. Saliva is 99% water, but also contains enzymes and proteins that lubricate the oral cavity.



There are three pairs of salivary glands (parotid, submandibular, and sublingual glands and two ducts on either side of the oral cavity. Produce salvia, and begins the chemical breakdown of starch using the enzyme amylase.

Secretion Control of digestion system:

The cells in the lining of the stomach and small intestine produce and release hormones that control the functions of the digestive system. These hormones stimulate production of digestive juices and regulate appetite. Both hormones and neural reflexes regulate the activities of the digestive system. Four important hormones and their effects on target cells as follow: Gastrin is produced by enteroendocrine cells of the stomach mucosa. Two types of nerves help control the action of the digestive system: extrinsic and intrinsic nerves. Extrinsic, or outside, nerves connect the digestive organs to the brain and spinal cord. These nerves release chemicals that cause the muscle layer of the GI tract to either contract or relax, depending on whether food needs digesting. The intrinsic, or inside, nerves within the GI tract are triggered when food stretches on the walls of the hollow organs. The nerves release many different substances that speed up or delay the movement of food and the production of digestive juices.