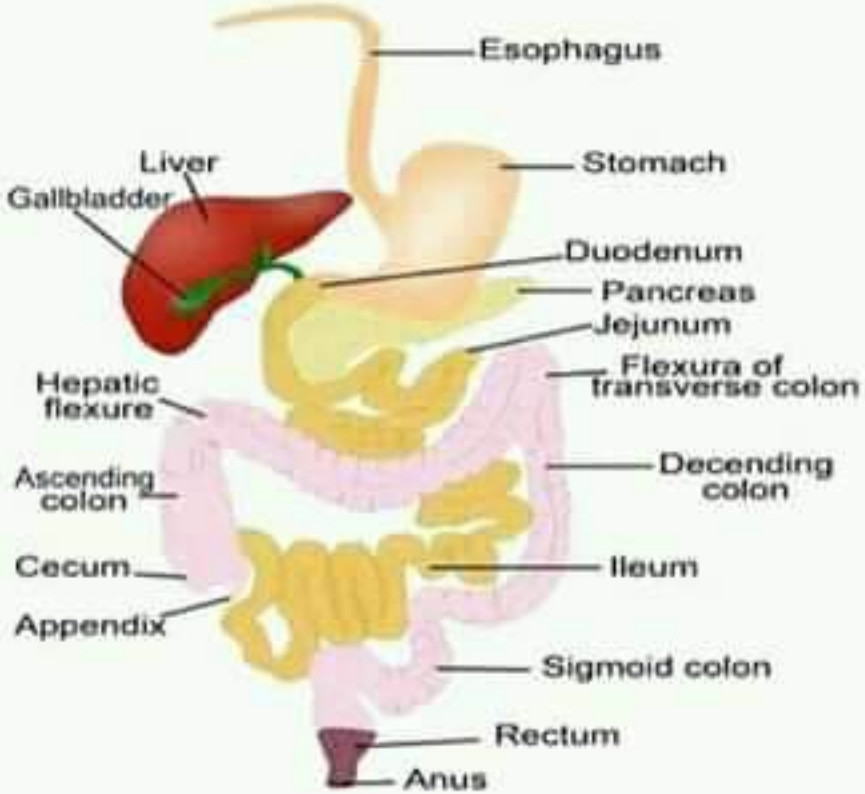
DIGESTIVE SYSTEM



DIGESTIVE SYSTEM

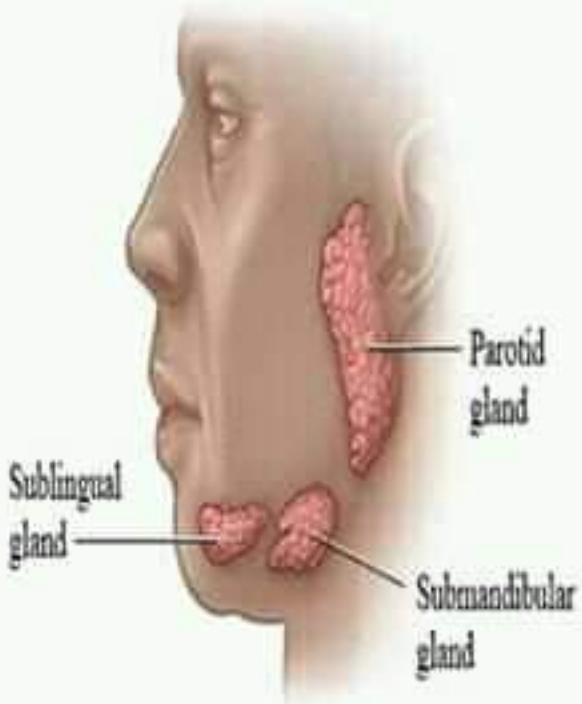
In the **human digestive system**, the process of digestion has many stages, the first of which starts in the mouth (oral cavity). Digestion involves the breakdown of food into smaller and smaller components which can be absorbed and assimilated into the body. The secretion of saliva helps to produce a bolus which can be swallowed in the oesophagus to pass down into the stomach

MOUTH

The oral cavity that is the mouth is the first part of the alimentary canal and is equipped with several structures that begin the first processes of digestion. These include salivary glands, teeth and the tongue. Most of the oral cavity is lined with oral mucosa a mucous membrane that produces a lubricating mucus of which only a small amount is needed. Mucous membranes vary in structure in the different regions of the body but they all produce a lubricating mucus, which is either secreted by surface cells or more usually by underlying glands.

SALIVARY GLANDS

Here are three pairs of main salivary glands and between 800 and 1,000 minor salivary glands, all of which mainly serve the digestive process, and also play an important role in the maintenance of dental health and general mouth lubrication, without which speech would be impossible. The main glands are all exocrine glands secreting via ducts. All of these glands terminate in the mouth. The largest of these are the parotid glands their secretion is mainly serous



SALIVA

Saliva functions initially in the digestive system to moisten and soften food into the formation of a bolus. The bolus is further helped by the lubrication provided by the saliva in its passage from the mouth into the oesophagus. Also of importance is the presence in saliva of the digestive enzymes **amylase and lipase**. Amylase starts to work on the starch in carbohydrates , breaking it down into the simple sugars of maltose and dextrose that can be further broken down in the small intestine.

TONGUE

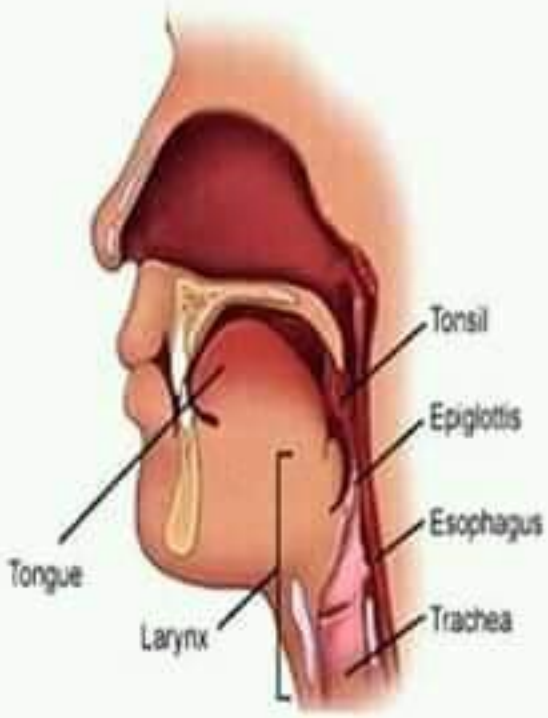
Food enters the mouth where the first stage in the digestive process takes place, with the action of the tongue and the secretion of saliva. The tongue is a fleshy and muscular sensory, and the very first sensory information is received via the taste buds on its surface. If the taste is agreeable the tongue will go into action, manipulating the food in the mouth which stimulates the secretion of saliva from the salivary glands

TEETH

Teeth are complex structures made of materials specific to them. They are made of a bone–like material dentin, which is covered by the hardest tissue in the body enamel. Teeth have different shapes to deal with different aspects of mastication employed in tearing and chewing pieces of food into smaller and smaller pieces. Incisors are used for cutting or biting off pieces of food; canines, are used for tearing, premolars and molars for chewing and grinding

EPIGLOTTIS

The epiglottis is a flap that is made of elastic cartilage and attached to the entrance of the larynx. It is covered with a mucous membrane and there are taste buds on its lingual surface which faces into the mouth. Its laryngeal surface faces into the larynx. The epiglottis functions to guard the entrance of the glottis, the opening between the vocal folds. It is normally pointed upward during breathing with its underside functioning as part of the pharynx, but during Swallowing, the epiglottis folds down to a more horizontal position, with its upper side functioning as part of the pharynx.

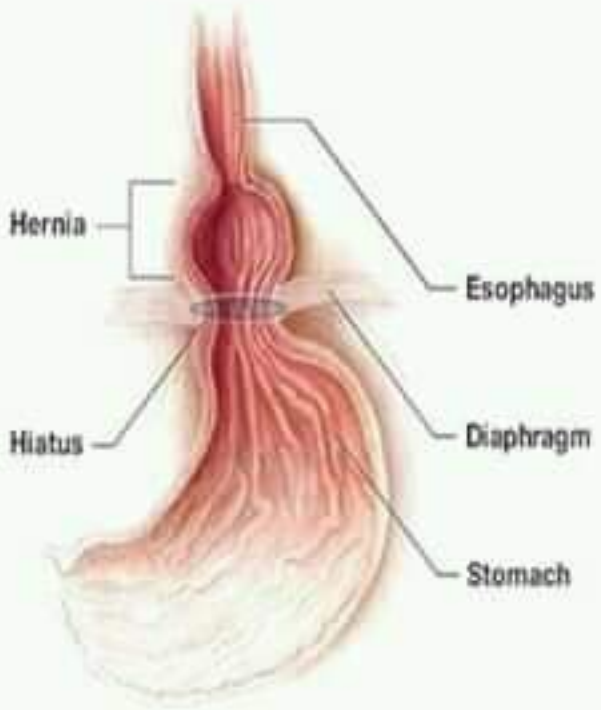


PHARYNX

The pharynx is a part of the digestive system and also a part of the conducting zone of the respiratory system. It is the part of the throat immediately behind the nasal cavity at the back of the mouth and superior to the oesophagus and larynx. The pharynx is made up of three parts. The lower two parts– the or pharynx and the laryngopharynx are involved in the digestive system. The laryngopharynx connects to the oesophagus and it serves as a passageway for both air and food

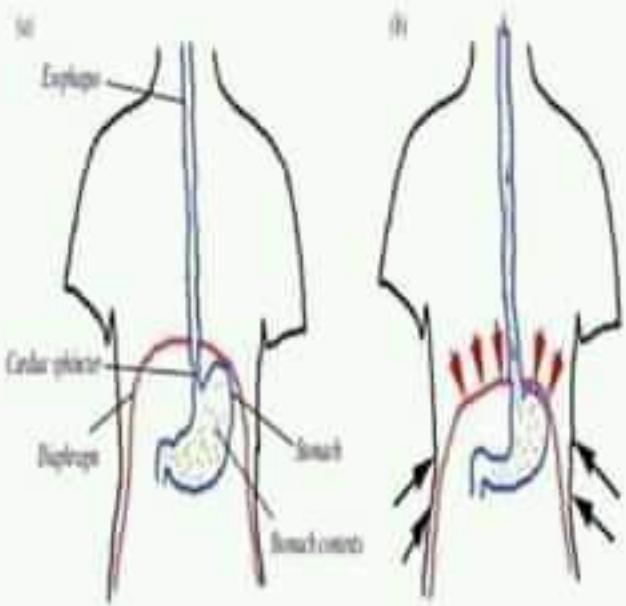
OESOPHAGUS

The oesophagus commonly known as the gullet, is an organ which consists of a muscular tube through which food passes from the pharynx to the stomach. The oesophagus is continuous with the laryngeal part of the pharynx. It passes through the posterior media sternum in the thorax and enters the stomach through a hole in the diaphragm at the level of the tenth thoracic vertebra (T10). Its length averages 25 cm, varying with height. It is divided into cervical, thoracic and abdominal parts. The pharynx joins the oesophagus at the oesophageal inlet which is behind the cricoids cartilage



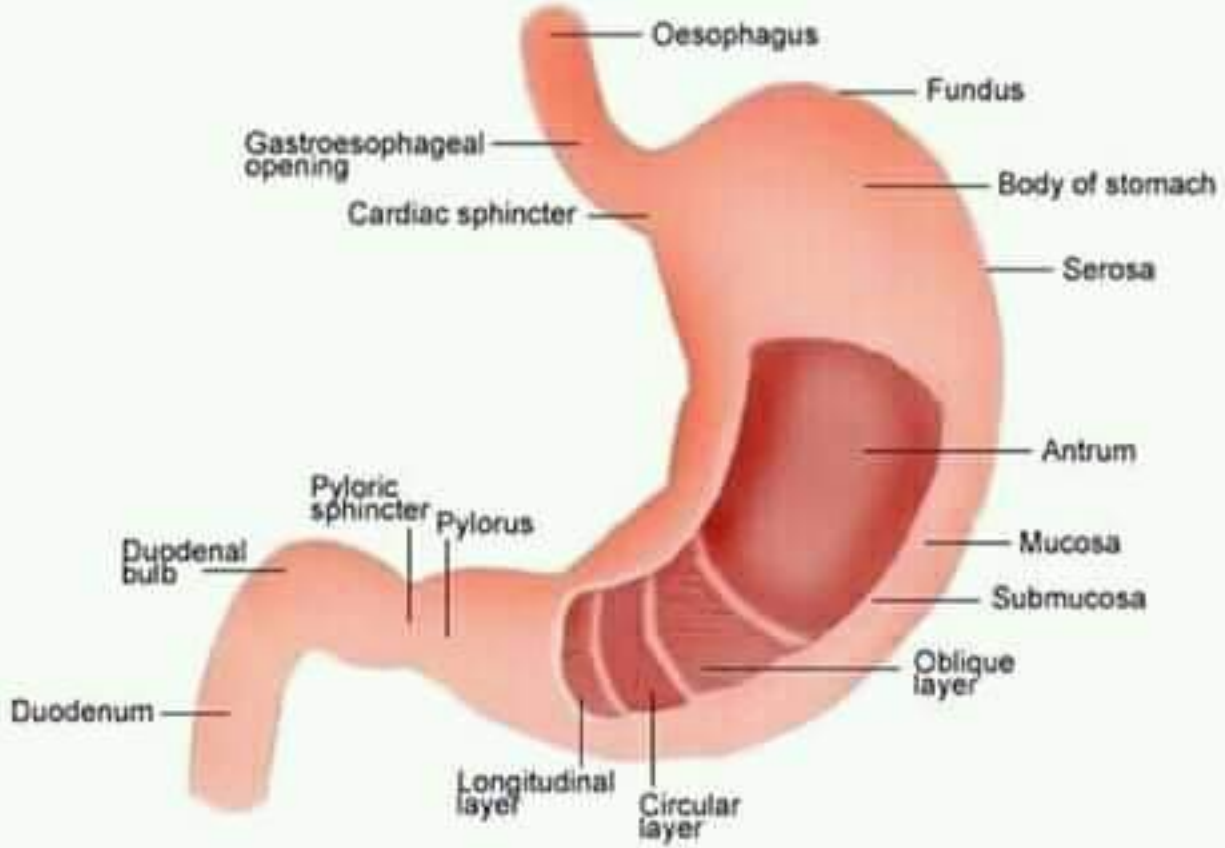
DIAPHRAGM

The diaphragm is an important part of the body's digestive system. The diaphragm separates the thoracic cavity from the abdominal cavity where most of the digestive organs are located. The suspensor muscle attaches the ascending duodenum to the diaphragm. This muscle is thought to be of help in the digestive system in that its attachment offers a wider angle to the duodena jejuna flexure for the easier passage of digesting material.



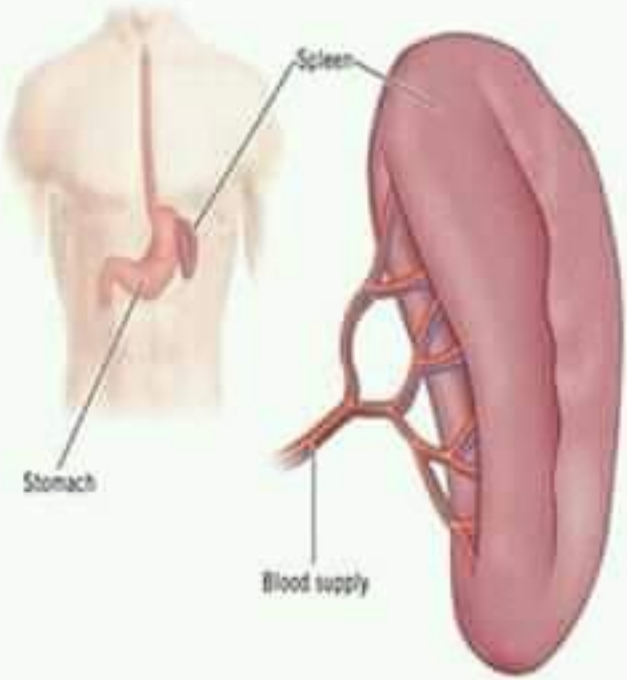
STOMACH

Areas of the stomach Gastric produced in the stomach plays a vital role in the digestive process, it mainly contains hydrochloric acid and sodium chloride. A peptide hormone gastrin produced by G cells in the stomach, stimulates the production of gastric juice which activates the digestive enzymes. Pepsinogen is a zymogen produced by the gastric chief cells and gastric acid activates this to the enzyme pepsin which begins the digestion of proteins. As these two chemicals would damage the stomach wall, mucus is secreted by the stomach, to provide a slimy protective layer against the damaging effects of the chemicals. At the same time that protein is being digested, mechanical churning occurs through the action of peristalsis, waves of muscular contractions that move along the stomach wall.


Oesophagus
Fundus
Gastroesophageal opening
Body of stomach
Cardiac sphincter
Serosa
Antrum
Pyloric sphincter
Pylorus
Dupdenal bulb
Mucosa
Submucosa
Oblique layer
Duodenum
Longitudinal layer
Circular layer

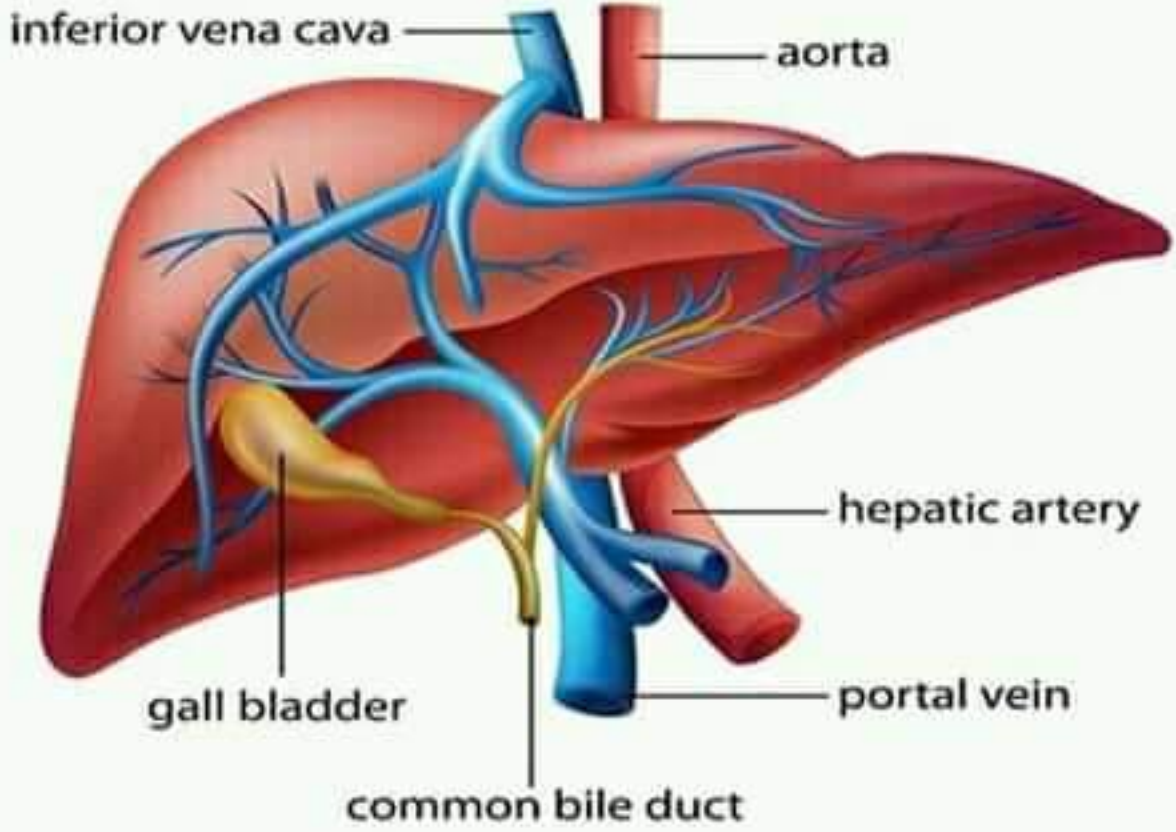
SPLEEN

The spleen breaks down both red and white blood cells that are spent. This is why it is sometimes known as the **'graveyard of red blood cells'**. A product of this digestion is the pigment bilirubin which is sent to the liver and secreted in the bile. Another product is iron which is used in the formation of new blood cells in the bone marrow



LIVER

The liver is the largest organ (after the skin) and is an accessory digestive gland which plays a role in the body's metabolism. The liver has many functions some of which are important to digestion. **The liver can detoxify various metabolites;** synthesise proteins and produce biochemical needed for digestion. It regulates the storage of glycogen which it can form from glucose (glycogenesis). The liver can also synthesise glucose from certain amino acids. Its digestive functions are largely involved with the breaking down of carbohydrates. It also maintains protein metabolism in its synthesis and degradation. In lipid metabolism it synthesises cholesterol..

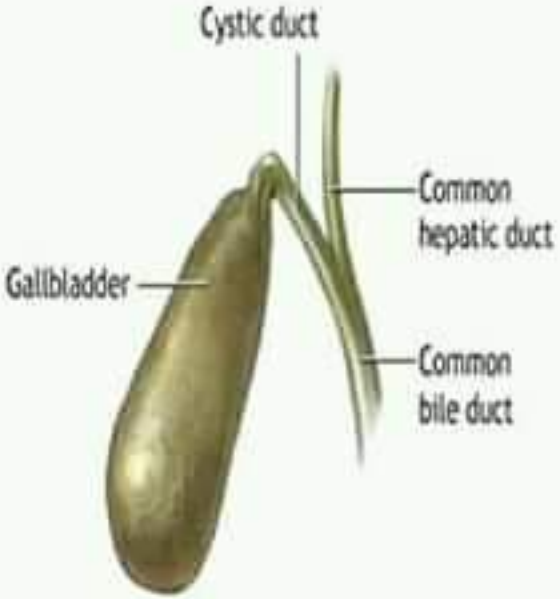

inferior vena cava
aorta
hepatic artery
portal vein
gall bladder
common bile duct

BILE

Bile produced by the liver is made up of water (85%), bile salts, mucus and pigments, 1% fats and inorganic salts. Bilirubin is its major pigment. Bile acts partly as a **surfactant** which lowers the surface tension between either two liquids or a solid and a liquid and helps to emulsify the fats in the chime. Food fat is dispersed by the action of bile into smaller units called micelles. The breaking down into micelles creates a much larger surface area for the pancreatic enzyme, lipase to work on. Lipase digests the tryglycerides which are broken down into two fatty acids and a monoglyceride

GALLBLADDER

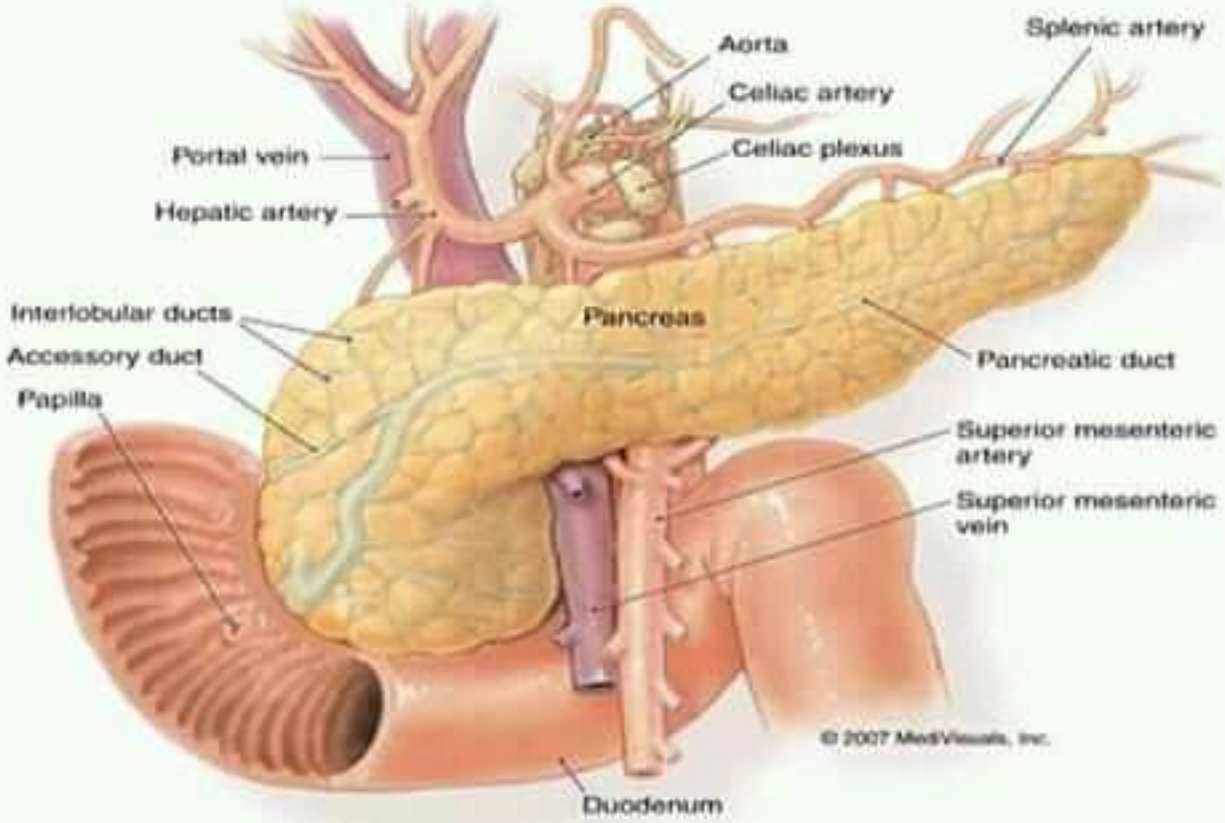
The gallbladder is a hollow part of the biliary system that sits just beneath the liver. It is a small organ where the bile produced by the liver is stored, before it is released into the small intestine. The bile flows from the liver through the bile ducts and into the gall bladder for storage. The bile is released in response to cholecystokinin (CKK) a hormone released from the small intestine. It is divided into three sections: fundus, body and neck



PANCREAS

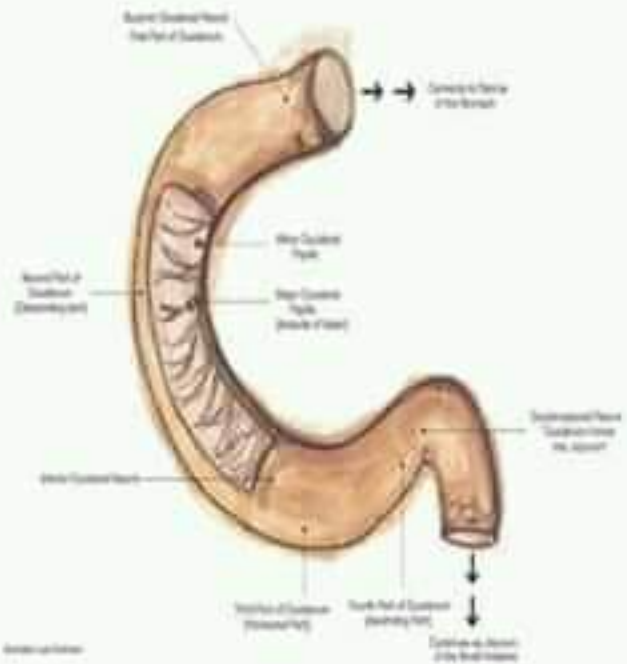
The pancreas is a major organ functioning as an accessory digestive gland in the digestive system. **It is both an endocrine gland and an exocrine gland.** The endocrine part secretes insulin when the blood sugar becomes high; insulin moves glucose from the blood into the muscles and other tissues for use as energy. The exocrine part releases glucagon when the blood sugar is low; glucagon allows stored sugar to be broken down into glucose by the liver in order to re–balance the sugar levels. Digestive enzymes are also produced. The pancreas lies below and at the back of the stomach. It connects to the duodenum via the pancreatic duct where it can act on the chyme that is released from the stomach into the duodenum.

Normal Pancreas



DUODENUM

Food eaten, starts to arrive in the small intestine after one hour, and after two hours the stomach has emptied. Until this time the food is termed a bolus. It then becomes the partially digested semi-liquid termed chyme. In the small intestine, the pH becomes crucial; it needs to be finely balanced in order to activate digestive enzymes. The chyme is very acidic, with a low pH, having been released from the stomach and needs to be made much more alkaline.



LARGE INTESTINE

In the large intestine the passage of the digesting food in the colon is a lot slower, taking from 12 to 50 hours until it is removed by defecation. The colon mainly serves as a site for the fermentation of digestible matter by the gut flora. The time taken varies considerably between individuals. The remaining semi-solid waste is termed faeces and is removed by the coordinated contractions of the intestinal walls, termed peristalsis, which propels the excreta forward to reach the rectum and exit via defecation from the anus

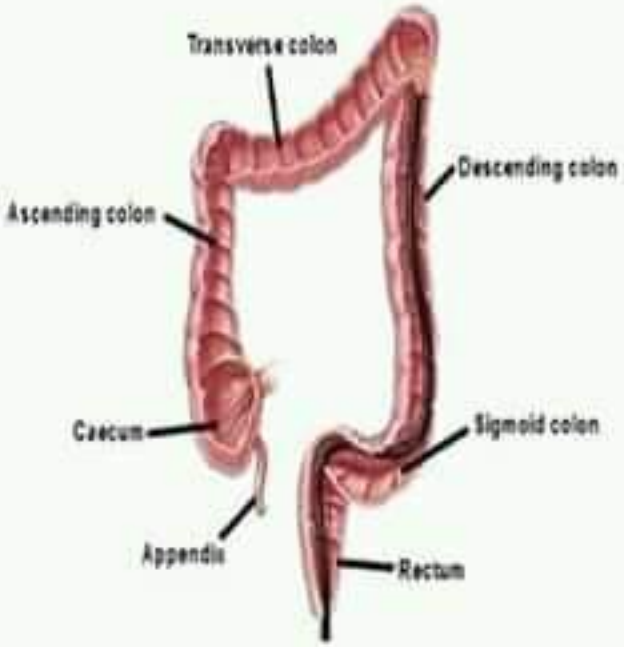
FUNCTIONAL DISORDERS

The primary causes for functional disorders include:

1. Eating a diet low in fibre
2. Not getting enough exercise
3. Travelling or other changes in routine
4. Eating large amounts of dairy products
5. Being stressed
6. Resisting the urge to have a bowel movement
7. Resisting the urge to have bowel movements due to pain from haemorrhoids
8. Overusing laxatives (stool softeners) that, over time, weaken the bowel muscles
9. Taking antacid medicines containing calcium or aluminium
10. Taking certain medicines (especially antidepressants, iron pills, and strong pain medicines such as narcotics)

CAECUM

The caecum is a pouch marking the **division between the small intestine and the large intestine.** The caecum receives chyme from the last part of the small intestine, the terminal, and connects to the ascending colon of the large intestine. At this junction there is a sphincter or valve, the ileocecal valve which slows the passage of chyme from the ileum, allowing further digestion. It is also the site of the appendix attachment



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