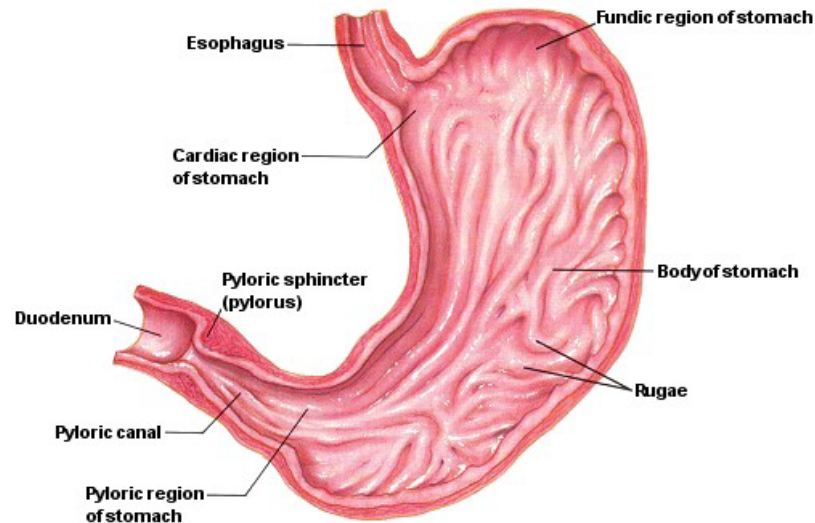


The Stomach



The stomach is a hollow muscular organ lying below the diaphragm in the upper left quadrant.

The oesophagus enters the stomach at the opening called the cardiac orifice. The part of the stomach that curves up and out above is called the fundus, the main part of the body, the lower narrower part the pylorus and the narrow opening into the duodenum is called the pyloric sphincter.

The pyloric sphincter relaxes and contracts, regulating the amount of food released into the small intestine. The outside of the stomach is covered by the peritoneum which attaches it to the posterior abdominal wall.

From the greater curvature, the peritoneum extends down in front of the abdominal organs like an apron. This is the greater omentum. This greater omentum contains fat and moves around in the abdomen often being called the abdominal policeman, because when infection occurs, it wraps itself around the organ to prevent the spread of infection.

The muscular coat of the stomach churns the food up, mixing it with the gastric juices in order to digest the food (break it down).

Gastric juice is produced by the stomach glands and contains water, hydrochloric acid, mineral salts, enzymes and intrinsic factor. Intrinsic factor is necessary for the absorption of vitamin B.

The bolus of food becomes more fluid and is called chyme.

The hydrochloric acid aids digestion and destroys bacteria.

The enzymes are:

- Pepsin – digests protein
- Rennin – curdles milk in infant's stomachs
- Intrinsic factor or anti-anaemic factor necessary for the absorption of vitamin B₁₂.

A normal meal will take two to four hours to digest before being passed on to the small intestine.

Vomiting occurs if a substance irritating the stomach is taken in. The cardiac orifice relaxes, the body of the stomach contracts and the stomach contents are forced up into the mouth.

Vomiting may also occur if balance via the middle ear is affected, e.g. sea sickness.

The Small Intestine

The small intestine is about six to seven metres in length and is divided into three parts. The first 28cm is called the duodenum, the next two fifths is called the jejunum and the other three fifths the ileum. The fold of peritoneum covering the small intestine is called the mesentery.

The mesentery contains blood vessels, nerves and lymphatic vessels and nodes. The mucous membrane of the intestine is arranged in folds and increases the surface area.

There are intestinal glands which secrete intestinal juice containing the enzymes maltase, sucrase and lactase. These enzymes complete the digestion of carbohydrates into glucose. Erepsin breaks down protein into amino-acids.

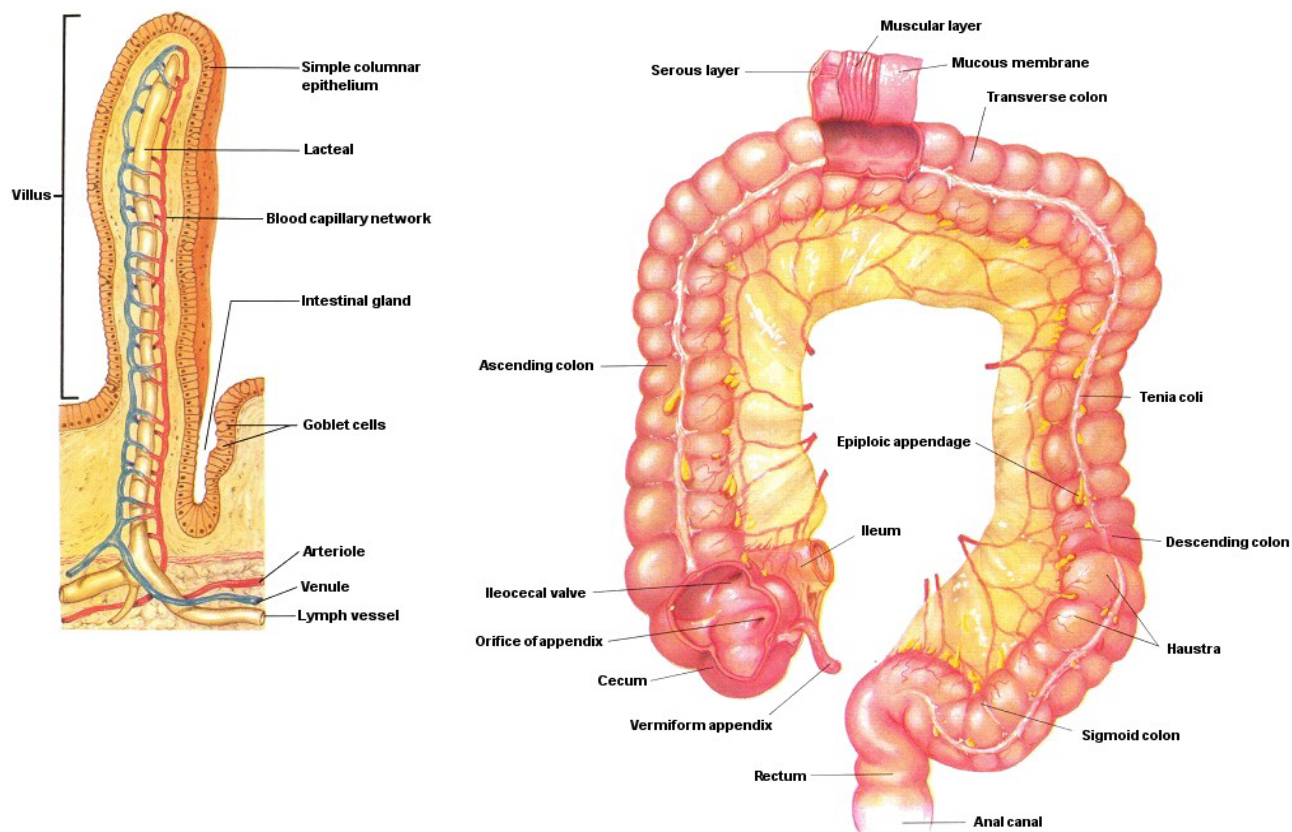
The bile duct excretes bile into the duodenum where it joins the pancreatic duct at the ampulla. Where the ampulla opens into the bowel is a sphincter muscle called the Sphincter of Oddi. Pancreatic juice is alkaline and contains the enzymes trypsin, amylase and lipase which act on protein, carbohydrates and fat respectively.

Bile is a yellowish-green alkaline fluid which is secreted by the liver and stored in the gall bladder. Bile emulsifies (breaks down) fat.

The chyme, which becomes alkaline in the duodenum, is moved along by peristalsis, mixed with pancreatic juice and intestinal juice until digestion is completed. The end product is absorbed through the walls of the villi and the residue continues on into the large intestine. The villi are tiny finger-like projections. Each villus contains a network of blood capillaries and a lymphatic capillary. The glucose and amino acids pass into the blood and the fatty acids and glycerol pass into the lymph. The lymph capillary is called a lacteal because the fat makes the lymph milky in appearance.

The Large Intestine

The large intestine is about 1.5 metres in length, it begins at the caecum which is a dilated pouch lying in the lower right quadrant of the abdomen. The food residue enters the caecum from the ileum through the ileo-caecal valve. The appendix is continuous with the caecum and is about 9 to 10cm long. It has no known function, but becomes inflamed possibly as a result of foreign bodies or hard faeces.



The caecum becomes the ascending colon, turns right at the hepatic flexure to become the transverse colon. It then turns down at the splenic flexure to become the descending colon and enters the pelvis to become the sigmoid colon. From there it forms an S-bend and becomes the rectum, the anal canal and the anal sphincter.

The colon is not as smooth as the small intestine, but is puckered due to three bands of longitudinal muscle fibres which are shorter than the bowel.

The residue of food is in fluid form when it reaches the colon and the function of the large intestine is to remove the water and convert the residue into faeces.

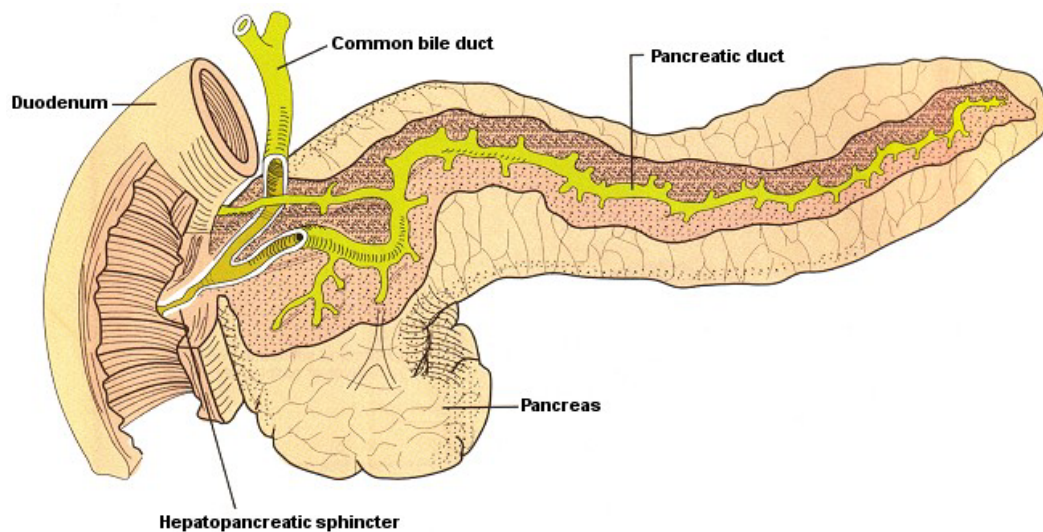
Faeces are normally brown in colour and contain millions of bacteria. These bacteria are harmless in the bowel.

Defecation

When the faeces reach the rectum, the walls are stretched and the sensory nerves alert the brain. The sphincters then relax and the faeces are passed out. The internal sphincter is controlled by the autonomic system, but the external is under the control of the will. If the act of defecation is controlled and does not take place, constipation may occur. Faeces are waste products and must be passed; otherwise toxins build up in the system.

Diarrhoea, sometimes due to food poisoning, can result in dehydration.

The Pancreas

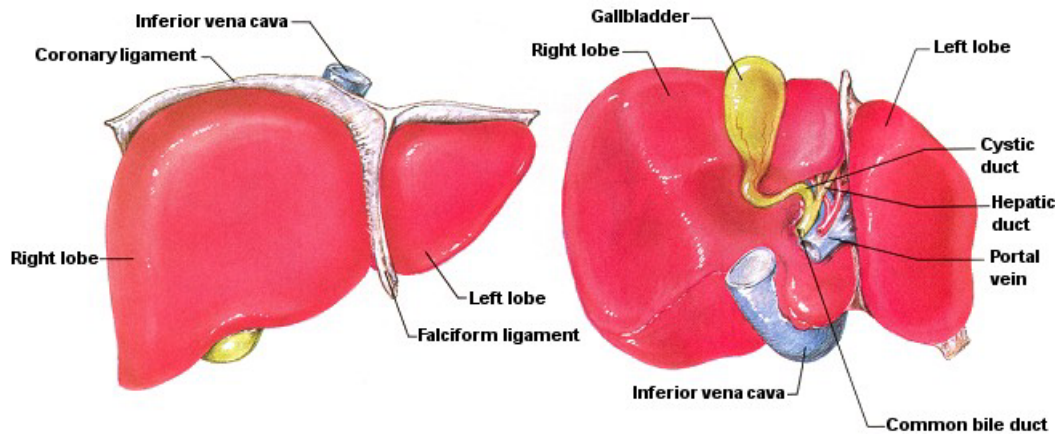


This is a fish-shaped, greyish-pink gland. It lies in the curve of the duodenum with its body lying posterior to the stomach and its tail in contact with the spleen.

The pancreas is made of lobules which secrete pancreatic juice which in turn is excreted by the pancreatic duct into the duodenum at the sphincter of Oddi. This juice consists of water, mineral salts and the enzymes trypsin, amylase and lipase.

Small areas of different types of tissue scattered throughout the pancreas secrete insulin. These areas are called the Islets of Langerhans and are endocrine glands. Insulin passes straight into the blood stream and is necessary for the storage of glucose in the liver and muscles. If insulin is absent, this storage is unable to take place and glucose builds up in the blood and is passed out through the kidneys and finally urine. This condition is called diabetes.

The Liver



The liver is the largest gland in the body and lies inferiorly to the diaphragm. It is wedge-shaped, soft, reddish-brown in colour and covered by a fold of the peritoneum which attaches it to the diaphragm. It has two lobes which are made up of tiny lobules.

Entering the liver on the under surface are the hepatic artery, nerves and the portal vein. Leaving the liver are the bile ducts, hepatic vein and the lymphatic vessels. The portal vein carries blood from the intestine, stomach and spleen directly to the liver. This blood contains nutrients from the intestines, bile pigments and iron from the spleen and the anti-anaemic factor which is formed in the stomach.

The liver is a most important and very active organ. Its functions are:

- Glucose is stored by the liver in the form of glycogen as a result of the action of insulin. When extra glucose is required by the body (e.g. fear) the adrenal glands excrete adrenaline which turns the glycogen back into glucose.
- Excess amino acids are broken down into glucose and urea. Glucose is used as fuel and urea is excreted by the kidneys.
- It converts fat which is stored in the body into a suitable form for combustion.
- It stores iron and vitamins A, B₁₂, D, E and K.
- It forms vitamin A from carotene.
- It forms plasma proteins which include the clotting substances.
- It helps form antibodies.