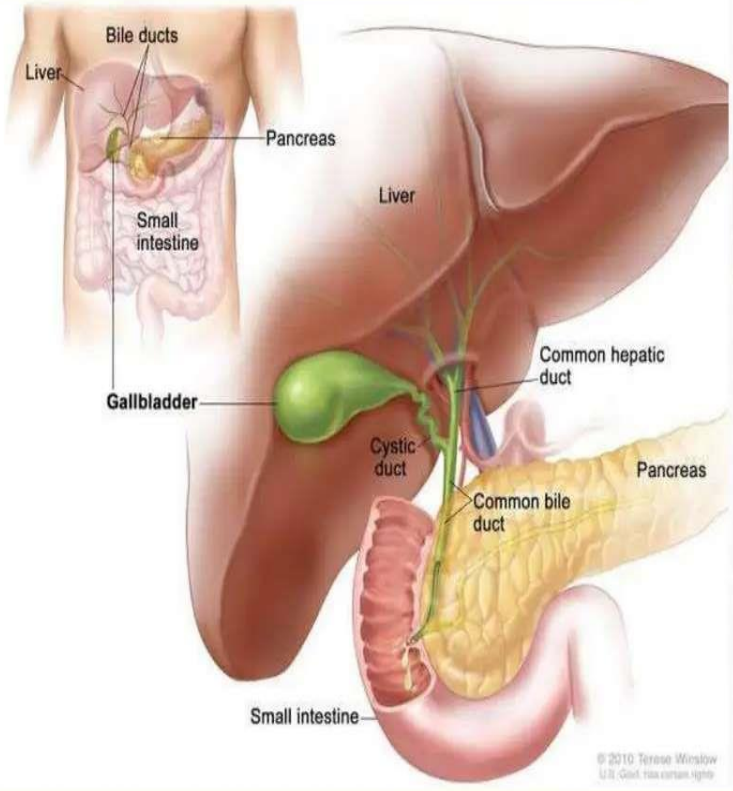
Anatomy and Physiology of Gall Bladder

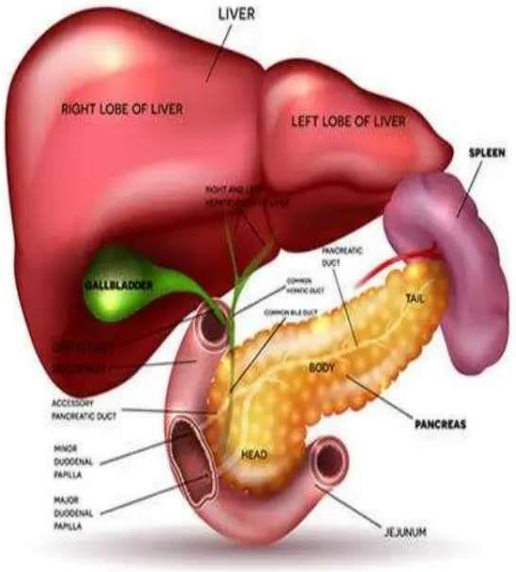
INTRODUCTION

- Pear shaped organ
- Stores 50 ml of bile produced by liver
- Bile is required for digestion
- 7-10 cm long in humans
- Dark green in colour



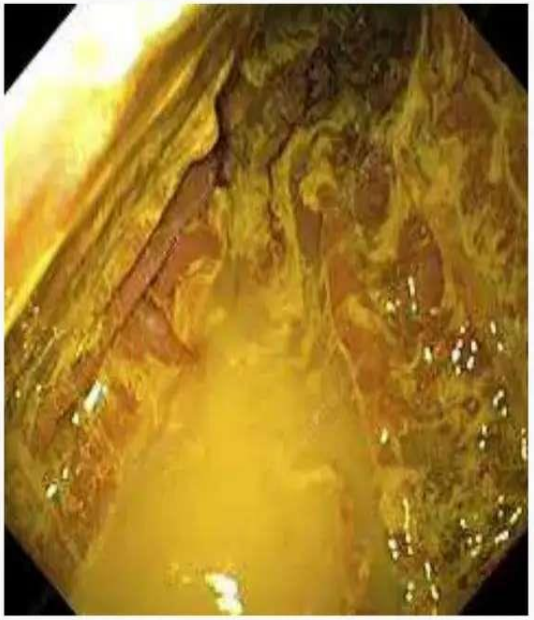
INTRODUCTION

- Muscular wall that contracts in response to cholecystokinin, a peptide hormone that is synthesized in the intestine
- Part of human biliary system



BILE

- Yellowish brown fluid
- Produced by liver
- Helps break down and digest fatty foods in small intestine
- 50 ml is stored in gall bladder at one time



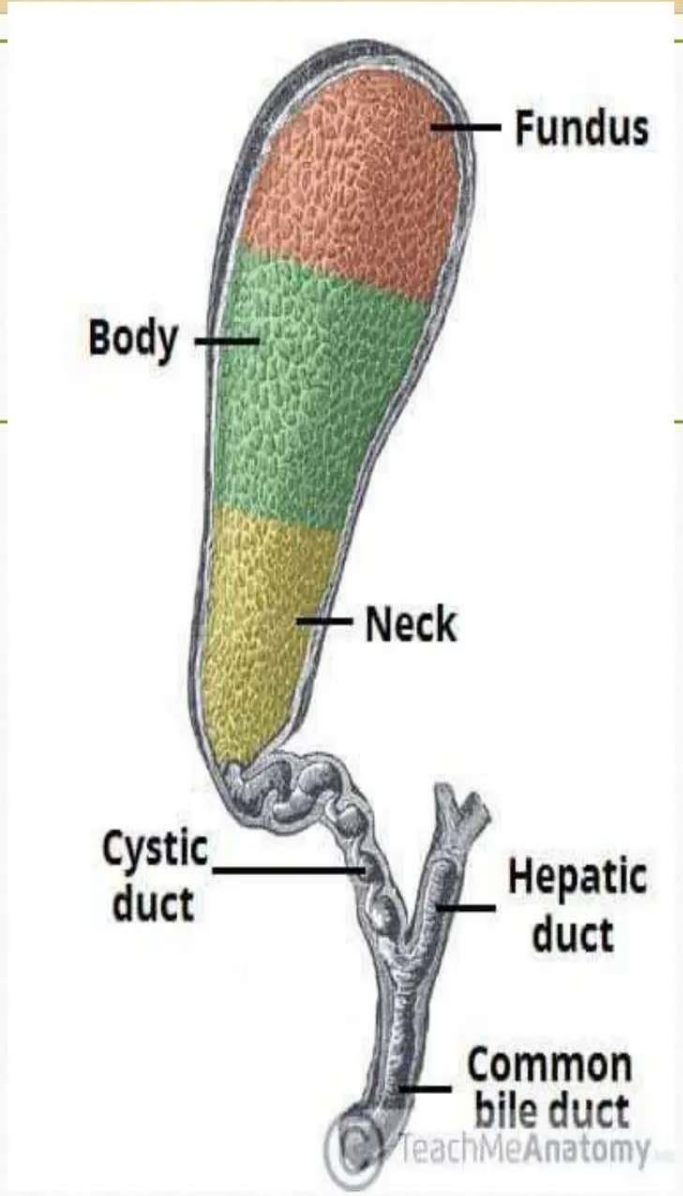
PARTS OF GALL BLADDER

- 3 parts

FUNDUS

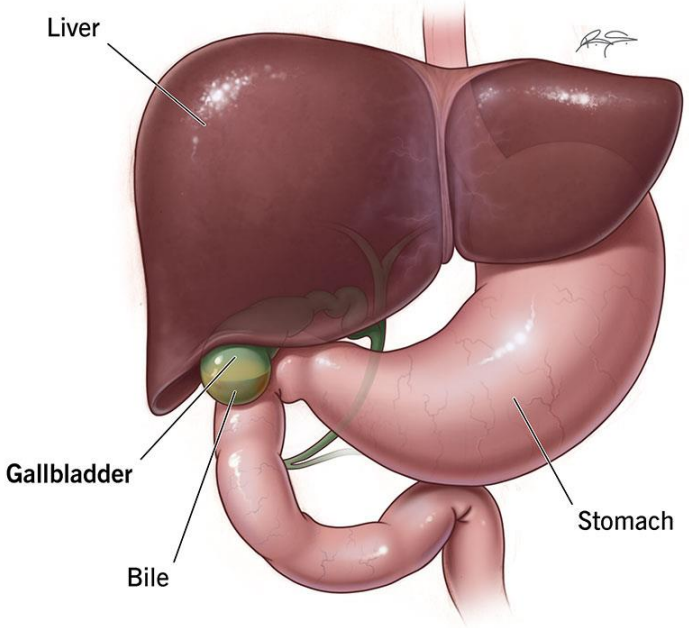
BODY

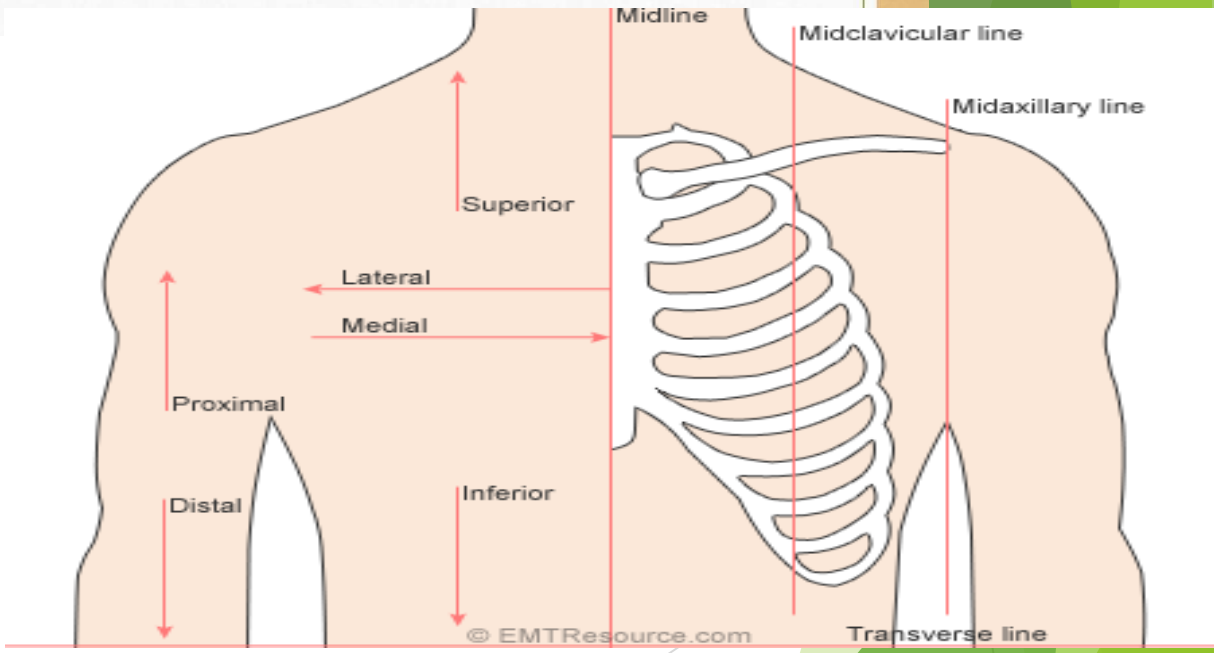
NECK


Fundus
Body
Neck
Cystic duct
Hepatic duct
Common bile duct
TeachMeAnatomy

FUNDUS

- Rounded, distal portion of the gallbladder
- Projects into the inferior surface of the liver in the mid clavicular line
- Protrudes beyond the lower border of the liver and may touch the anterior abdominal wall





BODY

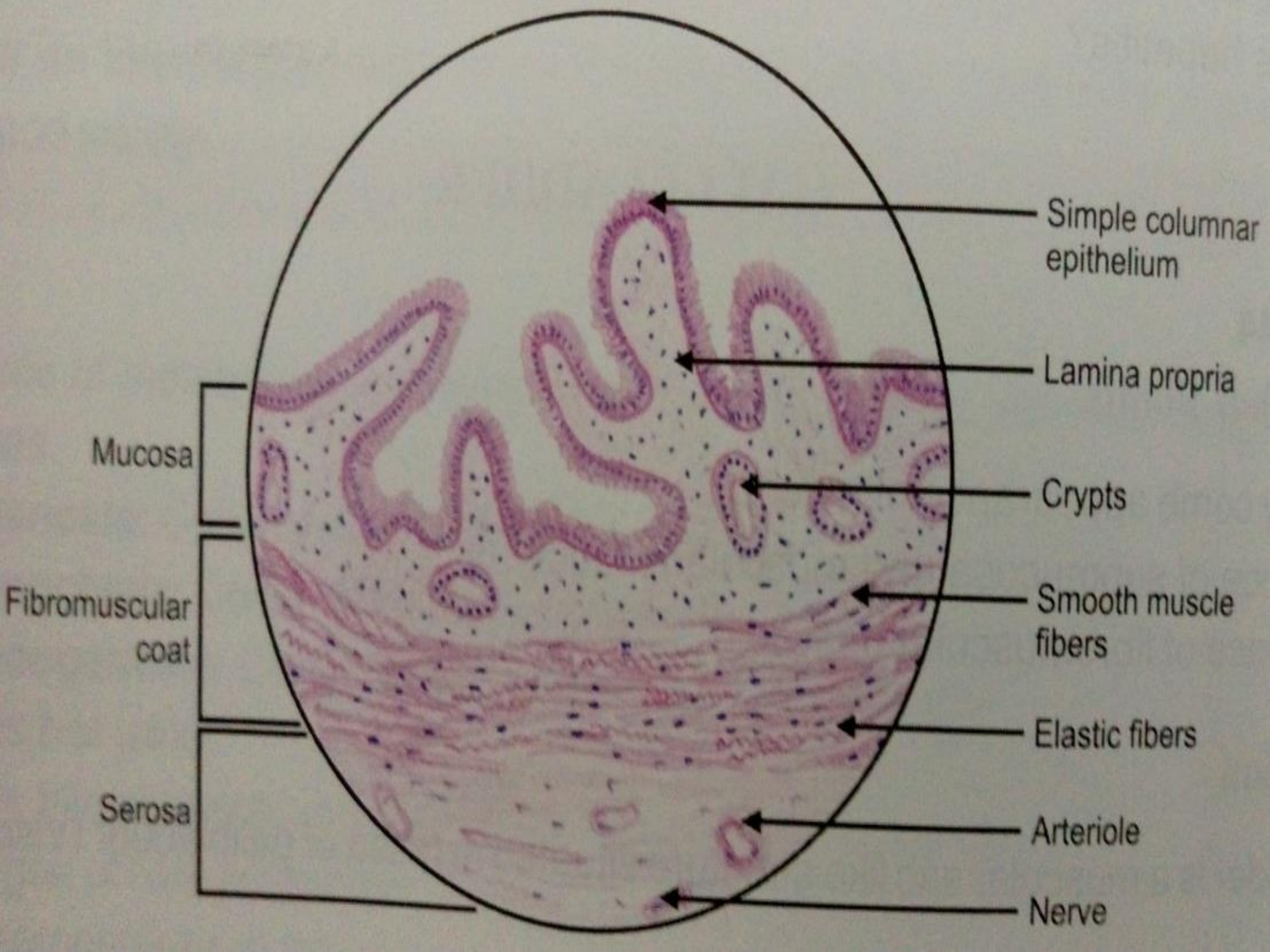
- Largest part of the gallbladder
- Adjacent to the posteroinferior aspect of the liver, transverse colon and superior part of the duodenum

Neck

- Gall bladder tapers to become continuous with the cystic duct leading into the biliary tree

LAYERS OF GALLBLADDER

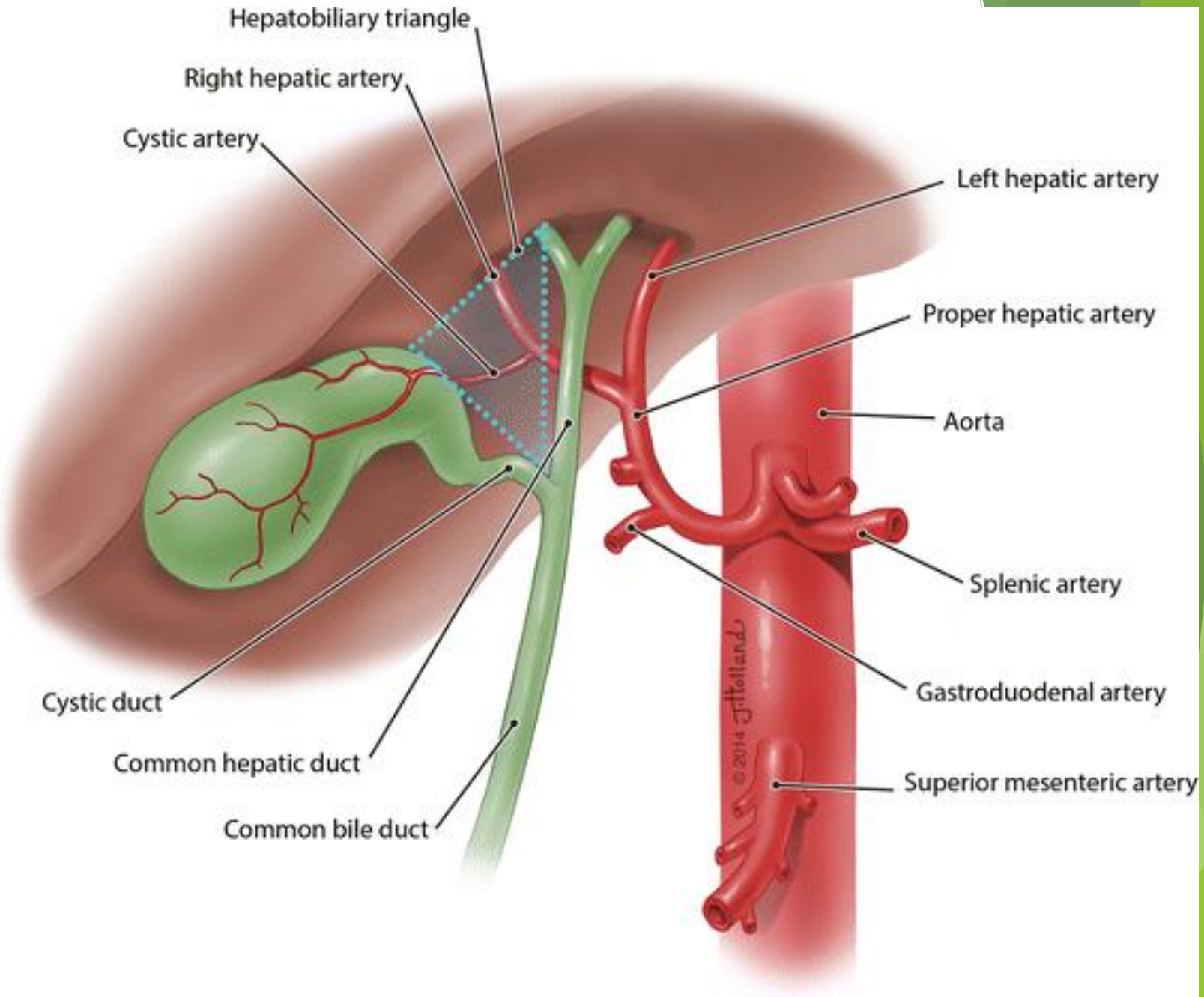
- Mucosa , muscularis, perimuscular and serosa
- Epithelium is a thin sheet of cell that is closest to the inside of the gall bladder
- Lamina propria is a thin layer of loose connective tissue which together with the epithelium forms the mucosa.
- Muscularis is a layer of smooth muscular tissue that helps the gallbladder contract and squirt bile into the bile duct
- Perimuscular is a fibrous connective tissue layer that surrounds the muscularis
- Serosa is a smooth mmembrane thatis the outer covering of the gallbladder


Simple columnar epithelium
Lamina propria
Crypts
Smooth muscle fibers
Elastic fibers
Arteriole
Nerve
Mucosa
Fibromuscular coat
Serosa

Functions of Gall Bladder

- The mucosa of the gall bladder consists of simple columnar epithelium arranged in ***rugae resembling those of the stomach.***
- The wall of the gall bladder ***lacks a submucosa.***
- The middle, muscular coat of the wall consists of ***smooth muscle fibres.***
- Contraction of the smooth muscle fibres ejects the contents of the gall bladder into the ***cystic duct.***
- The gall bladder's outer coat is the ***visceral peritoneum.***
- The functions of the gall bladder are:
  - ***to store*** and
  - ***concentrate*** the bile produced by the liver ***(up to tenfold)*** until it is needed in the small intestine.
- In the concentration process, ***water*** and **ions** are absorbed by the gall bladder mucosa.

Blood supply to Gall bladder



Blood supply to gall bladder

The gallbladder receives its blood supply from the cystic artery, which is a branch of the right hepatic artery:

	Description
Cystic artery	A branch of the right hepatic artery that supplies the gallbladder with oxygenated blood. It also supplies blood to the cystic duct, which connects the gallbladder to the common bile duct.
Right hepatic artery	Originates from the common hepatic artery, which is one of the three major branches of the celiac trunk.

Venous blood from gall bladder to liver

The gallbladder's venous blood **drains into the portal vein or hepatic sinusoids**, depending on the part of the gallbladder:

Neck of the gallbladder

The cystic veins drain the neck of the gallbladder directly into the portal vein. The cystic veins are usually multiple small veins that drain into the hepatic portal vein's branches and tributaries.

Fundus and body of the gallbladder

The venous blood from the fundus and body of the gallbladder drains into the hepatic sinusoids.

The portal vein is the main vessel of the portal venous system (PVS), which drains blood from the gallbladder, pancreas, spleen, stomach, and small and large intestines to the liver.

Nerve supply to Gall bladder

The gallbladder is innervated by sympathetic, parasympathetic, and sensory nerves:

Sympathetic nerves

The greater and lesser splanchnic nerves send sympathetic fibers to the gallbladder through the celiac and hepatic ganglia. These fibers may cause vasoconstriction.

Parasympathetic nerves

The vagus nerve sends parasympathetic fibers to the gallbladder through the hepatic plexus. These fibers, along with hormonal signals from the duodenum, cause the gallbladder to contract and secrete bile.

Sensory nerves

Visceral afferent sensory fibers carry pain sensation from the gallbladder along the vagus nerve or the splanchnic nerves. This pain is often felt in the right hypochondrium and epigastrium.

The gallbladder's main function is to store and release bile, which helps break down fats in the small intestine.

lymphatic drainage of the gallbladder

The lymphatic drainage of the gallbladder can occur along three pathways:

Cholecysto-retropancreatic pathway

This is considered the main pathway, running along the common bile duct and ending at nodes B and D. Node D is the main terminal lymph node and is located behind the portal vein.

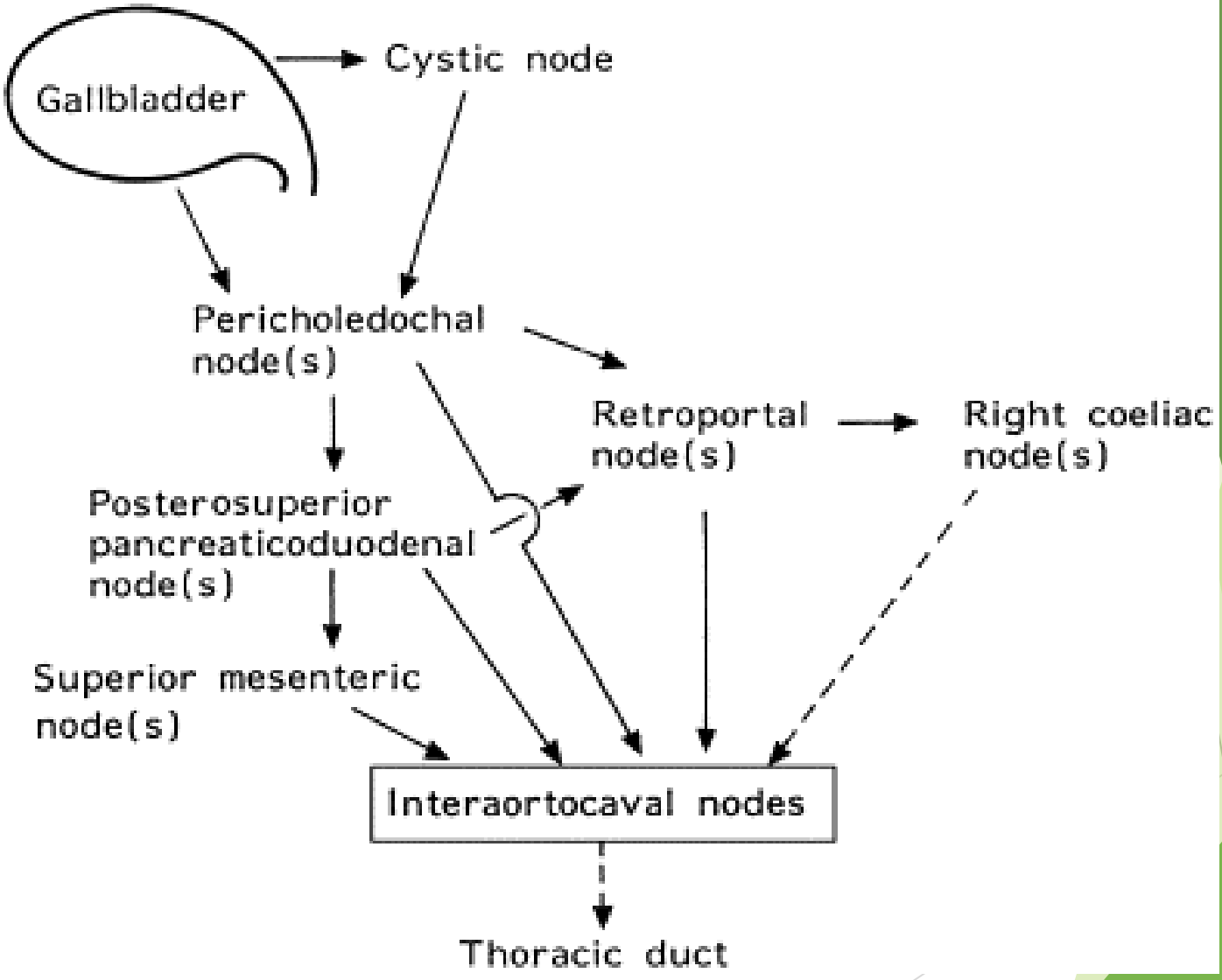
Cholecysto-celiac pathway

This pathway runs to the left through the hepatoduodenal ligament and reaches the nodes around the celiac trunk and common hepatic artery.

Cholecysto-mesenteric pathway

This pathway runs to the left in front of the portal vein and connects with the nodes at the superior mesenteric root. The three pathways converge near the left renal vein with the abdomino-aortic lymph nodes.

The lymphatic system is a network of lymphatic vessels, organs, lymph nodes, and lymphoid tissue that drains leaked tissue fluid back into circulation.


Gallbladder
Cystic node
Pericholedochal node(s)
Retroportal node(s)
Right coeliac node(s)
Posterosuperior pancreaticoduodenal node(s)
Superior mesenteric node(s)
Interaortocaval nodes
Thoracic duct

Physiology of Gall bladder

The gallbladder's physiology involves **storing and releasing bile to aid in digestion**:

Storage

The gallbladder is a pear-shaped organ that stores and concentrates bile from the liver. It's located in the upper right abdomen, just below the liver.

Release

When food, especially fatty food, is present in the duodenum, the gallbladder releases bile into the small intestine. This is triggered by nerve and chemical signals that cause the gallbladder to contract.

Bile's role

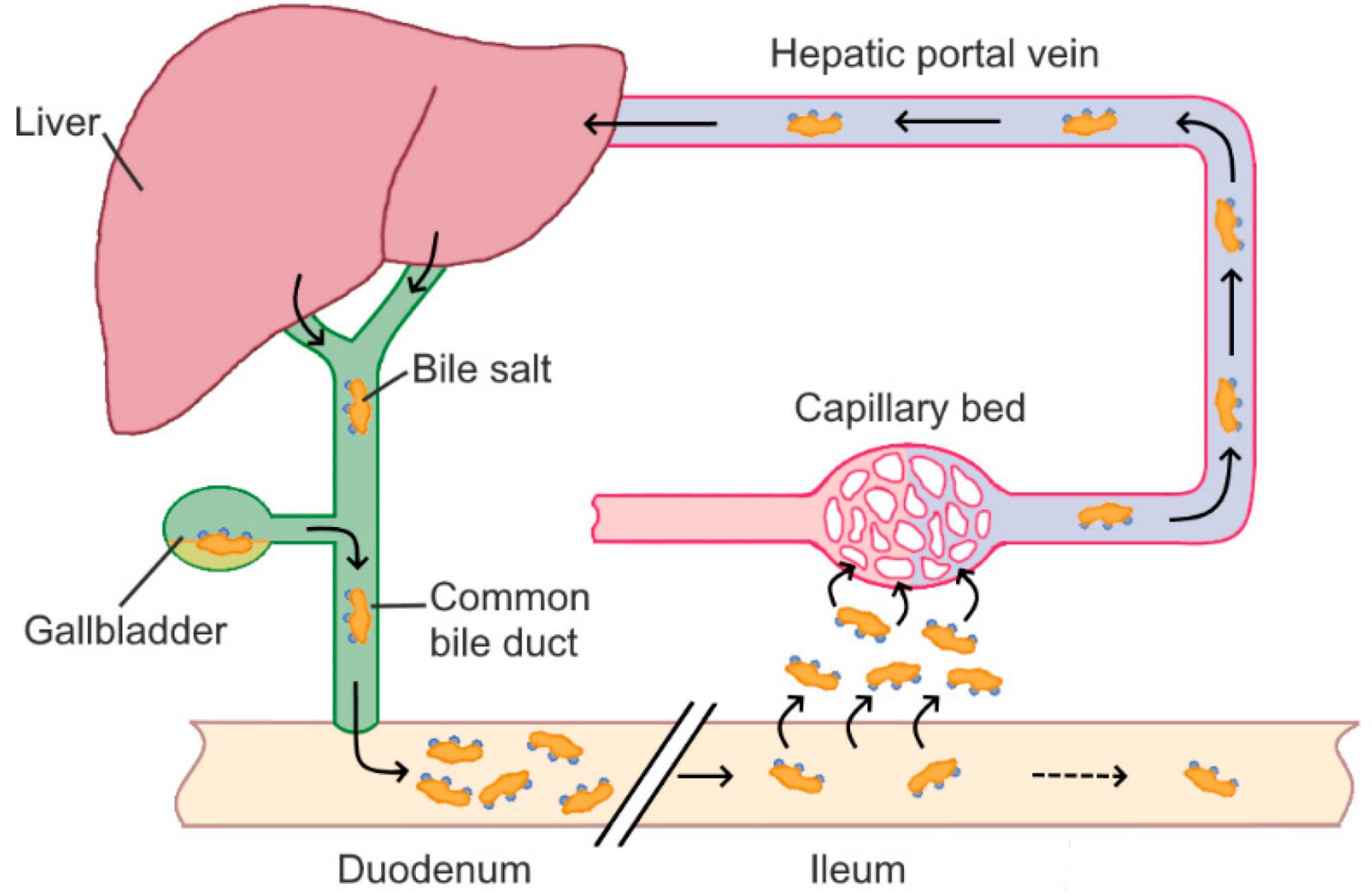
Bile helps the body break down and absorb fats from food. It emulsifies large fat droplets into smaller ones, which helps with fat absorption.

Bile concentration

The gallbladder concentrates bile by reabsorbing water, electrolytes, and some bile salts.

Gallbladder function

While the gallbladder is important for digestion, it's not essential. If the gallbladder isn't functioning, the bile acid pool will still cycle through the body, and most of it will be stored in the small intestine.


Hepatic portal vein
Liver
Bile salt
Capillary bed
Gallbladder
Common bile duct
Duodenum
Ileum