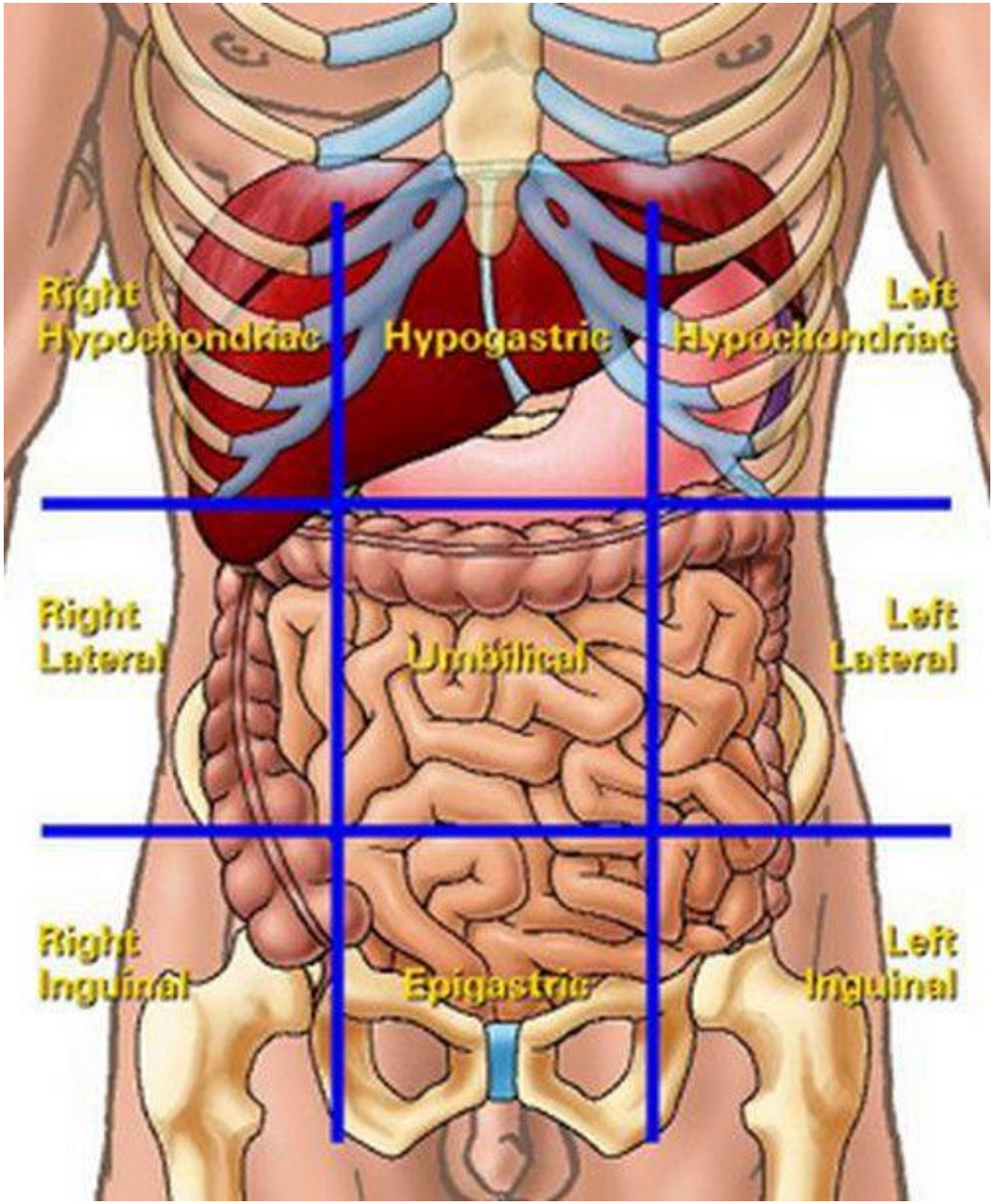
LIVER

INTRODUCTION

- **also called the 'hepar‘**
- **The liver is a peritoneal organ positioned in the right upper quadrant of the abdomen. It is the largest gland in the human body.**
- **An accessory digestion gland, the liver performs a wide range of functions; including synthesis of bile, glycogen storage and clotting factor production.**

Anatomical Position- the whole of the right hypochondrium, the greater part of the epigastrium, and extends into the left hypochondrium reaching up to the left lateral line.

Weight- about 1600 g in males and about 1300 g in females.


Right Hypochondriac
Hypogastric
Left Hypochondriac
Right Lateral
Umbilical
Left Lateral
Right Inguinal
Epigastric
Left Inguinal

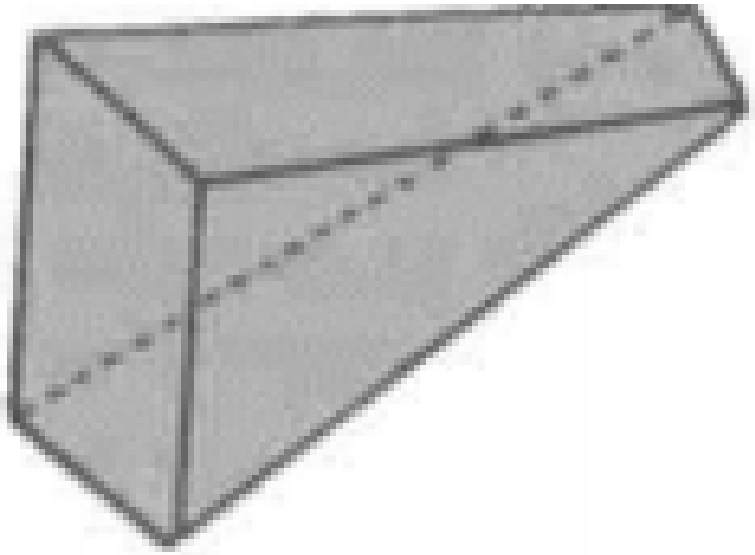
EXTERNAL FEATURES-

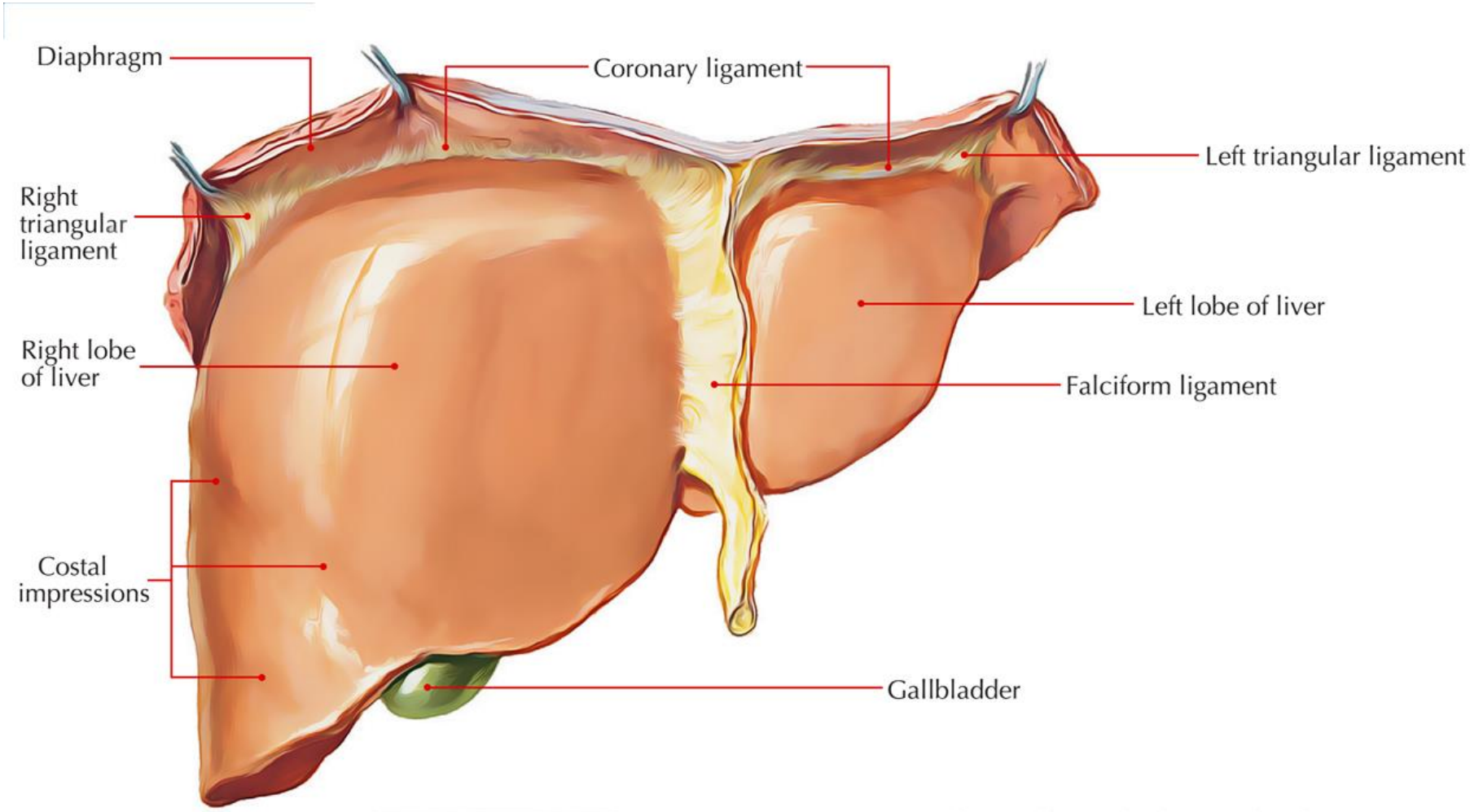
The liver is wedge-shaped.

- **Five Surfaces-**

(1) Anterior, (2) posterior, (3) superior, (4) inferior (5) right.

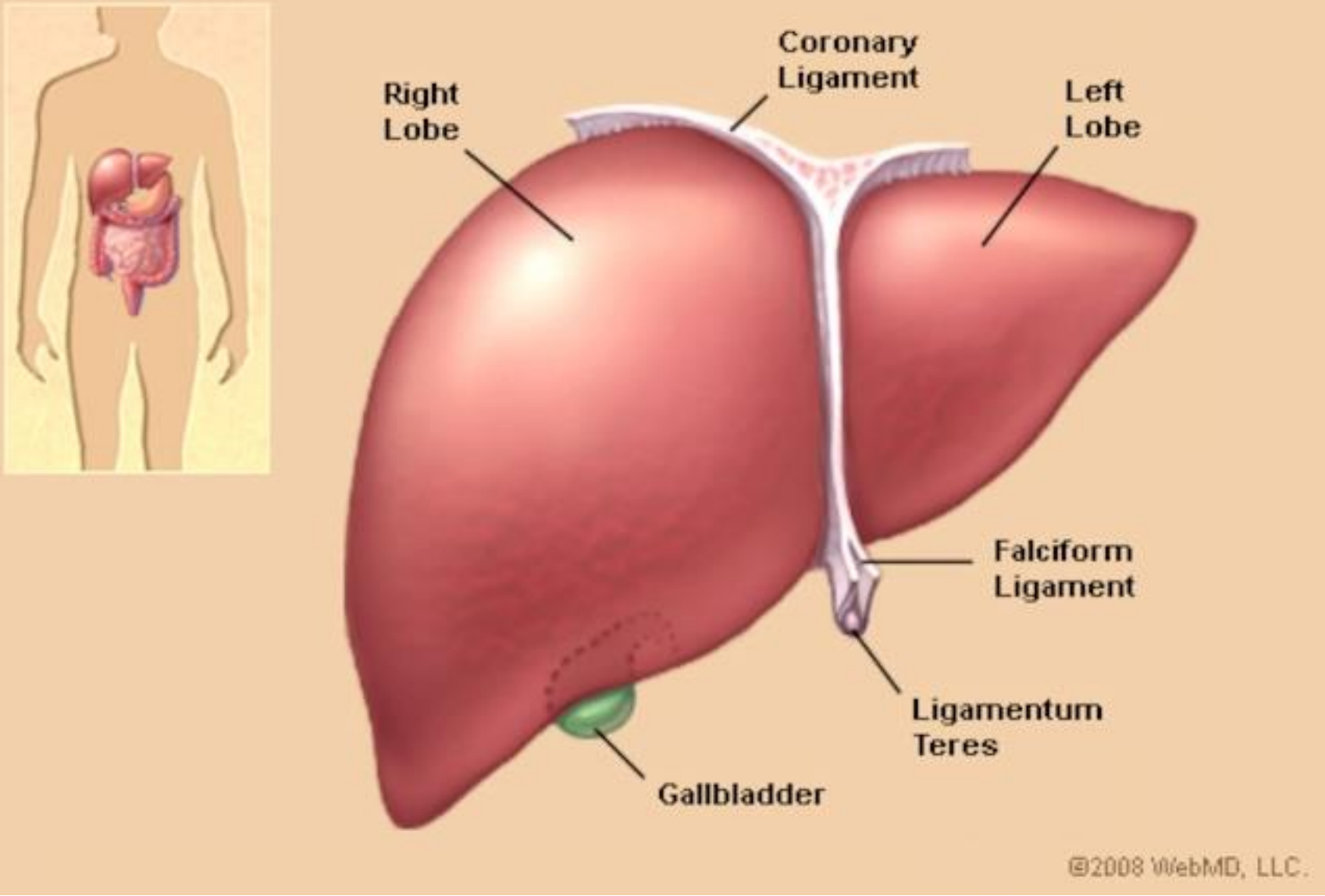
Out of these the inferior surface is well defined.




Diaphragm
Coronary ligament
Left triangular ligament
Right triangular ligament
Left lobe of liver
Right lobe of liver
Falciform ligament
Costal impressions
Gallbladder

One Prominent Border- The inferior border is sharp anteriorly where it separates the anterior surface from the inferior surface.

- **The sharp anterior part of inferior border is marked by (a) an interlobar notch or the notch for the ligamentum teres, and (b) a cystic notch for the fundus of the gall bladder.**


Coronary Ligament
Right Lobe
Left Lobe
Falciform Ligament
Ligamentum Teres
Gallbladder
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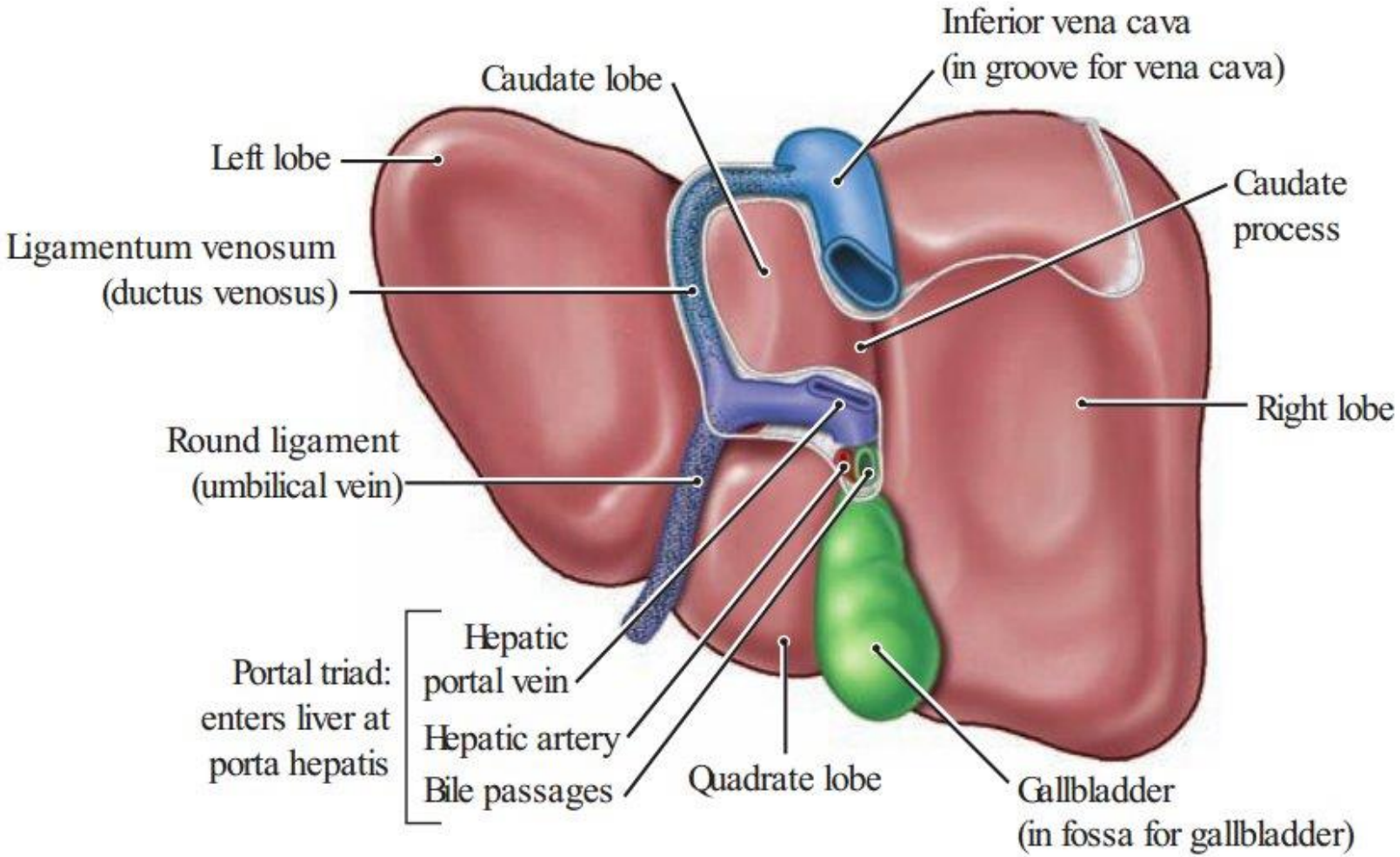
Anatomical Structure

The structure of the liver can be considered both macroscopically and microscopically.

Macroscopic

- ✓ **The liver is covered by a fibrous layer, known as Glisson's capsule.**
- ✓ **The liver is divided into right and left lobes by the attachment of the falciform ligament anteriorly and superiorly; by the fissure for the ligamentum teres inferiorly; and by the fissure for the ligamentum venosum posteriorly.**



C. Postero-inferior View

- ✓ **The right lobe is much larger than the left lobe, and forms five sixth of the liver. It contributes to all the five surfaces of the liver, and presents the caudate and quadrate lobes**
- ❑ **Caudate lobe – situated on the posterior surface. It is bounded on the right by the groove for the IVC, on the left by the fissure for the ligamentum venosum, and interiorly by the porta hepatis.**
- ❑ **Quadrate lobe situated on the inferior surface, and is rectangular in shape. It lies between the gallbladder and a fossa produced by the ligamentum teres.**

porta hepatis

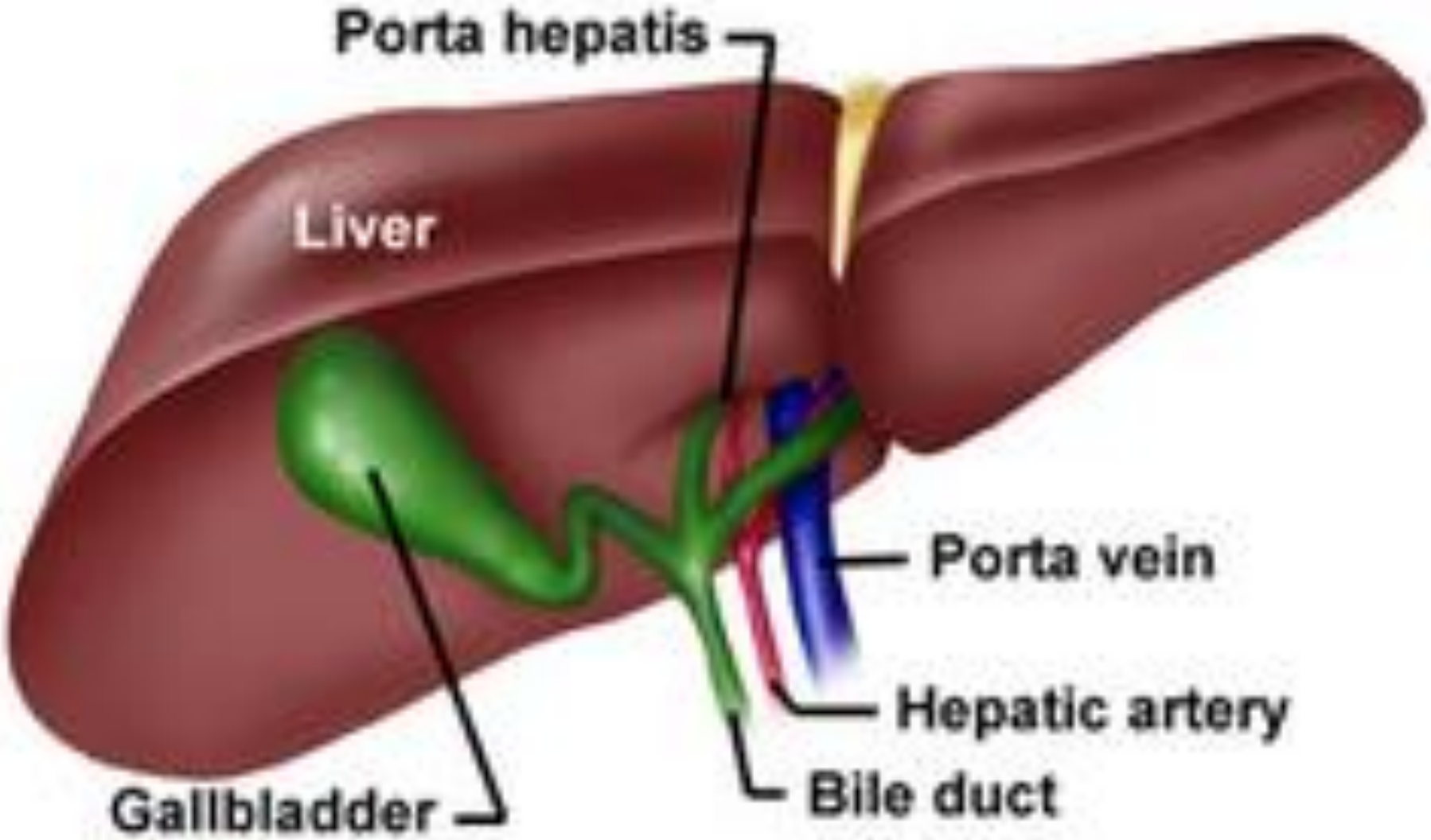
deep, transverse fissure about 5 cm long, situated on the inferior surface of the right lobe of the liver.

It lies between the caudate lobe and quadrate lobe

The portal vein, the hepatic artery and the hepatic plexus of nerves enter the liver through the porta hepatis, while the right and left hepatic ducts and a few lymphatics leave it.

The relations within the porta hepatis are from behind forwards the portal vein, the hepatic artery and the hepatic ducts.

The lips of the porta hepatis provide attachment to the lesser omentum


Porta hepatis
Liver
Porta vein
Hepatic artery
Bile duct
Gallbladder

RELATIONS

Peritoneal Relations-

Most of the liver is covered by peritoneum. The areas not covered by peritoneum are as follows :

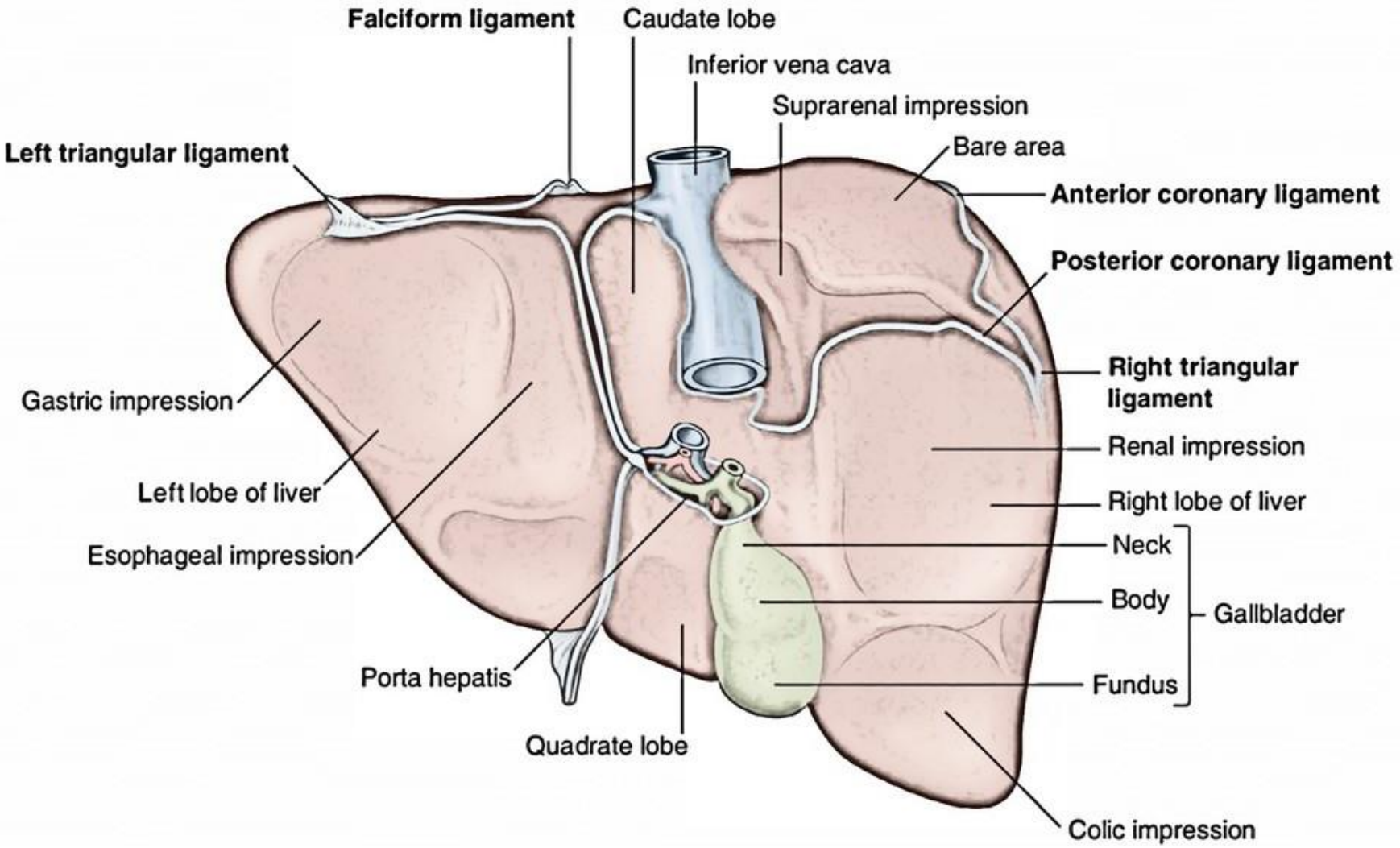
(a) A triangular 'bare area', on the posterior surface of the right lobe, limited by the upper and lower layers of the coronary ligament and by the right triangular ligament;

(b) the groove for the inferior vena cava, on the posterior surface of the right lobe of the liver, between the caudate lobe and the bare area;

(c) the fossa for the gall bladder which lies on the inferior surface of the right lobe to the right of the quadrate lobe;

(d) the coronary ligament having superior and inferior layers, which enclose the bare area of the liver; and

(e) the lesser omentum

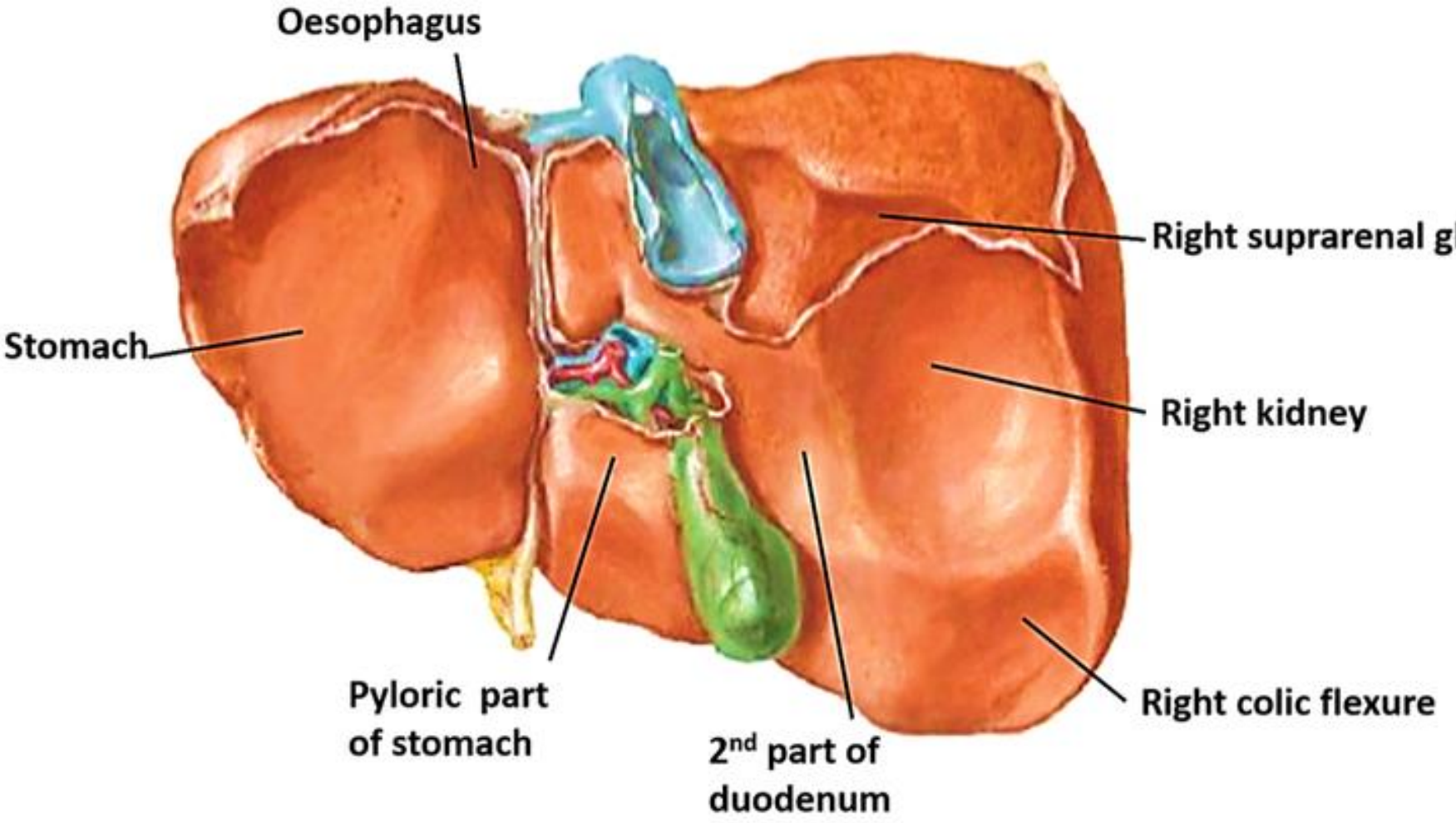

Falciform ligament
Caudate lobe
Inferior vena cava
Suprarenal impression
Left triangular ligament
Bare area
Anterior coronary ligament
Posterior coronary ligament
Right triangular ligament
Gastric impression
Renal impression
Left lobe of liver
Right lobe of liver
Esophageal impression
Neck
Body
Gallbladder
Porta hepatis
Fundus
Quadrate lobe
Colic impression

Visceral Relations

1. **Anterior Surface- related to the xiphoid process and to the anterior abdominal wall in the median plane; and to diaphragm on each side. The falciform ligament is attached to this surface.**

2. **Posterior Surface-**

- **middle part shows a deep concavity for the vertebral column.**
- **bare area is related to the diaphragm;**
- **right suprarenal gland near the lower end of the groove for the inferior vena cava.**
- **The groove for the inferior vena cava lodges the upper part of the vessel, and its floor is pierced by the hepatic veins.**
- **The fissure for the ligamentum venosum**
- **The posterior surface of the left lobe is marked by the oesophageal impression.**


Oesophagus
Right suprarenal gland
Stomach
Right kidney
Pyloric part of stomach
2nd part of duodenum
Right colic flexure

3.Superior Surface- cardiac impression in middle concavity. On each side of the impression the surface is convex to fit the dome of the diaphragm.

4. Inferior Surface-

- On the inferior surface of the left lobe there is a large concave gastric impression.
- The fissure for the ligamentum teres

The left lobe also bears a raised area that comes in contact with the lesser omentum: it is called the omental tuberosity.

- **The quadrate lobe is related to the lesser omentum, the pylorus, and the first part of the duodenum.**
- **The fossa for the gall bladder lies to the right of the quadrate lobe**
- **To the right of this fossa the inferior surface of the right lobe bears the colic impression for the hepatic flexure of the colon, the renal impression for the right kidney, and the duodenal impression for the second part of the duodenum.**

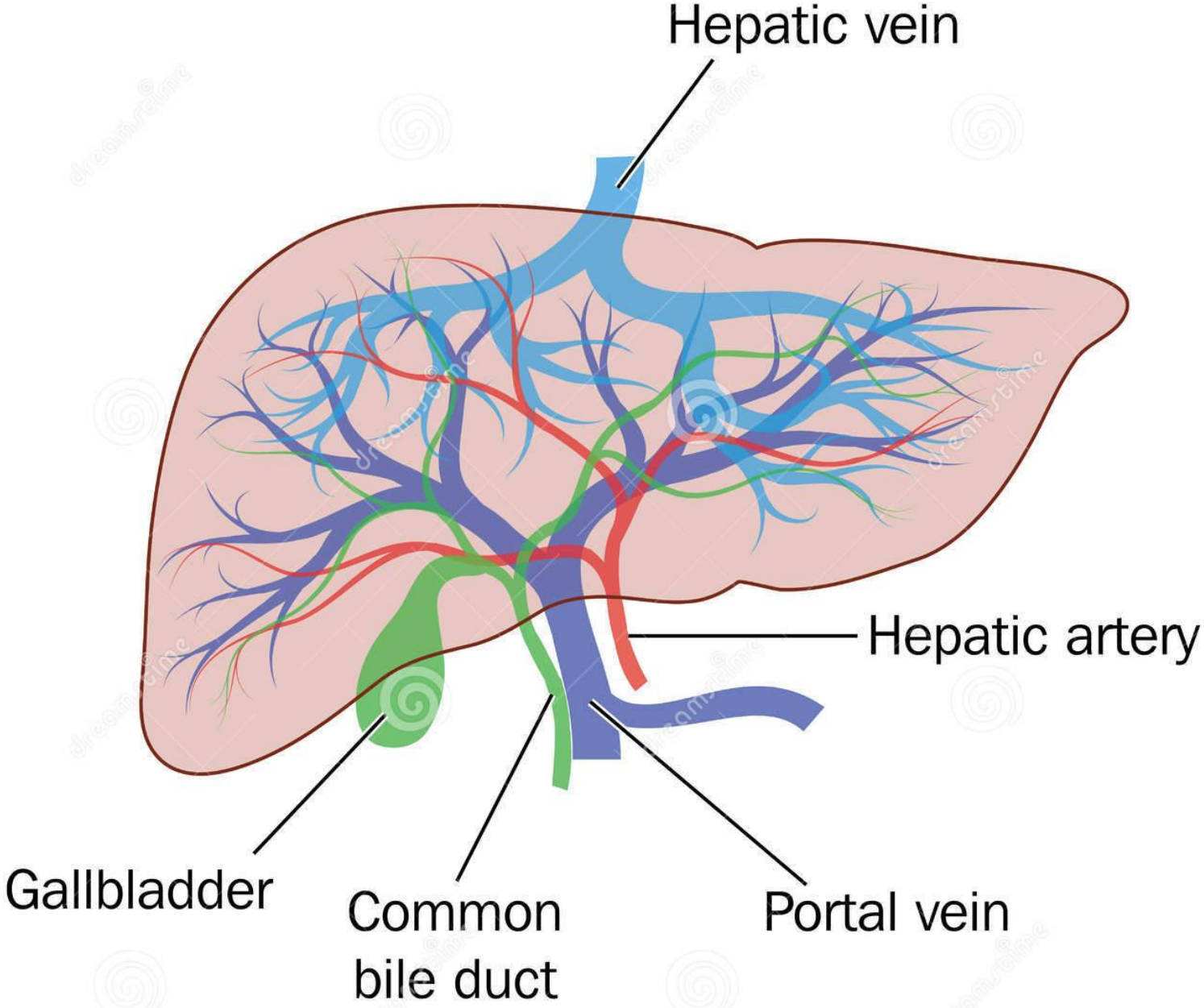
5. **Right Surface It is related to the diaphragm opposite the 7th to 11th ribs in the midaxillary line.**

Blood supply

The liver has a unique dual blood supply:

1. **Hepatic artery proper (20%) – supplies the non-parenchymal structures of the liver with arterial blood. It is derived from the coeliac trunk.**
2. **Hepatic portal vein (80%) – supplies the liver with partially deoxygenated blood, carrying nutrients absorbed from the small intestine. This is the dominant blood supply to the liver parenchyma, and allows the liver to perform its gut-related functions, such as detoxification.**

- **Before entering the liver, both the hepatic artery and the portal vein divide into right and left branches.**
- **Within the liver, they redivide to form segmental vessels which further divide to form interlobular vessels which run in the portal canals. Further ramifications of the interlobular branches open into the hepatic sinusoids. Thus the hepatic arterial blood mixes with the portal venous blood in the sinusoids.**



- **Venous drainage- Hepatic sinusoids drain into interlobular veins, which joins to form sublobular veins. These in turn unite to form the hepatic veins which drain directly into the inferior vena cava.**

Nerve Supply

- **The parenchyma of the liver is innervated by the hepatic plexus, which contains sympathetic (coeliac plexus) and parasympathetic (vagus nerve) nerve fibres.**

Lymphatic Drainage

- **anterior aspect of the liver drain into hepatic lymph nodes, empty in the colic lymph nodes which in turn, drain into the cisterna chyli.**
- **posterior aspect of the liver, drain into phrenic and posterior mediastinal nodes which join the right lymphatic and thoracic ducts.**

Surface Marking

In surface projection, the liver is triangular in shape when seen from the front.

Superior border- is marked by joining the following points:

(1) First point in the left 5th intercostal space 9 cm from the median plane;

(2) second point at the xiphisternal joint;

(3) third point at the upper border of the right 5th costal cartilage in the right lateral vertical plane;

(4) fourth point at the 6th rib in the midaxillary line;

(5) fifth point at the inferior angle of the right scapula; and

(6) sixth point at the 8th thoracic spine

Inferior border is marked by a curved line joining the following points :

(1) First point at the left 5th intercostal space 9 cm from the median plane;

(2) second point at the tip of the 8th costal cartilage on the left costal margin;

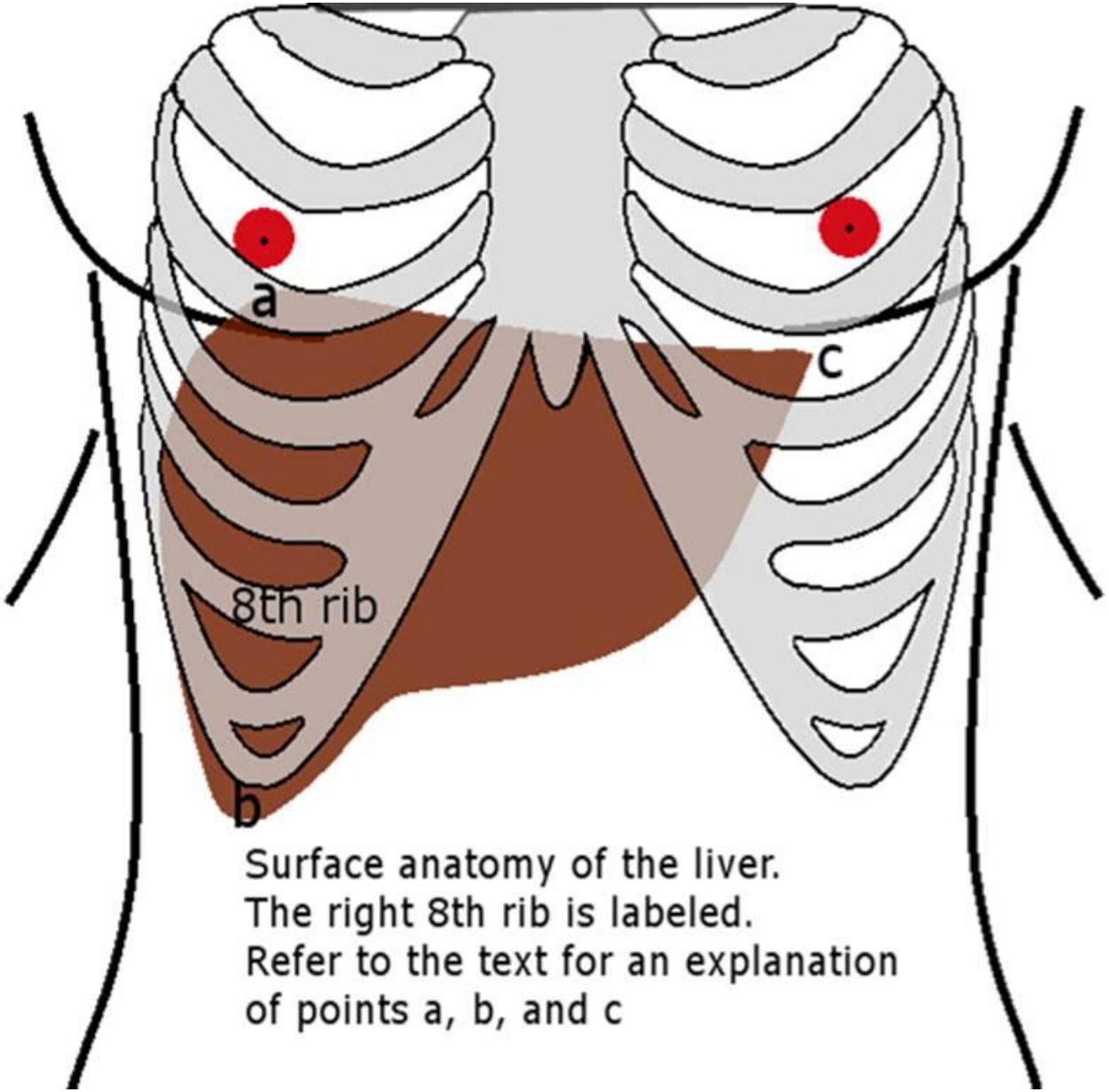
(3) third point at the transpyloric plane in the midline;

(4) fourth point at the tip of the 9th costal cartilage on the right costal margin;

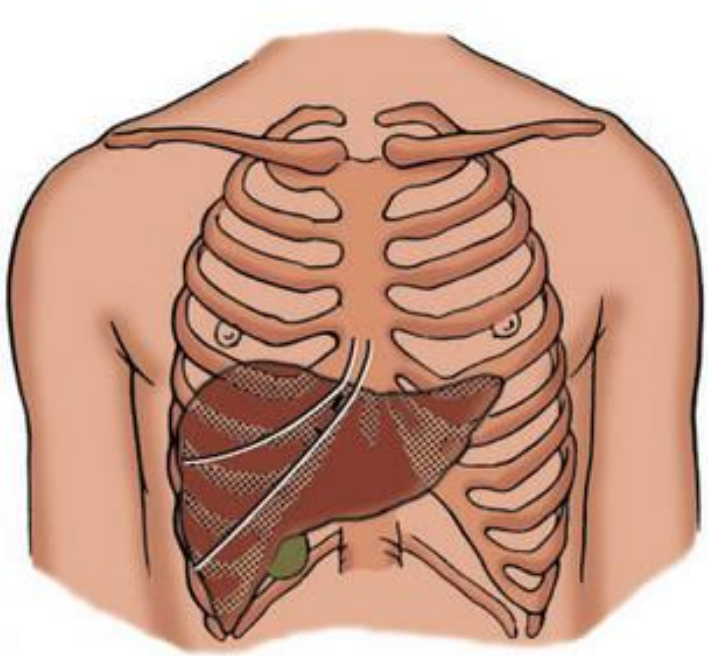
(5) fifth point 1 cm below the right costal margin at the tip of the 10th costal cartilage; and

(6) sixth point at the 11th thoracic spine.

- **Right border- is marked on the front by a curved line convex laterally, drawn from a point a little below the right nipple to a point 1 cm below the right costal margin at the tip of the 10th costal cartilage.**



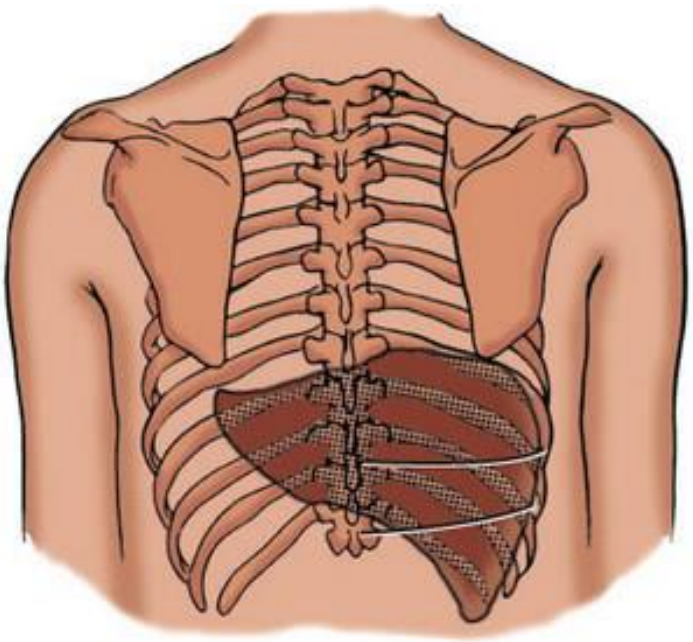
Surface anatomy of the liver.
The right 8th rib is labeled.
Refer to the text for an explanation
of points a, b, and c



LATERAL STERNAL LINE

Liver	5
Lung	6
Pleura	7

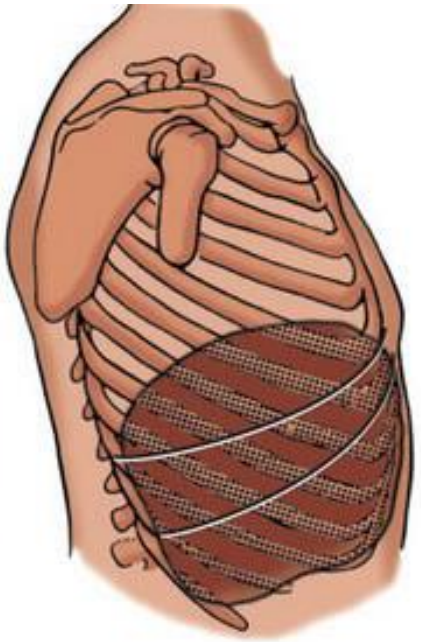
A



VERTEBRAL SPINES

Liver	8
Lung	10
Pleura	12

B



MID-AXILLARY LINE

Liver	6
Lung	8
Pleura	10

C