



# Pancreas & Biliary System

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# PANCREAS

Retro-peritoneal in position

soft, lobulated elongated gland with both exocrine and endocrine functions.

6-10 inch in length and 60-100 gram in weight.

Located in Epigastrium & Left upper quadrant of abdomen.

Lies across the posterior abdominal wall in a transverse /oblique directions at the transpyloric plane (L1 vertebra).

## Parts of pancreas

parts	Head	Neck	Body	Tail
Location	Disc shaped, lies within the concavity of the duodenum	The constricted portion connecting the head & body	<ul style="list-style-type: none"> <li>•It runs upward and to the left.</li> <li>•It is triangular in cross section.</li> </ul>	Narrow, short segment, ending at the splenic hilum
Relation	Related to the 2 <sup>nd</sup> and 3 <sup>rd</sup> portions of the duodenum on the right & continues with the neck on the left	Lies in front of origin of superior mesenteric artery and the confluence (beginning) of the portal vein	The splenic vein is embedded in its posterior surface And the splenic artery runs on its upper border	Anteriorly, related to splenic flexure of colon
Extra	Includes uncinete process (part extending to the left behind the superior mesenteric vessels)	The superior mesenteric vessels emerge from its inferior border	-	Lies in the splenicorenal ligament (may get injured during splenectomy), at the level of the T12 vertebra

## Relations of pancreas

### Anterior relation

- Stomach separated by **lesser sac**- and splenic artery
- Transverse colon & transverse mesocolon (splenic flexure)

### Posterior relation

- Bile duct**, portal & splenic veins, inferior vena cava, **aorta** & **origin of superior mesenteric artery**
- Left psoas muscle**, left adrenal gland, left renal vessels & upper 1/3rd of left kidney
- Hilum of **the spleen**

## Pancreatic Ducts

Main duct (of Wirsung)	Accessory duct (of Santorini)
<p>runs the entire length of pancreas beginning from the tail.</p> <p>receives many tributaries from tail, body, neck, inferior portion of head &amp; uncinata process.</p> <p>Joins common bile duct &amp; together they open into a small hepatopancreatic ampulla (Ampulla of Vater) in the duodenal wall</p> <p>The ampulla opens into the lumen of the duodenum by means of a small Papilla, (Major duodenal papilla).</p>	<p>drains superior portion of the head</p> <p>It empties separately into 2<sup>nd</sup> portion of duodenum at (minor duodenal papilla)</p>

Note: cancer in head of pancreas will lead to obstructive jaundice  
The tail of pancreas may get injured during splenoectomy

## Pancreas

Blood Supply				
Arteries	Veins	Lymphatic Drainage	Innervation	
<u>Head &amp; neck:</u>  <ul style="list-style-type: none"> <li>Celiac trunk through <b>Superior pancreaticoduodenal artery</b></li> <li>Superior mesenteric artery through <b>Inferior pancreaticoduodenal artery</b></li> </ul>	<u>-Head &amp; neck:</u> Drained by anterior and posterior venous arcades that form the superior & inferior pancreaticoduodenal veins which follow the corresponding arteries (to the superior mesenteric vein)	Rich network that drains into <b>pyloric, hepatic and splenic nodes</b> .  Ultimately the efferent vessels drain into the <b>celiac &amp; superior mesenteric lymph nodes</b> .	<b>Sympathetic</b>	<b>Parasympathetic</b>
			fibers from the thoracic splanchnic nerves.	fibers from the vagus.
<u>Body and tail:</u>  Supplied by <b>Splenic artery</b> , through 8-10 branches	<u>Body and tail:</u>  Drained by <b>splenic vein</b> , which is a tributary of <b>portal vein</b>		inhibitory	stimulate both exocrine and endocrine secretions

# Bile ducts



## The Bile Ducts

Bile canaliculi	interlobular ducts	right hepatic duct	Left hepatic duct	common hepatic duct	Common Bile Duct (Bile Duct)
The smallest interlobular tributaries of the bile ducts are situated in the portal canals of the liver; they receive the bile canaliculi.	join one another to form progressively larger ducts and, eventually, at the porta hepatis, form the right and left hepatic ducts	drains the right lobe of the liver	drains the left lobe, the caudate lobe, & quadrate lobe	is about 1.5 in (4 cm) long and descends within the free margin of the lesser omentum. It is joined on the right side by the cystic duct from the gallbladder to form the common bile duct	is about 3 inches (8 cm) long. Course: First it lies in the right free margin of the lesser omentum. Then it runs behind the 1 <sup>st</sup> part of the duodenum. Lastly it lies in a groove on the posterior surface of the head of the pancreas. Here, the bile duct comes into contact with the main pancreatic duct
		After a short course, the 2 hepatic ducts unite to form the common hepatic duct			

## Biliary System :

The biliary system consists of the ducts and organs (bile ducts, liver & gallbladder) that are involved in the production, storage & transportation of bile.

### Bile:

is secreted by the liver cells at a constant rate of about 40 ml per hour. When digestion is not taking place, the bile is stored and concentrated in the gallbladder; later, it is delivered to the duodenum.

### Common Bile Duct (Bile Duct):

- The bile duct ends below by piercing the medial wall of the 2<sup>nd</sup> part of the duodenum about halfway down its length.
- It is usually joined by the main pancreatic duct, and together they open into a small ampulla in the duodenal wall, called the hepatopancreatic ampulla (ampulla of Vater). The ampulla opens into the lumen of the duodenum by means of a small papilla, the major duodenal papilla.
- The terminal parts of both ducts and the ampulla are surrounded by circular muscle, known as the sphincter of the hepatopancreatic ampulla (sphincter of Oddi).
- Occasionally, the bile and pancreatic ducts open separately into the duodenum.

Note: in the free margin of lesser omentum:

1-common hepatic duct 2-gastrodeudanal artery 3- portal vein 4-cystic duct

## Gallbladder:

- A pear-shaped sac lying on the undersurface of the liver.
- It has a capacity of 30 to 50 ml , it stores bile, which is concentrated by absorbing water.
- The gallbladder is divided into the fundus, body, and neck.
- The peritoneum completely surrounds the fundus of the gallbladder and binds the body and neck to the visceral surface of the liver.

fundus	body	neck
is rounded and projects below the inferior margin of the liver, where it comes in contact with the anterior abdominal wall at the level of the tip of the 9 <sup>th</sup> right costal cartilage.	lies in contact with the visceral surface of the liver and is directed upward, backward, and to the left.	becomes continuous with the cystic duct, which turns into the lesser omentum, joins the common hepatic duct, to form the bile duct



# Gall bladder

Relations		Function	Blood Supply	Lymph Drainage	Nerve Supply
<p>Anteriorly</p> <ul style="list-style-type: none"> <li>• anterior abdominal wall</li> <li>• inferior surface of the liver</li> </ul>	<p>Posteriorly</p> <ul style="list-style-type: none"> <li>• transverse colon</li> <li>• 1<sup>st</sup> &amp; 2<sup>nd</sup> parts of the duodenum</li> </ul>	<p>When No digestion &gt; the sphincter of Oddi remains closed and bile accumulates in the gallbladder. The gallbladder concentrates &amp; stores bile; selectively absorbs bile salts, keeps the bile acid; it excretes cholesterol; &amp; secretes mucus. To aid in these functions, the mucous membrane is thrown into permanent folds that unite with each other, giving the surface a honeycombed appearance</p>	<p>The cystic artery, a branch of the right hepatic artery. The cystic vein drains directly into the portal vein. Several very small arteries and veins also run between the liver and gallbladder.</p>	<p>drains into a cystic lymph node situated near the neck of the gallbladder. From here, the lymph vessels pass to the hepatic nodes along the course of the hepatic artery and then to the celiac nodes.</p>	<p>Sympathetic and parasympathetic vagal fibers form the celiac plexus.</p> <p>The gallbladder contracts in response to the hormone cholecystokinin (CCK), which is produced by the mucous membrane of the duodenum on the arrival of fatty food.</p>

## Cystic Duct

The cystic duct is about 1.5 in. (3.8 cm) long and connects the neck of the gallbladder to the common hepatic duct to form the bile duct. It is usually somewhat S-shaped and descends for a variable distance in the right free margin of the lesser omentum.

The mucous membrane of the cystic duct is raised to form a spiral fold that is continuous with a similar fold in the neck of the gallbladder. The fold is commonly known as the "spiral valve." The function of the spiral valve is to keep the lumen constantly open.

1-Which of the following is not an anterior relation of the pancreas?

- A. Stomach
- B. transverse colon
- C. transverse mesocolon
- D. portal vein

2- which part of pancreas has the uncinata process

- A- head
- B- neck
- C- body
- D- tail

3- relating to the main pancreatic duct:

- A- drains the entire pancreas
- B- opens into the major duodenal papilla
- C- opens into the minor duodenal papilla
- D- drains superior portion of head

4-inferior pancreato-duodenal artery comes from

- A. Celiac trunk.
- B. Inferior mesenteric artery.
- C. Superior mesenteric artery.
- D. Splenic artery.

5- sympathetic supply to the pancreas comes from:

- A. Splanchnic nerves.
- B. Vagus nerves.
- C. Lumbar plexus.
- D. Non of the above.

6-which part of the gall bladder is related to the abdominal wall anteriorly:

- A. Neck.
- B. Body.
- C. Fundus.
- D. A&C.

7-Pancreas is:

- A. An endocrine organ
- B. An exocrine organ
- C. Both

8-The pancreatic juice which aids in digestion is secreted into:

- A. The Oesophagus
- B. Stomach
- C. Duodenum
- D. Ileum

9-which one of these lie posterior to pancreas:

- A. Hilum of the spleen.
- B. Stomach
- C. Transverse colon& transverse mesocolon

10-The bile canaliculi open into the:

- A. Right and left hepatic ducts.
- B. Cystic duct
- C. The common bile duct
- D. Interlobular ducts

11-The Form of common bile duct is by join of:

- A. Bile canaliculi and interlobular ducts
- B. Right and left hepatic ducts and common hepatic duct
- C. Cystic duct and common hepatic duct

12-The superior mesenteric vessels emerge from inferior border of

- A. Head
- B. Neck
- C. Body
- D. Tail

13-The peritoneum completely surrounds which part of gallbladder:

- A. Fundus
- B. Body
- C. Neck

14-Accessory duct of pancreas "Santorini" receives tributary from?

- A. Tail of pancreas
- B. Superior portion of the head of pancreas
- C. Inferior portion of head of pancreas
- D. Uncinate process

15-Fundus of Gallbladder contact with the anterior abdominal at?

- A. Tip of the ninth right costal cartilage.
- B. Tip of the fourth right costal cartilage.
- C. C3
- D. Tip of the ninth left costal cartilage

16-Which part of pancreas may get injured during splenectomy :

- A. Head
- B. Body
- C. Tail
- D. Neck

17-Which part of pancreas is supplied by Splenic artery?

- A. Body
- B. Head
- C. Neck
- D. Tail
- E. A+D

18-Function of the gallbladder:

- A. Storage of bile
- B. Transport of the bile
- C. Production of the bile

19-The neck of the gallbladder continuous with:

- A. Bile duct
- B. Common hepatic duct
- C. Cystic duct

20-main duct (of wiring) runs the entire length of pancreas beginning from??

- A. head
- B. neck
- C. body
- D. Tail

# GOOD LUCK DOCTORS

## Key answers

1-D	11-C
2-A	12-B
3-B	13-A
4-C	14-B
5-A	15-A
6-C	16-C
7-C	17-E
8-C	18-A
9-A	19-C
10-D	20-D



Done by:

نوف الجمعة

Revised & Edited by:

خلود العنزي