

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

2022

Gross Anatomy

THE PANCREAS

By

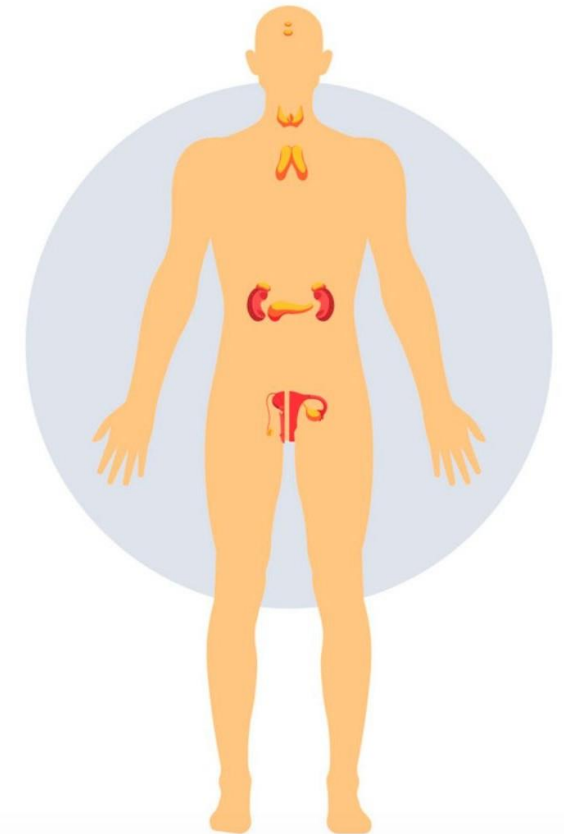
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Objectives

 **At the end of the lecture, students should be able to:**

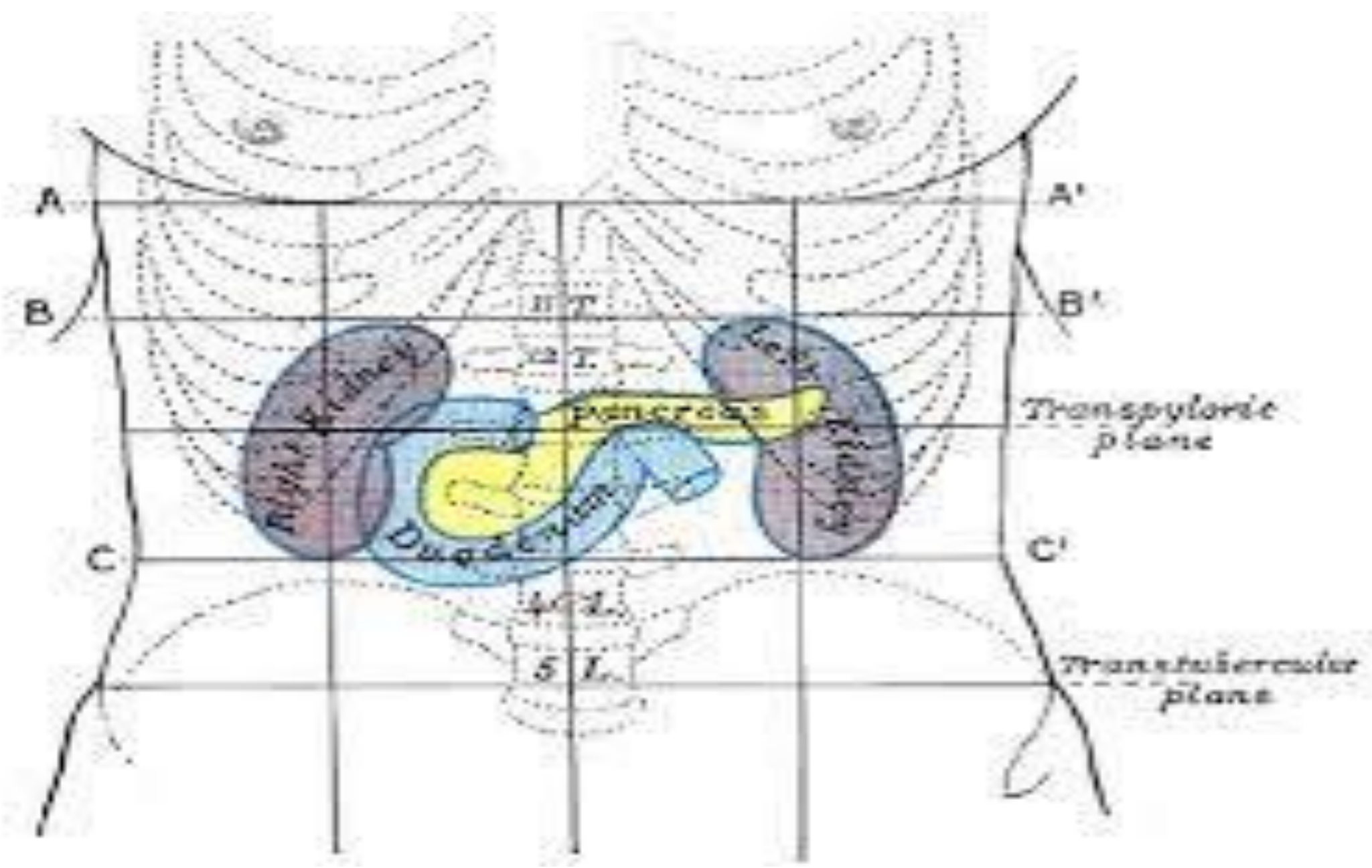
- **Describe the anatomical view of the pancreas regarding to: location, parts ,relations, ducts**
- **Arterial supply & Venous drainage**
- **Describe the nerve supply and lymph drainage**

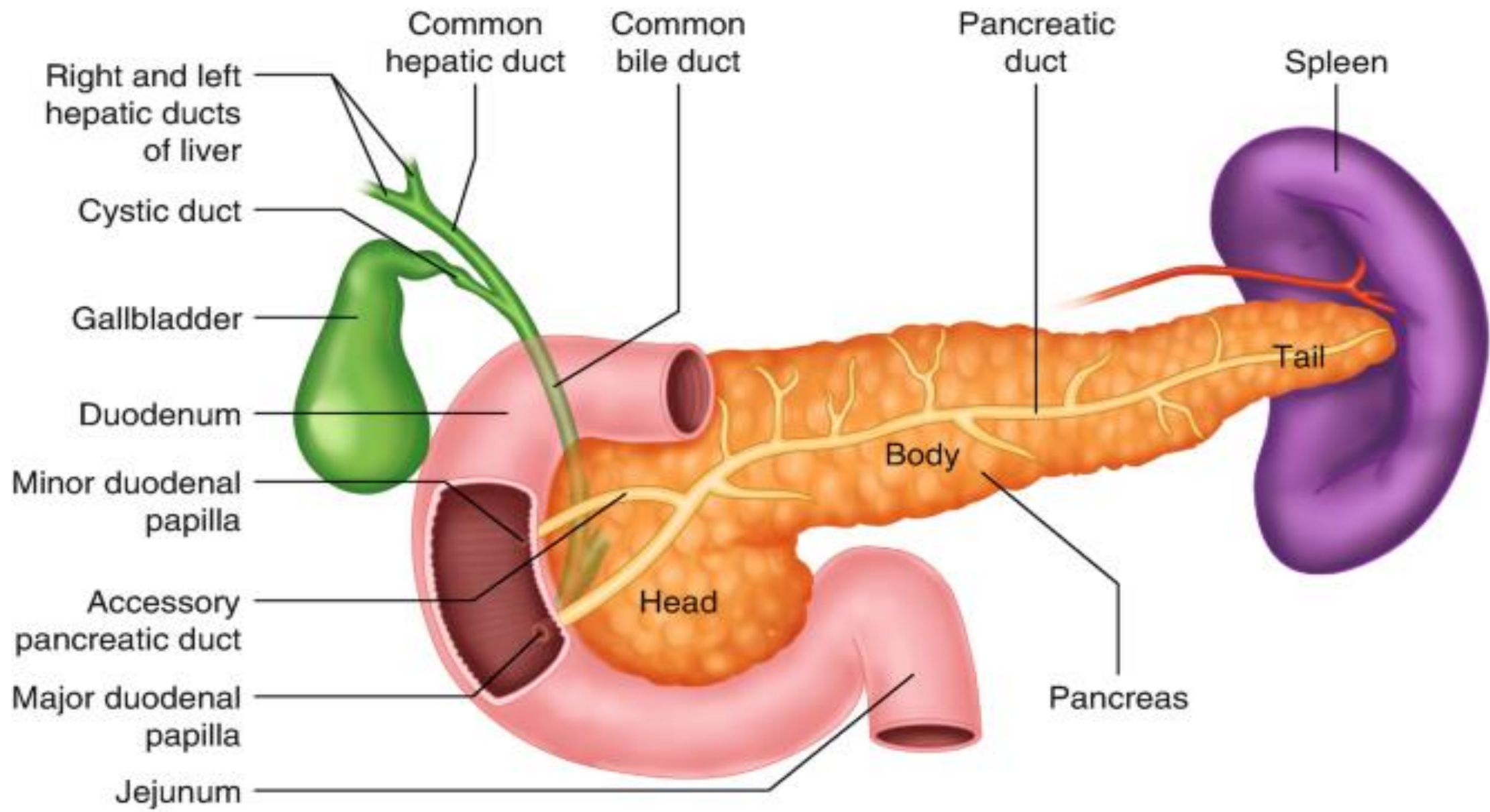


- The pancreas is an abdominal glandular organ with both **digestive** (exocrine) and **hormonal** (endocrine) functions.

ANATOMICAL POSITION

- The pancreas is an oblong-shaped organ positioned at the level of the **transpyloric plane (L1)**. With the exception of the tail of the pancreas, it is a retroperitoneal organ, located deep within the upper abdomen in the **epigastrium and left hypochondrium regions**.
- Within the abdomen, the pancreas has direct anatomical relations to several structures





ANATOMICAL STRUCTURE

The pancreas is typically divided into five parts:

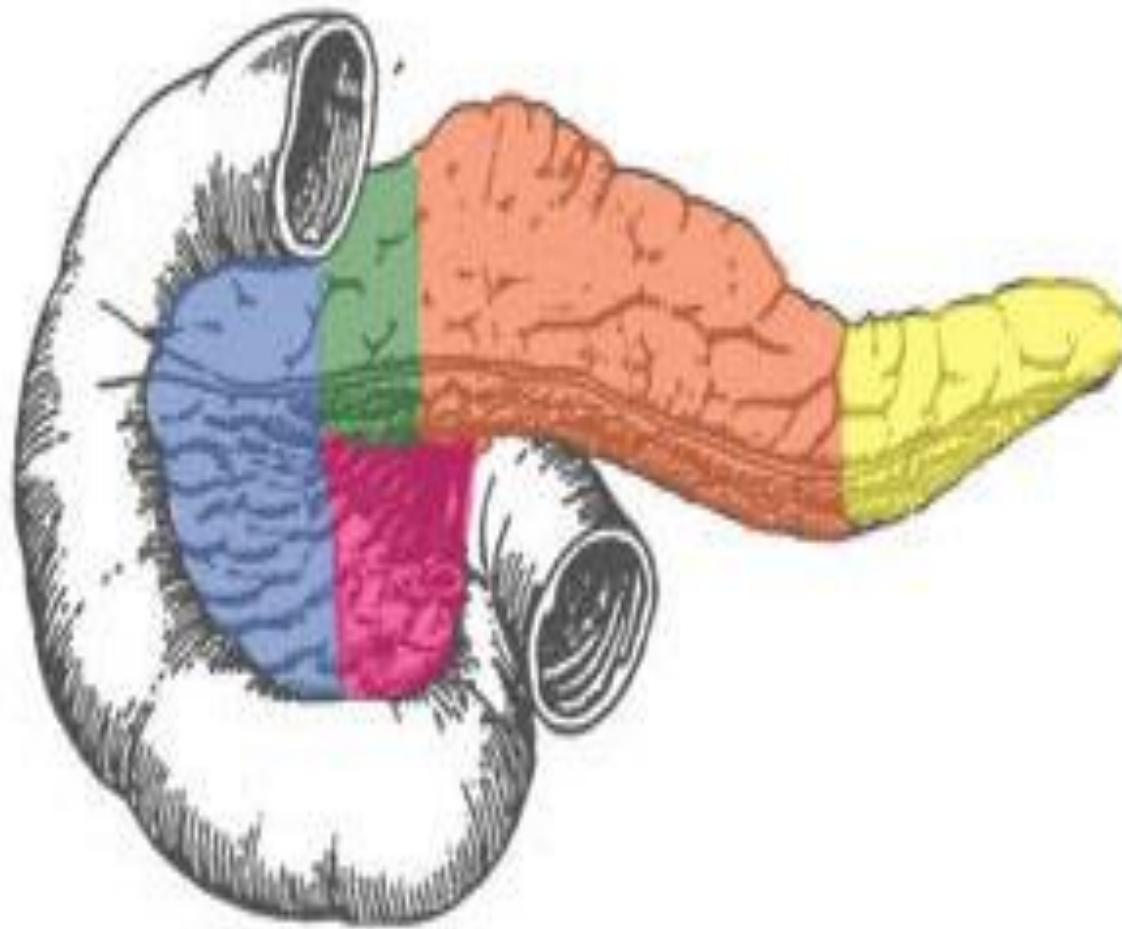
- **Head** – the widest part of the pancreas. It lies within the C-shaped curve created by the duodenum and is connected to it by connective tissue.
- **Uncinate process** – a projection arising from the lower part of the head and extending medially to lie beneath the body of the pancreas. It lies posterior to the superior mesenteric vessels.

ANATOMICAL STRUCTURE (CONTD)

- **Neck** – located between the head and the body of the pancreas. It overlies the superior mesenteric vessels which form a groove in its posterior aspect.

- **Body** – centrally located, crossing the midline of the human body to lie behind the stomach and to the left of the superior mesenteric vessels.

- **Tail** – the left end of the pancreas that lies within close proximity to the hilum of the spleen. It is contained within the splenorenal ligament with



- Uncinate process
- Head
- Neck
- Body
- Tail

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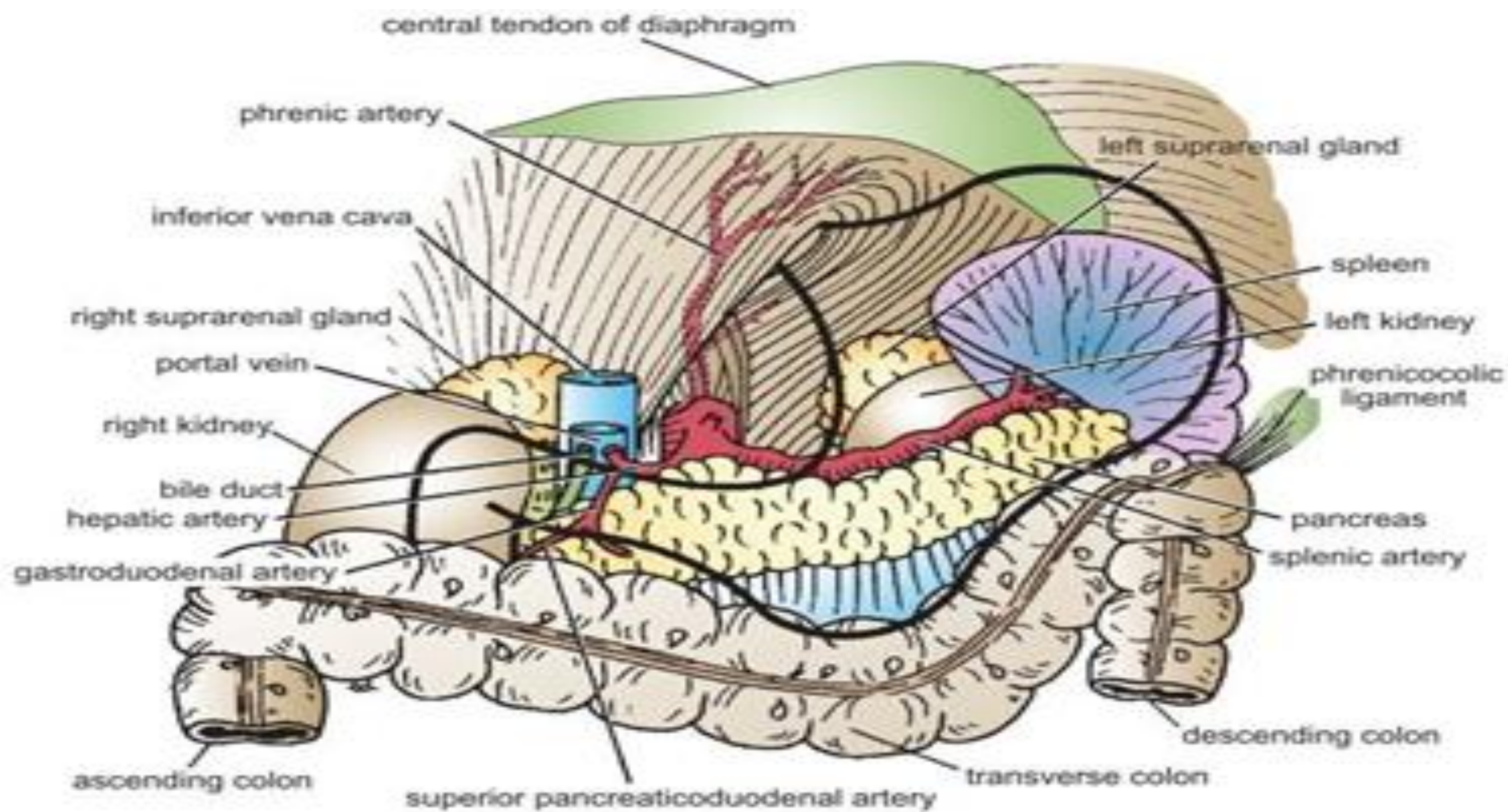
THE PARTS OF THE PANCREAS

ORGANS

- **Stomach** – Separated from the pancreas by the lesser sac, the stomach and pylorus lie anterior and to the pancreas.
- **Duodenum** – The “C” shaped duodenum curves around and outlines the head of the pancreas. The first part of the duodenum lies anteriorly whereas the second part of the duodenum including the ampulla of Vater lies laterally to the right of the pancreatic head
- **Transverse mesocolon** – Attaches to the anterior surface of the pancreas
- **Common bile duct** – Descends behind the head of the pancreas before opening into the second part of the duodenum alongside the major pancreatic duct through the major duodenal papilla
- **Spleen** – located posteriorly and laterally. The lienorenal ligament is formed from peritoneum and connects the spleen to the tail of the pancreas.

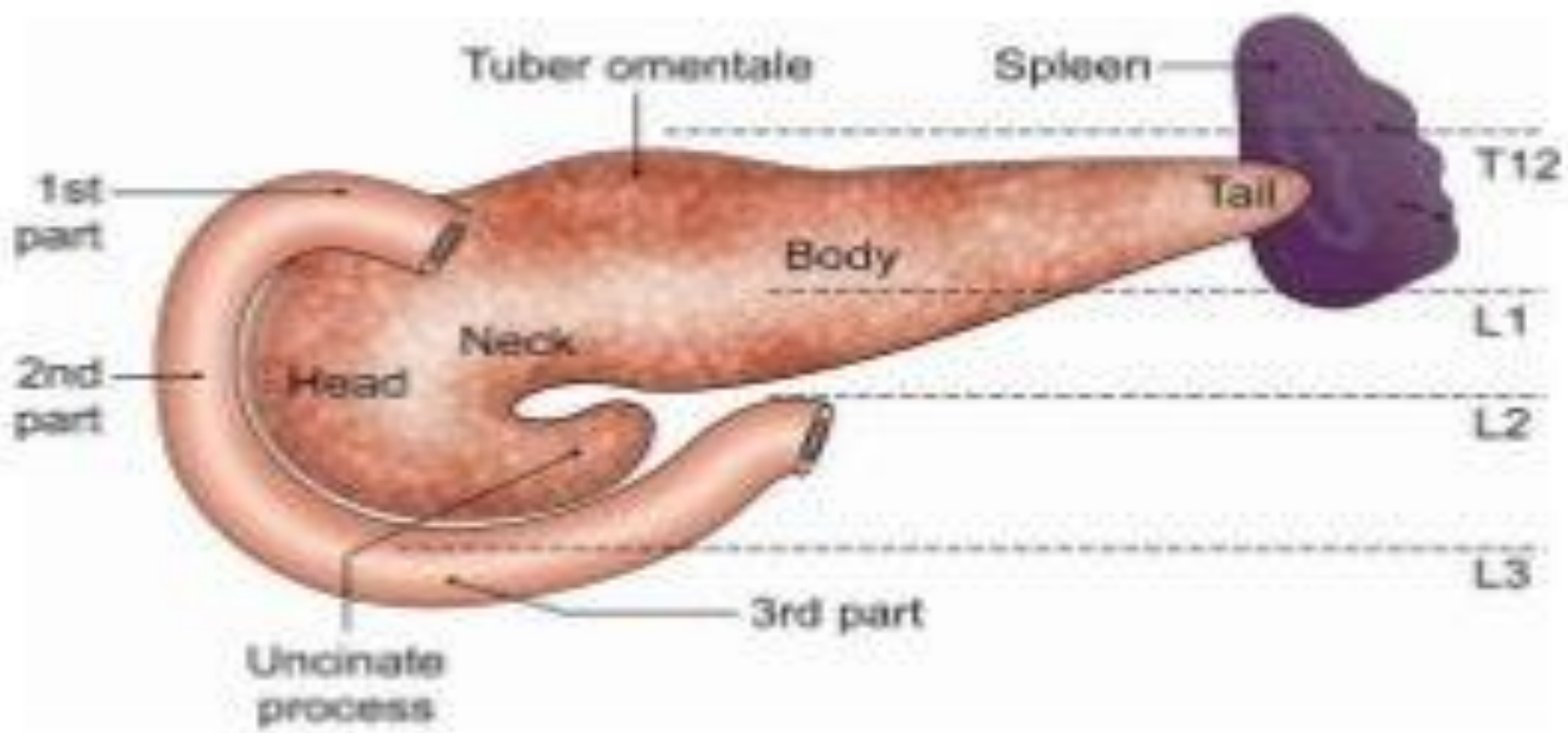
Anterior (to body and tail)

- **Stomach separated by lesser sac**
- **Transverse colon**
- **transverse mesocolon**

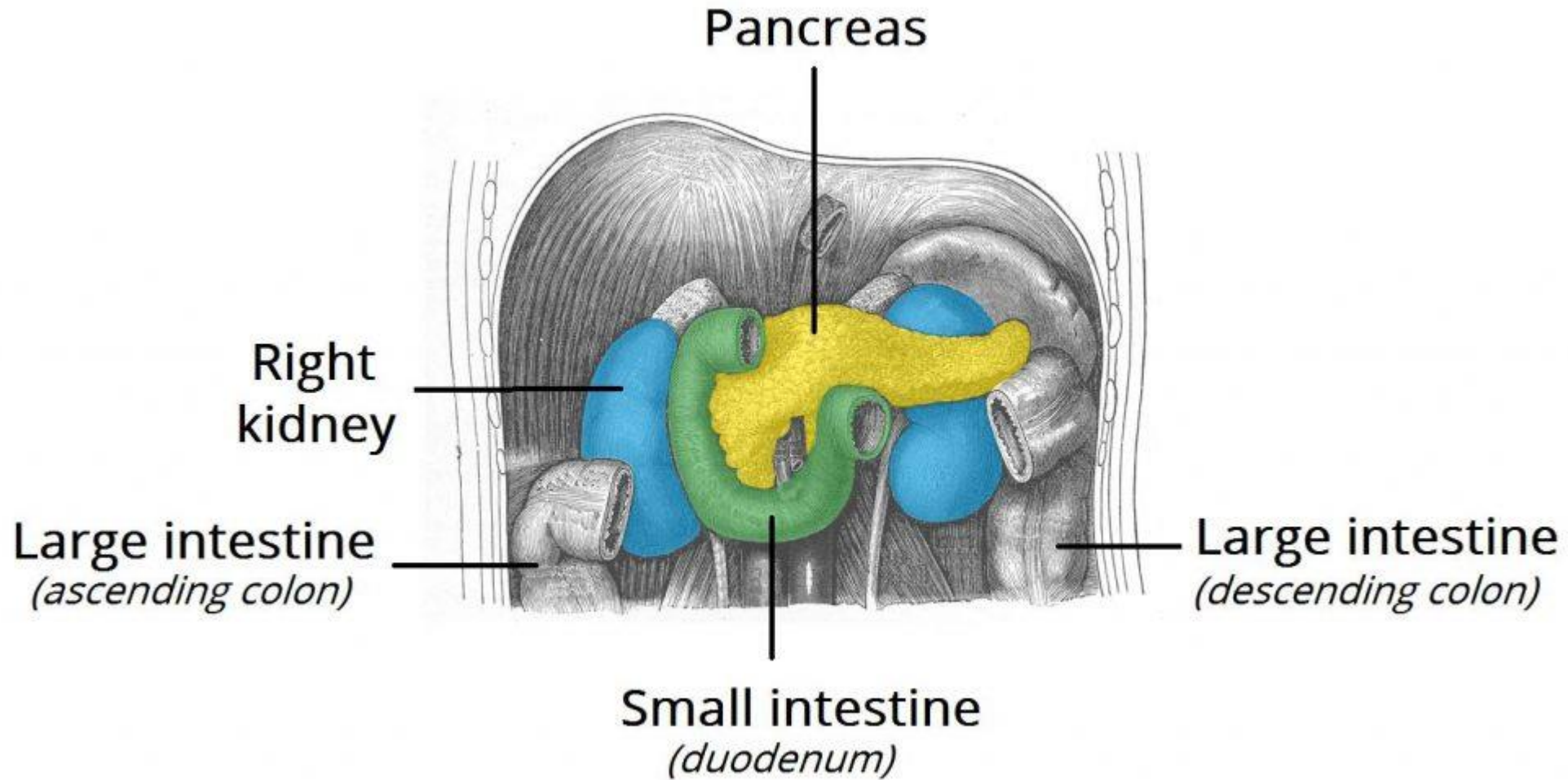


Posterior (to body and tail)

- **Bile duct**
- **Portal vein**
- **Left psoas muscle**
- **aorta & origin of superior mesenteric artery.**
- **left adrenal gland**
- **Hilum of the spleen.**
- **splenic veins,**
- **left renal vessels**
- **inferior vena cava**
- **left kidney**



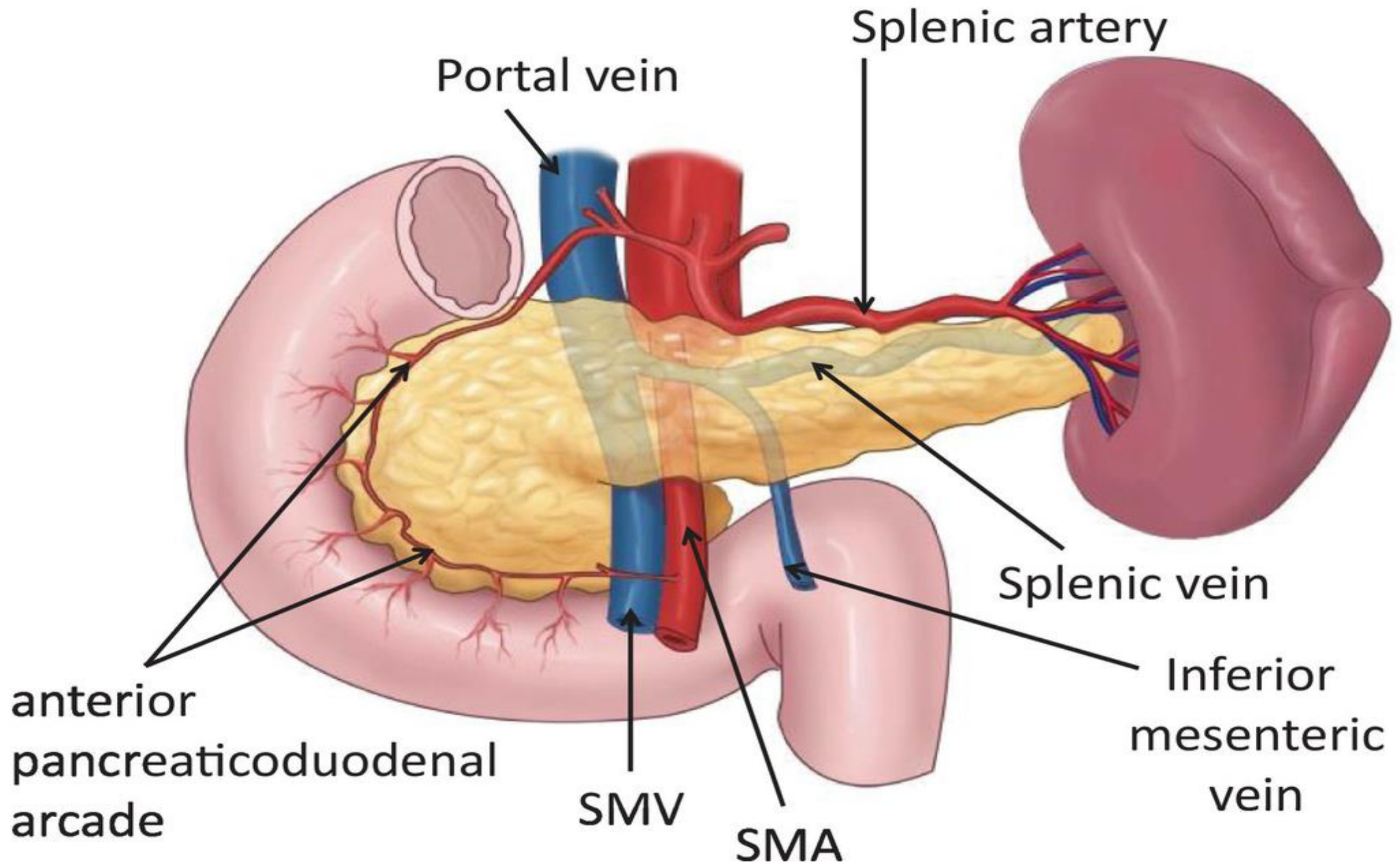
Location of the pancreas and parts of pancreas

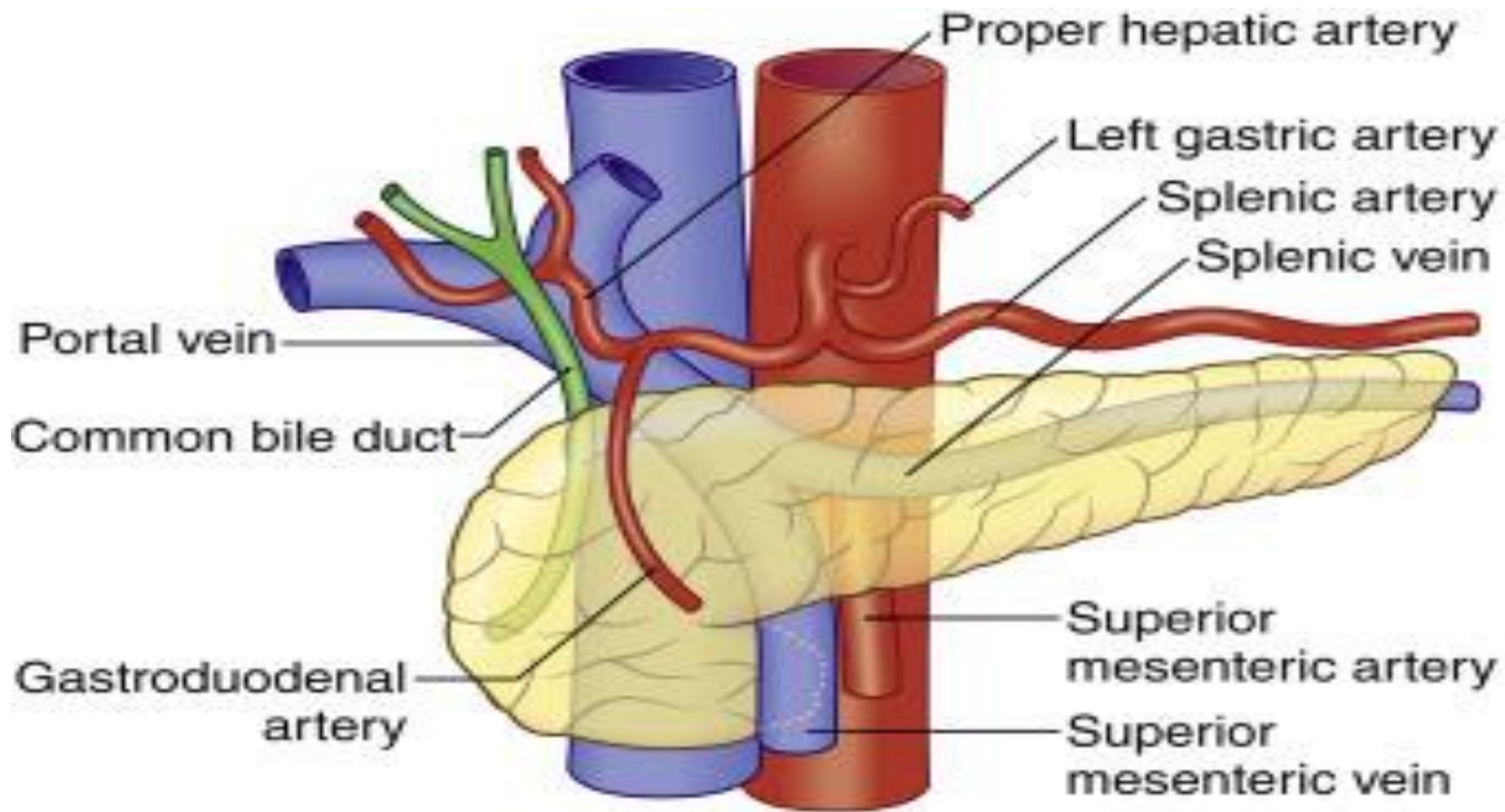


ANTERIOR VIEW OF THE ABDOMEN. THE STOMACH, TRANSVERSE COLON, AND THE MAJORITY OF THE SMALL INTESTINE HAVE BEEN REMOVED TO EXPOSE THE UNDERLYING PANCREAS

VESSELS

- The pancreas lies near several major vessels and significant landmarks in vascular anatomy:
- The aorta and inferior vena cava pass posteriorly to the head of the pancreas.
- The superior mesenteric artery lies behind the neck of the pancreas and anterior to the uncinate process.
- Posterior to the neck of the pancreas, the splenic and superior mesenteric veins unite to form the hepatic portal vein.
- As it journeys from its origin at the celiac plexus to the splenic hilum, the splenic artery traverses the superior border of the pancreas.

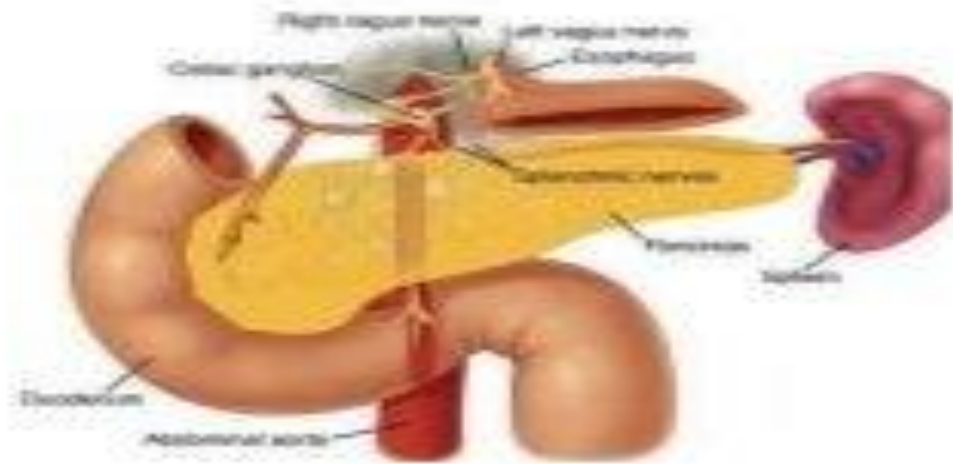




NERVE SUPPLY

Nerve supply...

- **Parasympathetic** by the **vagus nerve** controlling secretion .
- **Sympathetic** from **coeliac & superior mesenteric plex.**
- Secretion is also controlled by **hormone secretin-pancreozymine.**



DUCT SYSTEM

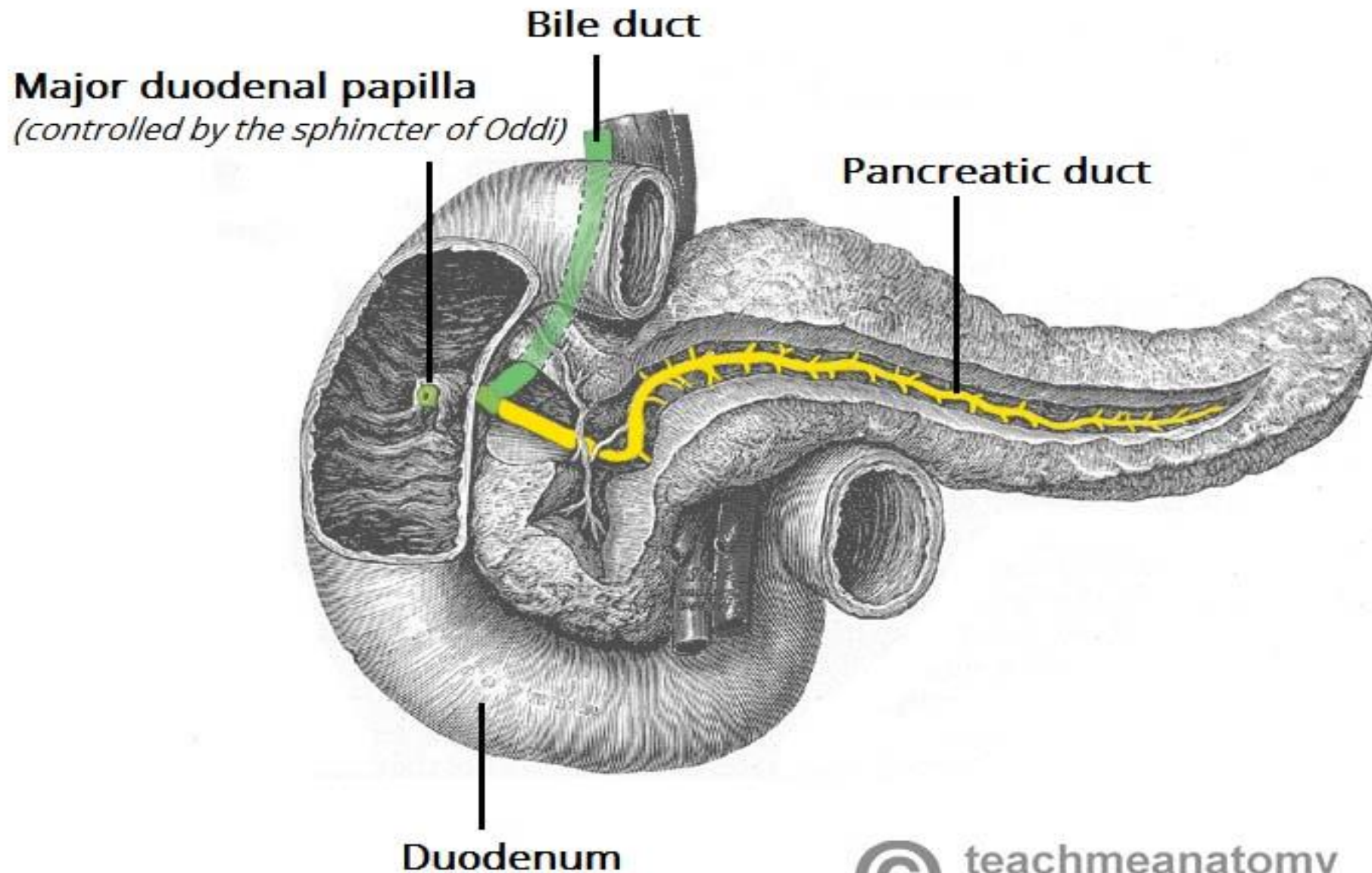
The exocrine pancreas is classified as a lobulated, **serous gland** which produces digestive enzyme precursors. It is composed of approximately one million 'berry-like' clusters of cells called acini, connected by short intercalated ducts.

The **intercalated ducts** unite with those draining adjacent lobules and drain into a network of **intralobular collecting ducts**, which in turn drain into the main pancreatic duct.

The pancreatic duct runs the length of the pancreas and unites with the [common bile duct](#), forming the **hepatopancreatic ampulla of Vater**.

This structure then opens into the duodenum via **the major duodenal papilla**.

Secretions into the duodenum are controlled by a muscular valve – the **sphincter of Oddi**. It surrounds the ampulla of Vater, acting as a valve.

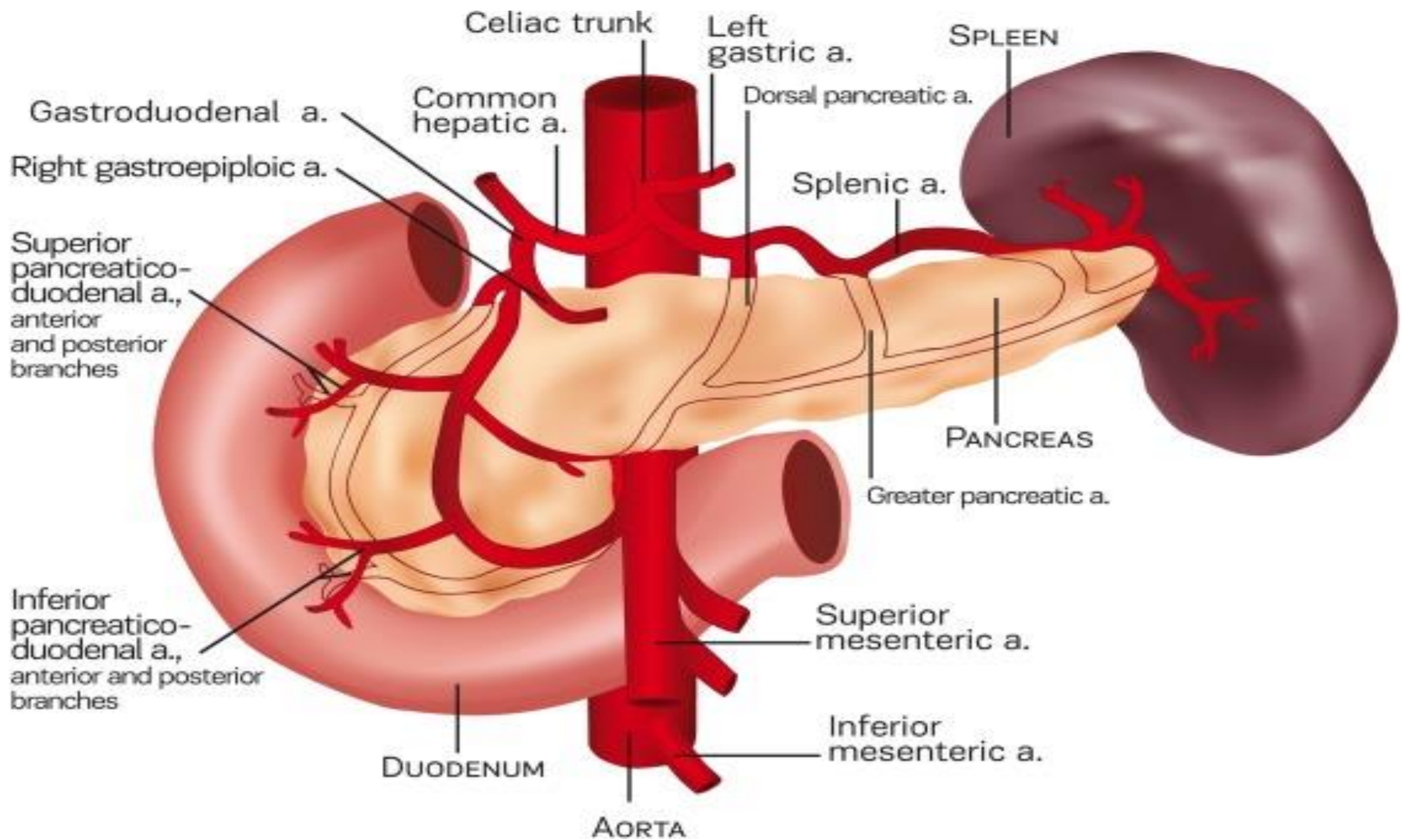


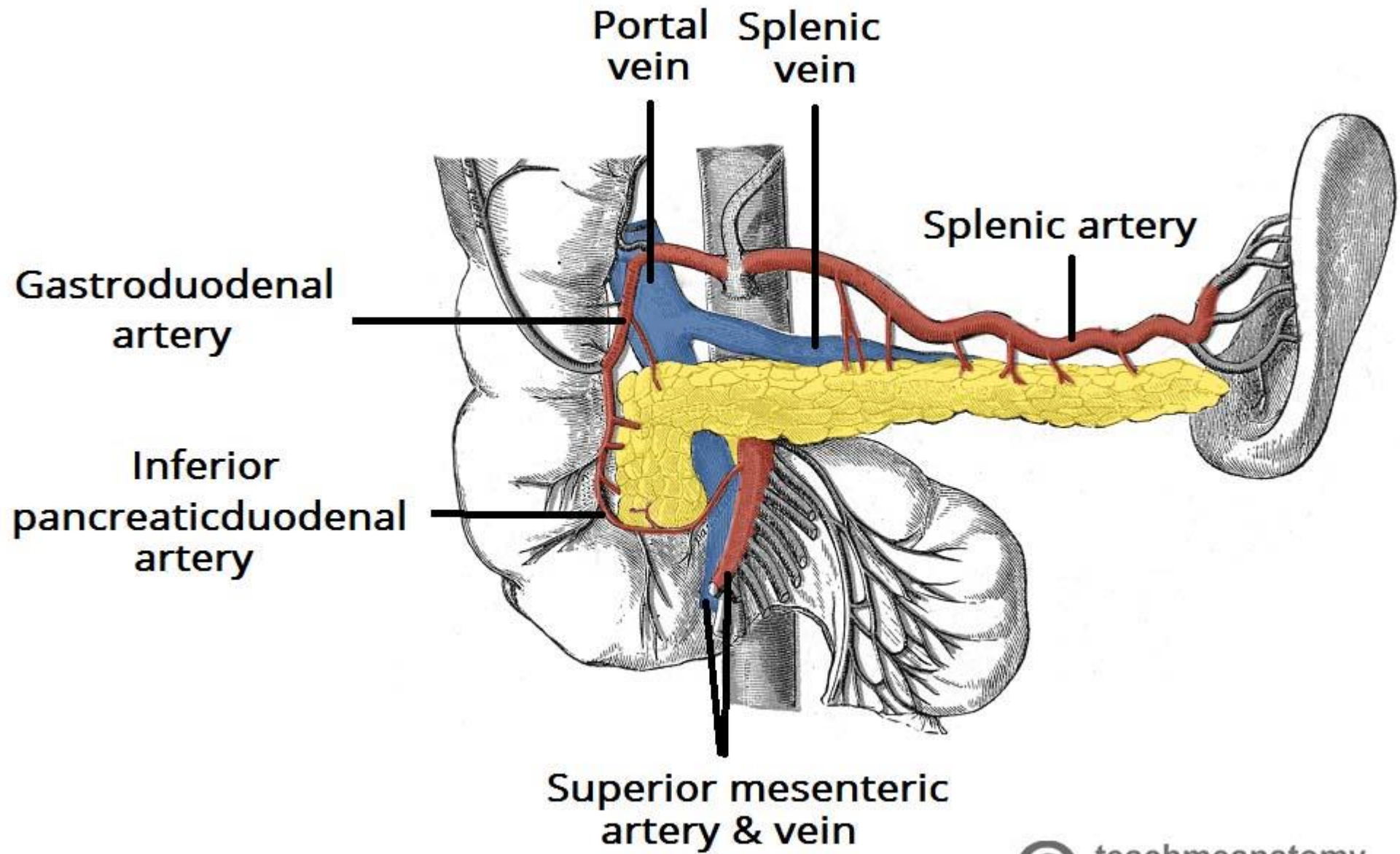
THE EXOCRINE PANCREAS, SECRETING INTO THE DUODENUM

VASCULATURE

The pancreas is supplied by the pancreatic branches of the **splenic artery**. The head is additionally supplied by the **superior and inferior pancreaticoduodenal** arteries which are branches of the gastroduodenal (from [coeliac trunk](#)) and [superior mesenteric arteries](#), respectively.

Venous drainage of the head of the pancreas is into the **superior mesenteric branches** of the [hepatic portal vein](#). The pancreatic veins draining the rest of the pancreas do so via the splenic vein.





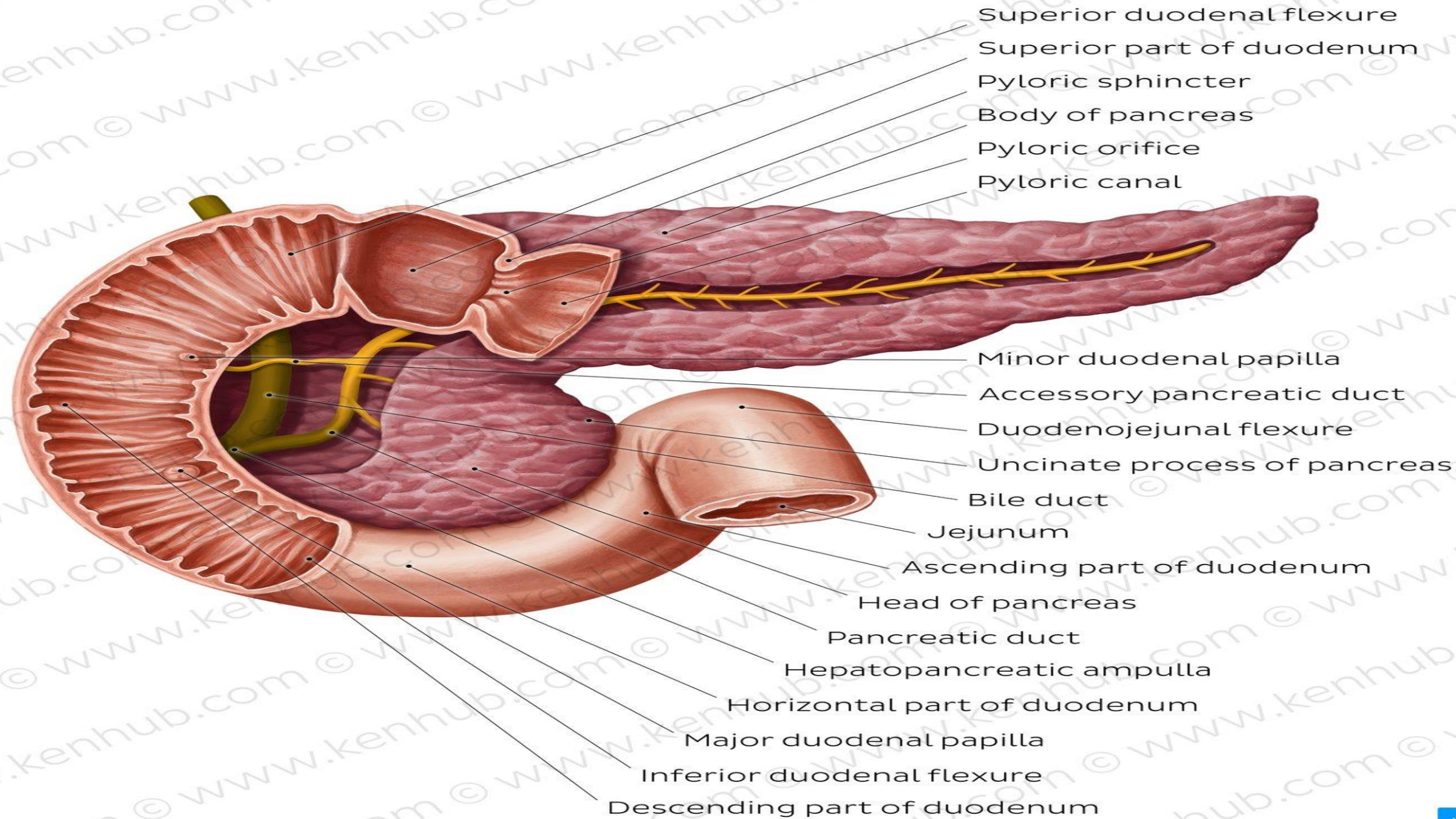
The arterial supply and venous drainage of the pancreas

LYMPHATICS

- The pancreas is drained by lymphatic vessels that follow the arterial supply. They empty into the **pancreaticosplenic nodes** and the pyloric nodes, which in turn drain into the superior mesenteric and coeliac lymph nodes.

KEY FACTS ABOUT THE PANCREAS

Location	Retroperitoneal Spans the epigastric, left hypochondriac, and a portion of the umbilical abdominal regions
Parts	External: head, uncinate process, neck, body, tail Internal: main pancreatic duct (of Wirsung), accessory pancreatic duct
Function	Digestion by releasing peptidases, lipases, nucleases, amylases Hormonal regulation by releasing insulin (beta cells), glucagon (alpha cells), and somatostatin (delta cells)
Blood vessels	Pancreaticoduodenal, splenic, gastroduodenal, and superior mesenteric arteries
Innervation	Parasympathetic: vagus nerve (CN X) Sympathetic: greater and lesser splanchnic nerves
Lymphatics	Pancreatico- splenic and pyloric lymph nodes
Clinical point	Pancreatitis



ANATOMICAL RELATIONS OF THE PANCREAS

Anterior	Stomach, lesser sac (omental bursa), transverse mesocolon, superior mesenteric artery
Posterior	Aorta, inferior vena cava, right renal artery , right and left renal veins , superior mesenteric vessels, splenic vein, hepatic portal vein, left kidney, left suprarenal gland
Superior	Splenic artery
Lateral	Spleen
Medial	Duodenum (descending and horizontal parts)

Acute vs Chronic

Acute Pancreatitis

- Acute, Isolated Episode
- Active Inflammation
- Sudden and Severe
- Short Term
 - Days - Weeks
- Elevated Pancreatic Enzymes
- Common Causes
 - Alcohol
 - Gallstones



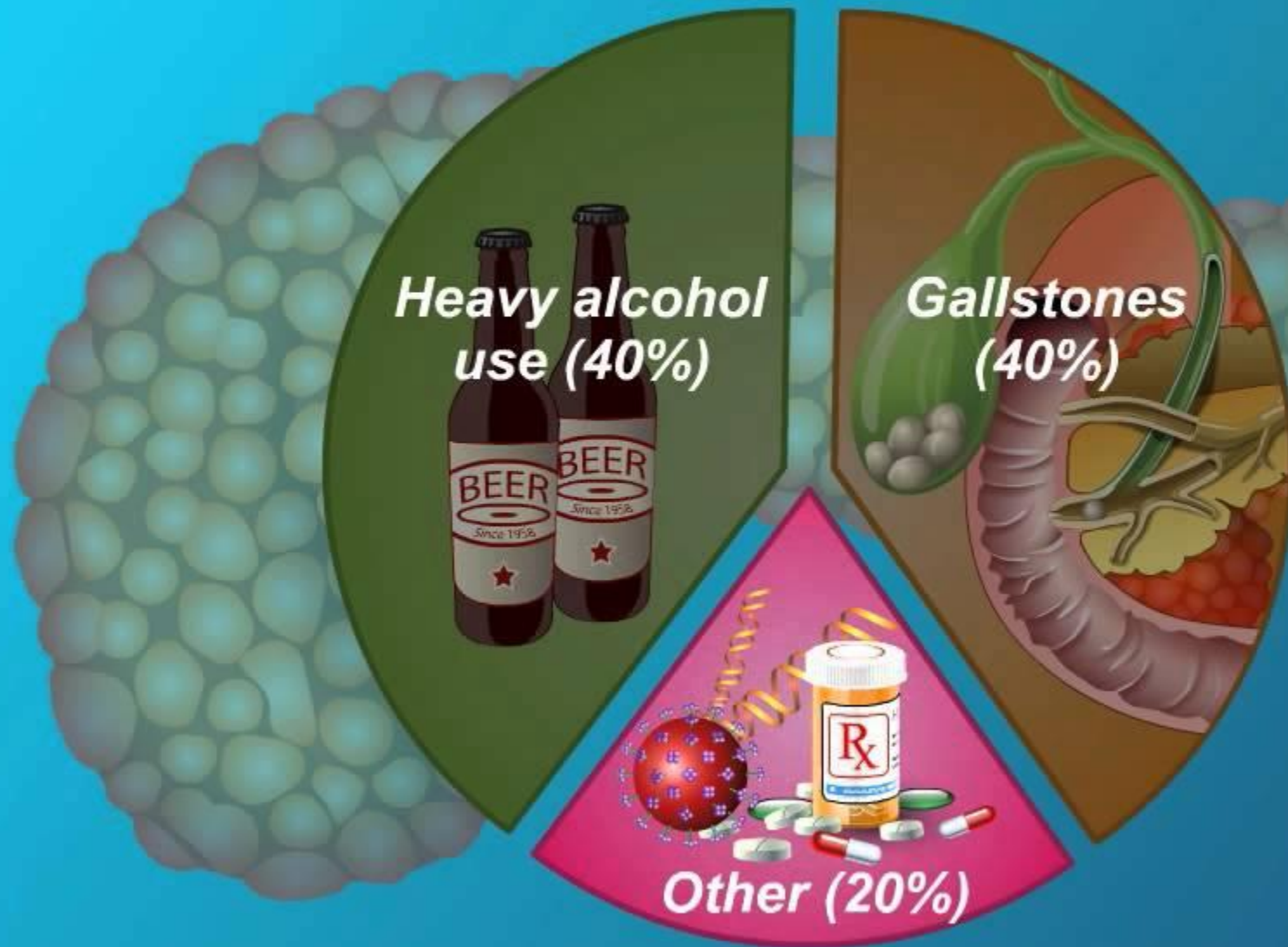
Chronic Pancreatitis

- Chronic, Ongoing Disease
- Chronic Changes/Damage
- Symptoms Fluctuate
- Long Term
 - Months - Years
- *Normal Pancreatic Enzymes
- Common Causes
 - Recurrent Acute Episodes
 - Alcohol, Hereditary, Diseases

Clinical Relevance: Pancreatitis

- Pancreatitis refers to inflammation of the pancreas – this can be acute or persist over an extended period (chronic pancreatitis). The causes of pancreatitis can be remembered using the mnemonic – **GET SMASHED**:
- **G**all stones
- **E**thanol
- **T**rauma
- **S**teroids
- **M**umps
- **A**utoimmune
- **S**corpion stings
- **H**ypertriglyceridemia, hypercalcaemia and hyperparathyroidism
- **E**RCP – endoscopic retrograde cholangiopancreatography
- **D**rugs – such as sodium valproate, azathioprine and sulphonamides

Causes of acute pancreatitis



Other causes:

- *Abdominal trauma*
- *Medications*
- *Infections*
- *Tumors*
- *Genetic/anatomical variants*
- *High triglyceride levels*
- *High calcium levels*

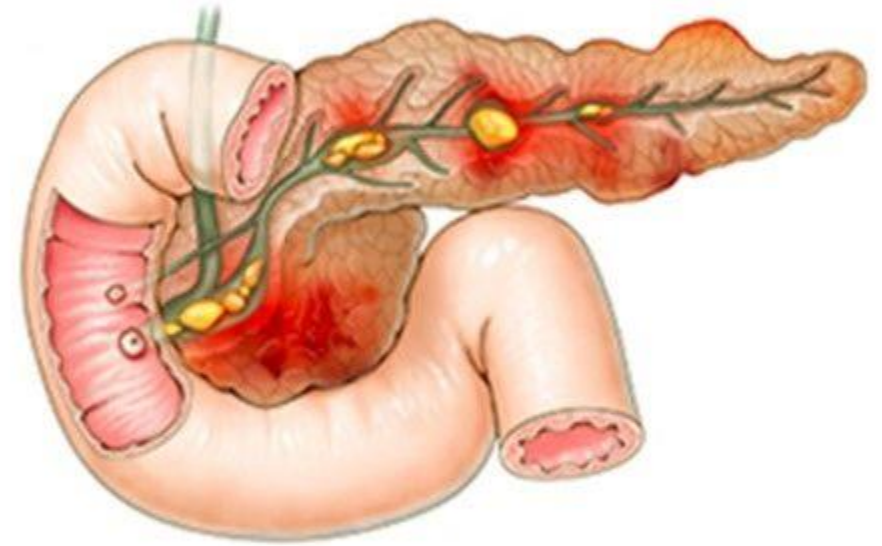
CLINICAL RELEVANCE: PANCREATITIS

- Pancreatitis creates severe **epigastric pain** which often **radiates** to the back, **nausea**, **vomiting** and **diarrhoea**.
- Treatment involves supportive measures such as **IV fluids** and analgesia. Antibiotics are rarely required, as most cases are not due to infection. The **underlying cause** will then also need to be treated.

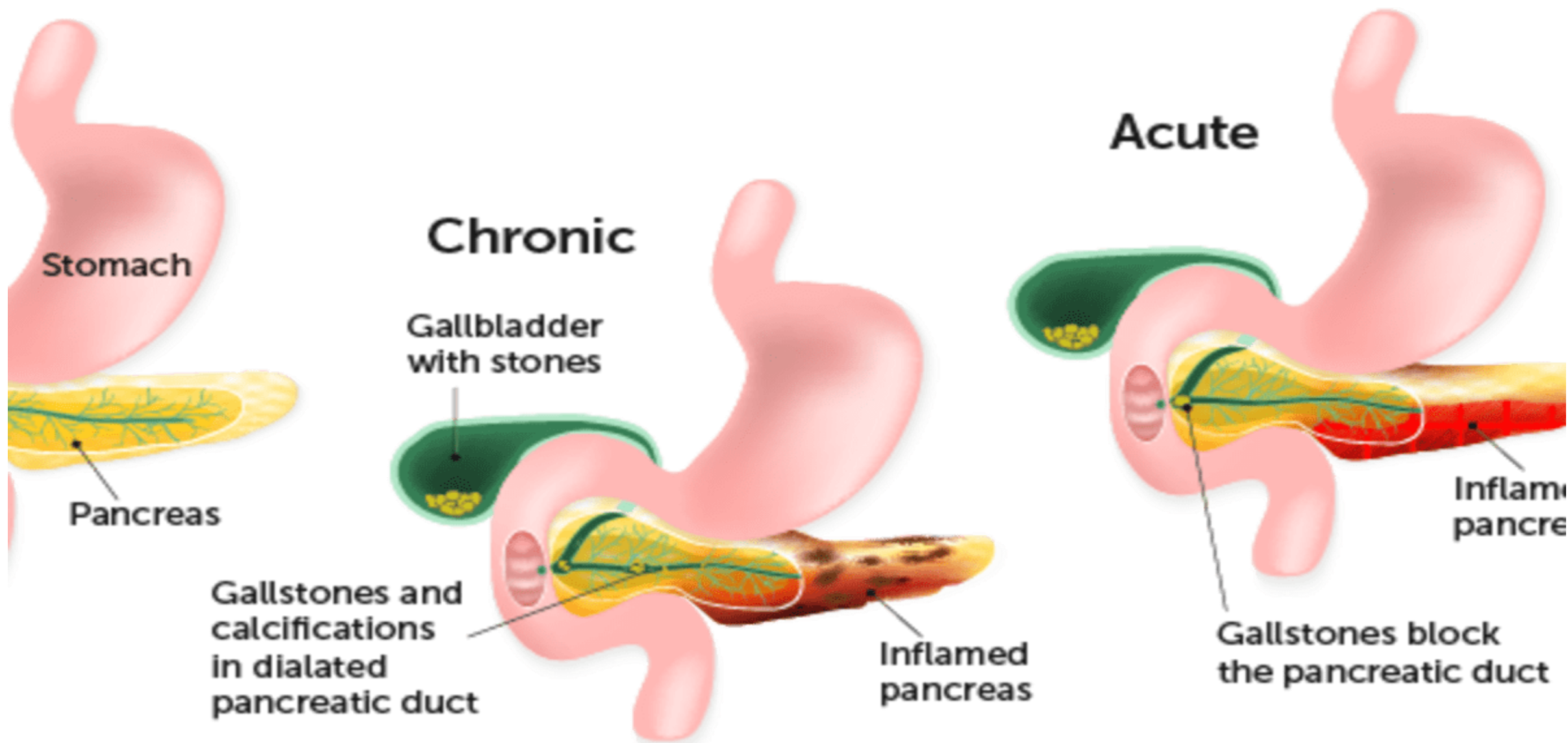


Treatment of Pancreatitis “MACHINES”

- Monitor vital signs
- Analgesia/Antibiotics
- Calcium gluconate (if deemed necessary)
- H2 receptor antagonist
- IV access/IV fluids
- Nil by mouth
- Empy gastric contents
- Surgery if required



Acute pancreatitis



QUIZ

Q1: Which part of the pancreas is drained by the splenic vein?

- A. Head
- B. Body
- C. Neck
- D. Uncinate Process

Q2: Which of the following structures runs posterior to the neck of the pancreas?

- A. superior mesenteric vessels
- B. Renal arteries
- C. Aorta
- D. Inferior phrenic

Q3: The tail of the pancreas runs in which of the following structures?

- A. Greater omentum
- B. Gastrosplenic ligament
- C. Splenorenal ligament
- D. lesser omentum

Q4: The stomach is separated from the tail of pancreas by which one of the following ?

- A. Lesser omentum
- B. Lessersac
- C. Greater omentum
- D. Splenorenal ligament

Q5: Which part of the pancreas may be injured in a splenectomy procedure?

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

Q6: The Tuber omentale is an extension of:

- A. The tail
- B. The upper part of head
- C. The lower part of head
- D. The body

Q7: The splenic vein is embedded in which one of the following pancreatic segments?

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

Q8: The ampulla of vater opens into the duodenal lumen through:

- A. Minor duodenal papilla..
- B. Major duodenal papilla.
- C. Duct of Santorini.
- D. bile duct

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
B	A	C	B	B	D	A	E

THANK YOU