MED437
KING SAUD UNIVERSITY

Revised By
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ANATOMY
Team 437

Small Intestines

Lecture (5)

- Important
- Doctors Notes
- Notes/Extra explanation

{وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ}

Please check our Editing File

هذا العمل مبني بشكل أساسي على عمل دفعة ٤٣٦ مع المراجعة
والتدقيق وإضافة الملاحظات ولا يغني عن المصدر الأساسي للمذاكرة

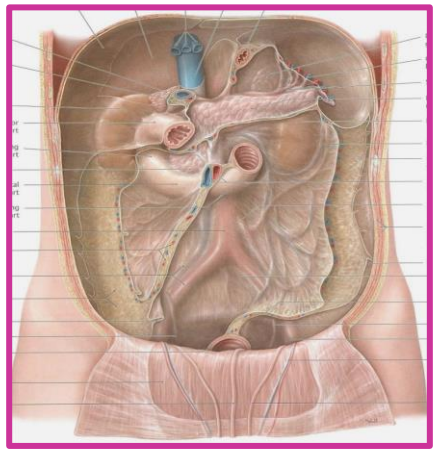
Objectives

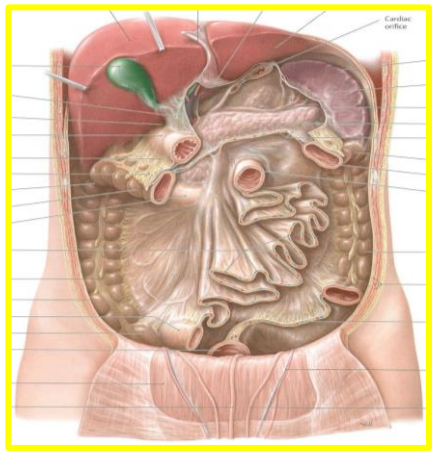
At the end of the lecture, students should be able to:

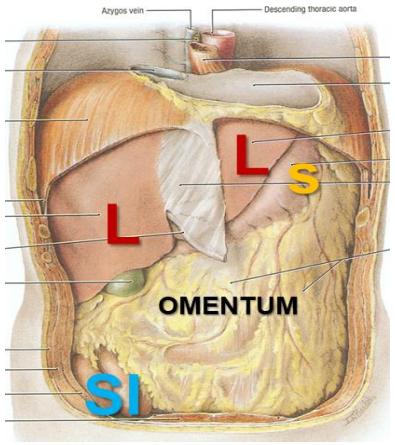
- ✓ List the different parts of **small intestine**.
- ✓ Describe the anatomy of **duodenum**, **jejunum** & **ileum** regarding: the **shape**, **length**, **site** of **beginning** & **termination**, **peritoneal covering**, **arterial supply** & **lymphatic drainage**.
- ✓ Differentiate between each part of duodenum regarding the **length**, **level** & **relations**.
- ✓ Differentiate between the **jejunum** & **ileum** regarding the **characteristic anatomical features** of each of them.

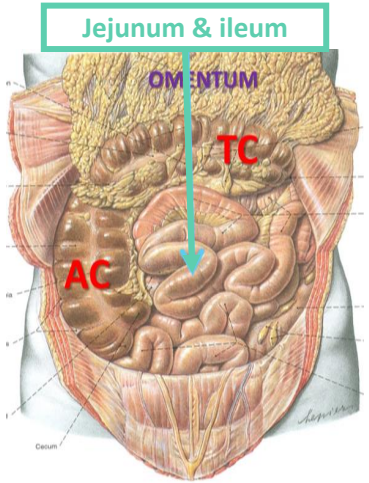
Abdomen

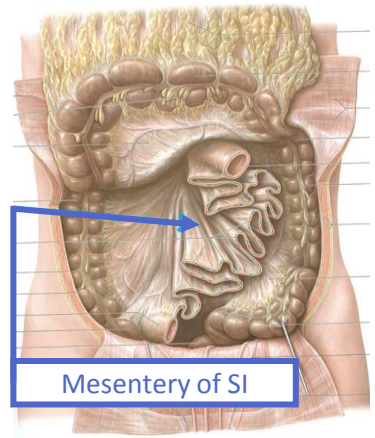
- **What is Mesentery?**
- It is a double layer attach the intestine to abdominal wall. If it has mesentery it is freely moveable.
- **The small intestines consist of two parts:**
  - Fixed part (without mesentery) (retroperitoneal): **duodenum**
  - Free (movable) part (with mesentery): **jejunum & ileum**











L= liver, S=Spleen, SI=Small Intestine,
AC=Ascending Colon, TC=Transverse Colon

Abdomen (this slide is not important)

Dr.ahmed fathalla's notes:

- any structure invaginates the peritoneum has a certain degree of mobility

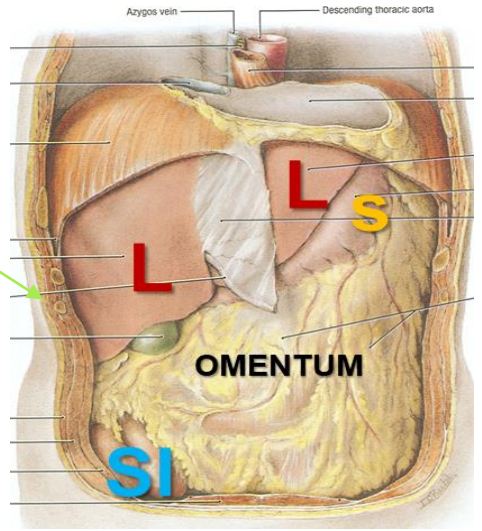
- we have three levels related to abdominal structures:

1- (Part of the GIT) it is mobile and completely covered by the peritoneum, because it has invaginated the peritoneum.
2- (the rest of the GIT structures) which have lost the mesentery and covered by the peritoneum from the front and the sides
3-(Non-GIT structures) which are found in the abdominal cavity

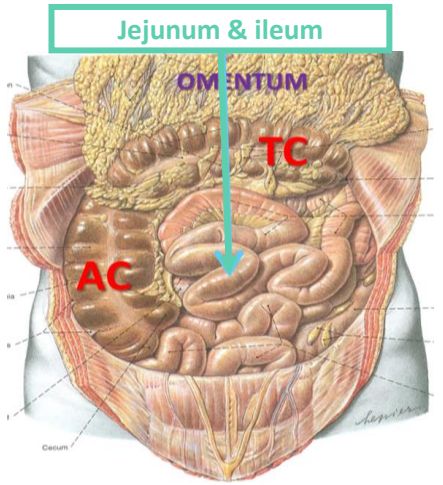
- Peritoneal folds have different names:

1- in stomach, we call them → omentum
2- In intestine → mesentery
3- colon → mesocolon
4-in the derivatives of GIT (spleen, liver, pancreas) → ligaments

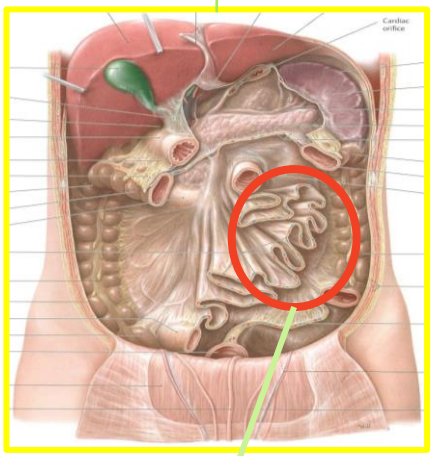
We you remove the anterior abdominal wall, you will find the most superficial structures are:
1- liver
2- stomach
3- transvers colon
4- small intestine)



The greater omentum and small intestine are removed



To see the second layer you should remove the parietal peritoneum of posterior abdominal wall.
The second layer consists of:
1- ascending colon
2- cecum
3- descending colon
4- duodenum
5- pancreas
6- spleen
And behind the 2nd layer, there are the other non-GIT structures like kidney, Aorta and IVC



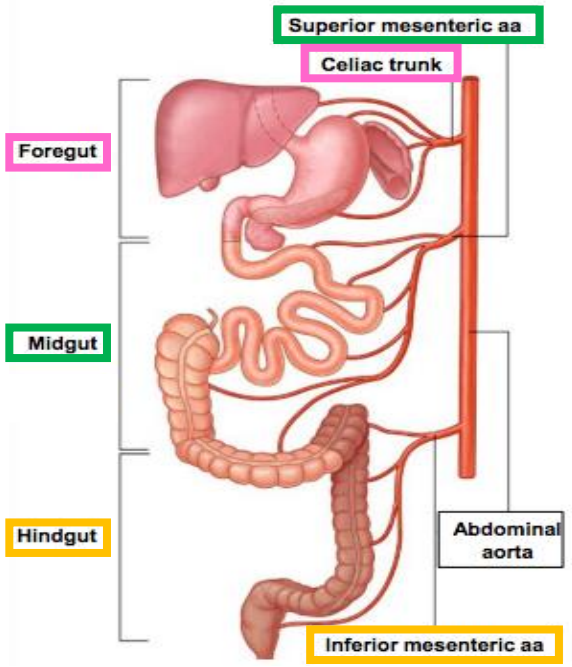
Mesentery of small intestine (fan shaped)

Only on the boy's slides

Relation Between Embryological Origin & Arterial Supply

Duodenum:

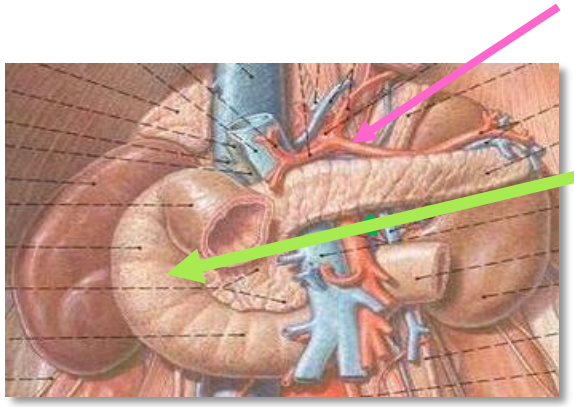
- **Origin:** foregut & midgut
- **Arterial supply:**
  - **Coeliac trunk** (artery of foregut)
  - **Superior mesenteric:** (artery of midgut)
- The duodenum has 2 arterial supply because of the double origin
- The junction of foregut and midgut is at the second part of the duodenum



Jejunum & ileum:

- **Origin:** midgut
- **Arterial supply:**
  - **Superior mesenteric:** (artery of midgut)

- Arterial supply depends on the embryological origin:
  - Foregut → Coeliac trunk
  - Midgut → Superior mesenteric artery
  - Hindgut → Inferior mesenteric artery

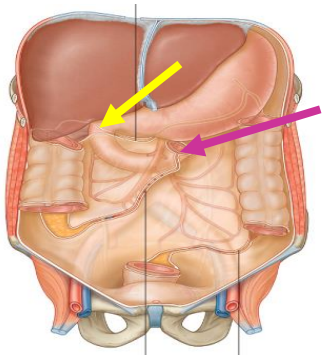


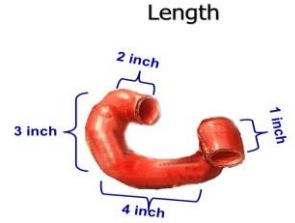
Note that the transvers colon is related to the 2nd part of duodenum

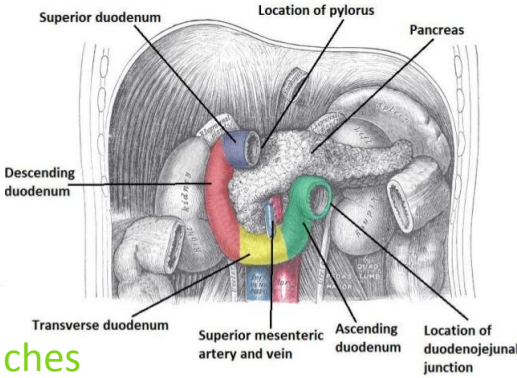
Duodenum

the first part of duodenum lies within the peritoneum but its other parts are retroperitoneum

Shape	C-shaped loop	
Length	10 inches	
Beginning	At pyloro-duodenal junction	
Termination	At duodeno-jejunal flexure	
Peritoneal covering	Retroperitoneal {fixed movement}	
Divisions	4 parts {superior-descending-horizontal-ascending} next slide	
Embryological origin	Foregut & midgut	
Arterial supply	Coeliac & superior mesenteric	
Venous drainage	Superior mesenteric & portal veins	
Lymphatic drainage	Coeliac & superior mesenteric lymph nodes	
Parts (Mnemonic: زود واحد على اسم كل جزء عشان يطلع لك عدد الانشات)	First part (Sup./Horizontal)	Length: **2 Inches**
	Second part (Descending)	Length: **3 Inches**
	Third part (Inf./Horizontal)	Length: **4 Inches**
	Fourth part (Ascending)	Length: **1 Inches**







Total length = 10 inches

Level (surface anatomy)
L1 (Transpyloric plane)
Descends from L1 TO L3
L3 (Subcostal plane)
Ascends from L3 to L2

IMPORTANT

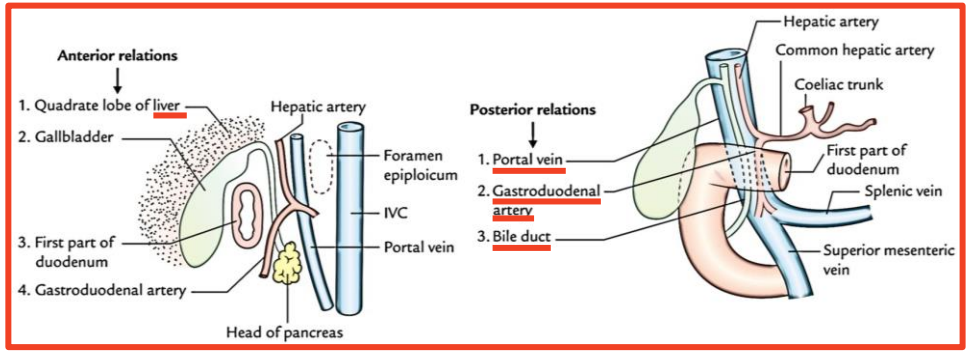
Duodenum Relations

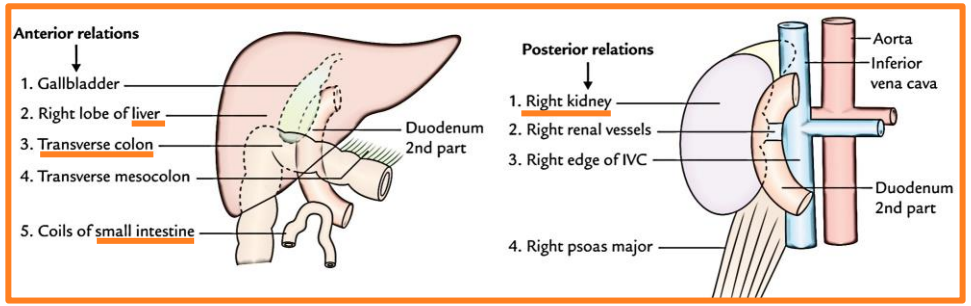
	Anterior	Posterior
First part (above the transvers colon)	Liver	1.Gastroduodenal artery 2.Portal vein 3.Bile duct
Second part (at the level of the transvers colon)	1.Liver 2.Transverse colon 3.Small intestine	Right kidney

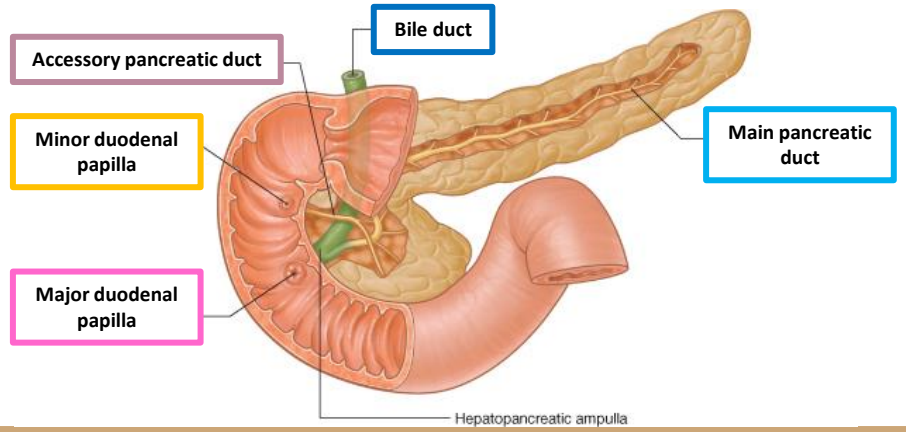
- **2nd part (Medial) relation** Pancreas (head)
- **2nd part (Lateral) relation** Right colic flexure

- **2nd part (Openings):**
- **Common** opening of **bile duct** & **main pancreatic duct**: On summit of **MAJOR** duodenal papilla**.**
- Opening of **accessory pancreatic duct** (one inch higher): On summit of **MINOR** duodenal papilla.

The first inch of the first part (duodenal cap) is more susceptible to duodenal ulcer.
And the gastroduodenal artery is more susceptible to get injured in case of duodenal ulcer.

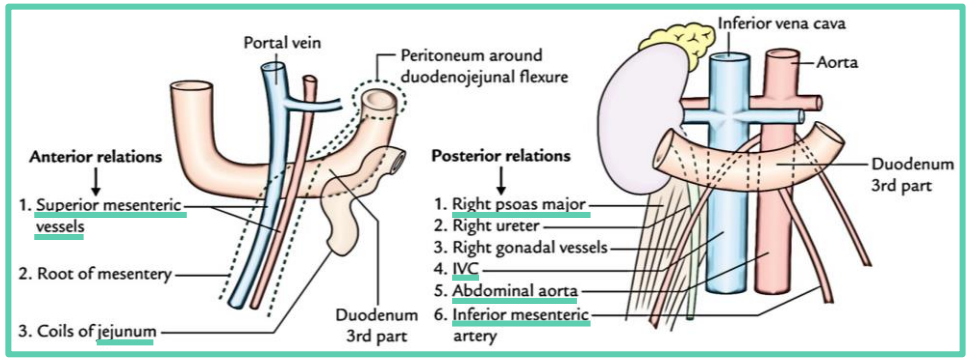


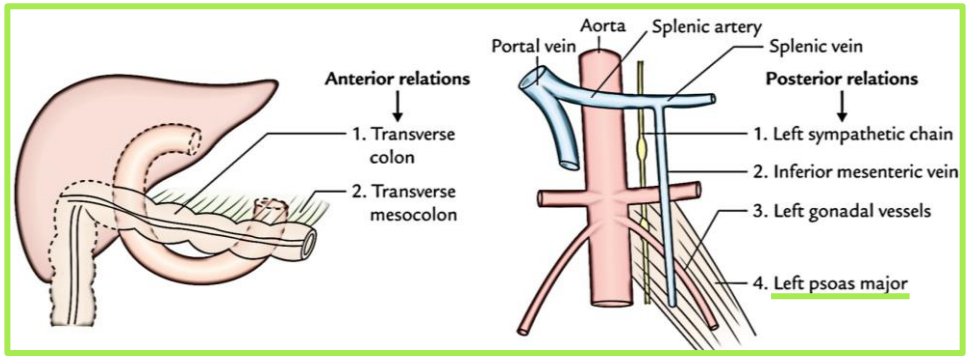


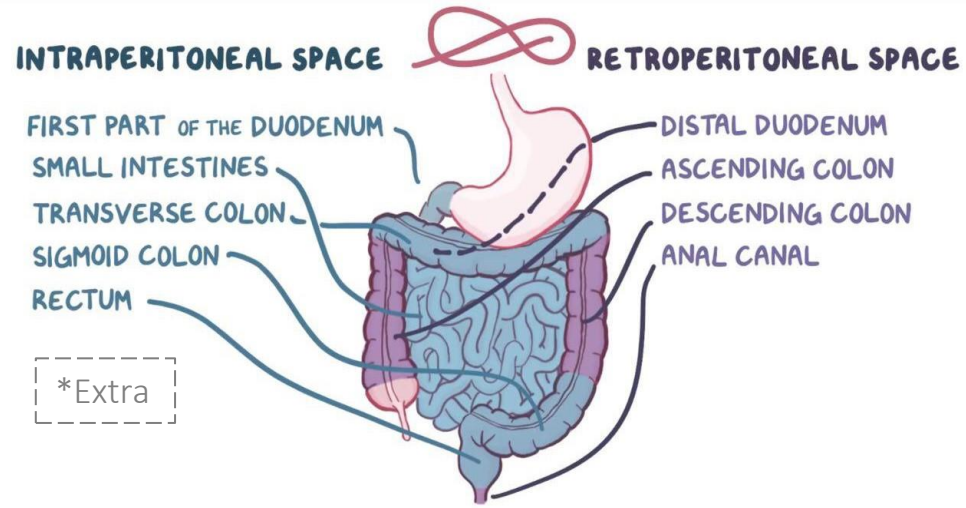


Duodenum Relations

	Anterior	Posterior
Third part (below the level of the transvers colon)	1.Small Intestine (jejunum) 2.Superior Mesenteric vessels	1.Right psoas major 2.Inferior vena cava 3.Abdominal aorta 4.Inferior mesenteric vessels (originate at L3)
Fourth part	Small Intestines	Left Psoas major







Duodenum Summary

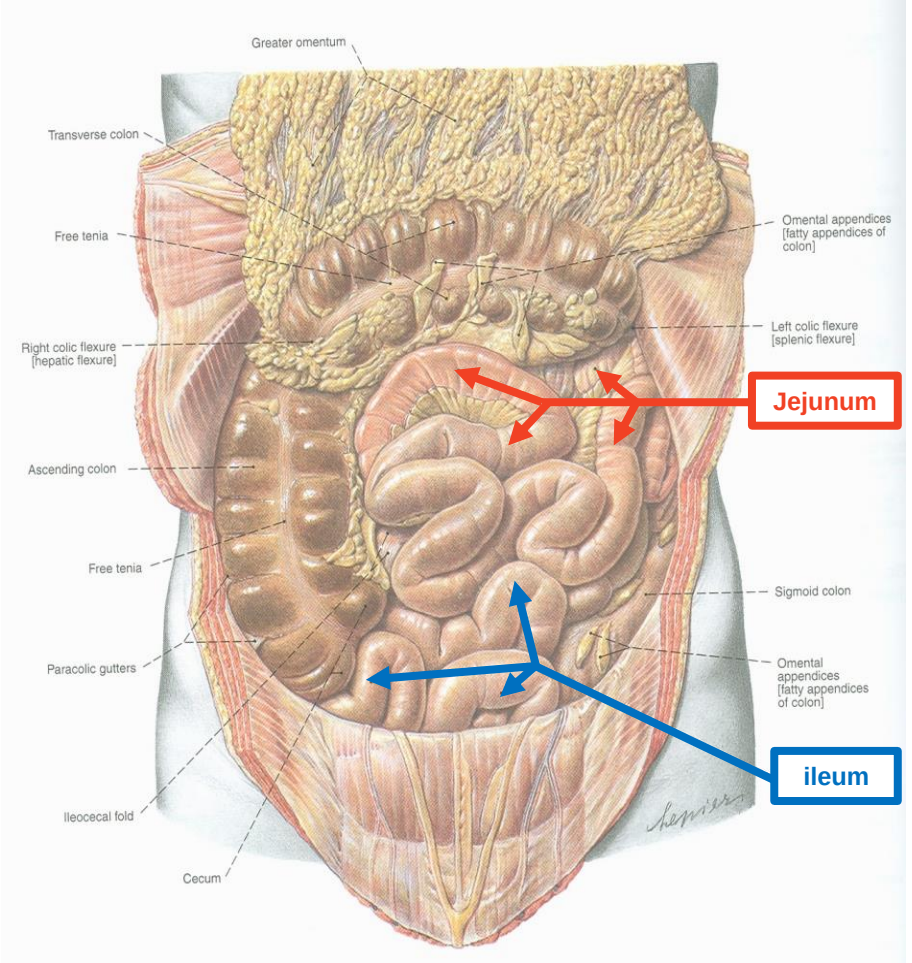
This slide is extra and summarizes the slides before

Duodenum					
Part		**Superior (1st)**	**Descending (2nd)**	**Inferior (3rd)**	**Ascending (4th)**
Length		2 Inches	3 Inches	4 Inches	1 Inches
Level		L1 – transpyloric plane	L1 → L3	L3 – subcotal plane	L3 → L2
Relations	**Anterior**	Liver	1.Liver **2.Transverse** colon 3.Small intestine (J & L)	1.Small intestine **2.Superior** mesenteric vessels	Small intestine
	Posterior	1.Bile duct 2.Gastroduodenal artery 3.Portal vein	**Right** kidney	**1.Right** psoas major 2.Inferior vena cava 3.Abdominal aorta **4.Inferior** mesenteric vessels	**Left** psoas major
	Medial		1.Pancreas		
	Lateral		1.Right colic flexure		

Jejunum & Ileum

Jejunum (upper left part of abdomen)
Ilium (lower right part of abdomen)

Shape	• Coiled tube
Length	• 6 meters (20 feet)
Beginning	• At duodeno-jejunal flexure
Termination	• At ileocecal junction Or valve/orifice
Peritoneal fold	• Mesentery of small intestine
Embyological origin	• Midgut
Blood supply	• Superior mesenteric Artery & Vein
Lypmphatic drainage	• Superior mesenteric lymph nodes

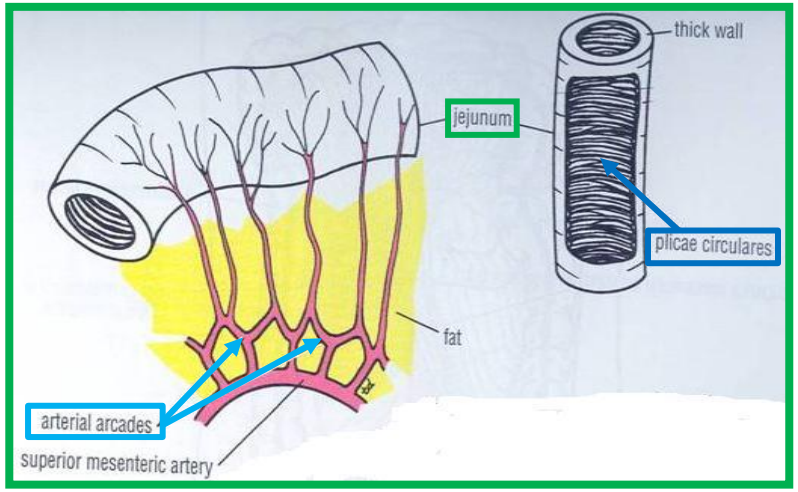


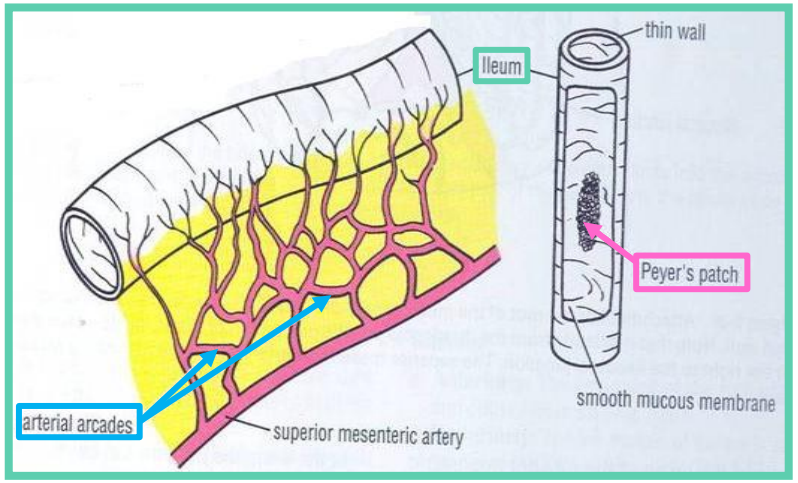
Jejunum & Ileum Comparison

(Jejunum absorbs more than the ileum and needs more blood)

	Jejunum	Ileum
Length*	**Shorter** (**proximal** 2/5) of SI	**Longer** (**distal** 3/5) of SI
Diameter	**Wider**	**Narrower**
Wall	**Thicker** (more plicae circulares) these are circular folds which increase the surface area for more absorption.	**Thinner** (less plicae circulares)
Appearance	**Dark** red (more vascular)	**Light** red (less vascular)
Vessels	○ **High** & **less arcades** ○ **Long** terminal branches	○ **Low** & **more** arcades ○ **Short** terminal branches كل ما تشعب الدم اكثر، الكمية اللي توصل اقل.
Mesenteric fat**	**Small amount** & ***Near (away from) intestinal border	**Large amount** & ***Near (Close to) intestinal border
Lymphoid tissue	**Few** aggregations	**Numerous** aggregations (peyer's patches)

- Plicae circulares: they are mucosal folds.
- Arcades: Anastomosing arterial arches.
- High: farther from the intestinal wall
- Low: nearer intestinal wall





*In regards to the total length of jejunum and ileum. (SI = Small Intestine)

**In general, the mesentery of the jejunum has less fat than the ileum. Also, the fat in the jejunum is not near the intestinal wall (the gap in the picture).

*** We talked to Dr.Ahmed Fathallah and he said that near in both is the wright information, but in girls slides it's different

Summary

	Duodenum	Ileum	Jejunum
Shape	C-shaped	Coiled tube	
Peritoneal covering	Retroperitoneal	With mesentery	
Length	10 inch	2/5 of SI	3/5 of SI
Beginning	Pyloro-duodenal junction	Duodeno-jejunal flexure	
End	Duodeno-jejunal flexure	Ilieo-caecal junction	
Embryological origin	Foregut & midgut	Midgut	
Arterial Supply	Celiac & superior mesenteric arteries	Superior mesenteric artery	
Venous Drainage	Superior mesenteric → portal vein	Superior mesenteric vein	
Lymphatic Drainage	Celiac & superior mesenteric lymph nodes	Superior mesenteric lymph node	

MCQs

(1) The origin of the duodenum is:

A) Foregut B) Midgut
C) Hindgut D) A and B

(2) The lymphatic drainage of the duodenum is:

A) Coeliac B) superior mesenteric
C) A and B D) Inferior mesenteric

(3) Which level lies the third part of duodenum?

A-Transpyloric plane. B) Subcotal plane
C) L1 to L3 D) L3 to L2

(4) Which of the following lies anterior to the first part of duodenum?

A) Liver B) Bile duct
C) Portal vein D) Aorta

(5) The blood supply for the jejunum and ileum is from the:

A) Celiac trunk B) Superior mesenteric artery
C) Inferior mesenteric artery

(6) Which of the following has a major contribution to the thickness of the jejunum?

A) Plicae circulares B) Lymphoid tissue
C) Mesenteric fat

(7) Which of the following lies anterior to the third part of duodenum?

A) Liver B) Superior mesenteric vessels
C) Inferior mesenteric vessels D) Abdominal aorta

(8) Which one of the following structures can be injured in case of perforated duodenal ulcer?

A) Right kidney B) Right colic flexure
C) Gastroduodenal artery D) Inferior mesenteric vessels

Answers

(1) D
(2) C
(3) B
(4) A
(5) B
(6) A
(7) B
(8) C

Good luck
Special thank for team436 ❤

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- References:
  1. Girls' & Boys' Slides
  2. Earthslab.com
  3. TeachMeAnatomy.com

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