Peritoneal cavity.
Infracolic compartment

Assoc. prof. dr. S. Delchev, MD, PhD
Infracolic compartment

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- It contains:
  - the small intestine and
  - large intestine
Infracolic compartment

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- It contains:
  - the **small intestine** and
  - **large intestine**
Organs in the infracolic compartment

- Most of the organs to be identified are parts of the gastrointestinal tract.
- The **small intestine** begins at the pyloric end of the stomach.
- It has three parts:
  - duodenum
  - Jejunum
  - ileum
- It extends to the ileocecral junction where the ileum joins the cecum.
Organs in the infracolic compartment

- Most of the **duodenum** is secondarily retroperitoneal.
- The duodenum is divisible into four parts:
  - Superior (first) part: short (approximately 5 cm),
  - Descending (second) part: longer (7-10 cm),
  - Inferior (third) part: 6-8 cm,
  - Ascending (fourth) part.
The **bile** and **main pancreatic ducts** enter its posteromedial wall.

These ducts usually unite to form the **hepatopancreatic ampulla**, which opens on an eminence, called the **major duodenal papilla**.
Organs in the infracolic compartment

- The **jejunum** begins at the **duodenojejunal flexure** where the digestive tract resumes an *intraperitoneal* course.
- The **ileum** ends at the **ileocecal junction**, the union of the terminal ileum and the cecum.
- Together, the jejunum and ileum are 6-7 m long, the jejunum constituting approximately two fifths and the ileum approximately three fifths of the intraperitoneal section of the small intestine.
Most of the **jejunum** lies in the left upper quadrant (LUQ) of the infracolic compartment, whereas most of the **ileum** lies in the right lower quadrant (RLQ).
The large intestine consists of the:

- **cecum**, appendix;
- **colon** - ascending, transverse, descending, and sigmoid;
- **rectum**
The large intestine can be distinguished from the small intestine by:
Organs in the infracolic compartment

- The large intestine can be distinguished from the small intestine by:
  - **Omental appendices**: small, fatty, omentum-like projections.
  - **Teniae coli**: three distinct longitudinal bands (thickened bands of smooth muscle representing most of the longitudinal layer)
  - **Haustrae**: sacculations of the wall of the colon between the teniae
Organs in the infracolic compartment

- The **cecum** is a blind intestinal pouch;
  - it is continuous with the ascending colon.
  - is almost entirely enveloped by peritoneum
  - the ileal orifice enters the cecum (valva ileocecalis)
Vermiform appendix is a blind intestinal diverticulum (6-10 cm in length) that contains masses of lymphoid tissue.

- It arises from the posteromedial aspect of the cecum inferior to the ileocecal junction.
- The position of the appendix is variable, but it is usually retrocecal.

**Organs in the infracolic compartment**

- 30% decending
- 65% retrocecal, posterior
- 2% preileal
- 1% postileal
Organs in the infracolic compartment

- **Vermiform appendix** - projections:
  - McBurney point - approximately 2.5 cm superomedial to the ASIS on the spinolumbical line.
  - Lanz point
The **colon** has four parts:
- ascending,
- transverse,
- descending, and
- sigmoid

**Organs in the infracolic compartment**

- **right colic flexure** - X-th rib
- **left colic flexure** - VIII intercostal space
Organs in the infracolic compartment

- Relationship to the peritoneum:
  - ascending is secondarily **retroperitoneal**
  - transverse - **intraperitoneal**
  - descending - secondarily **retroperitoneal**
  - sigmoid - **intraperitoneal**
Peritoneal formations

- The **greater omentum** is a prominent, four-layered peritoneal fold. It hangs down like an apron from the greater curvature of the stomach and connects to the:
  - diaphragm by the *gastrophrenic ligament*
  - spleen by the *gastroplenic ligament*
  - transverse colon by the *gastrocolic ligament*
Peritoneal formations

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Peritoneal formations

- The **mesentery** is a fan-shaped fold of peritoneum that attaches the jejunum and ileum to the posterior abdominal wall.
- Between the two layers of the mesentery are the:
  - superior mesenteric vessels
  - lymph nodes (about 200)
  - autonomic nerves
  - variable amount of fat
Peritoneal formations

- The **mesentery** has two margins:
  - **intestinal end**
  
- The origin or **root of the mesentery** (approximately 15 cm long) is directed obliquely. It extends from the duodenojejunal junction to the ileocolic junction.
The **transverse mesocolon** attaches the transverse colon to the posterior abdominal wall.

The mesocolon is adherent to or fused with the inferior wall of the omental bursa.
Peritoneal formations

- The **transverse mesocolon** attaches the transverse colon to the posterior abdominal wall.
- The mesocolon is adherent to or fused with the inferior wall of the omental bursa.
The transverse mesocolon divides the peritoneal cavity into:
- supracolic compartment
- infracolic compartment

The root of the transverse mesocolon lies along the anterior border of the pancreas and is continuous with the parietal peritoneum posteriorly.
Peritoneal formations

- The appendix has a short triangular mesentery, the **mesoappendix**.
- The appendicular artery and vein are within mesoappendix.
Peritoneal formations

- The sigmoid colon usually has a long mesentery - the sigmoid mesocolon.
- The root of the sigmoid mesocolon has an inverted V-shaped attachment.
- The left ureter and the division of the left common iliac artery lie retroperitoneally, posterior to the apex of the root.
Peritoneal spaces in the infracolic compartment

- Right paracolic gutter
- Left paracolic gutter
- Right mesenteric sinus
- Left mesenteric sinus
- Retrocecal recess
- Intersigmoid recess
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Peritoneal Cavity of Pelvis

- Inferior to the pelvic inlet (linea terminalis)
- **Intraperitoneal organs:**
  - Superior part of the rectum, uterus and uterine tubes, ovarium, sigmoid colon
- **Subperitoneal organs:**
  - urinary bladder, middle part of the rectum
Peritoneal Cavity of Pelvis
The parietal peritoneum reflects onto the pelvic viscera. Only their superior and superolateral surfaces are covered with peritoneum:

- In the male - rectovesical pouch
- In the female
  - rectouterine pouch (cul-de-sac of Douglas) and
  - vesicouterine pouch
Peritoneal Cavity of Pelvis

6 - rectovesical pouch

4 - vesicouterine pouch
6 - rectouterine pouch
Vessels in the infracolic compartment

**Celiac Trunk** – unpaired artery, branch of the abdominal aorta at the level of the Th-XII.

- It is very short (less than 2 cm in most cases) and divides into three branches:
  - **Left gastric artery**
  - **Common hepatic artery**
    - right gastric a.
    - hepatic a. proper
    - gastroduodenal a.
    - right gastro-omental a.
    - superior pancreaticoduodenal aa.
  - **Splenic artery**
    - short gastric aa.
    - left gastro-omental a.
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Vessels in the infracolic compartment

- **Superior mesenteric a.** — unpaired artery, branch of the abdominal aorta. It arises about 1 cm inferior to the celiac trunk at the level of the L-1.

- **Branches:**
  - Inferior pancreaticoduodenal a.
  - Intestinal aa. (jejunaes et ilei)
  - Ileocolic a.
  - Right colic a.
  - Middle colic a.
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Vessels in the infracolic compartment

Superior mesenteric artery
**Vessels in the infracolic compartment**

- **Inferior mesenteric a.** — unpaired branch of the abdominal aorta. It arises at the level of the intervertebral disc between vertebrae L-2 and L-3.

- **Branches:**
  - Left colic a.
  - Sigmoid aa.
  - Superior rectal a.
    - anastomoses with middle and inferior rectal aa.
**Vessels in the infracolic compartment**

- **The hepatic portal vein** – carries venous blood to the liver from the abdominal portion of the gastrointestinal tract, the spleen, and the pancreas.
  - It is formed by the union of the **superior mesenteric** and **splenic** veins. The **inferior mesenteric v.** enters the splenic vein.
Hepatic portal vein

Anastomoses between portal and caval veins
Retroperitoneal space

- **Retroperitoneal space** is not a real space. It is that part of the body between the parietal peritoneum and the muscles and bones of the posterior abdominal wall.
  - The retroperitoneal space contains the kidneys, ureters, suprarenal glands, aorta, inferior vena cava, and abdominal portions of the sympathetic trunks. They are **primary** retroperitoneal structures.
  - The pancreas, duodenum, ascending colon and descending colon are **secondarily** retroperitoneal organs.
Retroperitoneal space
Primary retroperitoneal structures

- The **kidneys** are bean-shaped structures located between the T12 and the L3 vertebral levels, deep (anterior) to the 12th ribs.
- The kidneys are hollow and are embedded in perinephric fat.
- Closely related to the diaphragm, the kidneys move 2-3 cm in a vertical direction with its excursions.
- The inferior pole of the right kidney is approximately a finger's breadth superior to the iliac crest.
Perinephric fat (capsula adiposa) surrounds the kidneys and their vessels as it extends into their hollow centers, the renal sinuses.

The kidneys, suprarenal glands, and the fat surrounding them are enclosed \textit{(except inferiorly!)} by a condensed, membranous layer of \textbf{renal fascia}.

The renal fascia continues medially to ensheath the renal vessels and abdominal aorta.

External to the renal fascia is \textbf{paranephric fat}. 
Primary retroperitoneal structures

- **Perinephric fat** (capsula adiposa) surrounds the kidneys and their vessels as it extends into their hollow centers, the renal sinuses.
- The kidneys, suprarenal glands, and the fat surrounding them are enclosed (**except inferiorly**) by a condensed, membranous layer of **renal fascia**.
- The renal fascia continues medially to ensheathe the renal vessels and abdominal aorta.
- External to the renal fascia is **paranephric fat**.
Primary retroperitoneal structures

- The collagen bundles, renal fascia, and perinephric and paranephric fat, along with the tethering provided by the renal vessels and intraabdominal pressure, **hold** the kidneys in a **relatively fixed position**.

- **Nephroptosis** (dropped kidney) - abnormally mobile kidneys may descend more than the normal 3 cm when the body is erect.
Primary retroperitoneal structures

- The **suprarenal (adrenal) glands** are located between the superomedial aspects of the kidneys and the diaphragm.
- They are enclosed by renal fascia by which they are attached to the crura of the diaphragm.
- The right suprarenal gland is triangular in shape.
- The left suprarenal gland is semilunar in shape.
Primary retroperitoneal structures

Blood supply of the suprarenal glands.
Primary retroperitoneal structures

- The **ureters** are muscular ducts (25-30 cm long) with narrow lumina that carry urine from the kidneys to the urinary bladder.
- They are divided into:
  - abdominal part
  - pelvic part
- The ureters normally demonstrate relative constrictions in three places:
  1. at the junction of the ureter and renal pelvis,
  2. where the ureters cross the brim of the pelvic inlet,
  3. during their passage through the wall of the urinary bladder
Surface marking of the ureters

Anterior view

Posterior view
Abdominal aorta

- From the aortic hiatus (Th12) to the bifurcation at level of the L4.
- The abdominal aorta lies anterior to the L1-L4 vertebral bodies.
- Splenic v., pancreas, duodenum (horizontal part), root of the mesenteri, left renal v. and peritoneum lie anterior to the aorta.
- Behind the aorta: cisterna chyli and the beginning of the thoracic duct.
- Laterally: nodi lymph. lumbales.
The abdominal aorta has three types of branches:

- **Unpaired** arteries to the gastrointestinal tract.
- **Paired visceral** arteries:
  - Renal a.
  - Middle suprarenal a.
  - Testicular (ovarian) a.
- **Paired** arteries to the abdominal wall (parietal):
  - Inferior phrenic a.
  - Lumbar aa. (4 pairs)
The **inferior vena cava** has no unpaired visceral tributaries because the hepatic portal system collects blood from the gastrointestinal tract.

- Left suprarenal v. and left testicular v. drain into the left renal v.!
Anastomoses between caval veins

**Vv. lumbales ascendens** – behind psoas major m..

- **Deep cava-caval anastomoses:**
  - Ascending lumbar vv. (to the superior v. cava) ↔ lumbar vv. (to the inferior v. cava)
  - Vertebral vv. (to the superior v. cava) ↔ lumbar vv. (to the inferior v. cava)
Lymphatic vessels and nodes

- Parietal lymph nodes:
  - Nodi lymph. iliaci communes
  - Nodi lymph. lumbales – 30-50
  - Nodi lymph. phrenici inferiores

- Visceral lymph nodes:
  - Nodi lymph. celiaci
  - Nodi lymph. mesenterici superiores
  - Nodi lymph. mesenterici inferiores

- Lymphatic vessels:
  - truncus lumbalis dex. et sin.
  - truncus intestinalis

Thoracic duct
Lymphatic vessels and nodes

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  - Nodi lymph. iliaci communes
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- **Visceral lymph nodes:**
  - Nodi lymph. celiaci
  - Nodi lymph. mesenterici superiores
  - Nodi lymph. mesenterici inferiores

- **Lymphatic vessels:**
  - truncus lumbalis dex. et sin.
  - truncus intestinalis

\[ \text{Cisterna chyli} \quad \text{Thoracic duct} \]
The lumbar plexus (ventral rami of spinal nerves L1 to L4) is formed within the psoas major muscle.
Lumbar plexus

Nerves of the lumbar plexus:
- Iliohypogastric n.
- Ilioinguinal n.
- Genitofemoral n.
- Lateral cutaneous nerve of the thigh
- Obturator n.
- Femoral n.
Abdominal autonomic nerves and plexuses

Abdominal Part of the Sympathetic Trunk - on the vertebral body between the crus of the diaphragm and the psoas major muscle.

- lumbar splanchnic nerves – pass anteriorly from the sympathetic trunk to the aortic autonomic nerve plexus.

The abdominal autonomic plexuses are nerve networks consisting of both sympathetic and parasympathetic fibers, which surround the abdominal aorta and its major branches:

- celiac plexus
- superior mesenteric plexus
- inferior mesenteric plexus
- intermesenteric plexus
- superior hypogastric plexus
Abdominal autonomic nerves and plexuses

The **sympathetic fibers** mainly innervate the blood vessels of abdominal viscera and are inhibitory to the parasympathetic stimulation.

The **vagus nerves** supplies parasympathetic fibers to the digestive tract from the esophagus through the transverse colon.

**Pelvic splanchnic nerves** supply the descending and sigmoid colon and rectum.

Parasympathetic stimulation promotes **peristalsis** and secretion.
Abdominal autonomic nerves and plexuses