Gross Anatomy Coursepack Illustrations



STUDENT COLLABORATIVE RESOURCES FOR UNDERSTANDING AND BRODY SUCCESS

SCRUBS is a student driven initiative that aims to develop supplemental resources for current and future cohorts that will pass through Brody. Members of **SCRUBS** participate in a variety of sub-committees working to create resources for students, by students. These resources aim to offer unique perspectives from students that have walked in the same shoes, developing resources that we wish we had been exposed to during our time in the course.

The hope is this organization will become a staple of the Brody student body, exemplifying the unique collaborative community that Brody offers. If this is a mission that aligns with your goals and you have the desire to help those that will come behind you, as well as a goal to leave your mark on Brody as a whole, we invite you to join the team!

Disclaimer:

The resources that are included in this document are made by students and not the faculty. As such, there is the possibility for errors in our development, although this is mitigated via a team approach to development with multiple stages of vetting. If there is a contradiction with the coursework presented within your course, please go by the course documents. Additionally, **SCRUBS** aims to supply **supplemental resources**, however these are in no way replacements to the instruction of the Brody faculty. Use these resources as a supplement, but not as your primary source for course material.

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Coronary Vasculature

Coursepack Section: Lungs and Heart

Image Description: The coronary arteries consist of the left coronary artery (LCA) and right coronary artery (RCA), which supply blood to the heart muscle. The LCA branches into the left anterior interventricular (LAD) artery, L. marginal, and circumflex artery, while the RCA branches into the anterior right atrial, right marginal, and posterior interventricular artery (PDA). The anterior interventricular, posterior interventricular, and right marginal are all associated with named veins



Key Points:

- Vein pairs
 - Anterior interventricular = great cardiac vein,
 - Posterior intervent. = middle cardiac vein
 - Right marginal = Small cardiac vein
- The major blood supply to the ventricles is the anterior and posterior interventriculars



Innervation to the Heart

Coursepack Section: Innervation of the thorax

Image Description: The sympathetic supply to the heart originates from the cervical and upper thoracic segments of the spinal cord, specifically TI-T5, increasing heart rate and contractility through the release of norepinephrine. The parasympathetic supply is provided by the vagus nerve (cranial nerve X), which decreases heart rate and contractility by releasing acetylcholine.



Key Points:

- Sympathetic: Cervical ganglia + T1-T5 = postganglionic
- Parasympathetic: Vagus = preganglionic
- 2 plexuses to the heart: Cervical cardiac plexus and thoracic cardiac plexus
- Sympathetic increased rate, contraction, and coronary vasodilation



Innervation to the Lungs and Esophagus

Coursepack Section: Innervation of the thorax

Image Description: The nerve supply to the lungs is primarily from the pulmonary plexus, which consists of sympathetic fibers from the thoracic sympathetic ganglia (TI-T6) that dilate the bronchi and parasympathetic fibers from the vagus nerve (cranial nerve X) that constrict the bronchi and stimulate mucus secretion. The esophagus is innervated by the esophageal plexus, which also receives sympathetic fibers from the thoracic sympathetic ganglia (TI-T10) and parasympathetic fibers from the vagus nerve, regulating peristalsis and glandular secretions.



Key Points:

- Sympathetic: postganglionic, Parasympathetic: preganglionic
- Vagus becomes plexiform on the esophagus, becomes anterior and posterior vagal trunks

Organ	Sympathetic	Parasympathetic
Lungs	T1-T6	Vagus
Esophagus	T1-T10	Vagus



Branches of the Abdominal Aorta

Coursepack Section: Vasculature of the Abdomen

Image Description: The abdominal aorta is the continuation of the thoracic aorta that begins at the diaphragm (T12) and extends down to the level of the fourth lumbar vertebra, where it bifurcates into the common iliac arteries. It gives off several major branches, including the celiac trunk, superior mesenteric artery, inferior mesenteric artery, renal arteries, and gonadal arteries, which supply blood to the abdominal organs, kidneys, and gonads.



Key Points:

- Celiac T12, Superior mesenteric (SMA) L1, Inferior mesenteric (IMA) L3
 - All come off anteriorly and supply the GI system
- Inferior phrenic, Suprarenal, Renal, and Gonadal branches are all lateral
- The gonadal artery comes off at the level of L2
- The abdominal aorta splits into common iliacs at the level of L4



Celiac Trunk

Coursepack Section: Vasculature of the Abdomen

Image Description: The celiac trunk is a major branch of the abdominal aorta that arises just below the diaphragm. It quickly divides into three primary branches: the left gastric artery, which supplies the stomach and lower esophagus; the splenic artery, which supplies the spleen, pancreas, and part of the stomach; and the common hepatic artery, which supplies the liver, gallbladder, stomach, and duodenum.



Key Points:

- Three main branches: Common hepatic, Splenic, and L. Gastric
- Associated with the **embryonic foregut**
- The gasto-omental vessels run along the greater curvature of the stomach
- The proper hepatic gives rise to the blood supply to the liver and gallbladder
- The superior pancreaticoduodenal will anastomose with the corresponding branch off the SMA



Superior Mesenteric Artery

Coursepack Section: Vasculature of the Abdomen

Image Description: The superior mesenteric artery (SMA) is a major branch of the abdominal aorta that arises just below the celiac trunk at L1. It supplies blood to the majority of the small intestine (including the duodenum, jejunum, and ileum) and the first two-thirds of the large intestine (including the cecum, ascending colon, and transverse colon), as well as parts of the pancreas.



Key Points:

- Associated with the **embryonic midgut**, supplies the bowel up to the splenic flexure
- The number of arcades increases in the ileal region
- The SMA passes overtop the L. Renal vein, Uncinate process of the pancreas, and duodenum



Inferior Mesenteric Artery

Coursepack Section: Vasculature of the Abdomen

Image Description: The inferior mesenteric artery (IMA) is a major branch of the abdominal aorta that arises below the superior mesenteric artery. It supplies blood to the distal third of the transverse colon, the descending colon, the sigmoid colon, and the upper part of the rectum.



Key Points:

- Associated with the **embryonic hindgut**, supplies the descending colon, sigmoid, and superior rectum
- The left colic (from IMA) and middle colic (from SMA) can connect to from the "marginal" sysyem
- The IMA becomes the superior rectal when it passes over the left common iliac artery
- Comes off the abdominal aorta at L3



Caval System

Coursepack Section: Vasculature of the Abdomen

Image Description: The inferior vena cava (IVC) is the large vein that runs through the abdomen, formed by the union of the common iliac veins at the level of the fifth lumbar vertebra. It ascends on the right side of the vertebral column, receiving blood from the lower limbs, pelvic organs, kidneys, and liver, and ultimately drains into the right atrium of the heart.



Key Points:

- Asymmetric branches on left and right
 - Branches to the left all come off the L. renal vein
- Does not have branches associated with the anterior divisions of the abdominal aorta
- Positioned to the right of the abdominal aorta and enters the liver posteriorly
- Passes through the diaphragm at the IVC hiatus at the level of T8
- Compression of the L. Renal vein by the SMA can lead to nutcrackers syndrome
- The IVC is the posterior border of the omental foramen



Portal System

Coursepack Section: Vasculature of the Abdomen

Image Description: The portal system is a network of veins that carries blood from the gastrointestinal organs and spleen to the liver. The main vessel of this system is the hepatic portal vein, formed by the union of the superior mesenteric vein and the splenic vein. This system allows nutrients and toxins absorbed from the intestines to be processed by the liver before entering the systemic circulation.



Key Points:

- The portal vein is formed by the combination of the splenic and SMV
- Goal = to take blood from the GI system to the liver to detoxify
- The IMV usually joins directly into the splenic vein
- Is the most posterior part of the portal triad. Runs through the hepatoduodenal ligament



Aortic Plexus

Coursepack Section: Innervation to the abdomen

Image Description: Sympathetic fibers originate from the thoracic and lumbar segments of the spinal cord traveling through the splanchnic nerves to the celiac superior mesenteric and inferior mesenteric ganglia. Parasympathetic fibers are provided by the vagus nerve (cranial nerve X) and the pelvic splanchnic nerves (S2-S4)



Key Points:

- Greater Splanchnic: T5-T9 Celiac, Superior mesenteric plexus
- Lesser Splancnic: T10-11 Aorticorenal, Least splanchinc: T12 Aorticoreanl/renal
- Upper lumbar splan. : L1-L2 Intermesenteric/inferior mes. Lower Lumbar (L1-2): Hypogast.
- Parasympathetic: Above IMA = Vagus, Below IMA = Pelvic splanchnic



Rectus Sheath

Coursepack Section: Anterolateral Abdominal Wall

Image Description: The rectus sheath is formed by the aponeuroses of three abdominal muscles: the external oblique, internal oblique, and transversus abdominis. These aponeuroses envelop the rectus abdominis muscle and fuse at the linea alba. Above the arcuate line, the internal oblique splits around the rectus abdominis, while below the arcuate line, all three aponeuroses pass anterior to the rectus abdominis, leaving only the transversalis fascia posteriorly.



Key Points:

- In the middle segment, the internal oblique aponeurosis splits anterior and posterior around the rectus abdominus
- Below the arcuate line, the transversalis fascia is the only thing posterior to the recuts



Inguinal Canal and Triangle

Coursepack Section: Anterolateral Abdominal Wall

Image Description: The inguinal canal is an oblique passage for the spermatic cord in males and the round ligament in females to the external genitalia. It has a deep inguinal ring (internal opening) and a superficial inguinal ring (external opening), with boundaries formed by the inguinal ligament, transversalis fascia, internal oblique, and external oblique muscles. The inguinal triangle is defined by the rectus abdominis muscle medially, the inguinal ligament inferiorly, and the inferior epigastric vessels laterally. This area is a common site for direct inguinal hernias, where abdominal contents can protrude through the weakened abdominal wall.



Key Points:

- Iliohypogastic nerve does NOT pass through the superficial inguinal ring
- The ilioinguinal nerve passes through the superficial inguinal ring
- Below the arcuate line, the transversalis fascia is the only thing posterior to the recuts



Lumbar Plexus

Coursepack Section: Lumbosacral Plexus

Image Description: The lumbar plexus is a network of nerves formed by the anterior rami of the L1-L4 spinal nerves, with contributions from T12. It is located within the psoas major muscle and provides motor and sensory innervation to the lower abdominal wall, pelvis, and lower extremities. Major branches of the lumbar plexus include the iliohypogastric, ilioinguinal, genitofemoral, lateral femoral cutaneous, femoral, and obturator nerves.



Key Points:

- Anterior divisions are on the right, posterior on the left
- Spinal segments indicated in blue