2018-1-07  **Outline the blood supply to the gastrointestinal system (arteries and veins).**

Portal circulatory system + arterial blood flow into liver
1100ml of portal blood + 400ml from hepatic artery = 1500ml (30% CO)
Oxygen consumption – 20-35% of total body needs

**Arterial Supply**

**Abdominal Aorta**
- It begins at the aortic hiatus of the diaphragm, anterior to the lower border of vertebra T7.
- It descends to the level of vertebra L4 it is slightly to the left of midline.
- The terminal branches of the abdominal aorta are the two common iliac arteries.

**Branches of Abdominal Aorta**

<table>
<thead>
<tr>
<th>Visceral Branches</th>
<th>Parietal Branches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celiac.</td>
<td>Inferior Phrenics.</td>
</tr>
<tr>
<td>Superior Mesenteric.</td>
<td>Lumbers</td>
</tr>
<tr>
<td>Inferior Mesenteric.</td>
<td>Middle Sacral.</td>
</tr>
<tr>
<td>Middle Suprarenals.</td>
<td></td>
</tr>
<tr>
<td>Renals.</td>
<td></td>
</tr>
<tr>
<td>Internal Spermatics.</td>
<td></td>
</tr>
<tr>
<td>Gonadal</td>
<td></td>
</tr>
</tbody>
</table>

**Anterior Branches of The Abdominal Aorta**
- Celiac Artery. Superior Mesenteric Artery. Inferior Mesenteric Artery.
- The three anterior branches supply the gastrointestinal viscera.

**Basic Concept**
- Fore Gut - Coeliac Trunk
- Mid Gut - Superior Mesenteric Artery
- Hind Gut - Inferior Mesenteric Artery

**Celiac Trunk**
- It arises from the abdominal aorta immediately below the aortic hiatus of the diaphragm anterior to the upper part of vertebra L1.
- It divides into the: left gastric artery, splenic artery, common hepatic artery.
  - Left gastric artery
  - Splenic artery
    - Short gastric vessels
    - Lt. gastroepiploic artery
  - Common hepatic artery
    - Hepatic artery proper
      - Left hepatic artery
      - Right hepatic artery
- Gastro-duodenal artery
  - Rt. Gastroepiploic (gastro-omen-tal) artery
  - Sup pancreato-duodenal artery
  - Supra-duodenal artery

Oesophagus
- Cervical oesophagus - branches from inferior thyroid artery
- Thoracic oesophagus - branches from bronchial arteries and aorta
- Abd. Oesophagus - branches from Lt. gastric & inferior phrenic A

Superior Mesenteric Artery
- It arises from the abdominal aorta immediately below the celiac artery anterior to the lower part of vertebra L1.
- It is crossed anteriorly by the splenic vein and the neck of pancreas.
- Posterior to the artery are the left renal vein, the uncinate process of the pancreas, and the inferior part of the duodenum.
- Branches of Superior Mesenteric Artery
  - Inferior pancreaticoduodenal artery
  - Jejunal and ileal arteries
  - Middle colic artery
  - Right colic artery
  - Ileocolic artery

Inferior Mesenteric Artery
- It is the smallest of the three anterior branches of the abdominal aorta and arises anterior to the body of vertebra L3.
- Initially, the inferior mesenteric artery descends anteriorly to the aorta and then passes to the left as it continues inferiorly.
- Branches of Inferior Mesenteric Artery
  - Left colic artery
  - Several sigmoid arteries
  - Superior rectal artery.

Venous Drainage of Gastrointestinal Tract
- Veins of portal venous system
- Systemic veins

Blood from GIT enter the liver via portal vein and leave the liver via hepatic veins to enter the inferior vena cava
Venous drainage except for the inferior part of the rectum, is through the portal system of veins.
Portal Vein
- It is formed by the union of the splenic vein and the superior mesenteric vein posterior to the neck of the pancreas at the level of vertebra L2.
- It is the final common pathway for the transport of venous blood from the spleen, pancreas, gallbladder, and the abdominal part of the gastrointestinal tract.
- It divides into right and left branches, which enter the liver parenchyma.
- Tributaries to The Portal Vein
  - Right and left gastric veins draining the lesser curvature of the stomach and abdominal esophagus
  - Cystic veins from the gallbladder
  - The para-umbilical veins are associated with the obliterated umbilical vein and connect to veins on the anterior abdominal wall.

Splenic Vein
- It forms from numerous smaller vessels leaving the hilum of the spleen.
- It passes to the right, passing through the splenorenal ligament with the splenic artery and the tail of pancreas.
- It crosses the posterior abdominal wall.
- Tributaries to The Splenic Vein
  - Short gastric veins from the fundus and left part of the greater curvature of the stomach
  - Left gastro-omental vein from the greater curvature of the stomach
  - Pancreatic veins draining the body and tail of pancreas
  - Inferior mesenteric vein.
    - It drains blood from the rectum, sigmoid colon, descending colon, and splenic flexure.
    - It begins as the superior rectal vein and ascends, receiving tributaries from the sigmoid veins and the left colic vein.
    - It joins the splenic vein posterior to the body of the pancreas

Superior Mesenteric Vein
- It drains blood from the small intestine, cecum, ascending colon, and transverse colon.
- It begins in the RIF as veins draining the terminal ileum, cecum, and appendix.
- It ascends in the mesentery to the right of the superior mesenteric artery.
- Tributaries to The Superior Mesenteric Vein
  - Right gastro-omental vein, draining the right part of the greater curvature of the stomach;
  - Anterior and posterior inferior pancreaticoduodenal veins
  - Anterior superior pancreaticoduodenal vein usually empties into the right gastro-omental vein, and the posterior superior pancreaticoduodenal vein usually empties directly into the portal vein.

Portosystemic Anastomosis
- Areas:
  - Lower end of oesophagus
  - Upper part of anal canal
  - Umbilicus
  - Retroperitoneal Bare area of liver
- The gastroesophageal junction around the cardia of the stomach-where the left gastric vein and its tributaries form a portosystemic anastomosis with tributaries to the azygos system of veins of the caval system.
- The anus-the superior rectal vein of the portal system anastomoses with the middle and inferior rectal veins of the systemic venous system.
• The anterior abdominal wall around the umbilicus-the para-umbilical veins anastomose with veins on the anterior abdominal wall.
• Clinical Applications:
  o Hemorrhoids at the anorectal junction
  o Esophageal varices at the gastroesophageal junction
  o Caput medusae at the umbilicus.

**Examiner Comments:**
7% of candidates passed this question.
An outline of the blood supply from the oesophagus down to the anus was expected. Very few candidates knew the branches of the main 3 arteries and which portion of the gastrointestinal system they supplied. Concepts related to control of blood flow and autoregulation of blood flow were not asked and therefore marks were not awarded for this information.