Embryology

Digestive and Respiratory Systems
Avinash Bharadwaj

The Beginning
- Head and tail folds again!
- Endodermal tube…
  - …open middle part
- Communication with yolk sac
- Three parts of the tube
  - Foregut
  - Midgut
  - Hindgut

Gut Tube Defined
- The communication narrows
- Endoderm → Lining epithelium
- Surrounding mesoderm → Muscle + CT
- Part of the tube is cranial to the abdomen

Relationship to Peritoneum
- Foregut: two mesenteries
  - Ventral and dorsal

Foregut Derivatives
- Abdominal oesophagus
- Stomach:
  - Ventral border → Lesser curvature
  - Dorsal border → Greater curvature
  - Cranial duodenum

Midgut
- Growth → midgut “loop”
- Communication with yolk sac
- Cranial and caudal ‘limbs’
- Caecal bud
**Cranial to Caudal**

1. V-I Duct
2. V-I Duct
3. Desc. Sigmoid

**Midgut + Hindgut**

1. Midgut:
   - Distal duodenum + Jejunum + Ileum
   - Caecum + appendix
   -Ascending + Most of transverse colon

2. Hindgut:
   - Left colic flexure, Descending + Sigmoid colon, Rectum
   - Part of anal canal

**Anal Canal**

- Common UG and GIT opening – cloaca → separation of channels.
- Anal opening initially closed by membrane
- Upper part: hindgut, endodermal
- Lower part: Ectodermal

**Pancreas, Liver, Gall Bladder**

- Pancreas
  - Two “buds”
  - Differential duodenal growth → Fusion
  - Biliary tree stays with ventral duct
  - Hepatic and cystic parts → liver and gall bladder
  - Liver – massive proliferation… …within the ventral mesogastrium

**Blood Supply**

- Foregut: coeliac
- Midgut: superior mesenteric
- Hindgut: inferior mesenteric
- Liver, gall bladder, pancreas: Junction of F + M
- Anal canal: IM + Iliac
- Veins → portal vein
- Portasystemic anastomoses

**Examples of Anomalies**

- Hollow organs grow by proliferation of lining cells
- Recanalisation by cell death essential
- Failure of recanalisation → atresia, stenosis
- Meckel’s diverticulum

- Pancreatic anomalies
- Others
  - Imperforate anus
  - Pyloric stenosis (hypertrophic)
Respiratory System
- Offshoot of upper foregut
- Single endodermal diverticulum
- Ventral to the foregut
- Branching

Lung – Histogenesis
- Pseudoglandular – embryonic period
- Canalicular: 16 – 26 weeks
- Terminal sac phase: 7m

Lung development determines the viability of a premature baby.

Tracheo-oesophageal anomalies