Derivatives of Germ Layers

ECTODREM

1. Lining Epithelia of
   i. Skin
   ii. Lips, cheeks, gums, part of floor of mouth
   iii. Parts of palate, nasal cavities and paranasal sinuses
   iv. Lower part of anal canal
   v. Terminal part of male urethera
   vi. Labia majora and outer surface of labia minora
   vii. Epithelium of cornea, conjuctiva, ciliary body, iris
   viii. Outer layer of tympanic membrane and membranous labyrinth
ECTODERM (contd.):

2. Glands
   – Exocrine – Sweet glands, sebaceous glands
     Parotid, Mammary and lacrimal

3. Other derivatives
   i. Hair
   ii. Nails
   iii. Enamel of teeth
   iv. Lens of eye; musculature of iris
   v. Nervous system
MESODERM:

- All connective tissue including loose areolar tissue, superficial and deep fascia, ligaments, tendons, aponeuroses and the dermis of the skin.
- Specialised connective tissue like adipose tissue, reticular tissue, cartilage and bone
- All muscles – smooth, striated and cardiac – except the musculature of iris.
- Heart, all blood vessels and lymphatics, blood cells.
- Kidneys, ureters, trigone of bladder, parts of male and female urethra, inner prostatic glands.
- Ovary, uterus, uterine tubes, upper part of vagina.
- Testis, epididymis, ductus deferens, seminal vesicle ejaculatory duct.
- Lining mesothelium of pleural, pericardial and peritoneal cavities; and of tunica vaginalis.
- Living mesothelium of bursae and joints.
- Substance of cornea, sclera, choroid, ciliary body and iris.
ENDODERM:

1. Lining Epithelia of

i. Part of mouth, palate, tongue, tonsil, pharynx.

ii. Oesophagus, stomach, small and large intestines, anal canal (upper part)

iii. Pharyngo – tympanic tube, middle ear, inner layer of tympanic membrane, mastoid antrum, air cells.

iv. Respiratory tract

v. Gall bladder, extrahepatic duct system, pancreatic ducts

vi. Urinary bladder except trigone

vii. Female urethera except part of its posterior wall

viii. Male urethera except part of posterior wall of prostatic part

ix. Greater part of vagina, vestibule and inner surface of labia minora
2. Glands

i. Endocrine: Thyroid, parathyroid, thymus, islets of Langerhans

ii. Exocrine: Live, pancreas, glands in G.I.T., prostatic glands and its female homologues
Placenta

• Primary site of nutrient and gas exchange between mother and foetus
• feto-maternal organ
Trophoblast
  Cytotrophoblast
  Syncytiotrophoblast

Lacunar stage

Start of uteroplacental circulation

Formation of primary Villi

Initially villi cover whole surface
  - villi at embryonic pole disappear-chorionic laeve (smooth)
  - villi at embryonic pole expand--chorionic frondosum (bushy)
Formation of Secondary Villi

Formation of Tertiary Villi

Foetal contribution- Chorionic frondosum

Maternal contribution- Decidua basalis

Decidua which is shed off in labour

1. decidua capsularis--covers abembryonic pole

2. decidua basalis--covers embryonic pole

3. decidua parietalis-- rest of uterine wall
• Decidua capsularis disappears
• Chorionic laeve adheres to decidua parietalis; uterine cavity obliterates.
• Amnion increases in size rapidly; amnion fuses to chorion - chorionic cavity obliterates - amniochorionic membrane formed
• Decidua sends septa into intervillous space - these septa are incomplete - divide the maternal surface into compartments - cotyledons
Fig. 130.—A scheme to show the relationships of a full term uterine placenta and its membranes.
Placental Circulation

• 80 to 100 spiral endometrial vessels pierce cytотrophoblast shell
• Maternal arterial blood bathes intervillous space

• Oxygenated blood is at high pressure in spiral artery
• Enters foetal (chorionic) vessels via intervillous space and placental membrane
• From chorionic veins it flows to umblical veins
  Endometrial veins are at low pressure so carry venous blood back through the same route
Placental membrane

Placental membrane initially composed of
• Endothelium of fetal vessel
• Connective tissue (extra embryonic mesoderm)
• Syncytiotrophoblast
• Cytotrophoblast
**Diagram A:**
- Cytotrophoblast shell
- Decidua
- Spiral artery
- Intervillosus space
- Blood vessel
- Cytotrophoblast
- Extraembryonic mesoderm
- Syncytiotrophoblast
- Chorionic plate

**Diagram B:**
- Villous blood vessel

**Diagram C:**
- Barrier formed by:
  1. Syncytiotrophoblast
  2. Cytotrophoblast
  3. Connective tissue
  4. Endothelium

**Diagram D:**
- Barrier formed by:
  1. Syncytiotrophoblast
  2. Endothelium
• Full term placenta is discoid
• Diameter – 15-25cm
• Thickness – 3cm
• Weight – 500 to 600gm
• No of cotyledons – 15 to 20
• Haemochorial
• Fetal surface smooth
• Maternal surface – bulging cotyledons seen
Near the end of pregnancy

- Placental exchange decreases
- Fibrosis of villus core
- Thickening of basement membrane of villi
- Fibrin deposition on cytotrophoblast
- Small capillaries disappear
Amniotic Cavity

- clear watery fluid in amniotic cavity
- secreted by amniotic cells and maternal blood
- provides protective cushion
- Volume 30 ml at 10 weeks
  - 450ml at 20 weeks
  - 1000 ml at 37 weeks
Functions

- Exchange of gases
- Exchange of nutrients and electrolytes
- Transmission of maternal antibodies
- Hormone production
  - Progesterone (after 4th month)
  - Hcg (1st two months)
  - Estrogens
  - Somatomammotrophin
Umbilical Ring

- Comprises of-
  - connecting stalk with allantois and umbilical vessels
  - yolk stalk with vitelline vessels
  - canal connecting intra and extraembryonic cavity
Umbilical Cord

- It forms when amnion envelops umbilical ring structures.
- Yolk sac obliterates by third month.
- Loops of intestine may enter umbilical ring.
- Allantois, vitelline duct and vessels disappear.
- Wharton's jelly now protects umbilical vessels.
- It is rich in proteoglycans.