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COURSE TITLE: GENERAL EMBRYOLOGY

Discuss the 2nd week of development

As implantation of the blastocyst occurs, morphologic changes in the embryoblast produce a bilaminar embryonic disc composed of epiblast and hypo blast. The embryonic disc gives rise to the germ layers that form all the tissues and organs of the embryo. Extraembryonic structures forming during the second week are the amniotic cavity, amnion, umbilical vesicle connecting stalk, chorionic sac.

Further implantation of the blastocyst

- Implantation of the blastocyst is collected during the second week. It occurs during a restricted time period 6 to 10 days after ovulation and fertilisation.
- The erosive syncytiotrophoblast invades the endometrial connective tissue, and the blastocyst slowly becomes embedded in the endometrium.
- Syncytiotrophoblastic cells displace endometrial cells at the implantation site(this is because the endometrial cells undergo apoptosis which facilitates further invasion)
- More cells in the cytotrophoblast divide and migrate into the syncytiotrophoblast.

Formation of extra embryonic structures (amniotic cavity, amnion, embryonic disc and umbilical vesicle, connecting stalk and connecting stalk).

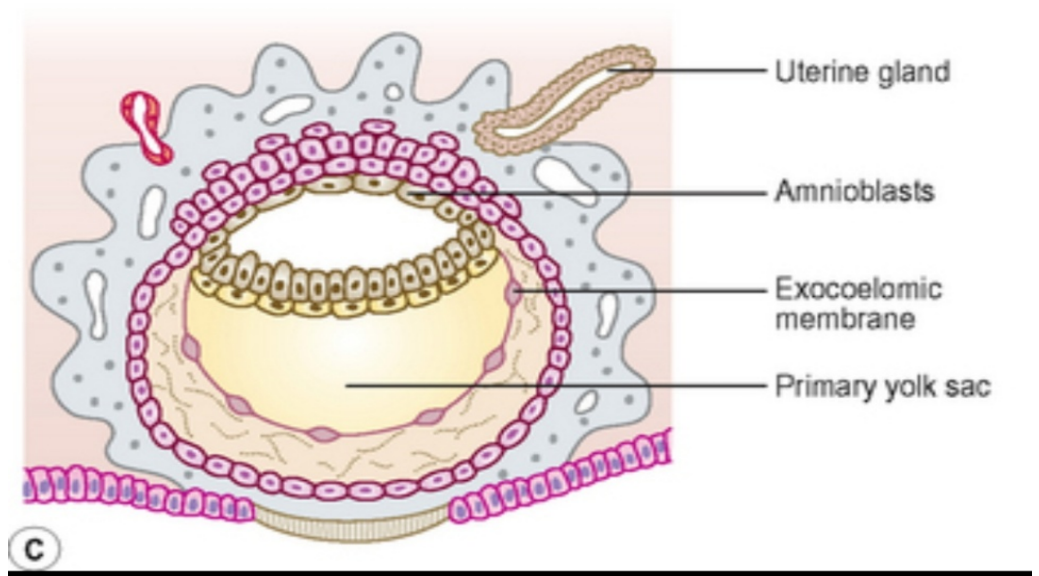
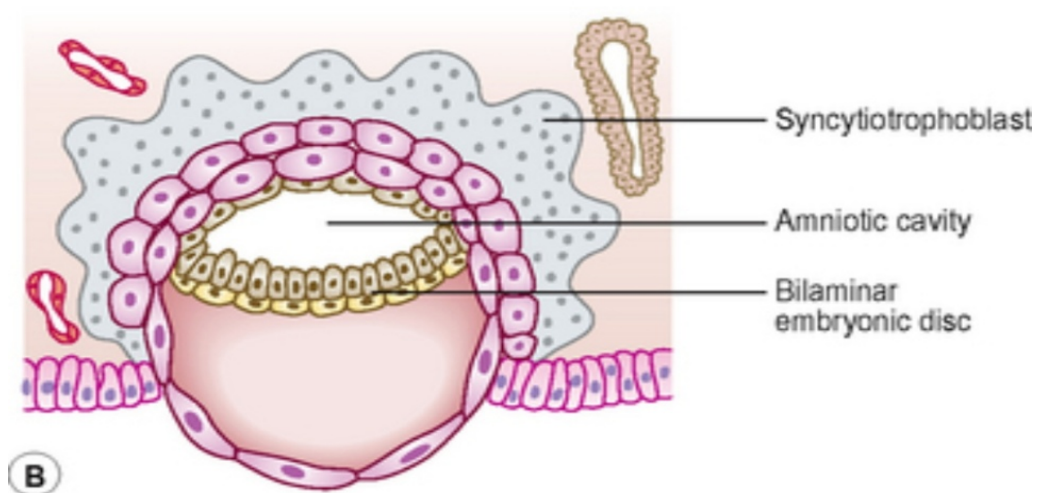
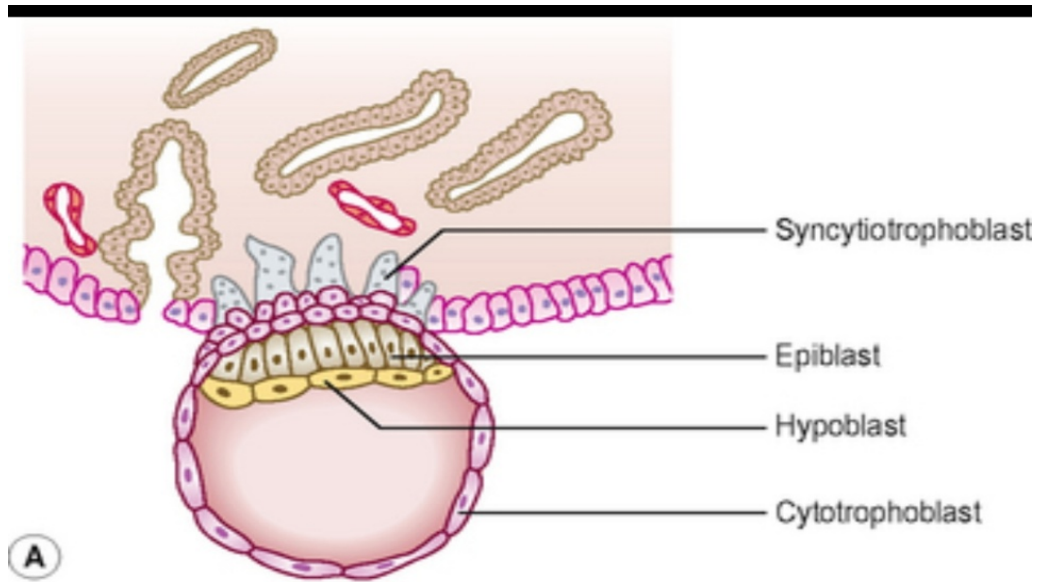
A flat almost bilaminar plate of cells(embryonic disc) consisting of two

layers forms from the embryoblast. They are:

- Epiblast, the thicker layer consisting of high columnar cells relates to the amniotic cavity
- Hypoblast, consisting of small cuboidal cells adjacent to the exocoelomic cavity(yolk sac/ primary umbilical vesicle)

Concurrently, a small space appears in the epiblast which is the primordium of the amniotic cavity.

- The epiblast forms the floor of the amniotic cavity and is continuous peripheral with the amnion where it is referred to as **amnioblast**.
- The hypoblast forms the roof of the exocoelomic cavity and is continuous with the thin **exocoelomic (Heuser's) membrane** which lines it. This membrane together with the hypoblast, lines the primary umbilical vesicle.
- Lacunae appear in the syncytiotrophoblast hence this stage is termed the **lacunar stage**



- The embryo is completely embedded in the endometrium on the 10th day.
- Initially, there is surface defect in the endometrial epithelium that is soon closed by a fibrin coagulum of blood
- By the 12th day, uterine epithelium which is almost completely developed covers the closing plug.

Establishment of primordial uteroplacental circulation

- In a 12 day embryo, adjacent syncytiotrophoblastic lacunae have fused to form **lacunar networks**
- The endometrial capillaries around the implanted embryo become congested and dilated to form maternal sinusoids
- These are eroded by syncytiotrophoblast and maternal blood flows freely into the lacunar networks. The syncytiotrophoblast absorbs nutritive fluid(**embryotroph**) from the lacunar networks which is transferred to the embryonic disc by diffusion and provides nutritive material to the embryo.
- The communication of the eroded sinusoids with the lacunae in the syncytiotrophoblast establishes the **primordial uteroplacental circulation**

Formation of extraembryonic membrane

- Cells from the primary umbilical vesicle form a layer of connective tissue, the **extraembryonic mesoderm**, which surrounds the amnion and umbilical vesicle.
- As the trophoblast undergoes changes, the extraembryonic mesoderm increases and isolated **extraembryonic coelomic spaces** appear within it, which rapidly fuses to form a large isolated cavity, **the extraembryonic coelom**.
- This fluid filled cavity surrounds the amnion surrounds and umbilical vesicle, except where they are attached to the chorion by connecting

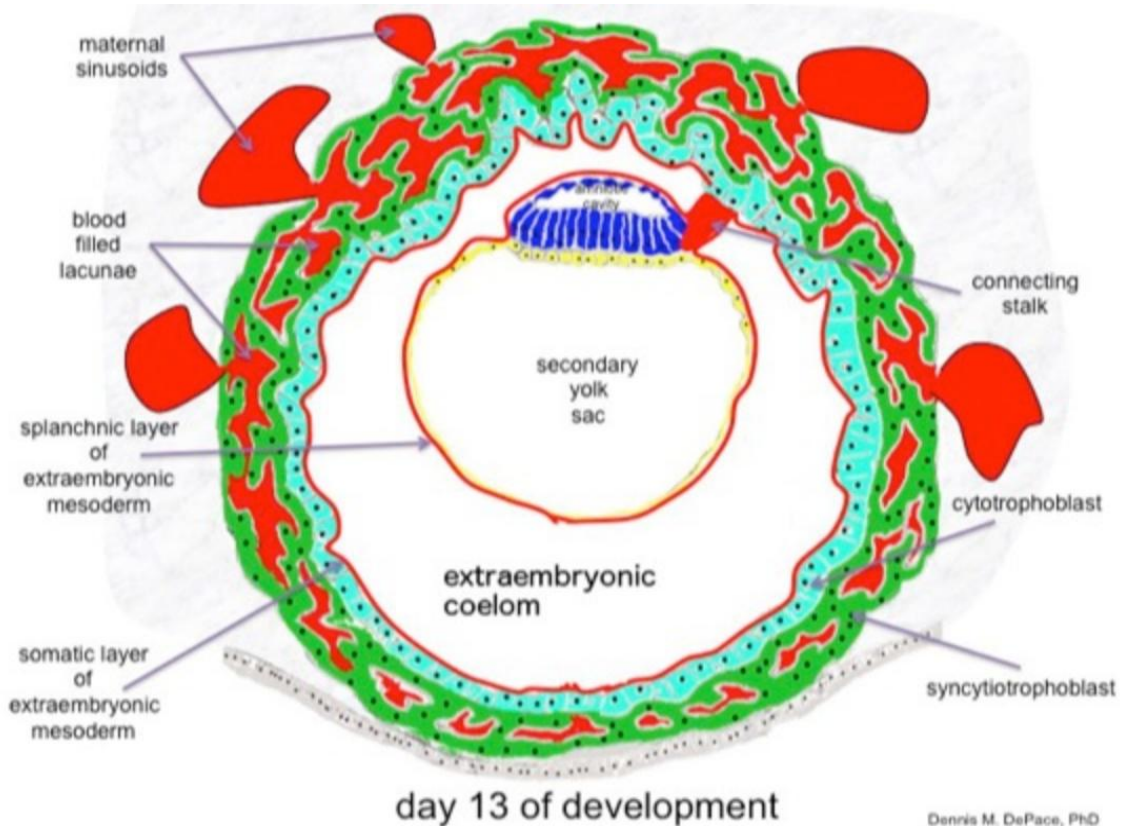
stalk

- As the extraembryonic coelom forms, the primary umbilical vesicle decreases in size and a smaller **secondary umbilical vesicle**
- During formation of the secondary umbilical vesicle, a large part of the primary umbilical vesicle is pinched off leaving a remnant of the vesicle called **exocoelomic cysts**.

Development of chorionic sac

- Cellular extensions of the cytotrophoblast grow into the syncytiotrophoblast and when they are enveloped in syncytial coverings, they are referred to as **primary chorionic villi**. They are the first stage of development of the chorionic villi of the placenta.
- The extraembryonic coelom splits the extraembryonic mesoderm into two layers
 1. **Extraembryonic somatic mesoderm**, lining the trophoblast and covering the amnion.
 2. **Extraembryonic splanchnic mesoderm**, surrounding the umbilical vesicle.
- The extraembryonic somatic mesoderm and the two layers of trophoblast form the **chorion** which forms the outer wall of the **chorionic sac**.
- The extraembryonic coelom is the primordium of the chorionic cavity.

- A 14 day embryo still has the form of a flat bilaminar embryonic disc, but the hypoblastic cells in a localised area are now columnar and form a thickened circular area, the **prechordal plate**(indicates the site



of the mouth and is an important organizer of the head region).