

2nd WEEK OF DEVELOPMENT

DR. NAJEEB LECTURE NOTES

BY FATIMA HAIDER

KGMC

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OVERVIEW OF SECOND WEEK

Day 7, 8, 9: Blastocyst penetration into endometrium

Day 10, 11: Blastocyst inside endometrium

Day 11, 12: Utero-placental circulation

Day 12, 13: Endometrium lining closed

By the end of first week, implantation begins and by the end of second week, implantation completes.

RULE OF TWO

Second week has the rule of two.

1. Trophoblast develop into two layers i-e cytotrophoblast and syncytiotrophoblast
2. Embryoblast develop into two layers i-e epiblast and hypoblast
3. Two cavities made around embryoblast i-e amniotic cavity and chorionic cavity
4. Two extracoelomic mesoderm layers i-e splanchnopleuric mesoderm and somatopleuric mesoderm

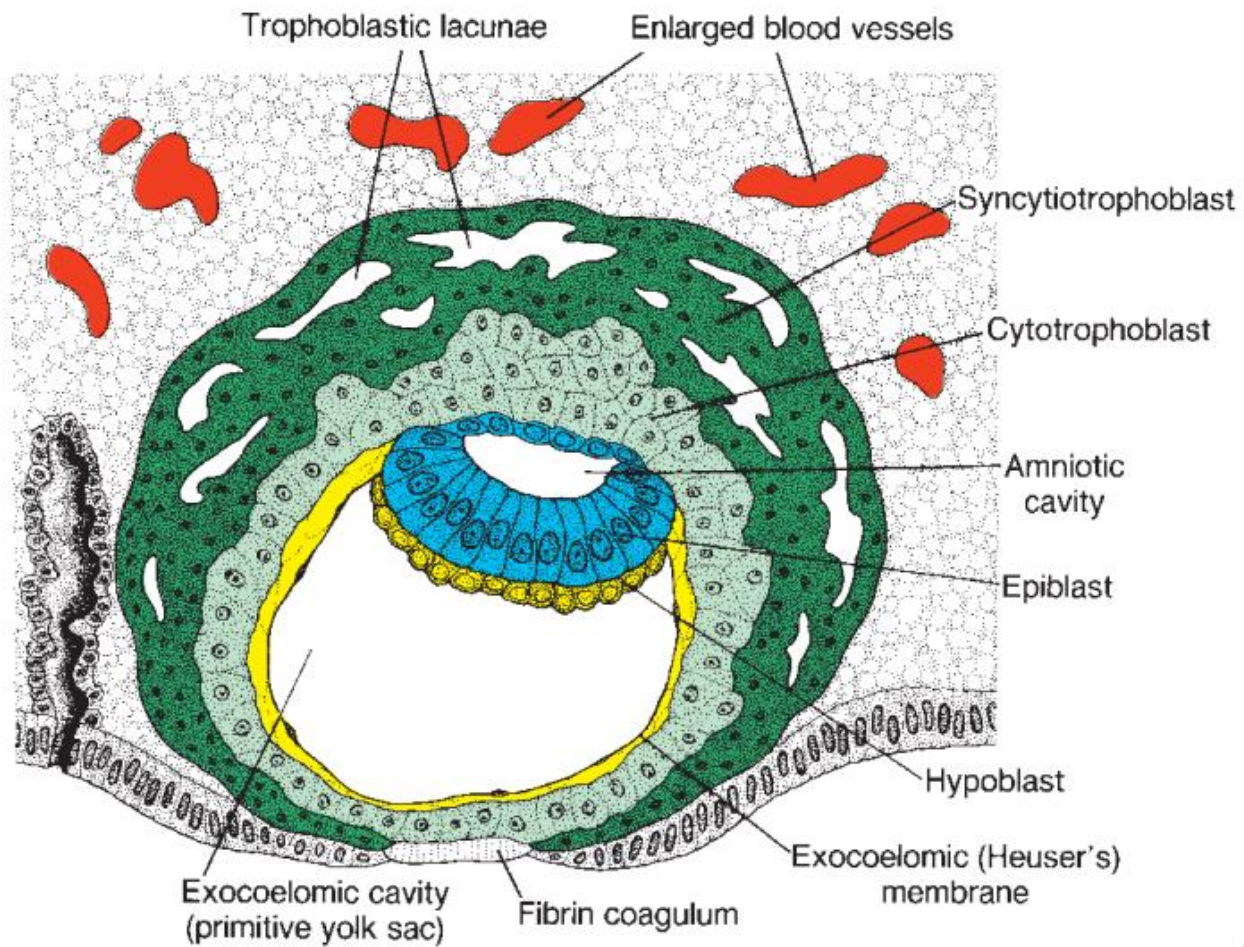
EMBRYONIC POLE

The pole having embryoblast is called **embryonic pole** while the pole opposite to it is called **abembryonic pole**. The trophoblast will develop more on the embryonic pole and less on the abembryonic pole.

SYNCYTIOTROPHOBLAST

The inner layer of trophoblast is called **cytotrophoblast**. The cytotrophoblast later gives rise to syncytiotrophoblast. The cytotrophoblast cells divide by mitosis and the mitotic cells move to outside and make another layer. This layer of cells lose their membrane and their cytoplasm becomes confluent and make a mass of protoplasm with scattered nuclei. This structure is called **syncytiotrophoblast**.

Syncytiotrophoblast develops more on embryonic pole.



LACUNAR NETWORK

Around 9th day, multiple cavities develop within the syncytiotrophoblast called **lacunae**. These lacunae interconnect with each other and produce a network of cavities called lacunar network.

UTERO-PLACENTAL CIRCULATION

The syncytiotrophoblast digest away some capillaries of the endometrium. At this stage, the capillaries in endometrium are of larger size and are called sinusoids. The syncytiotrophoblast break down some sinusoids and their endometrial lining connects with the lacunar space and maternal blood enters the lacunar system. The lacunar system at some points is connected with arterioles and blood will come at high pressure into these points while at other points, the lacunar system is connected with venous system and blood will seep out through the lacunar system into the venules. This is initial development of utero-placental circulation.

PRIMARY VILLI

Around the 14th day, some cells from cytotrophoblast cells make columns of cells which are extended towards syncytiotrophoblast. These column of cells are called primary villi.

BILAMINAR GERM DISK

Meanwhile, cells of the embryoblast make specialized layer of cells (next to blastocyst) which make cuboidal cell layer called **hypoblast**. The cells above hypoblast make columnar cell layer called **epiblast** and another cavity develops over the epiblast called amniotic cavity. The cells over amniotic cavity are called amnioblasts. The epiblast and hypoblast are together called **bilaminar germ disk**.

PRIMARY YOLK SAC

Hypoblast cells produce other cells which move down to produce another cavity called **primary yolk sac**. The cells lining primary yolk sac start secreting connective tissue called **extra-embryonic mesoderm** around the embryo. (don't confuse it with intra-embryonic mesoderm which is derived from epiblast).

SECONDARY YOLK SAC

The hypoblast produce additional cells that migrate along the inside of the extracoelomic membrane. These cells proliferate and gradually form a new cavity within the **extra-coelomic cavity**. This new cavity is known as **secondary yolk sac or definitive yolk sac**.

CHORIONIC CAVITY

A cavity develops within the extra-embryonic mesoderm called **extra-embryonic coelom or chorionic cavity**. The mesoderm due to this cavity forms two distinct layers:

1. **Splanchnic layer** – the inner layer close to embryoblast
2. **Somatic layer** – the outer layer close to cytotrophoblast

At one point, **connecting stalk** is present between both layers which will eventually become umbilical cord.

The somatic layer along with cytotrophoblast and syncytiotrophoblast are together called **chorionic plate**. One part of chorionic plate will later develop into placenta.

