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***18/MHS01/188***

***200L***

***MEDICINE AND SURGERY***

***ANA 205***

Discuss the second week of embryonic development.

The following events occur during the second week of embryonic development:

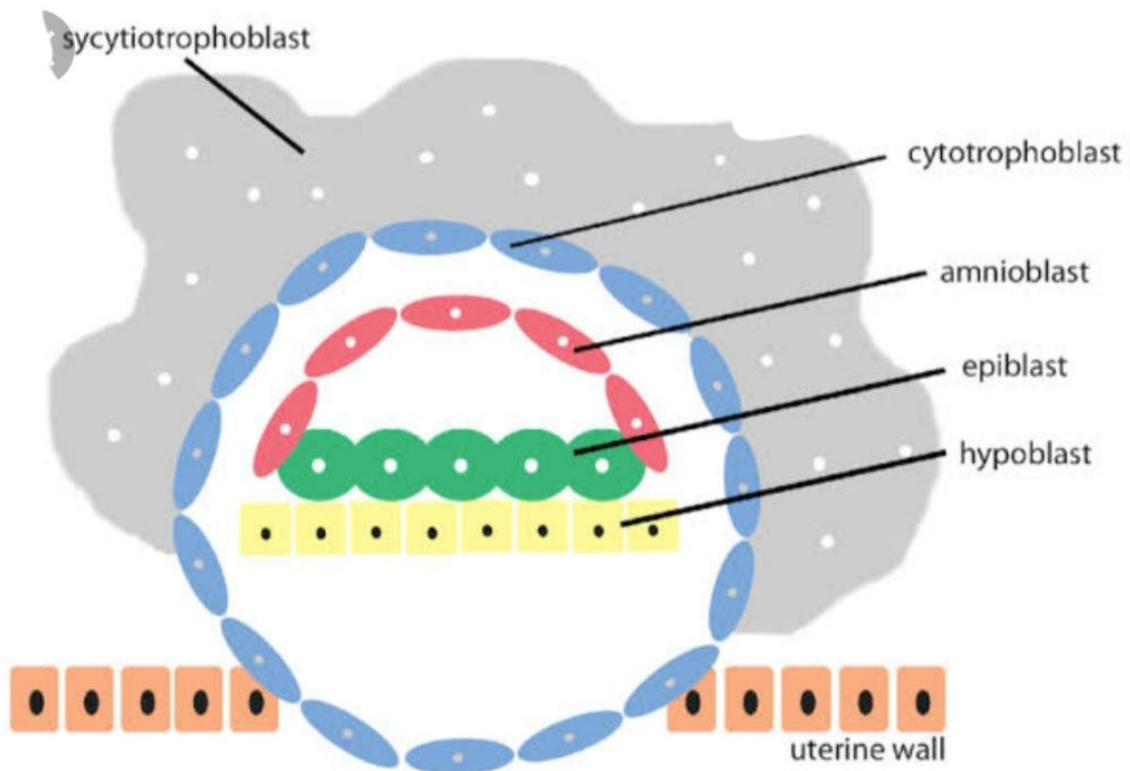
- Completion of blastocyst implantation
- Formation of bilaminar embryonic disc (hypoblast and epiblast)
- Formation of other embryonic structures ( Amniotic cavity, chorionic cavity, yolk sac, amnion, connecting stalk )

❖ Day 8

As implantation continues, the blastocyst becomes partially embedded in the endometrium. The syncytiotrophoblast penetrates the endometrium, cells of the cytotrophoblast proliferate and migrate into the syncytiotrophoblast, lose their individual membranes and fuse. The cells of the embryoblast proliferate and differentiate into:

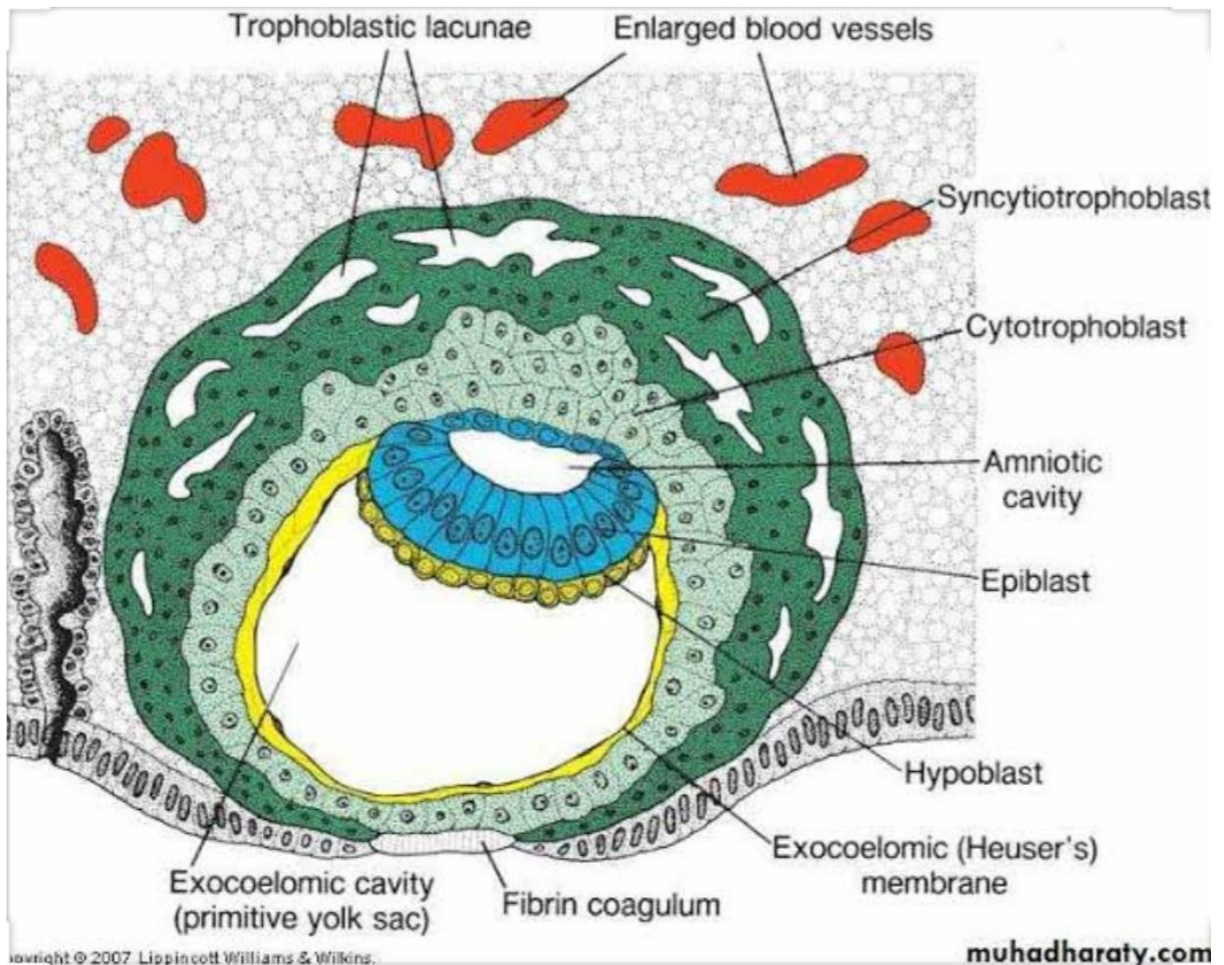
- ✓ Hypoblast; a layer of small, cuboidal cells adjacent to the blastocystic cavity.
- ✓ Epiblast; a layer of high, columnar cells adjacent to the amniotic cavity.
- ✚ These two cells form a flat ovoid shaped disc known as the *bilaminar germ disc*.

A cavity forms within the epiblast, this is known as the *amniotic cavity*. Cells of the epiblast adjacent to the cytotrophoblast are known as *amnioblasts*, amnioblasts together with the remaining cells of the epiblast line the amniotic cavity.



#### ❖ Day 9

The blastocyst is deeply embedded in the endometrium. The penetrative defect is now covered by a fibrin coagulum. Vacuoles collect in the trophoblast and coalesce to form a lacunae, this is referred to as the lacunar stage of trophoblastic development. The syncytiotrophoblast continues to evade the endometrium. The cells of the hypoblast adjacent to the cytotrophoblast form a thin membrane; the exocoelomic or Heuser's membrane. The hypoblast together with the Heuser's membrane line the exocoelomic cavity, or primitive yolk sac, or primordial umbilical vesicle.

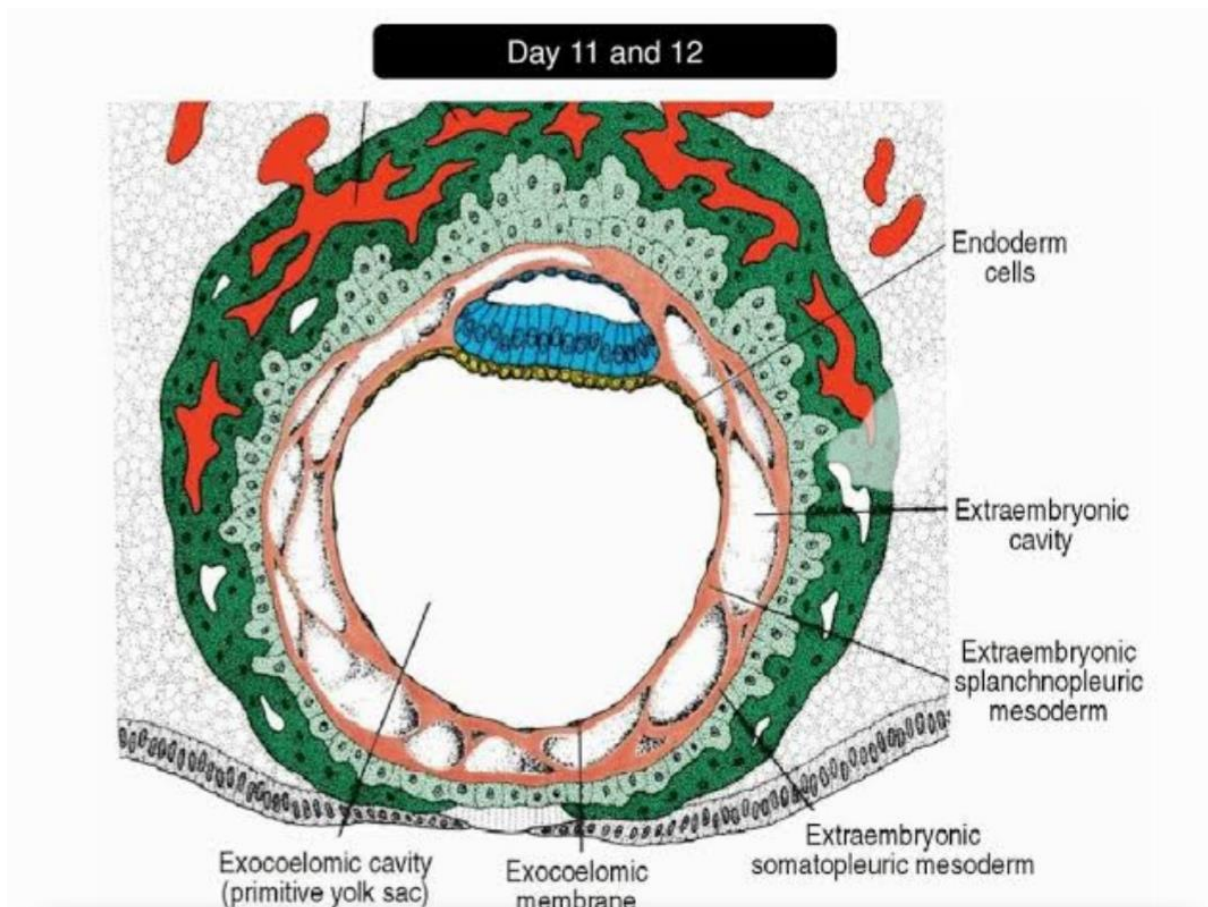


❖ Day 11-12

The blastocyst is fully embedded in the endometrium. A slight protrusion appears in the uterine lumen. The epithelium has almost covered the penetrative defect. The syncytiotrophoblast erodes the endothelial lining of the endometrial capillaries, the eroded capillaries are called sinusoids. The blood from the sinusoids enter the lacunae system, establishing a *primordial uteroplacental communication*. A new layer of cells form between the outer surface of the exocoelomic cavity and the inner layer of the cytotrophoblast; *the extraembryonic mesoderm*. The mesoderm lining the inner layer of the cytotrophoblast is the *extraembryonic somatic mesoderm*, while the cells lining the yolk sac and the amniotic cavity is the *extraembryonic splanchnic mesoderm*. Small cavities coalesce to form a larger cavity called the *extraembryonic cavity*, the

extraembryonic cavity surrounds the yolk sac and amniotic cavity except where the amnion is connected to the to the cytotrophoblast (*the connecting stalk*).

During implantation, the endometrium undergoes a *decidual reaction*. In this reaction, the endometrial tissues swells as a result of the accumulation of glycogen and lipids in the cytoplasm of the endometrium; this provides nutrients and an immunologically privileged site for the developing embryo.

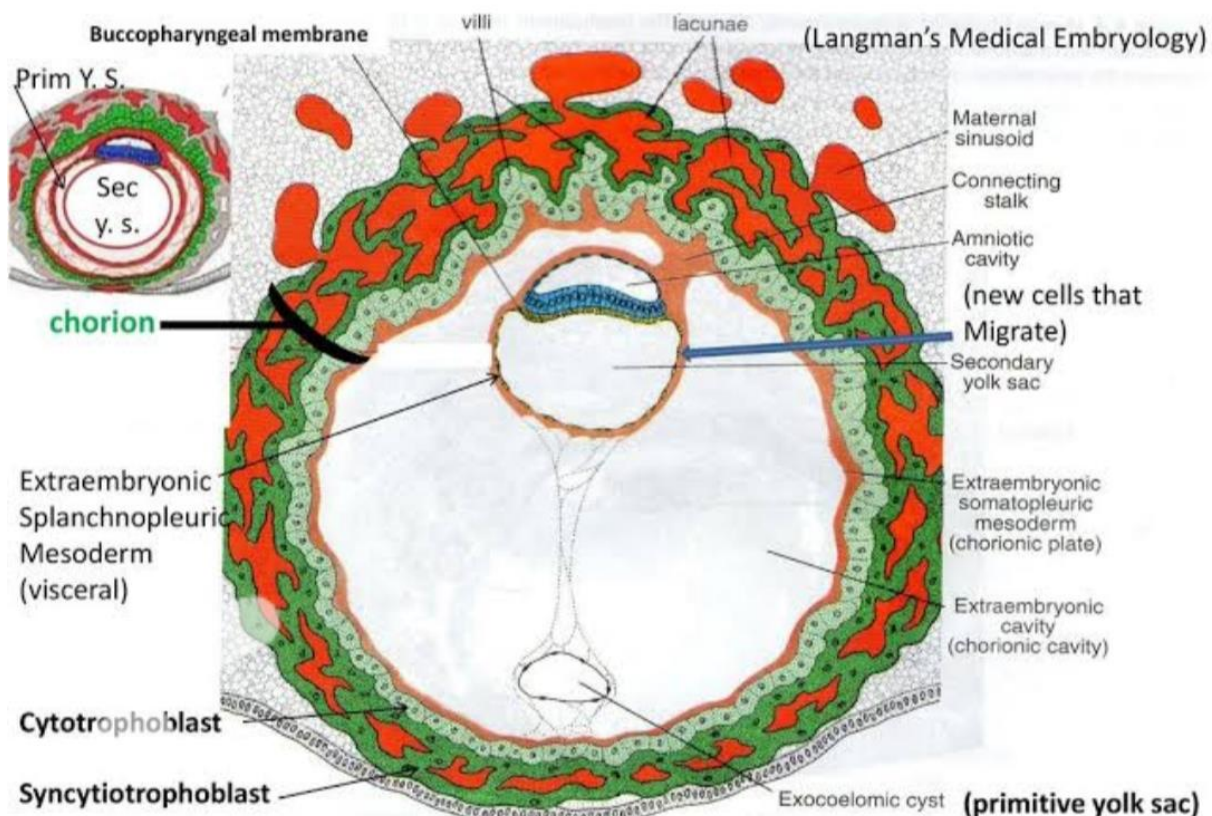


❖ Day 13

The blastocyst is fully embedded in the endometrium, the penetrative defect has been fully covered by the epithelium. The cells of the cytotrophoblast proliferate and

migrate into the syncytiotrophoblast, forming cellular columns covered with syncytium. These columnar cells with the syncytial covering form the *primary villi*. The hypoblast secretes a new layer of cells which migrate along the inside of the primary yolk sac, displacing it to form a *secondary yolk sac* or *definite umbilical vesicle*. During its formation, a large portion of the exocoelomic cavity is pinched off to form the *exocoelomic cyst* which is located within the chorionic cavity. The extraembryonic somatic mesoderm becomes the *chorionic plate* and the extraembryonic cavity grows larger to form the *chorionic cavity*.

With the formation of blood vessels, the connecting stalk becomes the umbilical cord.



13-day human blastocyst. Trophoblastic lacunae are present at the embryonic as well as the abembryonic pole, and the uteroplacental circulation has begun. Note the primary villi and the extraembryonic coelom or **chorionic cavity**. The secondary yolk sac is entirely lined with endoderm.