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**Dept: Medicine and surgery**

**Level: 200lv**

**Anatomy assignment**

## **2nd week of development**

During the 2nd week of development three events takes place:

- Completion of implantation of the blastocyst
- Formation of bilaminar embryonic disc(epiblast and hypoblast)
- Formation of extraembryonic structures e.g. amniotic cavity, amnion, umbilical vesicle (yolk sac), chorionic sac, and connecting stalk

At the eighth day of development, the blastocyst is partially embedded in the endometrium and the syncytiotrophoblast continues its invasion of the endometrium, thereby eroding endometrial blood vessels and endometrial glands

More cells in the cytotrophoblast divide and move into the syncytiotrophoblast, where they fuse and lose their individual cell membranes

Cells of the embryoblast differentiate into 2 layers:

the hypoblast layer, which is made up of small cuboidal cells, and are adjacent to the blastocyst cavity

the epiblast layer which is made up of high columnar cells, and it adjacent to the amniotic cavity

The hypoblast and epiblast layers together gives rise to the bilaminar germ disc, a small cavity also appears within the epiblast at the same time which enlarges to form the amniotic cavity

Epiblast cells which are adjacent to the cytotrophoblast are called Amnioblasts, and amnioblasts together with the rest of the epiblast, line the amniotic cavity

The endometrium adjacent to the implantation site is edematous and highly vascular

At day 9

The blastocyte is deeply (not fully) embedded into the endometrium and the surface epithelium is closed by a coagulum called fibrin coagulum

Vacuoles develop at the region of the trophoblast and they fuse to form larger lacunae, this phase of trophoblast development is known as the lacunar stage

the cells of the hypoblast adjacent to the cytotrophoblast develop a thin membrane called the exocoelomic (Heuser's) membrane, this membrane lines the inner surface of the cytotrophoblast

the exocoelomic (Heuser's) membrane together with the hypoblast surrounds a cavity called exocoelomic cavity, or primitive yolk sac or primary umbilical vesicle

Day 11-12

blastocyte is completely embedded in the endometrium and there is presence of ruptured capillaries (sinusoids) which communicate with lacunae to transport blood, oxygen and nutrient to the developing embryo and at this stage a primordial uteroplacental circulation is established

A space of mesoderm develops between the region of the cytotrophoblast and the outer surface of the exocoelomic cavity and between amnioblast and cytotrophoblast (except at the point where we have the connective stalk). The space is called extraembryonic mesoderm.

Inside the extraembryonic mesoderm are cavities which develop to form a new space called extraembryonic cavity or extraembryonic coelom

The part of the mesoderm that lies closer to the region of the cytotrophoblast is called extraembryonic somatic mesoderm

The part of the mesoderm that lies closer to the exocoelomic membrane and amnioblast is called extraembryonic splanchnic mesoderm

As the conceptus implants, the endometrial connective tissue cells undergo a transformation, called decidual reaction. During this transformation, the cells of the endometrium swell because of the accumulation of glycogen and lipid in their cytoplasm, and they are called as decidual cells and primary function of the decidual reaction is to provide nutrition for the early embryo and an immunologically privileged site for the conceptus

Day 13

The surface defect in the endometrium has been completely covered by the surface epithelium and cells of the cytotrophoblast proliferate locally and penetrate into the syncytiotrophoblast, forming cellular columns surrounded by syncytium which looks like a villi and are called primary villi

Connective stalk forms the future umbilical cord

The primary yolk sac becomes reduced in size and is known as the secondary yolk sac or definitive yolk sac or the secondary umbilical vesicle

In humans the yolk sac contains no yolk but is important for the transfer of nutrients between the fetus and mother, this yolk sac is much smaller than the original exocoelomic cavity or primitive yolk sac

During its formation, large portions of the exocoelomic cavity are pinched off to form exocoelomic cysts which are often found in the extraembryonic cavity or chorionic cavity or extraembryonic coelom

The extraembryonic cavity enlarges and gives rise to a larger cavity called chorionic cavity and the extraembryonic mesoderm lining the inside of the cytotrophoblast is then known as the chorionic plate

The only place where extraembryonic mesoderm traverses the chorionic cavity is in the connecting stalk and with development of blood vessels, the connecting stalk becomes the umbilical cord