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DEPARTMENT:MBBS

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Question

Discuss the second week of development?

The following events take place during the second week of development:

- i. Completion of implantation of the blastocyst.**
- ii. Formation of bilaminar embryonic disc (epiblast and hypoblast)**
- iii. Formation of extra embryonic structures such as (amniotic cavity, amnion, umbilical vesicle (yolk sac), connecting stalk and chorionic sac)**

Completion of implantation of the blastocyst.

At the eighth day of the development, the blastocyst is partially i.e. slowly embedded in the endometrium. The blastocyst is more deeply embedded in the endometrium at the ninth day. And the penetration defect in the surface epithelium is closed by a coagulum called fibrin.

The blastocyst continues gradually and it is completely embedded in the endometrium amount the 11th to 12th day. The surface epithelium almost entirely covers the original defect in the uterine wall. The surface defect in the endometrium has been completely covered by the surface epithelium at the thirteenth day and occasionally bleeding occurs at the implantation site as a result of increased blood flow into the lacunar spaces.

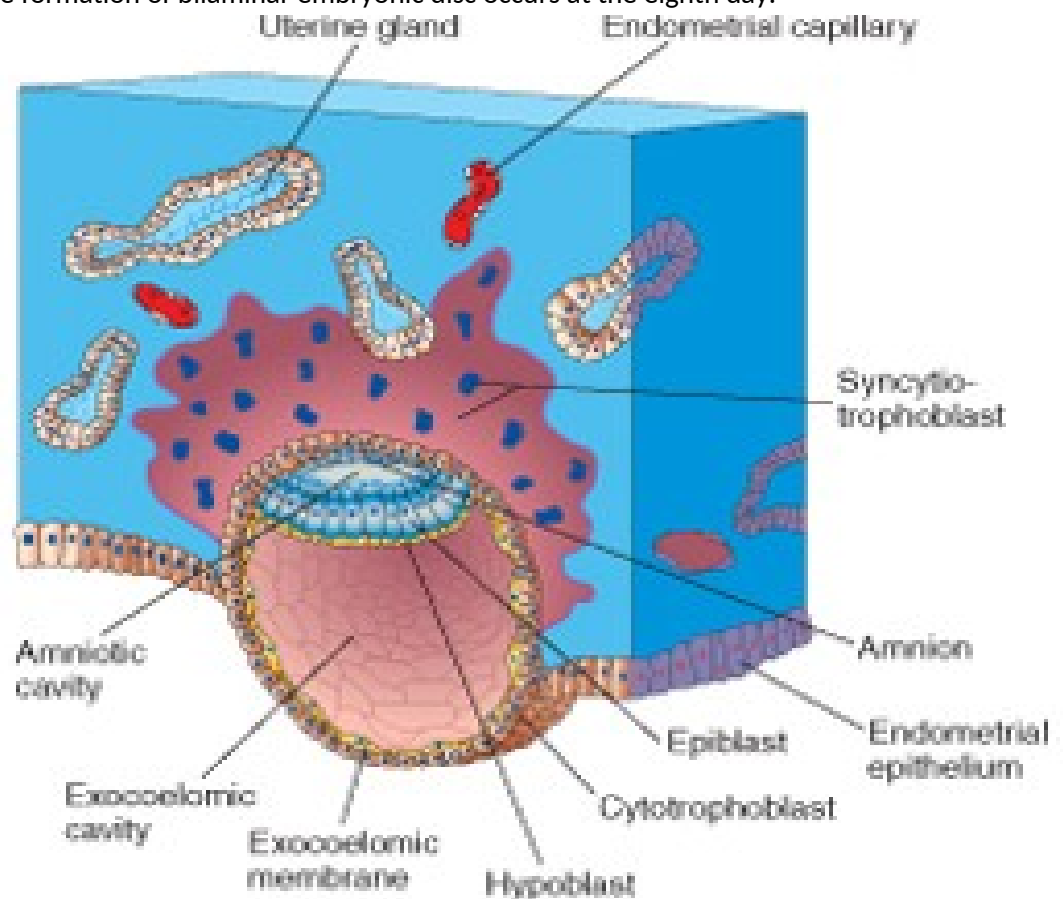
Formation of bilaminar embryonic disc (epiblast and hypoblast)

The cells of inner cell mass or embryoblast also differentiate into 2 layers. i.e. the hypoblast and the epiblast layer. The hypoblast is made up of small cuboidal cells, and it is adjacent (nearer) to the blastocyst cavity.

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

The hypoblast and epiblast layers together form a flat ovoid shaped disc called the bilaminar embryonic disc.

N/B The formation of bilaminar embryonic disc occurs at the eighth day.



Formation of extra embryonic such as (amniotic cavity, amnion, umbilical vesicle (yollic sac) connecting stalk and chorionic sac)

A small cavity appears within the epiblast which enlarges to form the amniotic cavity.

Epiblast cells adjacent to the cytotrophoblast are called aminoblast.

Aminoblast together with the rest of epiblast, lines the amniotic cavity. These occur at eighth day.

The cells of the hypoblast adjacent to the cytotrophoblast form a thin membrane called exocoelomic (Heuser's) membrane.

This membrane lines the inner surface of the cytotrophoblast. The exocoelomic (Heuser's) membrane together with the hypoblast forms the lining of the exocoelomic cavity or primitive yolk sac or primary umbilical vesicle. The formation of the primitive yolk sac occurs at ninth day.

On the 11th-12th, a new population of cells appears between the inner surface of the cytotrophoblast and the outer surface of the exocoelomic cavity. These cells which are derived from the yolk sac cells form a fine, loose connective tissue called the extra embryonic mesoderm. Large cavities develop in the extra embryonic mesoderm and when these become confluent, they form a new space called extra embryonic cavity, or chorionic cavity or extra embryonic coelom.

This space surrounds the primitive yolk sac and amniotic cavity, except where the germ disc. The connecting stalk later develops into the umbilical cord.

The extra embryonic mesoderm lining the cytotrophoblast and amniotic is called the extra embryonic somatic mesoderm.

The extra embryonic somatic mesoderm also forms the connecting stalk.

The lining covering the yolk sac is known as the extra embryonic splanchnic mesoderm. As the conceptus implants, the endometrial connective tissue undergoes a transformation called decidual reaction.

The primitive function of decidual reaction is to provide nutrition for early embryo and an immunologically privileged site for the conceptus.

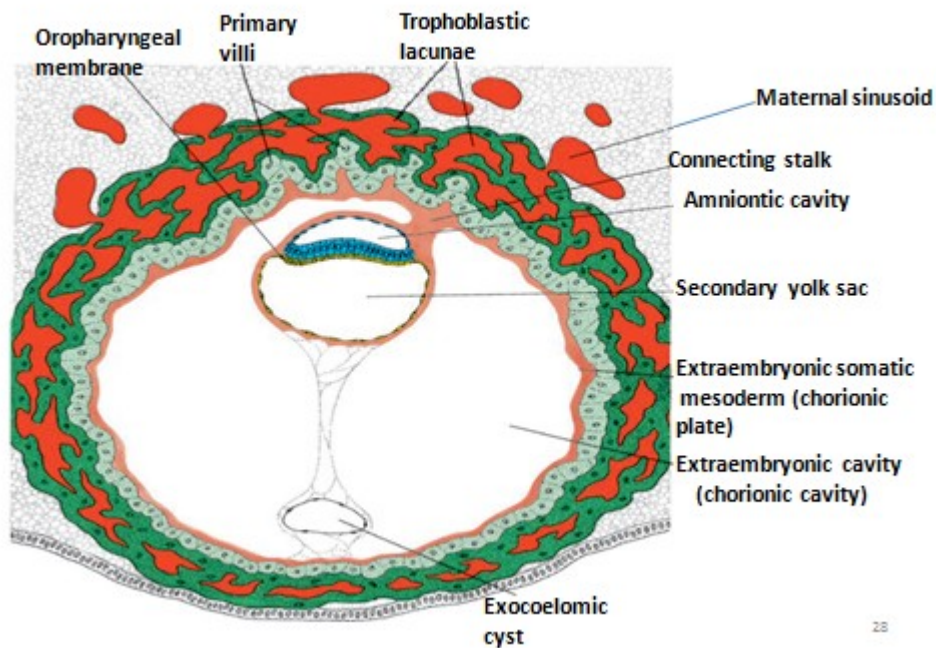
On the 13th day, the cells of cytotrophoblast proliferate locally and penetrate into the syncytiotrophoblast forming cellular columns surrounded by syncytium.

Cellular columns with the syncytial covering are known as primary villi. The primary yolk sac becomes reduced in size and is known as secondary yolk sac or definitive yolk sac or the secondary umbilical vesicle.

In humans the yolk sac contains no yolk, it is important for the transfer of nutrients between the fetus and mother.

Meanwhile, the extra embryonic coelom expands and forms a large cavity called the chorionic cavity.

The only place where extra embryonic mesoderm transfers the chorionic cavity is in the connecting stalk.



Clinical correlates:

- The syncytiotrophoblast produces a hormone called the **human chorionic gonadotrophin (hCG)**, which enters the maternal blood via lacunae keeps the corpus luteum secreting estrogens and progesterone
- hCG maintains the hormonal activity of the corpus luteum in the ovary during pregnancy.
- as **day 10** of pregnancy and is the basis for pregnancy tests
- Enough hCG is produced by the syncytiotrophoblast at the end of the second week to give a positive pregnancy test, even though the woman is probably unaware that she is pregnant

Extrauterine Implantation

- Blastocysts may implant outside the uterus
- These implantations result in **ectopic pregnancies**
- 95% to 98% of ectopic implantations occur in the uterine tubes, most often in the **ampulla** and **isthmus**

