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18/MHS01/098

MEDICINE AND HEALTH SCIENCES

MEDICINE AND SURGERY

EMBRYOLOGY.

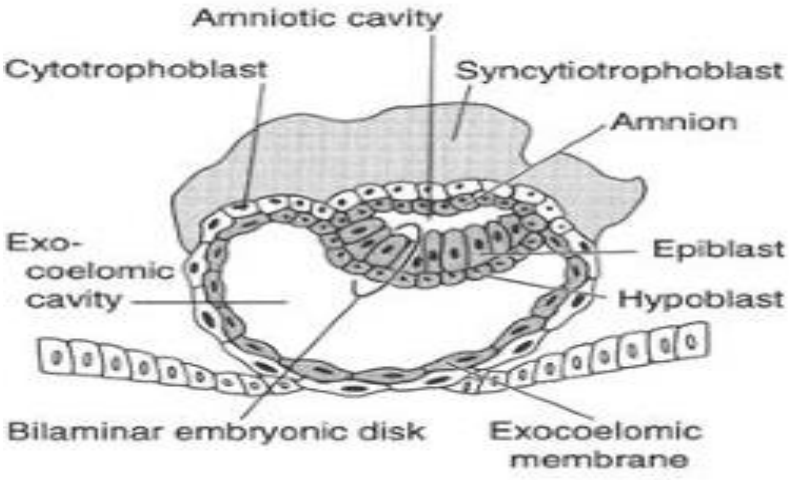
2ND WEEK OF EMBRYONIC DEVELOPMENT.

Three events take place in the second week and they include:

I. Completion of implantation.
II. Formation of bilaminar germ discs.
III. Development of extra embryonic structures.

Day 8

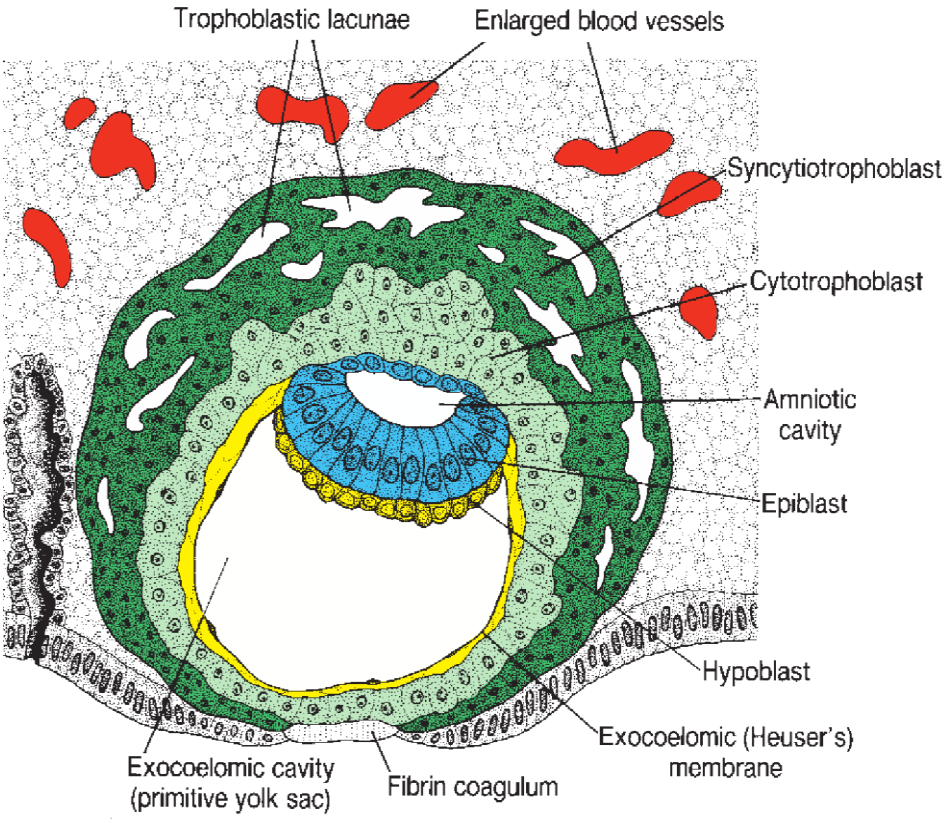
- Blastocyst is partially embedded in the endometrium.
- The syncytiotrophoblast continues to erode and invade into the endometrium, eroding endometrial blood vessels and glands.
- Cells of the cytotrophoblast continues to divide and migrate deeper into the region of the syncytiotrophoblast.
- The embryoblast differentiates into two cell types:
    - Hypoblast (cuboidal cells).
    - Epiblast (a layer of columnar cells).
- The cells of the epiblast adjacent to the cytotrophoblast are called Amnioblast.
- The epiblasts surround a cavity called Amniotic cavity.
- Epiblast and hypoblast together form the Bilaminar germ disc.



Day 9

- Blastocyst is more deeply embedded in the endometrium.
- Syncytiotrophoblast continues to erode and invade the endometrium.
- Cells of the cytotrophoblast continues to divide and migrate towards the region of the syncytiotrophoblast.
- The surface epithelium is covered by a coagulum called Fibrin coagulum.

- Cells off the hypoblast adjacent to the cytotrophoblast forms a thin layer called Exocoelomic membrane or Heuser's membrane.
- The hypoblast, together with the Exocoelomic membrane forms the lining of a cavity called Exocoelomic cavity/primary umbilical cord/primirive yolk sac.
- In the region of syncytiotrophoblast, vacuoles appear and enlarges to form trophoblastic lacunae.

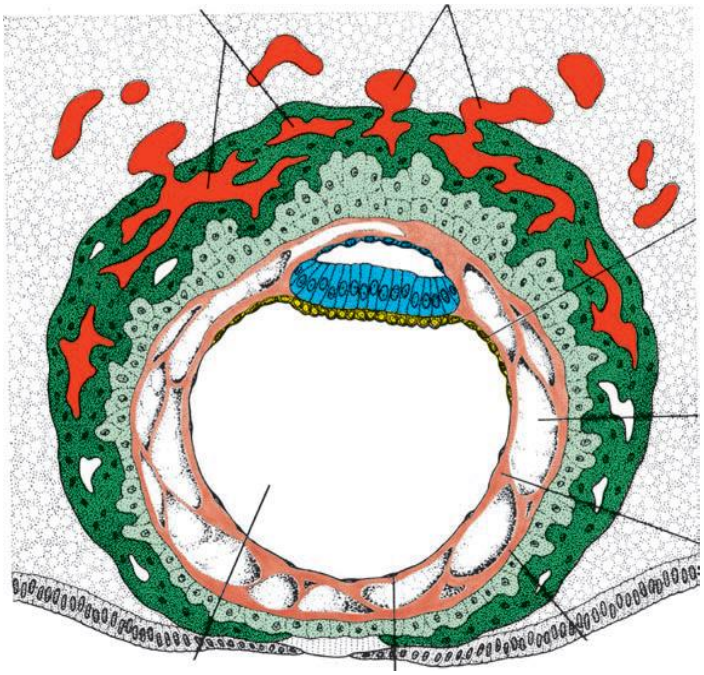


Day 11-12

- The blastocyst is completely embedded in the endometrium.
- Syncytiotrophoblast continues to erode into the endometrium.
- Cells of the cytotrophoblast continues to divide and migrate into the region of syncytiotrophoblast.
- Capillaries get ruptured forming a spillage of blood as the blastocyst continues to embed in the endometrium. Ruptured capillaries is called sinusoid.
- The lacunae of the embryo communicates with the sinusoid of mother and maternal blood flows into the lacunar system, helping to transport nutrient and oxygen to the embryo.
- At this stage, primordial uteroplacental circulation is established.
- A space of mesoderm develops between the Exocoelomic membrane and cytotrophoblast and between the Amnioblast and cytotrophoblast except at the connecting stalk. This mesoderm is called extraembryonic mesoderm (a loose connective tissue formed from cells of yolk sac).

- Cavities also develop within the mesoderm and it is called extraembryonic cavity/coelom.
- These cavities divide the blastocyst into two:
    - The part of mesoderm that lines the cytotrophoblast: **extraembryonic somatic mesoderm.**
    - The part of mesoderm that lines the Amnioblast and Exocoelomic membrane: **extraembryonic splanchnic mesoderm.**
- As conceptus implants, cells of endometrial connective tissue undergo transformation called Decidual reactions.
- There is accumulation of glycogen and lipid (decidual cells) at the region of cells of endometrium which results in swelling of the cells of endometrium.
- The function is to establish or provide nourishment for the embryo and establish immunologically privileged site for the conceptus.

Trophoblastic lacunae **Maternal sinusoids**

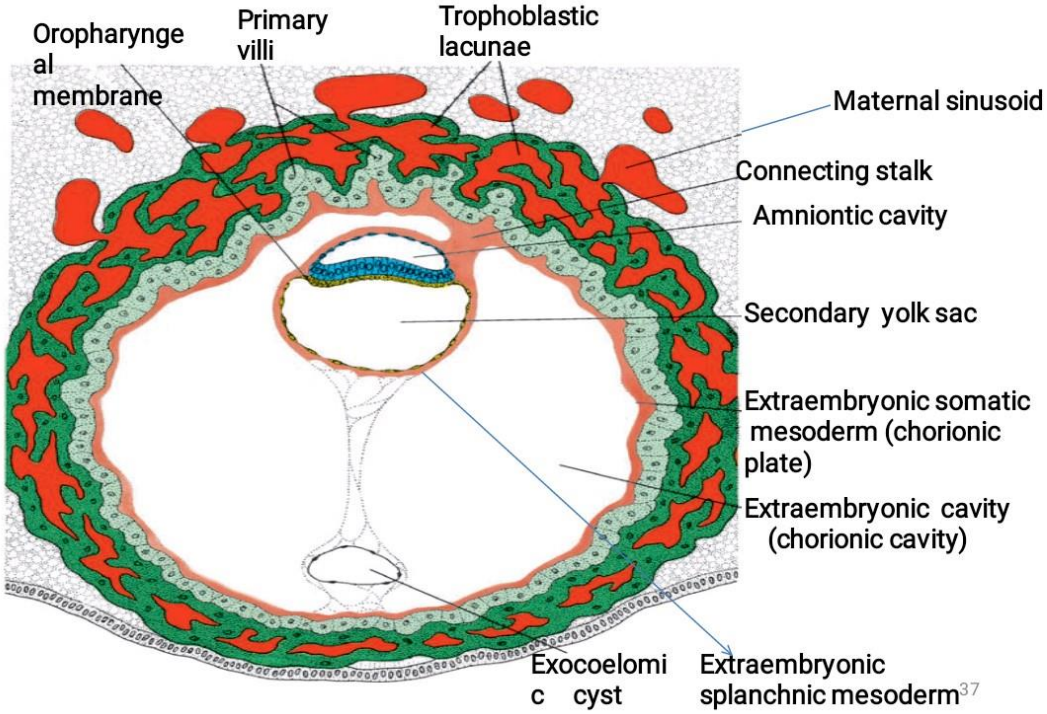


Exocoelomic cavity (primitive yolk sac) **Exocoelomic somatic mesoderm** **Extraembryonic somatic mesoderm**

<u>Day 13</u>

- Cells of the cytotrophoblast acquires a syncytium. When it acquires this syncytium, it is called primary villi.
- The connecting stalk gives rise to primordium/future umbilical cord when blood vessels develop in it.

- The extraembryonic cavity becomes enlarged and it gives rise to larger cavity called chorionic cavity.
- The Exocoelomic cavity becomes smaller and is called secondary yolk sac (for transfer of nutrient between mother and fetus).
- A portion of the extraembryonic cavity is pinched off to form secondary yolk sac. This portion forms a cyst called Exocoelomic cyst.



CLINICAL CORRELATES.

1. The syncytiotrophoblast produces human chorionic gonadotropin (hCG) and it enters the maternal blood through the lacunae, keeping the corpus luteum secreting estrogen and progesterone.
   The human chorionic gonadotropin is detected in the mother's blood or urine as early as day 10 of pregnancy and it is the basis of pregnancy test.
   Enough human chorionic gonadotropin is produced by the syncytiotrophoblast after the second week of pregnancy to give positive result of pregnancy test.
   It maintains the hormonal activity of corpus luteum in the ovary during pregnancy.

2. Extra-uterine Implantation.
   This is when the blastocyst implants outside the uterus. Majority happens in the ampulla of uterine tube.