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COLLEGE: MEDICINE AND HEALTH SCIENCES

COURSE: ANA 205

COURSE TITLE: EMBRYOLOGY

QUESTION: Discuss the second week of embryonic development.

Three major events occur at the second week of human development (DAY 8- 14):

- i. Completion of implantation
- ii. Formation of bilaminar germ disc
- iii. Development of extra embryonic structures.

Day 8

- The blastocyst is partially embedded in the endometrium.
- Syncytiotrophoblast continues to erode the endometrium.
- The cells of the cytotrophoblast continue to divide and migrate to the region of syncytiotrophoblast.

The inner cell mass forms into a two-layered disc of embryonic cells, and a space- the amniotic cavity- opens up between it and the trophoblast. Columnar cells from the upper layer of the disc (**the epiblast**) extend around the amniotic cavity. The cells of the epiblast adjacent to the cytotrophoblast are called amnion. The amnion fills with amniotic fluid and eventually grows to surround the embryo. Cuboidal cells on the ventral of the embryonic disc, lower layer of the embryonic disc (**the hypoblast**) extend into the blastocyst cavity. The epiblast (apart from amnion) and the hypoblast give rise to **bilaminar germ disc**.

Day 9

- The blastocyst is deeply embedded in the endometrium.
- The surface epithelium is closed by **fibrin coagulum**.
- Vacuoles develop in the region of the syncytiotrophoblast and with time they become larger to form **trophoblastic Lacunae**.

The cells of the hypoblast adjacent to the cytotrophoblast form 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 forms the lining of the **exocoelomic cavity**, or **primitive yolk sac** or **primary umbilical vesicle**.

Day 11-12

- The blastocyst is completely embedded in the endometrium.
- Syncytiotrophoblast continues to erode the endometrium leading to ruptured blood capillaries called **Sinusoids**.

Sinusoids from the mother communicate with the trophoblastic lacunae of the embryo thus causing blood to spill from the mother to the embryo and **Primordial Uteroplacental Circulation** is established. Nutrients and oxygen are transferred from maternal blood surrounding the villi through the capillaries and into the fetal bloodstream. A space of mesoderm occupies the region between the inner surface of the cytotrophoblast and the outer surface of the exocoelomic cavity. Large cavities develop in the **extraembryonic mesoderm**, and when these become

confluent, they form a new space known as the **extraembryonic cavity**, or **chorionic cavity** or **extraembryonic coelom**. The extraembryonic mesoderm lining the cytotrophoblast and amnion is called the **extraembryonic somatic mesoderm**, the lining covering the yolk sac is known as the **extraembryonic splanchnic mesoderm**.

- As the conceptus implants, the endometrial connective tissue cells undergo a transformation, called **decidual reaction**. Accumulation of glycogen and lipid in their cytoplasm happens when endometrium swells, and they are known as **decidual cells**. The purpose of this 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. Occasionally bleeding occurs at the implantation site as a result of increased blood flow into the lacunar spaces. Cellular columns with the syncytial covering are known as **primary villi**. Primary yolk sac becomes smaller to form **secondary yolk sac**. During its formation, large portions of the exocoelomic cavity are pinched off to form **exocoelomic cysts**. Meanwhile, the extraembryonic coelom expands and forms a large cavity, the **chorionic cavity**. As development continues the **connecting stalk** give rise to the **umbilical cord**.