NAME: NASA-OKOLIE KENECHUKWU Z

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COURSE: INTEGRATED CORE BASIC SCIENCES (EMBRYOLOGY)

COURSE CODE: ICBS

Discuss the second week of development?

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

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

**Day 8**

* At the eighth day of development, the blastocyst is partially embedded in the endometrium.
* The syncytiotrophoblast continues its invasion of the endometrium, thereby eroding endometrial blood vessels and endometrial glands.
* More cells in the cytotrophoblast divide and migrate into the syncytiotrophoblast, where they fuse and lose their individual cell membranes.
* Cells of inner cell mass or embryoblast also differentiate into 2 layers; the **hypoblast** layer, which is made up of small cubiodal cells and it is adjacent to the blastocyst cavity and the **epiblast** layer which ismade up of high columnar cells and it adjacent to the amniotic cavity.
* The hypoblast and epiblast layers together form a flat ovoid shaped disc called the **bilaminar embryonic disc.**
* At the same time, a small cavity appears within the epiblast which enlarges to form the amniotic cavity.
* Epiblast cells adjacent to the cytotrophoblast are called **amnioblast.**
* Amnioblast together with the rest of the epiblast line the amniotic cavity.
* The endometrium adjacent to the implantation site is edematous and highly vascular.

**Day 9**

* The blastocyst is more deeply embedded in the endometrium, and the penetration defect in the surface epithelium is closed by a coagulum called fibrin.
* Vacuoles appear 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 form a thin membrane called the **exocoelomic membrane**.
* The exocoelomic membrane together with the hypoblast forms the lining of the exocoelomic cavity or primitive yolk sac.

**Day 11th-12th**

* and the surface epithelium almost entirely covers the original defect in the uterine wall.
* The blastocyst now produces a slight protrusion into the lumen of the uterus.
* Cells of the syncytiotrophoblast penetrate deeper into the stroma and erode the endothelial lining of the endometrial capillaries.
* These ruptured endometrial capillaries called sinusoids.
* the lacunae then begins to communicate with the sinusoid and maternal blood enters the lacunar system.
* The communication of the eroded endometrial capillaries with the lacunae establishes the primordial uteroplacental circulation.
* When maternal blood flows into the lacunae oxygen and nutritive substances are available to the embryo.
* A new population of the cells appear between the inner surface of the cytotrophoblast and the outer surface of the exocoelomic cavity.
* These cells which are derived from the yolk sac from a fine loose connective tissue called **extraembryonic mesoderm.**
* Soon large cavities develop in the extraembryonic mesoderm and when these become confluent they form a space known as the **chorionic cavity.**
* The space surrounds the primitive yolk sac and amniotic cavity except where the germ disc is connected to the trophoblast by the connective stalk.
* The extraembryonic mesoderm lining the cyotrophoblast and amnion is called the **extraembryonic somatic mesoderm.**
* **Extraembryonic somatic mesoderm also forms the connecting stalk.** The lining covering the yolk sac is known as the **extraembryonic splanchic mesoderm.**
* As the concepts implants the endometrial connective tissue cells undergo a transformation called the **decidual reaction.**
* During this transformation the cells of the endometrium swells because of the accumulation of glycogen and lipid in their cytoplasm and they are known as decidual cells.
* The primary function of the decidual reaction is to provide nutrition for the early embryo and an immunologically privileged site for the conceptus.

**13th Day of Development.**

The surface defect in the endometrium has completely covered the surface epithelium. Occasionally bleeding occurs at the implantation site as a result of increased blood flow into the lacunar spaces. Cells of the 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 the secondary yolk sac. The new cavity is known as the definitive yolk sac. 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 cysts. Exocoelomic cysts are often found in the extraembryonic cavity. Meanwhile, the extraembryonic coelom expands and forms a large cavity called the **chorionic cavity**. 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 the connecting stalk. With development of blood vessels the connecting stalk becomes the umbilical cord.