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**COURSE: BIOCHEMISTRY**

**MATRICULATION NUMBER: 18/MHS01/152**

**DEPARTMENT: MBBS**

**ASSIGNMENT**

Discuss the 2nd week of development.

**2ND WEEK OF HUMAN DEVELOPMENT**

The following events take place during the 2nd week of human development:

1. Completion of implantation of the blastocyst
2. Formation of bilaminar embryonic disc(epiblast and hypoblast)
3. Formation of extraembryonic structures(amniotic cavity, amnion, umbilical vesicle [yolk sac], connecting stalk, and chorionic sac)

At the eighth day of development, the blastocyst is partially (slowly) 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 the inner cell mass or embryoblast also differentiate into 2: the hypoblast and the epiblast layers which 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. The epiblast cells adjacent to the cytotrophoblast are called amnioblasts. Amnioblasts together with the rest of the epiblast, line the amniotic cavity.

On the ninth day, 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 lager 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 (Heuser’s) membrane lining the inner surface of the cytotrophoblast. The membrane together with the hypoblast forms the lining of the exocoelomic cavity or primitive yolk sac.

Between the 11th - 12th days of development, the blastocyst is completely embedded in the endometrium 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. The cells of the syncytiotrophoblast penetrate deeper into the stroma and erode the endothelial lining of the endometrial capillaries (sinusoids).

The lacunae then begin to communicate with the sinusoids, maternal blood enters the lacunar system and establishes the primordial uteroplacental circulation. When maternal blood flows into the lacunae, oxygen and nutritive substances are available to the embryo and 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 yolk sac cells form a fine, loose connective tissue called the extraembryonic mesoderm. Soon, 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. The extraembryonic mesoderm lining the cytotrophoblast and amnion is called the extraembryonic somatic mesoderm which also forms the connecting stalk. 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. During this process, the cells of the endometrium swell because of the accumulation of glycogen and lipid in their cytoplasm, and they are known as decidual cells.

On day 13, the surface defect in the endometrium has been completely covered by the surface epithelium. As a result of increased blood flow into the lacunar spaces occasional bleeding occurs at the implantation site. Cells of the cytotrophoblast proliferate locally and penetrate into the syncytiotrophoblast, forming cellular columns surrounded by syncytium.

**Note:**

* Cellular columns with the syncytial covering are known as primary chorionic villi.
* The primary yolk sac becomes reduced in size and is known as the secondary 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 cavity or primitive yolk sac. During its formation, large portions of the exocoelomic cavity are pinched off to form exocoelomic cysts are often found in the extraembryonic coelom. 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 with development of blood vessels, the stalk becomes the umbilical cord.

The 14-day embryo still has the form of a flat bilaminar embryonic disc, but the hypoblast cells in a localized area are now columnar and form a thickened circular area-the prechordal plate which indicates the future site of the mouth and an important organizer of the head region.