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ASSIGNMENT TITLE: DEVELOPMENT

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QUESTION: DISCUSS THE SECOND WEEK OF DEVELOPMENT

ANSWER:

- **Day 8**

At the eight day of development, the blastocyst is partially embedded in the endometrial stroma. In the area over the embryoblast, the trophoblast has differentiated into two layers; an inner layer of mononucleated cell called the cytotrophoblast and an outer multinucleated zone without distinct cell boundaries called the syncytiotrophoblast. Mitotic figures are found in the cytotrophoblast but not in the syncytiotrophoblast. Thus cells in the cytotrophoblast divide and migrate to the syncytiotrophoblast, where they fuse and lose their individual cell membranes.

Cells of the embryoblast also differentiate into two: a layer of small cuboidal cells adjacent to the blastocystic cavity known as the hypoblast layer and a layer of high columnar cells adjacent to the amniotic cavity, the epiblast layer, together the layers form a flat disk. At the same time a small cavity appears within the epiblast, this cavity enlarges to become the AMNIOTIC CAVITY. Epiblast cells adjacent to the cytotrophoblast are called amnioblasts; together with the rest of the epiblasts they line the amniotic cavity. The endometrial stroma adjacent to the implantation site is edematous and highly vascular. The large tortuous glands secrete abundant glycogen and mucus.

- **Day 9**

The blastocyst is more deeply embedded in the endometrium, and the penetration defect in the surface epithelium is closed by a fibrin coagulum. The trophoblast shows progress in development particularly at the embryonic pole, where vacuoles appear in the syncitium. When these vacuoles fuse, they form a large lacuna, and this phase of trophoblast development is thus known as the LACUNAR STAGE.

At the abembryonic pole, flattened cells probably originating from the hypoblast form a thin membrane. The exocoelomic (heuser's) membrane that lines the surface of the cytotrophoblast. Together with the hypoblast, this membrane forms the lining of the exocoelomic cavity otherwise known as the primitive yolk sac.

- **Day 11 and 12**

By the 11th to 12th day of development, the blastocyst is completely embedded in the endometrial stroma, and the surface epithelium almost entirely cover the original defect in the uterine wall, the blastocyst now produces a slight protrusion into the lumen of the uterus. The trophoblast is characterized by the lacunar spaces in the syncitium that form an intercommunicating network, this network is particularly evident at the embryonic pole, at the abembryonic pole the trophoblast mainly consists of cytotrophoblastic cells.

Concurrently , cells of the syncytiotrophoblast penetrate deeper into the stroma and erode endothelial lining of the maternal capillaries. These capillaries which are congested and dilated are known as sinusoids. The syncytial lacunae become continuous with the sinusoids and maternal blood enters the lacunar system. As the trophoblast continues to erode more and more sinusoids, the maternal blood begins to flow through the trophoblastic system, establishing the UROPLACENTAL CIRCULATION. In the mean time a new population of cells appears between the inner surface of the cytotrophoblast and the outer surface of the exocoelomic cavity. These cells derived from the yolk sac cells, form a fine loose connective tissue, the extraembryonic mesoderm, which eventually fills the space between the trophoblast externally and the amnion and exocoelomic membrane internally. Soon large cavities develop in the extraembryonic mesoderm, when these become confluent; they form a new space known as the extraembryonic coelom or the chorionic cavity. This space surrounds the primitive yolk sac and the amniotic cavity except where the germ disk is connected to the trophoblast by the connecting stalk. The extraembryonic mesoderm lining the cytotrophoblast and amnion is called the extraembryonic somatic mesoderm (also forms the connecting stalk). The lining covering the yolk sac is known as the extraembryonic splanchnic mesoderm.

Growth of the bilaminar disk is relatively slow compared with that of the trophoblast; consequently the disk remains very small. Cells of the endometrium, meanwhile, become polyhedral and loaded with glycogen and lipids; intercellular spaces are filled with extravasate, and the tissue is edematous. These changes known as the DECIDUA REACTION are at first confined to the area immediately surrounding the implantation site but soon occur throughout the endometrium.

- **Day 13**

By the 13th day of development the surface defect in the endometrium has usually healed. Occasionally however, bleeding occurs at the site of implantation as a result of increased blood flow into the lacunar spaces. Because this bleeding occurs near the 28th day of the menstrual cycle, it may be confused with normal menstrual bleeding and therefore cause inaccuracy in the determining the expected delivery date. The trophoblast is characterized by villous structures. 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.

In the meantime, the hypoblast produces additional cells that migrate along the inside of the exocoelomic membrane. These cells proliferate and gradually form a new cavity within the exocoelomic cavity called the secondary yolk sac or definitive yolk sac. This yolk sac is much smaller than the original exocoelomic cavity. During its formation large portions of the exocoelomic cavity are pinched off, these portions are represented by exocoelomic cysts which are often found in the extraembryonic coelom.

Meanwhile, the extraembryonic cavity expands and forms a large cavity, the CHORIONIC CAVITY. The extraembryonic mesoderm lining the inside of the cytotrophoblast is then known as the chorionic plate. The only place where the extraembryonic mesoderm traverses the chorionic cavity is in the connecting stalk. With development of blood vessels the stalk becomes the UMBILICAL CORD.