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**DEPARTMENT: MEDICINE AND SURGERY (MBBS)**

**COLLEGE: MEDICINE AND HEALTH SCIENCES**

**SUBJECT: EMBRYOLOGY**

**ASSIGNMENT: DISCUSS THE SECOND WEEK OF DEVELOPMENT**

### **2<sup>ND</sup> WEEK OF DEVELOPMENT**

The second week of development spans between day 8 and day 14

There are three major events which do take place during this period. They are;

1. Completion of the formation of blastocysts
2. Formation of the bilaminar embryonic discs (epiblast and hypoblast)
3. Formation of extraembryonic structures

First of all, at the eight day of development, the blastocyst is partially embedded in the endometrium. The syncytiotrophoblast continues to erode and invade the endometrium thereby eroding endometrial blood vessels and endometrial glands. Also, the cells of the cytotrophoblast continue to divide and migrate into the region of the syncytiotrophoblast, where they now fuse and lose their individual cell membranes.

Next up the cells of the embryoblast (inner cell mass) differentiate into two layers;

1. The CUBOIDAL hypoblast
2. The COLUMNAR epiblast

The hypoblast layer is made up of tiny cuboidal cells and it is nearer or adjacent to the blastocyst cavity. The epiblast made up of high columnar cells are closer or adjacent to

the cytotrophoblast cells called AMNIOBLAST and they surround a region called the amniotic cavity.

#### THE EPIBLAST AND HYPOBLAST TOGETHER GIVE RISE TO THE BILAMINAR GERM DISC

At day 9, the blastocyst is fully embedded in the endometrium and because it has become fully embedded, the surface epithelium of the endometrium is closed by a coagulum/blockage called FIBRIN. Vacuoles appear at the region of the trophoblast and they fuse to form a layer called LACUNAE. This phase of trophoblast development is called the LACUNAR STAGE.

The cells of the hypoblast adjacent to the cytotrophoblast form a THIN membrane called the EXOCOELOMIC (HEUSERS) membrane. This membrane lines the inner surface of the cytotrophoblast.

The EXOCOELOMIC membrane together with the HYPOBLAST form the lining of the EXOCOELOMIC CAVITY/PRIMITIVE YOLK SAC/PRIMARY UMBILICAL VESICLE.

WITHIN DAY 11-12, the blastocyst is completely embedded in the endometrium, and the surface epithelium almost entirely covers the original defect in the uterine wall. The syncytiotrophoblast continues to erode the endometrium and this causes the capillaries in the endometrium to rupture. These ruptured capillaries are called SINUSOIDS.

The lacuna begins to communicate with the sinusoids and maternal blood enters the lacuna system, establishing the PRIMORDIAL UTEROPLACENTAL CIRCULATION.

A new population of cells appear between the INNER SURFACE OF THE CYTOTROPHOBLAST and the OUTER SURFACE OF THE EXOCOELOMIC CAVITY. These cells form a loose connective tissue called the EXTRAEMBRYONIC MESODERM. Soon, large vacuoles begin to appear in the mesoderm forming the extraembryonic cavity/chorionic cavity/extraembryonic coelom.

The extraembryonic mesoderm lining the cytotrophoblast is called the EXTRAEMBRYONIC SOMATIC. This mesoderm also forms the connecting stalk. The lining covering the yolk sac is known as the EXTRAEMBRYONIC SPHLANCHNIC MESODERM.

A reaction takes place called DECIDUAL REACTION during the transformation of the endometrium. During this transformation, the cells of the endometrium swell because of the accumulation of glycogen and lipid in their cytoplasm and they are now known as DECIDUAL CELLS. The function of the decidual reaction is to provide nutrition for the early embryo and an immunologically privileged site for the conceptus.

By the 13<sup>th</sup> day, the surface of the endometrium has been fully covered by the SURFACE EPITHELIUM. The cells of the cytotrophoblast move more and penetrate into the syncytiotrophoblast, forming cellular columns surrounded by SYNCYTIUM. The 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. This new cavity is known as the SECONDARY YOLK SAC/ DEFINITIVE YOLK SAC/ SECONDARY UMBILICAL VESSEL. During the formation of the yolk sac, large portions of the EXOCOELOMIC CYSTS. These 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 the extraembryonic mesoderm traverses the CHORIONIC CAVITY is in the CONNECTING STALK. With the development of blood vessels, the CONNECTING STALK becomes the UMBILICAL CORD

### Clinical correlates

The syncytiotrophoblast produces a hormone called the HUMAN CHORIONIC GONADOTROPHIN (hCG), which enters the maternal blood via LACUNAE, keeps the CORPUS LUTEUM secreting ESTROGENS AND PROGESTERONES

hCG maintains the hormonal activity of the CORPUS LUTEUM in the ovary during pregnancy

