

NAME: EBIMOGHAN EBIEKIYE BENEDICT

MATRIC NUMBER: 18/MHS01/127

DEPARTMENT: MEDICINE AND SURGERY

COURSE: ICBS EMBRYOLOGY

QUESTION: DISCUSS THE SECOND WEEK OF DEVELOPMENT

Embryonic development or embryogenesis is the process by which embryo forms and develops. The second week of embryonic development falls under the early stages of prenatal development (embryonic period).

In the second week of development, there are 3 important events which occur. They include:

- Completion of implantation
- Formation of bi-lamina germ disc
- Development of extra embryonic structures

On the first day of the second week (DAY8):

The blastocyst becomes partially embedded into the endometrium. The syncytiotrophoblast continues to erode the surface of the endometrium so that the blastocyst can be embedded in it. The cytotrophoblast continues to divide and migrate into the region of the syncytiotrophoblast. The inner mass of cells (Embryoblast) will differentiate into two cell types:

- Cuboidal cells (Hypoblast): cells close to the exocoelomic cavity. It is located beneath the epiblast cells.
- Columnar cells (Epiblast): cells closest to the Cytotrophoblast, they are also called Amnioblast/Amnion. The epiblastic cells surround a cavity referred to as the **Amniotic cavity**

N/B: The epiblast cells together with the hypoblast cells from the **Bi-laminar disc**.

On the second day of the second week (DAY9):

The blastocyst becomes deeply embedded in the endometrium. The surface epithelium of the endometrium is closed by a fibrin coagulant. An **exocoelomic membrane** is formed adjacent and all around the inner surface of the lower cytotrophoblast. The membrane is

also called **Heuser's membrane**. The **exocoelomic cavity** is formed between the exocoelomic membrane and the hypoblast cells. The exocoelomic cavity is also referred to as the **primary yolk sac** or **primary umbilical vesicle**. Vacuoles begin to develop at the region of the syncytiotrophoblast and as they increase in size they are then called **Trophoblastic lacunae**.

On the fourth and fifth day of the second week (DAY11 AND DAY12):

At this time, the blastocyst becomes completely embedded in the endometrium. Due to its constant erosion of the endometrium, ruptured blood vessels (capillaries) are formed which are referred to as **Ruptured sinusoids**. The ruptured sinusoids communicate with the trophoblastic lacunae to facilitate the transfer of nutrient, blood and oxygen to the blastocyst. At this stage, a **Primordial Utero Placenta Circulation** is established between the mother and the developing embryo.

A space of mesoderm called the **Extraembryonic** mesoderm is developed between the upper cytotrophoblast and the Amnioblast and also between the lower cytotrophoblast and the exocoelomic membrane leaving out the **Connecting stalk**. Cavities called **Extraembryonic cavities** or **Extraembryonic coelom** are formed in the extra embryonic mesoderm. The extraembryonic cavities divide the extraembryonic mesoderm into parts:

- (i) **Extraembryonic somatic mesoderm:** The part that lines with the cytotrophoblast
- (ii) **Extraembryonic splanchnic mesoderm:** the part that lines together with the amnioblast and the exocoelomic membrane.

A **Decidual** reaction occurs to provide nutrition for the early embryo. This is done by accumulation of glycogen and lipid in the cytoplasm of the endometrium.

On the sixth day of the second week (DAY13):

At this stage, the cells of the cytotrophoblast grow into a **syncytium** when they penetrate the syncytiotrophoblast forming columns surrounded by syncytium, giving rise to villi. At this point they are referred to as **Primary villi**. The connecting stalk gives rise to the umbilical cord with the development of blood vessels. The extraembryonic somatic mesoderm lining the inside of the cytotrophoblast is then known as the **chorionic plate**. The exocoelomic cavity enlarges and gives rise to the **Chorionic cavity**.

CLINICAL CORRELATES

- Early pregnancy testing: hCG produced by syncytiotrophoblast can be detected in maternal blood or urine as early as day 10 of pregnancy and is the basis of pregnancy test.

- Placenta previa: a situation where the placenta may cover the internal cervical Os. It may lead to preterm labour.