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Discuss the second week of development

The major events that occur during the second week of development include:

1. Completion of implantation of blastocyst
2. Formation of bilaminar germ discs
3. Development of extraembryonic structures

#### Day 8

- On the eight day, the blastocyst is partially embedded in the endometrium
- The syncytiotrophoblast keeps invading the endometrium, also eroding the blood vessels in the endometrium
- The cells of the cytotrophoblast keep dividing and they migrate into the region of the syncytiotrophoblast.
- The embryoblast divides into two: hypoblast (small cuboidal cells nearer to the blastocyst cavity) and epiblast (high columnar cells nearer to the amniotic cavity)
- The hypoblast together with the epiblast form the bilaminar germ disc/ bilaminar embryonic disc
- The cells of the epiblast adjacent to the cytotrophoblast are the amnioblasts/ amnion
- The cells of the epiblast surround a cavity called the amniotic cavity

#### Day 9

- The blastocyst is deeply embedded in the endometrium
- The surface epithelium is closed by fibrin coagulum
- Vacuoles develop in the region of the trophoblast and enlarge to form trophoblastic lacunae
- The cells of the hypoblast adjacent to the cytotrophoblast form a membrane called the exocoelomic membrane, also called the Heuser's membrane
- It has a cavity called the exocoelomic cavity/ primary yolk sac/primary umbilical cord

#### Day 11-12

- The blastocyst is completely embedded in the endometrium
- Cells of the syncytiotrophoblast move deeper into the tissue and erode the endometrial capillaries leading to their rupture and these ruptured endometrial capillaries are called sinusoids

- The sinusoids communicate with the lacunae, helping with the transfer of nutrient and oxygen to the embryo and a primordial uteroplacental circulation is established.
- A space of mesoderm forms between the cytotrophoblast and amnioblast and between the cytotrophoblast and the exocoelomic membrane called the extraembryonic mesoderm
- Cavities called extraembryonic cavity or coelom form in this region
- The extraembryonic mesoderm surrounds the exocoelomic cavity and amniotic cavity except where the germ disc is connected to the trophoblast by the connecting stalk.
- The extraembryonic cavity divides the mesoderm into 2 parts:
  - a. The part adjacent to the region of the cytotrophoblast: the extraembryonic somatic mesoderm
  - b. The part adjacent to the region of the primary yolk sac: the extraembryonic splanchnic mesoderm
- As development continues, a reaction called decidual reaction occurs
- In this reaction, the cells of the endometrium swell due to accumulation of glycogen and lipid in their cytoplasm, therefore becoming decidual cells
- The function of this reaction is to provide nutrient for the early embryo

### Day 13

- The surface defect in the endometrium has been completely covered by the surface epithelium
- The cells of the cytotrophoblast develop syncytium, acquiring the shape of a villi extending into the syncytiotrophoblast to form a primary villi
- The connecting stalk forms the future umbilical cord
- The primary yolk sac reduces to secondary yolk sac or definitive yolk sac or the secondary umbilical vesicle
- Portions of the exocoelomic cavity are hinged off to form exocoelomic cysts
- The extraembryonic coelom expands and forms the chorionic cavity

### Clinical correlates

- The syncytiotrophoblast produces a hormone called the human chorionic gonadotrophin (hCG) which enters the maternal blood through the lacunae and keeps the corpus luteum secreting estrogens and progesterone
- hCG maintains the hormonal activity of the corpus luteum during pregnancy and it determines if a person is pregnant depending on its concentration. Therefore, it is the basis of pregnancy tests
- Blastocysts may sometimes implant outside the uterus resulting in ectopic pregnancies