

# The Second Week of Embryo Development

## Day 8

The **blastocyst** is partially incorporated into the *endometrium* of the uterus (into which it enters due to the proteolytic enzymes of the syncytiotrophoblast cells), and in order to fit in, the blastocyst must partially collapse and change its shape.

- The **trophoblast** differentiates into two layers (in the area around the inner cell mass) - an inner layer = **cytotrophoblast** and an outer multinucleated layer with no visible boundaries between the cells = **syncytiotrophoblast**. The cells of the *cytotrophoblast* divide; mitotic figures are found here. The cells of the *cytotrophoblast* travel to the *syncytiotrophoblast* where they fuse and lose their individual plasma membrane. We do not find mitotic figures in *syncytiotrophoblast* cells.
- The cells of the **embryoblast** (inner cell mass) also differentiate into two layers - a layer of cuboidal cells adjacent to the blastocyte cavity = **hypoblast** and a layer of tall cylindrical cells = **epiblast**.

Together, the hypoblast and epiblast form a flat structure. Inside the epiblast, forms a cavity, which enlarges and becomes the **amniotic cavity**. The cells of the epiblast adjacent to the *cytotrophoblast* are called the **amnioblast**. The amniotic cavity is bounded by the amnioblast together with the epiblast. **Stromal cells** in the endometrium fill with glycogen and lipids, take on a polyhedral shape, and thus transform the endometrium into the decidua (themselves into decidual cells). The decidual cells near the syncytiotrophoblast degenerate and are then engulfed by the embryo (**histiotrophy**).

## Day 9

The blastocyst is deeper in the endometrium. The place where the blastocyst entered the endometrium is closed by a fibrin coagulum = **operculum deciduae**. The *trophoblast* continues to develop mainly at the embryonic pole, where cavities form in the syncytium. Eventually these cavities fuse to form larger lacunae. At the same time, at the **abembryonic pole**, the flat cells form a thin **exocoelom = Heuser's membrane**, which lines the inner surface of the cytotrophoblast. The Heuser membrane together with the hypoblast delimits the **exocoelomic cavity = primitive yolk sac**.

## 11th and 12th day

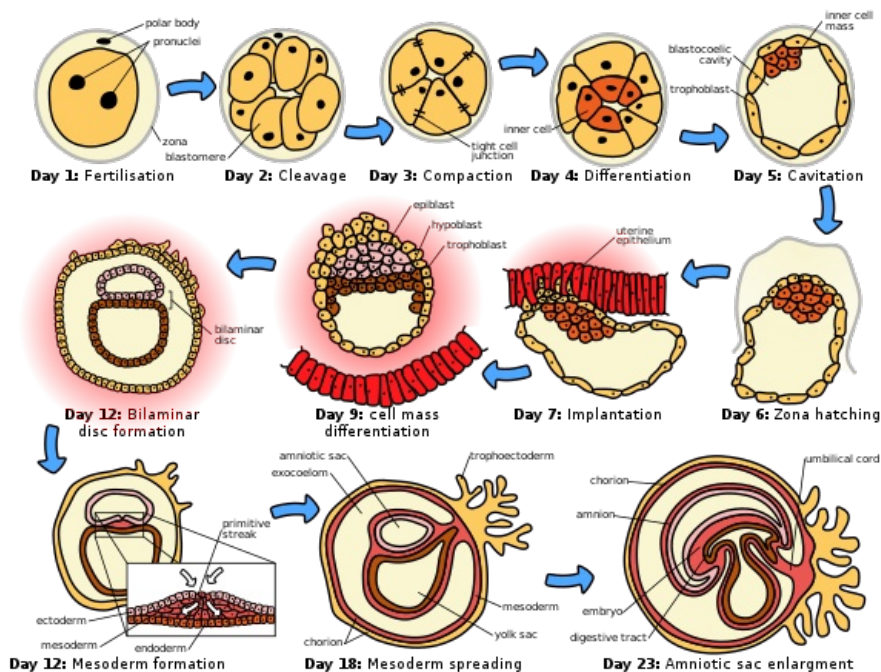
From day 11th or 12th, the blastocyst is completely embedded in the endometrium and the endometrial surface epithelium is completely re-epithelialized at the site of blastocyst entry. The lacunae in the syncytium form an *intercommunicating network*, mainly at the embryonic pole, while at the abembryonic (opposite) pole the *trophoblast* is mainly composed of *cytotrophoblast* cells. **Syncytiotrophoblast** cells penetrate deeper into the endometrium where they disrupt the endothelial layer of blood capillaries (congested and dilated *sinusoids*). Eventually, the sinusoids fuse with the lacunae and maternal blood enters the lacunar system. Maternal blood begins to flow through the trophoblastic system of the lacunes, and *uteroplacental circulation* begins. Meanwhile, a new population of cells derived from the yolk sac cells appears between the inner surface of the *cytotrophoblast* and the outer surface of the exocoelomic cavity. These cells form a fine connective tissue = **extraembryonic mesoderm**. The extraembryonic mesoderm forms large cavities, when these cavities fuse, a cavity is formed = **extraembryonic coelom = chorionic cavity**. The chorionic cavity surrounds the primitive yolk sac and the amniotic cavity, except the place where the **germinal target** is connected to the trophoblast by a **germinal stalk** (*connecting stalk*).

- The extraembryonic mesoderm covering the yolk sac is referred to as extraembryonic splanchnopleuric mesoderm.
- The extraembryonic mesoderm below the *cytotrophoblast* and around the amniotic sac is referred to as the *extraembryonic somatopleuric mesoderm*.

The tertium remains relatively small.

## Day 13

By day 13, the superficial defect in the endometrium is usually healed. Sometimes bleeding occurs at the *implantation* site (increased blood flow in the lacunar spaces). This bleeding can occur around *day 28* of the menstrual cycle and can therefore be mistaken for normal menstrual bleeding. The *trophoblast* has a characteristic *wedge-shaped* structure. The cells of the *cytotrophoblast* proliferate locally and penetrate the *syncytiotrophoblast* to form cell columns surrounded by syncytia = **primary villi**. The *hypoblast* produces additional cells, which migrate along the inner wall of the *Heuser's membrane*. These cells proliferate and eventually form a cavity within the *exocoelomic cavity* of the **secondary yolk sac (definitive yolk sac)**. This is much smaller than the *exocoelomic cavity (primitive yolk sac)*. During the formation of the definitive yolk sac, much of the *exocoelomic cavity* is separated. The separated portion represents the **exocoelomic cyst**, which is often found in the *extraembryonic coelom* (chorionic cavity). While the *extraembryonic coelom* expands to form a large cavity (chorionic cavity), the *extraembryonic mesoderm* lies on the inner side of the *cytotrophoblast* as a **chorionic plate**. The only place where the *extraembryonic mesoderm* crosses the *chorionic cavity* is the **germinal stem**. With the development of blood vessels, the germinal cord becomes the **umbilical cord**<sup>[1]</sup>.



First 3 weeks of embryonic development

## Links

### External sources

- **Picture 1** (<http://anmat.chytrak.cz/emb/kap02.jpg>)

### Related articles

- Prenatal Development: Embryo
- Fetus
- Gametogenesis
- Fertilization
- Types of eggs and their segmentation
- First Week of Embryo Development
- Second Week of Embryo Development
- Third Week of Embryo Development
- Fourth to Eighth Week of Embryo Development

### References

1. MOORE, Keith L – PERSAUD, T. V. N. *Zrození člověka*. 1. edition. ISV, 2002. 564 pp. ISBN 80-85866-94-3.

### Literature

- MOORE, Keith L – PERSAUD, T. V. N. *Zrození člověka*. 1. edition. ISV, 2002. 564 pp. ISBN 80-85866-94-3.