

The first week of embryonic development

Zygote

The fertilized egg turns into a zygote, in which repeated mitotic divisions take place. The zygote first divides into two blastomeres, then into four, etc. This early division of cells takes place in the fallopian tube, where the blastomeres are surrounded by the zona pellucida (it is transparent under the microscope, therefore pellucida)

As soon as the nine-cell stage is reached, the blastomeres adhere to each other and form a compact ball of cells undergoing a process called compaction, which is conditioned by adhesive molecules (E-cadherins – glycoproteins, compaction is initiated in the 16-cell embryo). An embryo consisting of 12-15 blastomeres is referred to as a morula, and it arises about 3 days after fertilization.

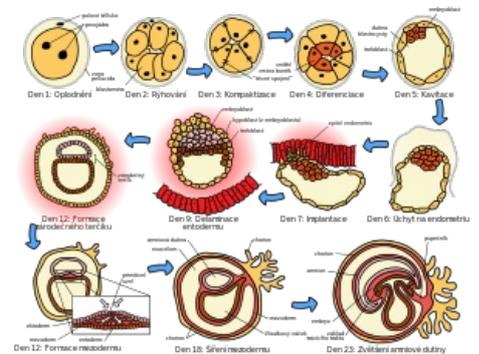
Blastogenesis

Around day 4, the morula enters the uterus and a fluid-filled cavity begins to appear inside of it - the blastocyst cavity. This is because the zona pellucida disappears and fluid enters from the uterine cavity. The cavity enlarges and the blastocyst separates into two parts::

- thin outer layer of cells – **trophoblast** (gives rise to the germinal part of the placenta);
- a group of centrally located blastomeres, the inner cell mass (ICM), that form the **embryoblast**. These cells are **pluripotent** - they can give rise to any cell structure except for the trophoblast (these cells are used precisely as stem cells - embryonic stem cells - ESC).

The blastocyst floats freely in the uterine secretions for two days, and the zona pellucida gradually degrades and disappears, allowing the blastocyst to rapidly increase in volume. Usually, on day 6 after fertilization, the blastocyst attaches to the endometrial epithelium, most often by its fetal pole. The trophoblast begins to proliferate and differentiate into two layers::

- inner layer: consists of individual cells and is referred to as inner layer: consists of individual cells and is referred to as **cytotrophoblast**;
- outer mass: **syncytiotrophoblast** - multinucleated cytoplasmic mass (syncytium), where the boundaries between cells are lost (these cells are polyploid)



Human embryogenesis

On the 7th day, delamination occurs on the surface of the cytotrophoblast (or epiblast) and it develops the hypoblast. The syncytiotrophoblast produces the hormone human chorionic gonadotropin (hCG) - it then enters the lacunae in the vicinity and thus into the maternal blood, where it can be measured as a pregnancy marker. The function of this hormone is to maintain the function of the corpus luteum gravidarum.

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References

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