

# First week of human development

## Zygote

A fertilized egg turns into a zygote, in which repeated mitotic divisions (striating) take place. The zygote first divides into two blastomeres, then into four, etc. Growing takes place in the fallopian tube, the blastomeres are surrounded by the *zona pellucida* (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 cell sphere (so-called compaction, it 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 [ [morula]], is formed about 3 days after fertilization.

## Blastogenesis

Around day 4, the morula enters the womb and a fluid-filled cavity - the blastocyst cavity - begins to appear.

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 embryonic part of the placenta);
- a group of centrally located blastomeres, the inner cell mass (ICM) (*embryoblast*). These cells are **pluripotent** - they can give rise to any cell structure outside 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 the 6th day after fertilization, the blastocyst attaches to the epithelium of the endometrium, most often by its embryonic pole. The trophoblast begins to proliferate and differentiate into two layers:

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

On the 7th day, it is formed by delamination on the surface of the cytotrophoblast (or epiblast) - **hypoblast**. *The syncytiotrophoblast produces hormone human chorionic gonadotropin (hCG) - it then gets into the surrounding lacunae and thus into the maternal blood, where it can be measured (pregnancy marker) , its function is to maintain the function of the corpus luteum gravidarum<sup>[1]</sup>.*

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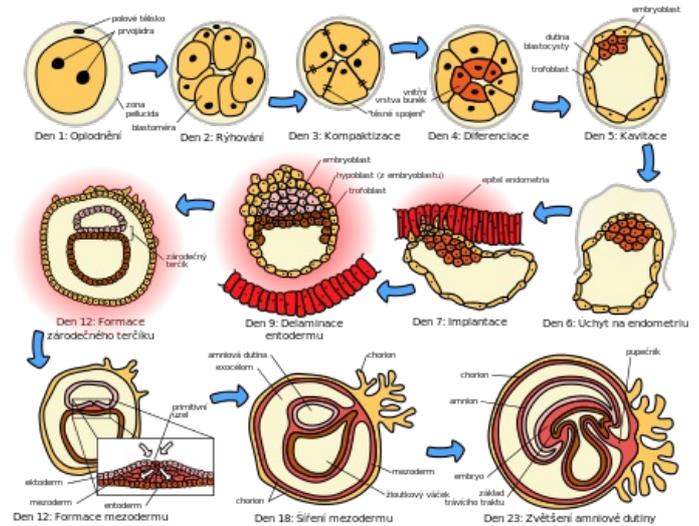
- Prenatal Development: Embryo • Fetus
- Gametogenesis • Fertilization • Types of eggs and their furrowing
- First week of human development • Second week of human development • Third week of embryo development • Fourth to eighth week of embryo development

## References

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

## References

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První 3 týdny vývoje