

# Lecture 2: Embryology

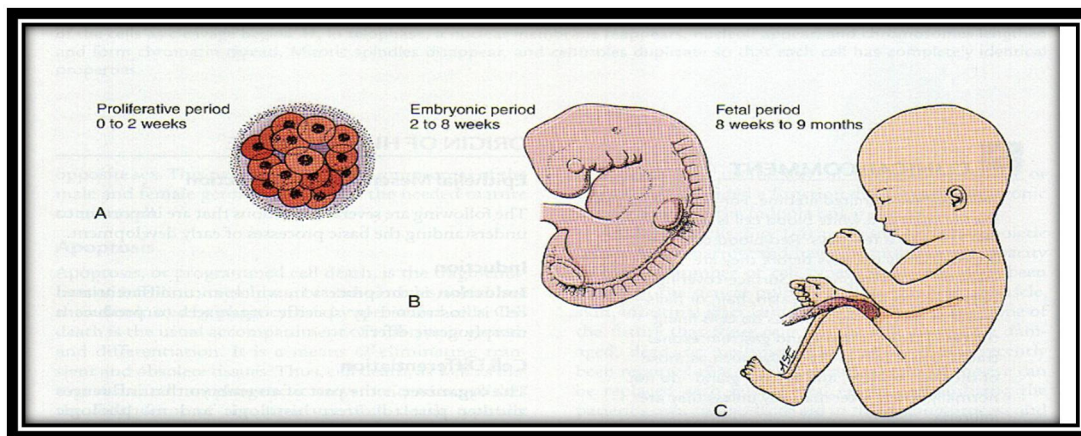
Human embryology as a science deals with embryogenesis, a complicated process by which the zygote (fertilized ovum) during the first eight weeks of development at the beginning of the ninth week the embryo is termed a fetus. Additionally, embryology is the study of congenital disorders that occur before birth. The normal period of gestation (pregnancy) is nine months or 38 weeks. There are two types of development: prenatal and postnatal development.

## Periods of prenatal development:

**1: proliferated period: or germinal** started from the day of fertilization to the end of 2 weeks include fertilization, implantation and formation of embryonic disk.

**2: embryonic period:** start at 3<sup>rd</sup> week, during this period the all tissues develop and organize to form organ systems that completed in the end of eighth week.

**3: fetal period:** this period extend until birth. The tissues that developed during embryonic stage enlarged differentiate and become capable of function.

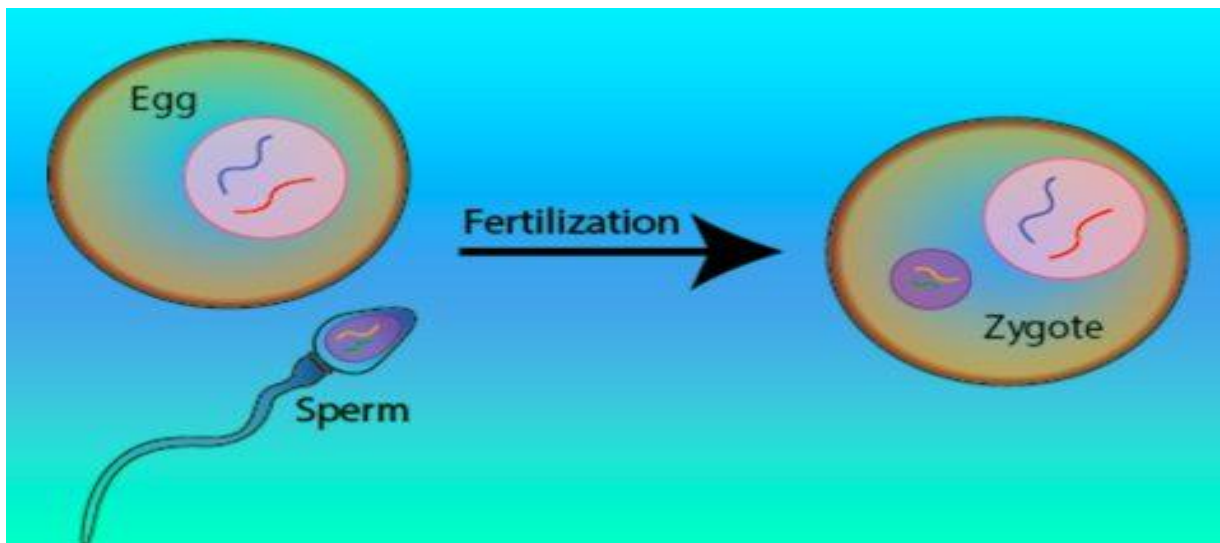


## Proliferated or germinal Periods:

A. **Fertilization** Fertilization is the process by which male and female gametes fuse to produce zygote, occurs in the ampullary region of the uterine tube.

### The main results of fertilization are as follows:

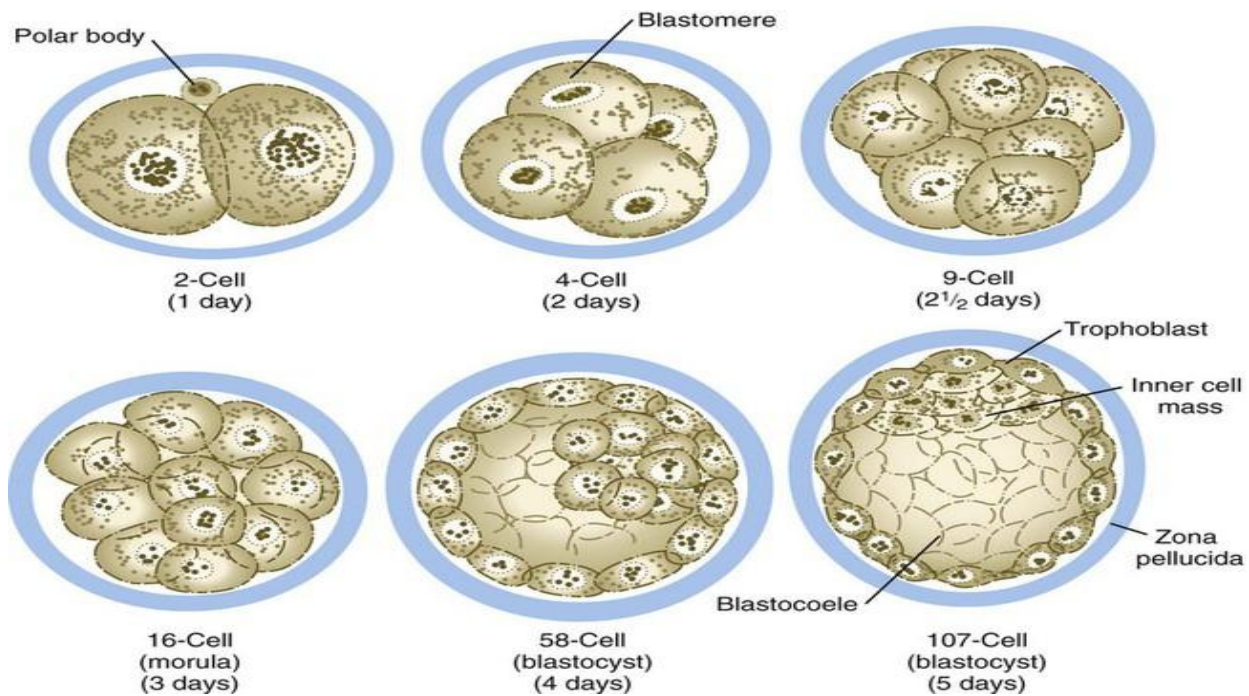
- Restoration of the diploid number of chromosomes, half from the father and half from the mother. Hence, the zygote contains a new combination of chromosomes different from both parents.
- Determination of the sex of the new individual. An X-carrying sperm produces a female (XX) embryo, and a Y-carrying sperm produces a male (XY) embryo.
- Initiation of cleavage.



## B. Cleavage

Once the zygote has reached the two-cell stage, it undergoes a series of mitotic divisions, increasing the numbers of cells. These cells, which become smaller with each cleavage division, are known as blastomeres.

**Morula: (blastomeres)** the continuous division of the zygote until reach 16 cells during 3-4 day now known as morula.

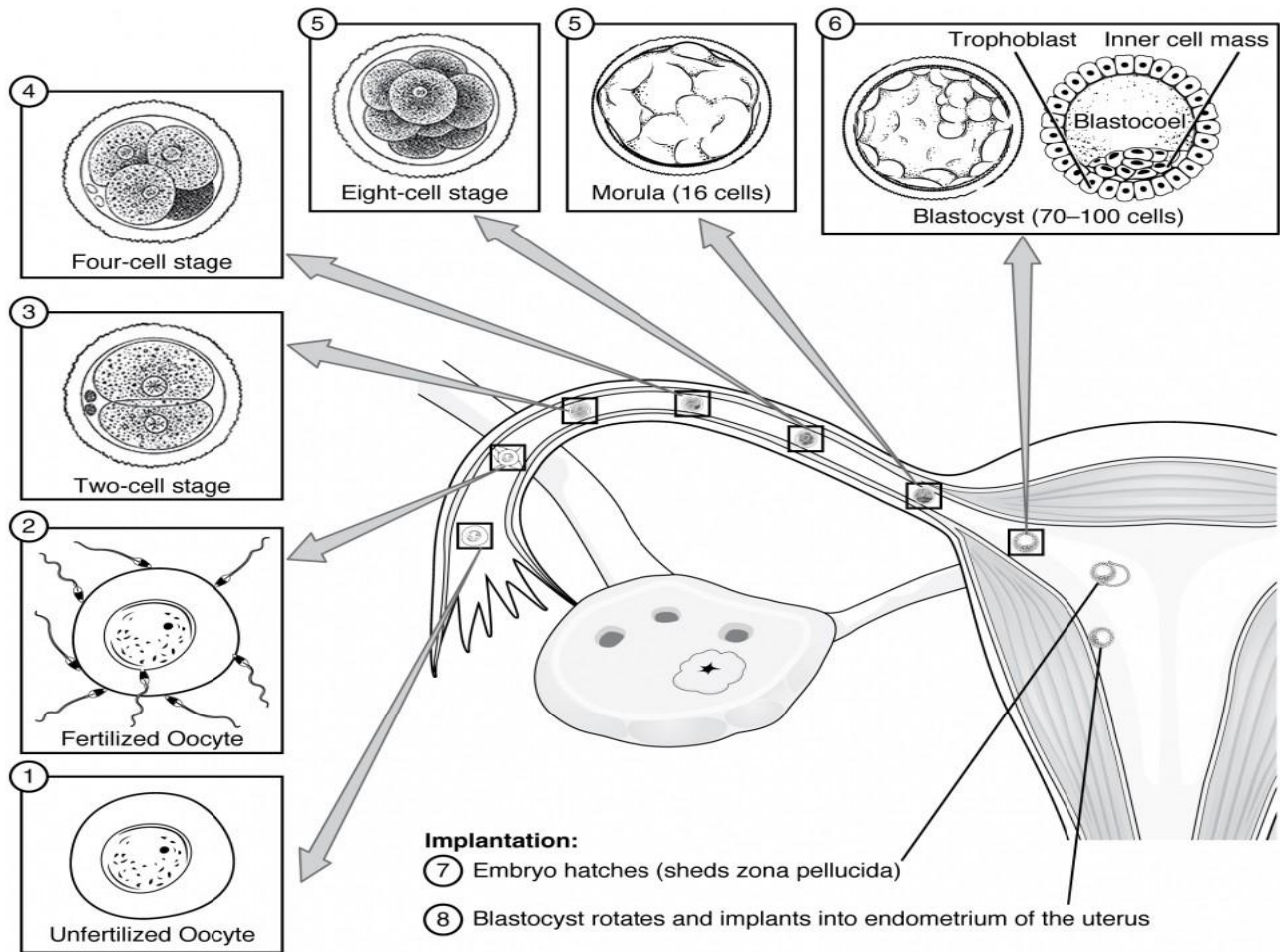


### **Blastulation(Blastocyst formation)**

**Blastocyst:** the continuous growth of morula in 4-5 day formed blastocyst that contain hollow in the center and lateral cell mass and it pass to the uterine to start implantation.

The blastocyst possesses an inner cell mass which forms the embryo. The outer layer of the blastocyst consists of cells collectively called the trophoblast. This layer surrounds the inner cell mass and a fluid-filled cavity known as the blastocoel.

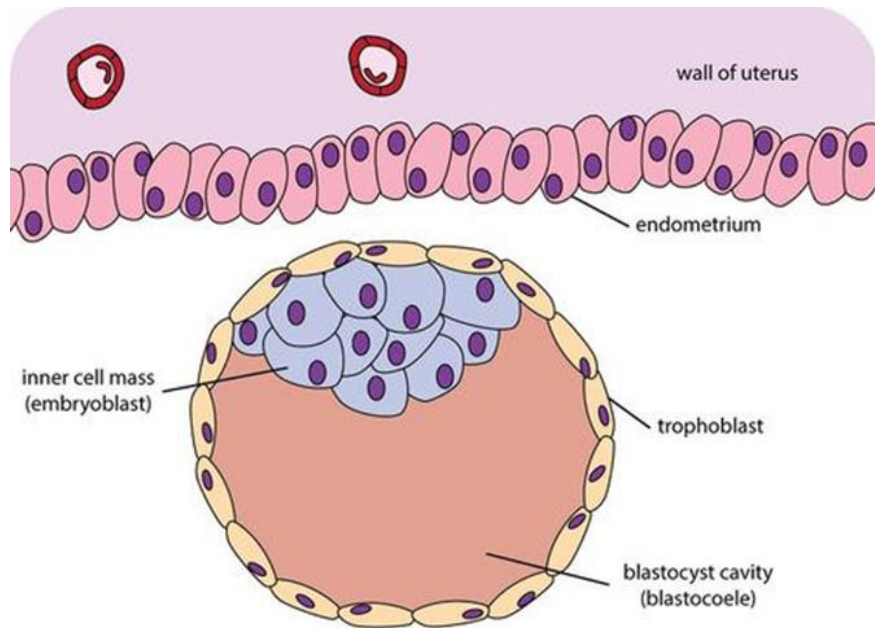
Cells differentiate into an outer layer of cells called the trophoblast and an inner cell mass. The inner mass of cells differentiate to become embryoblasts and polarise at one end.



**Embryonic disk:** two small cavities (sac) develop on either side of the inner cell mass. When these two cavities come in contact, the embryonic disk develops between them that consists of two cell layers that are responsible for the formation of the embryo.

The embryoblast and the trophoblast will turn into two sub-layers. The embryoblast forms the embryonic disc, which is a bilaminar disc of two layers, an upper layer called the epiblast (primitive ectoderm) and a lower layer called the hypoblast (primitive endoderm). The disc is stretched between what will become the amniotic cavity and the yolk sac.





**Amniotic cavity (sac):** small cavity lined by ectodermal cells that form ventral surface of embryonic disk.

**Yolk cavity (sac):** this cavity larger than amniotic sac lined by endodermal layer that form dorsal surface of embryonic disk.

**Implantation:** the blastocyst attach to the dorsal surface of uterus that lined by sticky endometrium membrane. The blastocyst digests this membrane and allows deep implantation to form future placenta. In this stage it known as trophoplaste. The embryonic disk composed of ectodermal and endodermal layers.

