Al-Qadsea University/Biotechnology College-Medical Embryology-second stage- first lab.
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First Lap: Overview and Some scientific terms of Embryology

1. Embryology

Is the branch of biology that studies the development of gametes (sex cells), fertilization, and development of embryos and fetuses. Additionally, embryology is the study of the embryo and its development from a single cell zygote (fertilized ovum) to the establishment of form and shape.

An embryo is a multicellular diploid eukaryote in its earliest stage of development, from the time of fertilization through sexual reproduction until birth (human &animals), hatching (bird), or germination (plant).

2. Embryogenesis

The embryogenesis is the process by which the embryo forms and develops. In mammals, the term refers chiefly to early stages of prenatal development, whereas the terms fetus and fetal development describe later stages.

Embryogenesis starts with the fertilization of the egg cell (ovum) by a sperm cell, (spermatozoon). Once fertilized, the ovum is referred to as a zygote, a single diploid cell.

The zygote undergoes mitotic divisions with no significant growth (a process known as cleavage) and cellular differentiation, leading to development of a multicellular embryo.

3. Fertilization

Fertilization is the fusion of gametes, occurs in the ampulla region of the uterine tube to initiate the development of a new individual organism. In animals, the process involves the fusion of an ovum with a sperm, which first creates a zygote and then leads to the development of an embryo.(figure 1)

Only 1% of the sperms deposited in the vagina enter the cervix, yet movement of sperm from cervix to uterine tube occurs by muscular contractions of uterus and uterine tube & by their own propulsion, and this sperms reach to the uterine tube during 2-7 hrs.

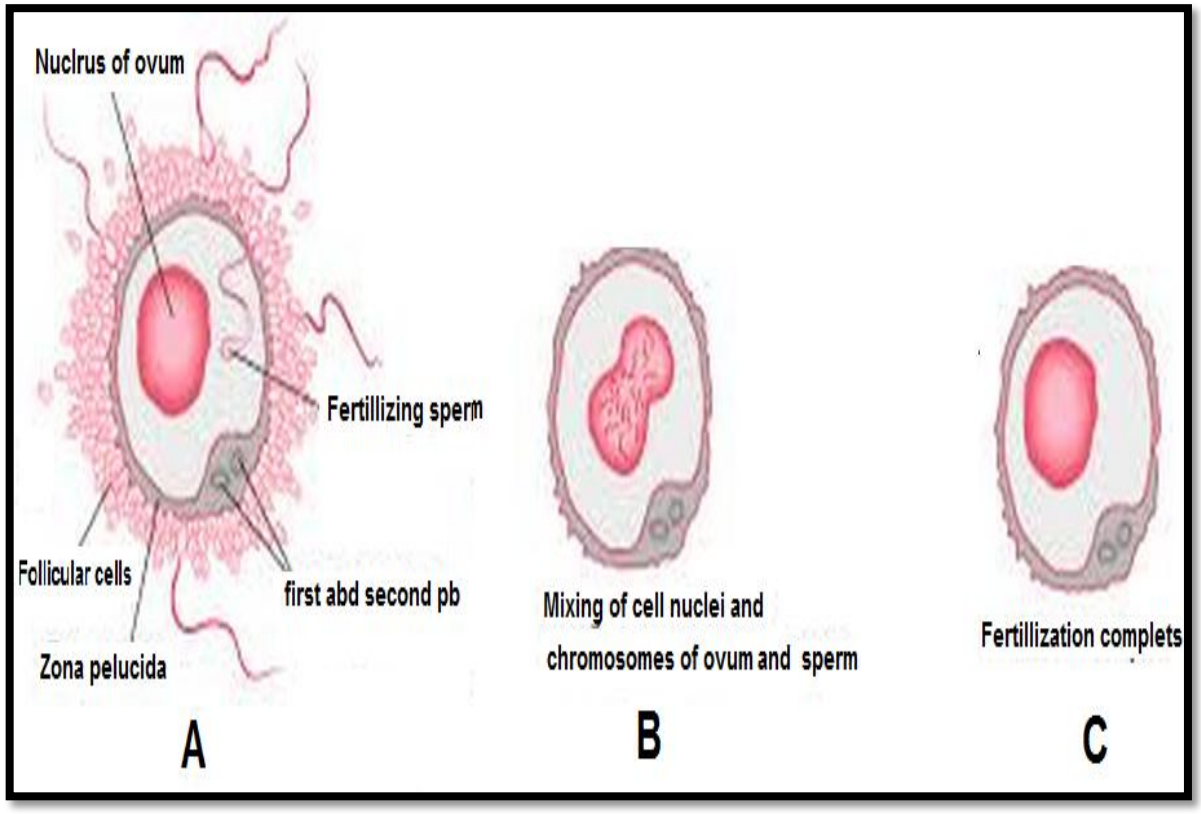

Figure (1)

4. Cleavage

The cleavage is a series of rapid mitotic divisions (without cell growth). At the end of the cleavage stage, cells making up the blastula move about and surface proteins help cells recognize each other the gastrula is formed, which consists of 3 "germ layers" Endoderm, Mesoderm and Ectoderm. (figure 2,3)

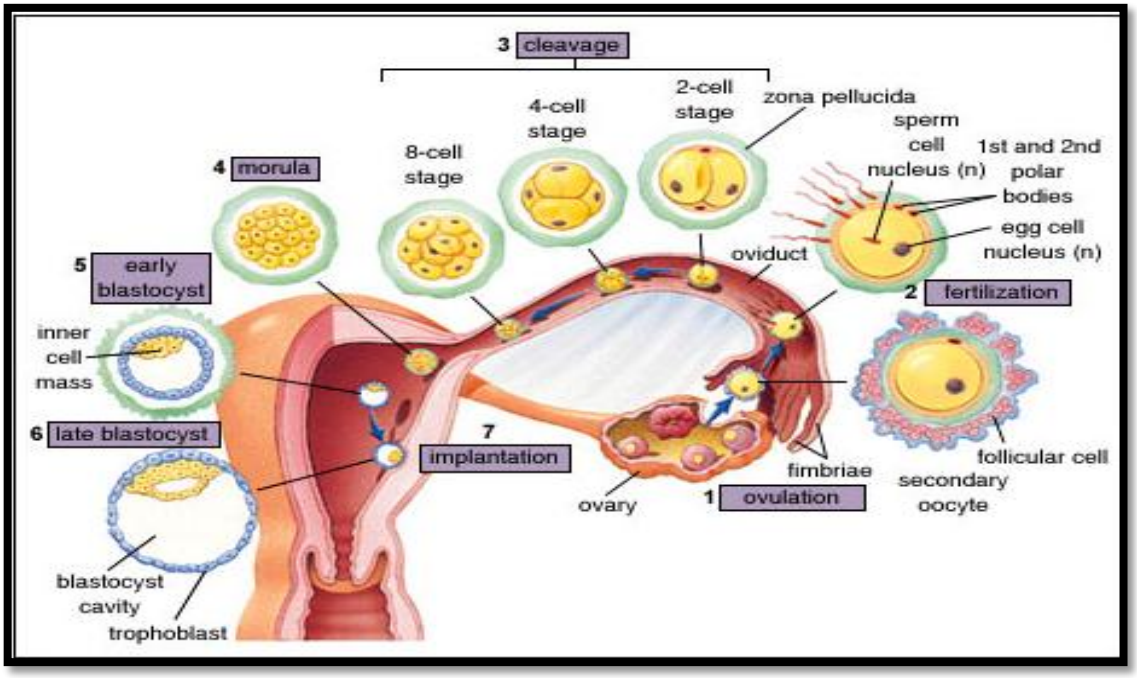

Figure (2)

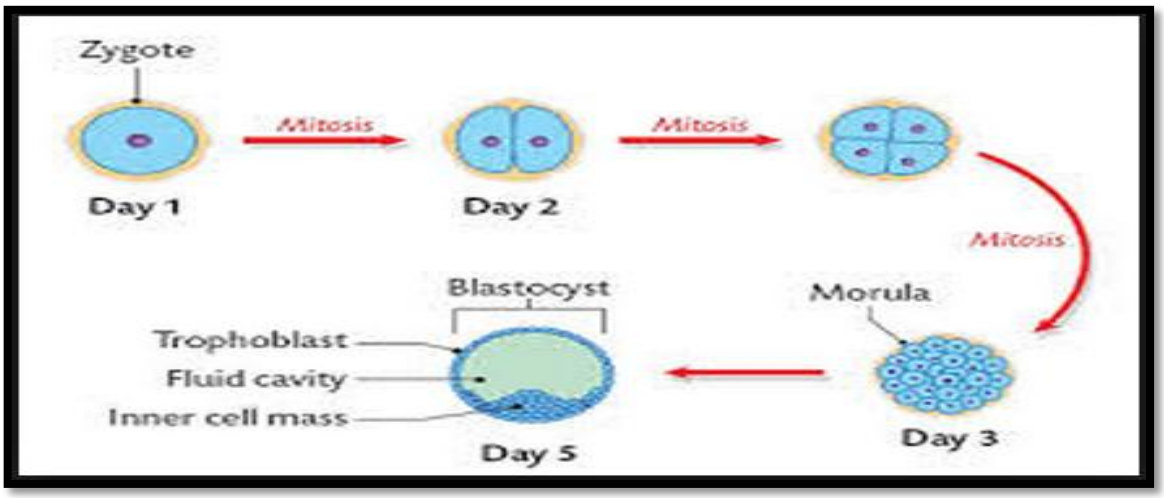

Figure (3)

4. Zygot

The zygote is a eukaryotic cell formed by a fertilization event between two gametes, the zygote's genome is a combination of the DNA in each gamete, and contains all of the genetic information necessary to form a new individual.(figure 4,5)

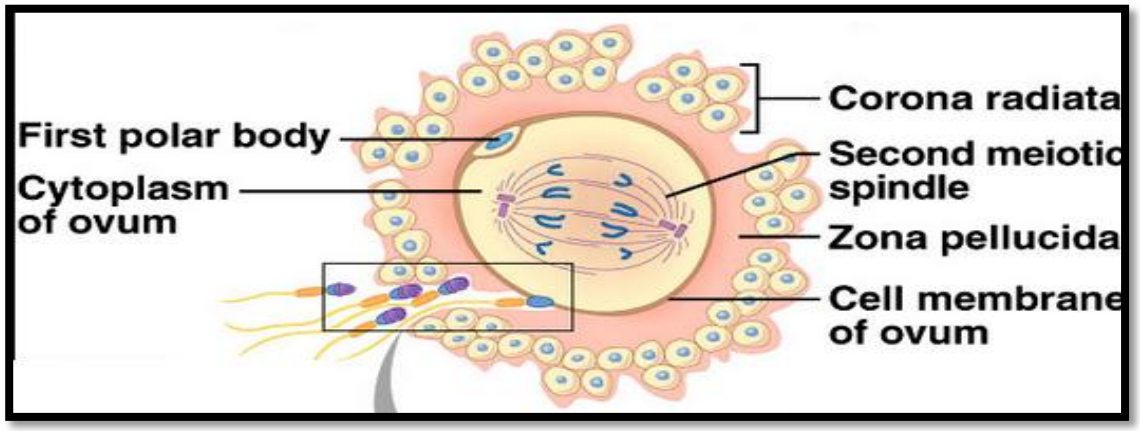

Figure (4)

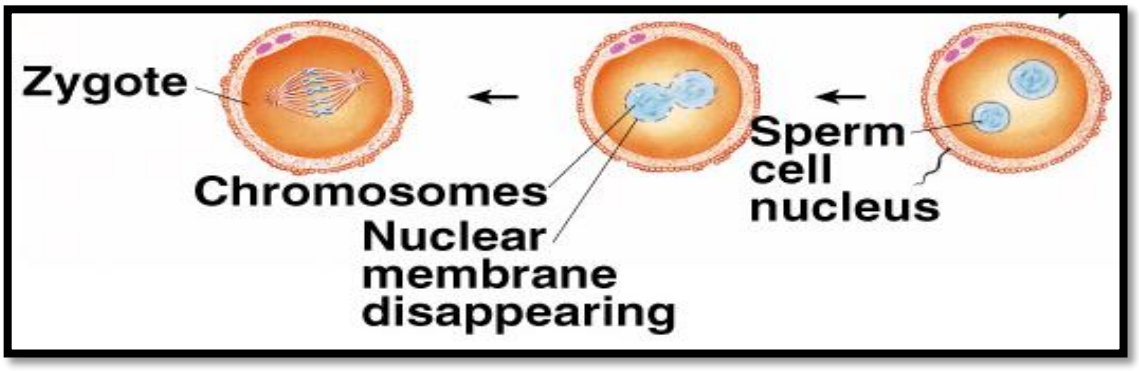

Figure (5)

6. Morula

The embryo development begins with a sperm fertilizing an egg to become a zygote which undergoes many cleavages to develop into a ball of cells called a morula (32 cells) . The morula is form in 3-4 days post fertilization, is an 8 cell mass, will eventually develop into a blastocyst. (figure 6)

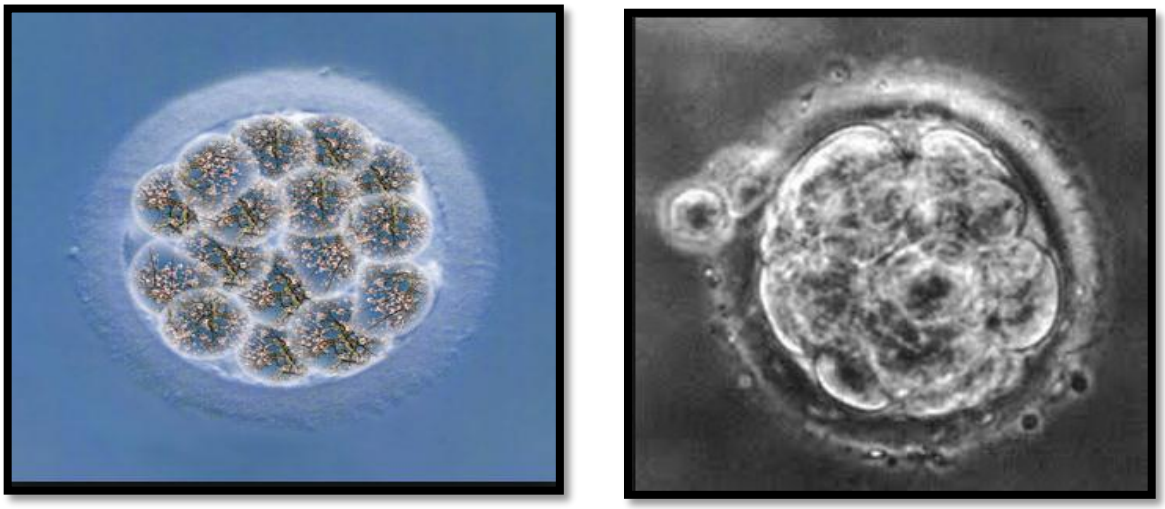

Figure (6)

7. Blastula

The blastula is a hollow sphere of cells in 4-5 days post fertilization has a cavity inside the trophoblast along with an inner cell mass, and surrounding an inner fluid-filled cavity, formed during an early stage of embryonic development in animals.

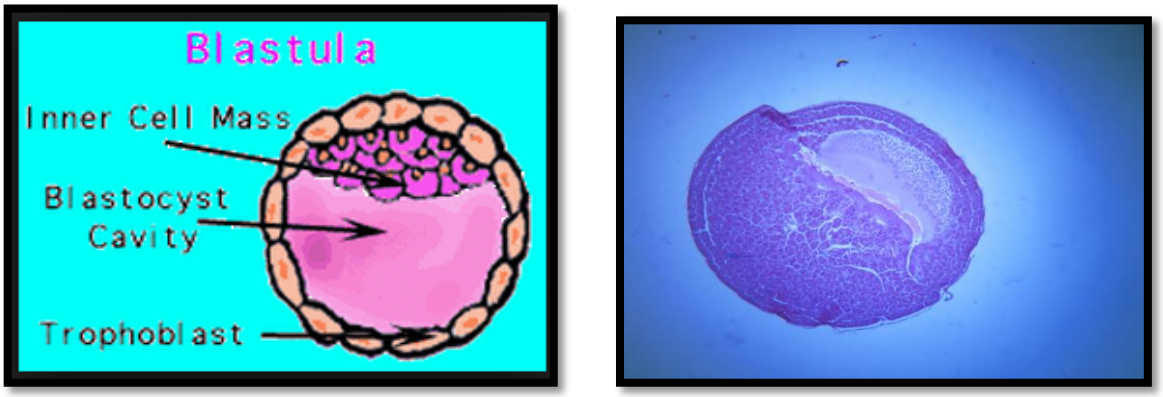

Figure (7)

8. Stem cells

The Stem cells are undifferentiated biological cells that can differentiate into specialized cells and can divide (through mitosis) to produce more stem cells, they are found in multicellular organisms. in mammals, there are two broad types of stem cells: embryonic stem cells, which are isolated from the inner cell mass of blastocysts, and adult stem cells, which are found in various tissues.(figure 8)

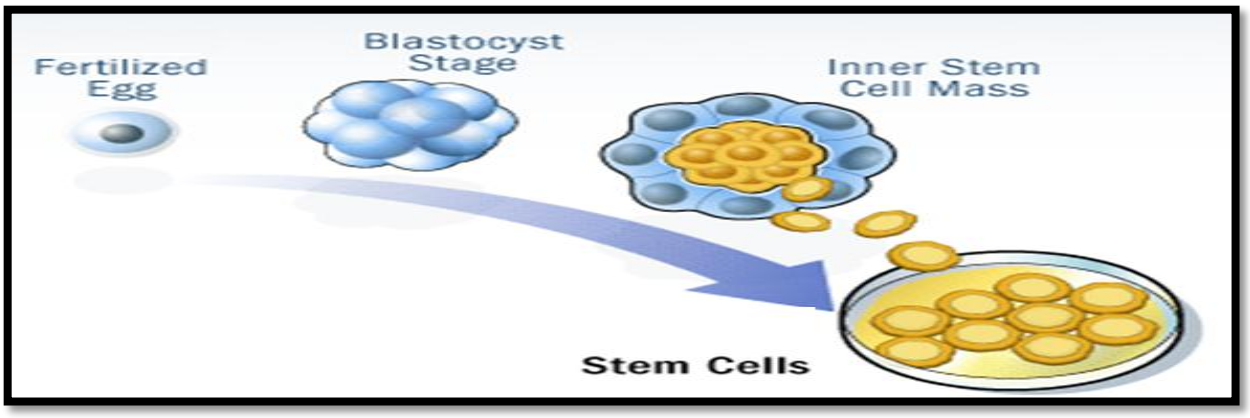

Figure (8)

9. Gastrula

At the end of the cleavage stage, cells making up the blastula move about and surface proteins help cells recognize each other the gastrula is formed, which consists of 3 "germ layers" Endoderm, Mesoderm, Ectoderm. (figure 9)

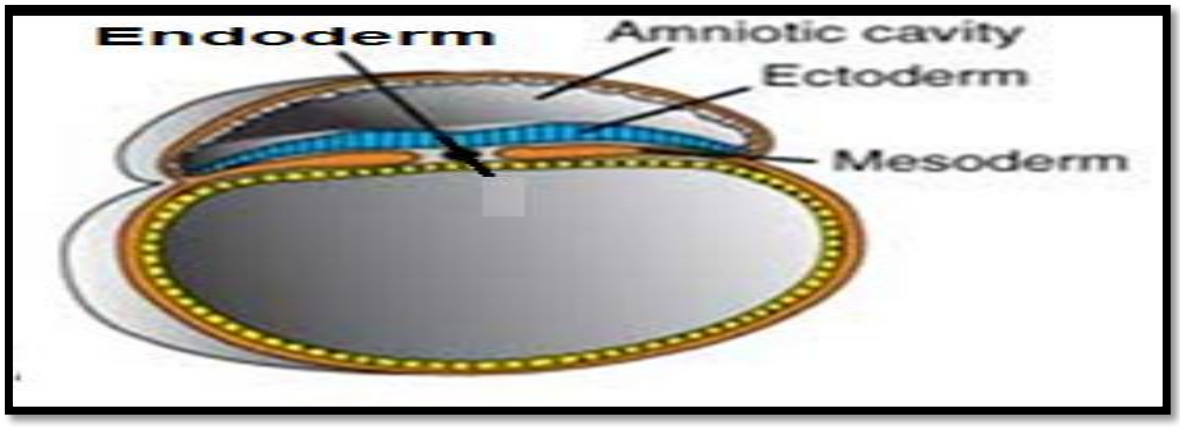

Figure (9)