Histology
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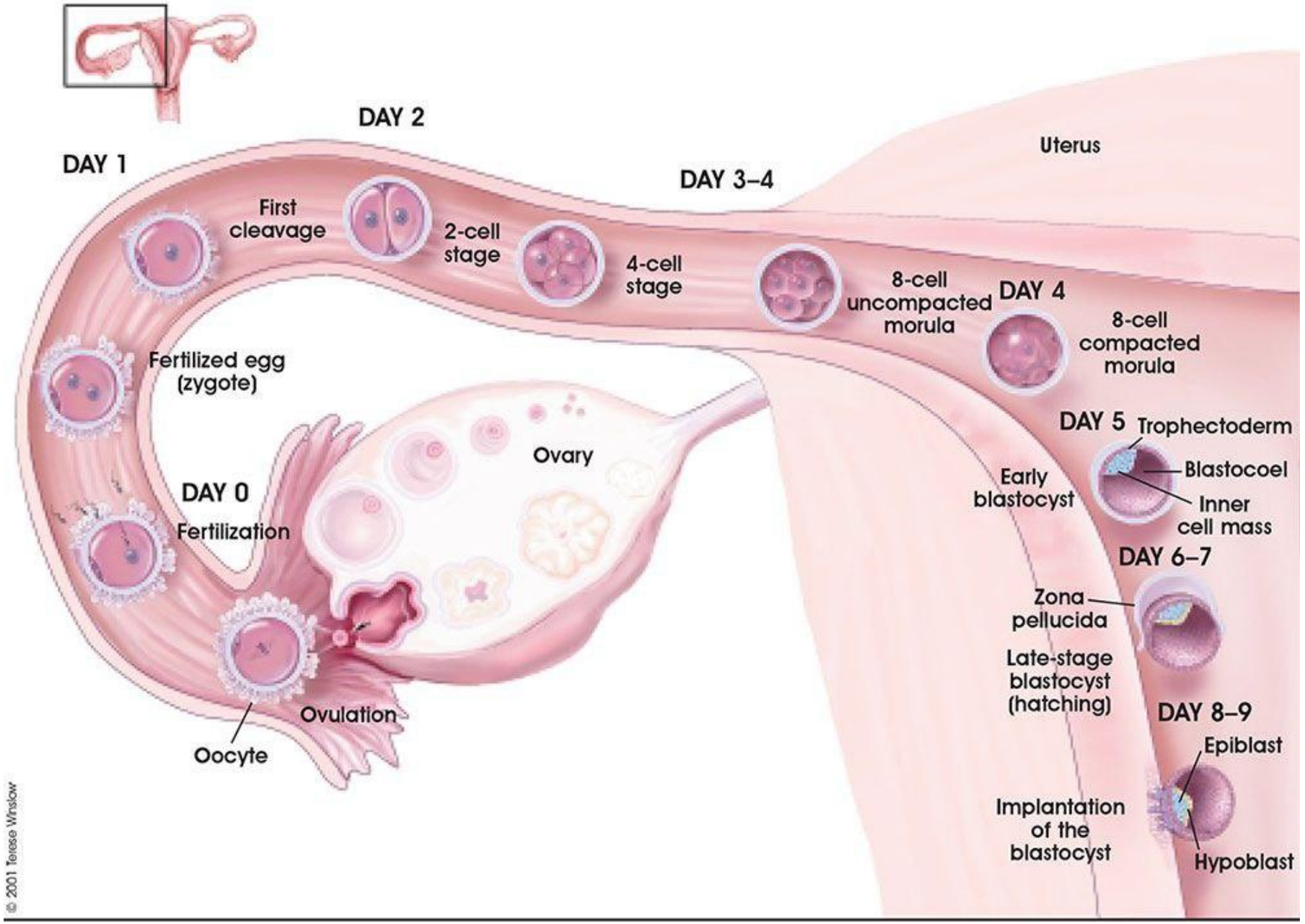
Embryology

Embryology is the science of the development of an embryo from the fertilization of the ovum to the fetus stage.

- In human, prenatal development begins at the time of fertilization and continues until the birth of the child.


DAY 1
DAY 2
DAY 3–4
DAY 4
DAY 5
DAY 6–7
DAY 8–9
DAY 0
Uterus
First cleavage
2-cell stage
4-cell stage
8-cell uncompacted morula
8-cell compacted morula
Fertilized egg (zygote)
Ovary
Fertilization
Ovulation
Oocyte
Trophectoderm
Blastocoel
Inner cell mass
Early blastocyst
Zona pellucida
Late-stage blastocyst (hatching)
Epiblast
Hypoblast
Implantation of the blastocyst
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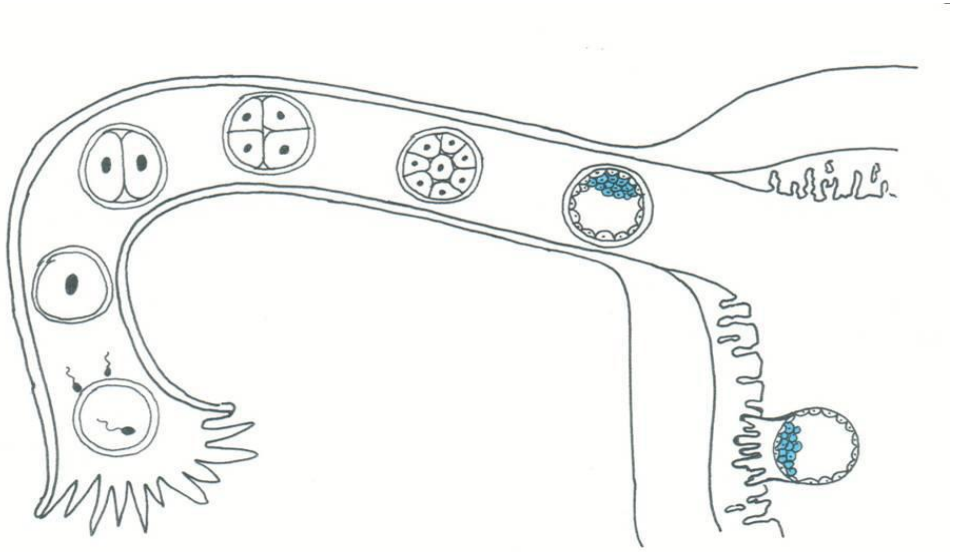
- The **female gamete** or the ovum which contains haploid number of chromosomes (23)
- combined with the **male gamete** (sperm) which contains haploid number of chromosomes (23) in process called **fertilization.** The formed egg after fertilization is called **zygote** which contains diploid number of chromosomes (46=44 somatic chromosomes and pair of sex chromosomes).
- How and when the different characters of the human being going to be determined?
- It is going to be determined five hours after fertilization.

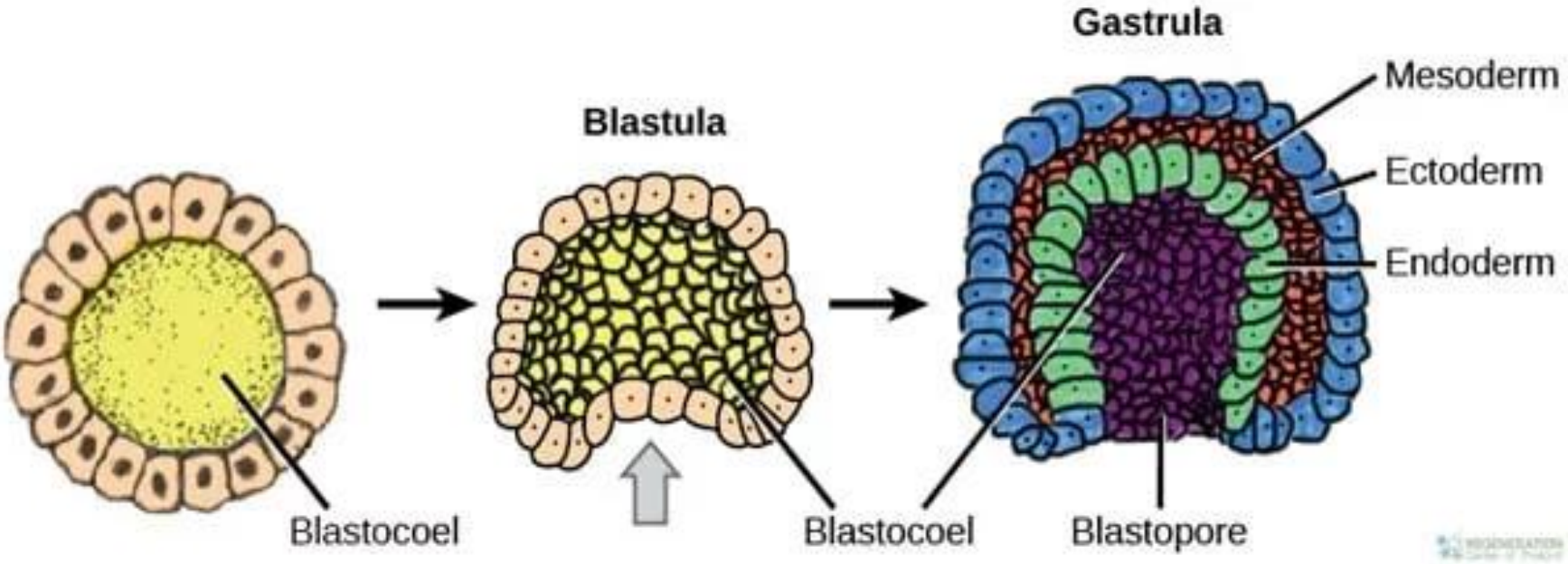
Implantation and gastrulation

- In humans, **implantation** is an event that occurs early in pregnancy in which the embryo adheres to the wall of uterus.
- At this stage of prenatal development, the embryo is **a blastocyst**. It is by this adhesion that the fetus receives the oxygen and the nutrients from the mother to be able to grow.

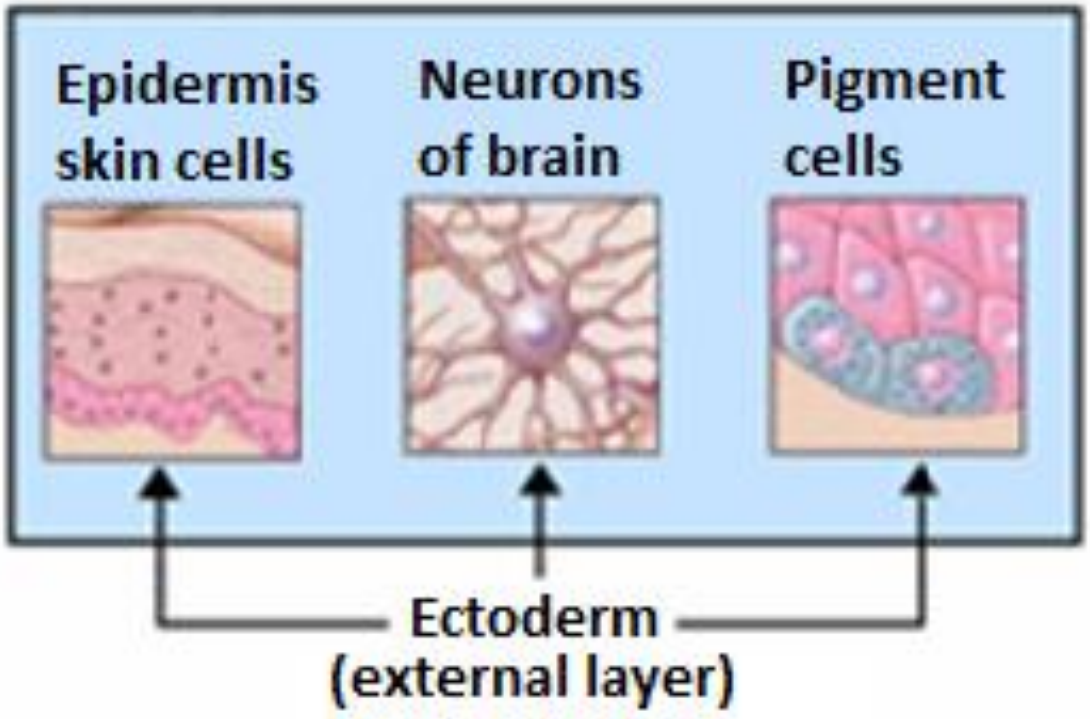


- **In humans, implantation of a blastocyst is most likely to occur about 7 days after ovulation.**
- By two weeks after fertilization cells from blastocyst starts secreting hormone called **Human chorionic gonadotropin** (HCGH).This hormone could be detected in mother's blood at end of first two weeks of pregnancy ,and in the urine of the mother at the end of first month of pregnancy (important for pregnancy test in the pregnant female).

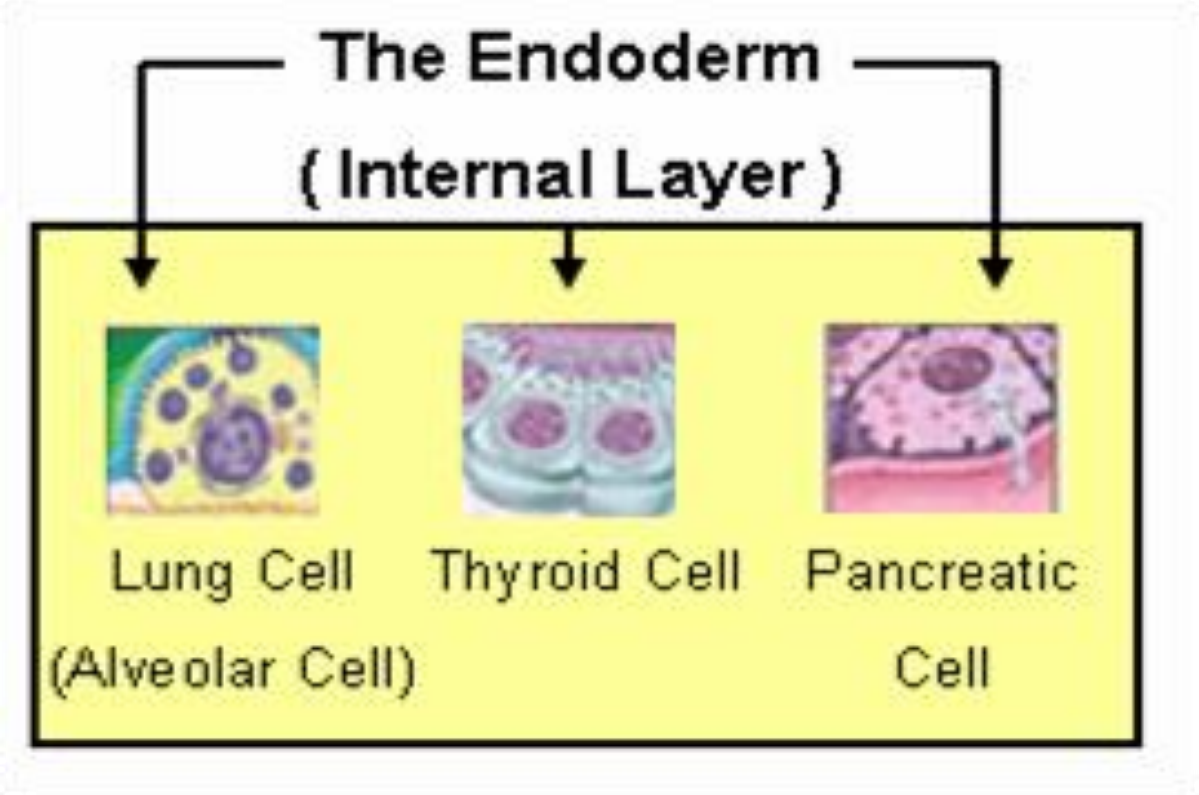
- **GASTRULATION** is the process that establishes the three primary germ layers: ectoderm, mesoderm, and endoderm. All cell and tissues of the adult can be traced back to the three primary germ layers.
- **Occurs at the third week of pregnancy.**



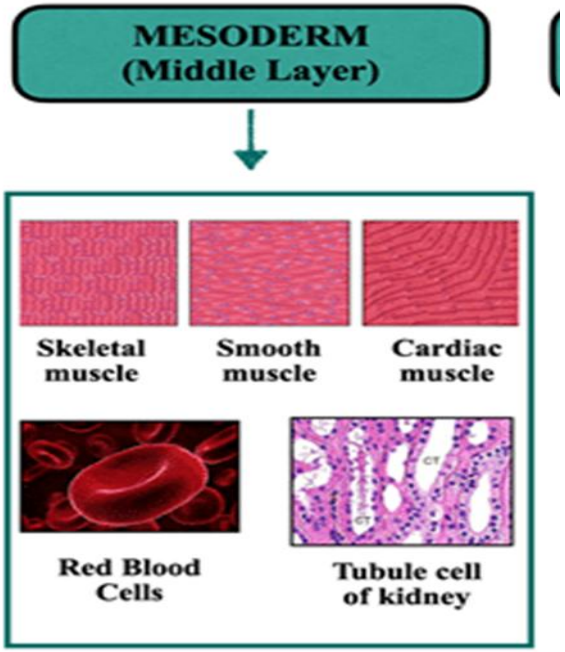
- **Embryonic ectoderm** gives rise to the epidermis, central and peripheral nervous systems, the eye, and inner ear, and, as neural crest cells. The neural crest cells give rise many connective tissues of the head.



- **Embryonic endoderm** is the source of the epithelial linings of the respiratory and alimentary (digestive) tracts, including the glands opening into the gastrointestinal tract and the glandular cells of associated organs such as the liver and pancreas.



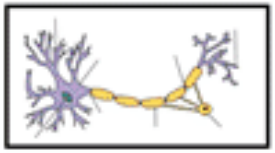
- **Embryonic mesoderm** gives rise to all skeletal muscles, blood cells and the lining of blood vessels, all visceral smooth muscular coats, the serosa linings of all body cavities, the ducts and organs of the reproductive and excretory systems, and most of the cardiovascular system. In the trunk, it is the source of all connective tissues, including cartilage, bones, tendons, ligaments, dermis, and stroma of internal organs.



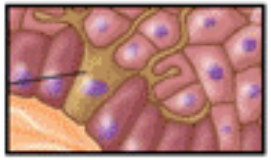
GERM LAYERS

ECTODERM (External Layer)

Skin cells of Epidermis

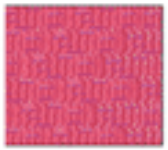


Neuron of Brain

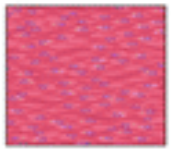


Pigment cells

MESODERM (Middle Layer)

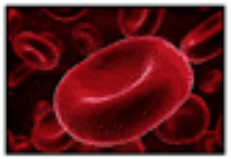


Skeletal muscle

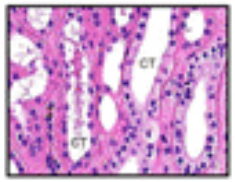


Smooth muscle

Cardiac muscle

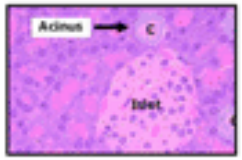


Red Blood Cells

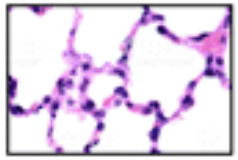


Tubule cell of kidney

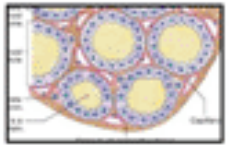
ENDODERM (Internal Layer)



Pancreatic Cells



Alveolar Cells of Lungs



Thyroid Cells