



Lec. 8

## **Introduction to Embryology**

### **Definition of Embryology**

This term generally refers to prenatal development of embryos and fetuses.

- “Human embryology” is the science concerned with the origin and development of a human being from a zygote to birth of an infant.
- Development does not stop at birth. Important changes, in addition to growth occur after birth (postnatal changes) e.g., development of teeth and female breasts.

### **SIGNIFICANCE OF EMBRYOLOGY**

Importance of Embryology :

- The study of prenatal stages of development, especially those occurring during the embryonic period to understand the normal body structure and the causes of congenital anomalies.
- So, It is concerned with various genetic and /or environmental factors that disturb the normal development producing birth defects.

Developmental periods

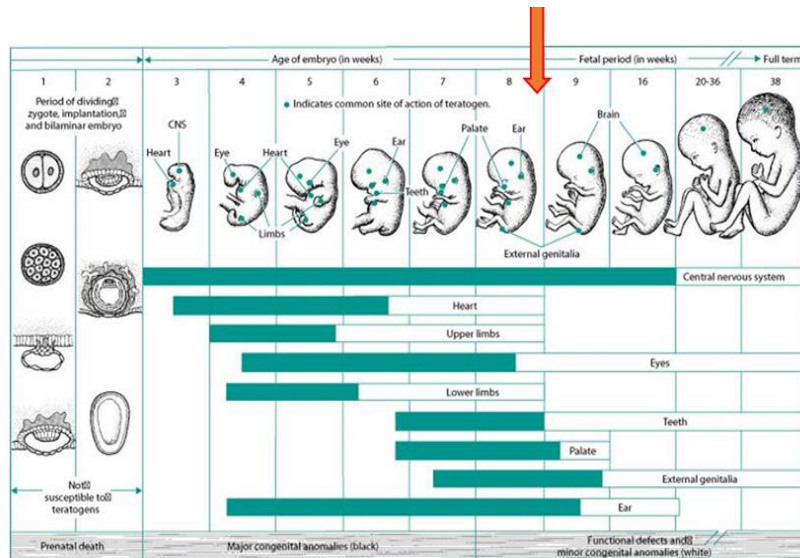
Developmental periods are divided into :

1- **Prenatal development** : It is the main developmental changes occurring before birth, including :

- The embryonic period : starts from the fertilization to the end of 8th week.
- The fetal period : begins from the 9th week until birth.

2- **postnatal development** : breast. The changes occurring after birth, like teeth and

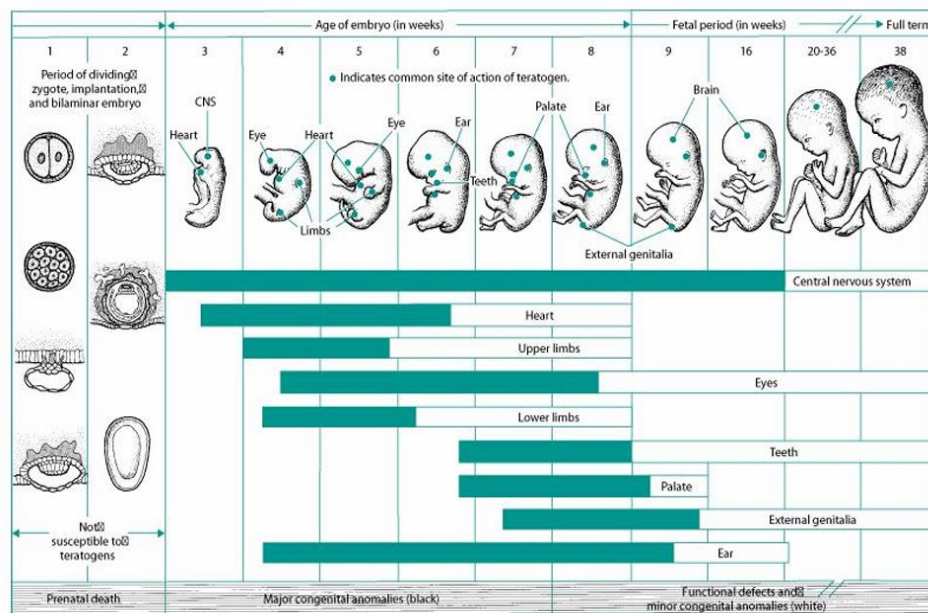
- Prenatal development is more rapid than postnatal development and results in more striking changes.



## Critical Periods of Human Development

This is the stage of development of an embryo that is susceptible to an agent, such as a drug or virus, which can lead to congenital abnormalities.

- Embryological Development is most easily disrupted when the tissues and organs are forming during the embryonic period.



Common terminology :

Oocyte; the immature ovum or female germ cell.

- Ovum; the mature female germ cell.
- Sperm; the mature male germ cell.
- Zygote; the fertilized ovum.

- Cell division : one cell divides into two cells; there are two types of cell division:
- A-Mitotic : It occurs in the somatic cell, it produces 2 cells each contains 44 autosomes and 2 sex chromosomes (Diploid number of chromosomes).
- B- Meiotic (reduction) : It occurs in the primitive germ cells in the testes or the ovaries, it includes 2 stages 1st & 2nd meiotic divisions, it produces 2 cells then 4 cells ; each contains 22 autosomes and one sex chromosomes (Haploid number of chromosomes).

### Descriptive Terms of the embryo :

Related to the Directions:

Cranial; the top of the embryo or the head.

- Cephalic; superior or the head.
- Caudal; inferior or the tail end.
- Dorsal; back of the embryo.
- Ventral; anterior or the belly side.
- Medial; near to the midline.
- Lateral; flank side.

### Major events during embryonic period

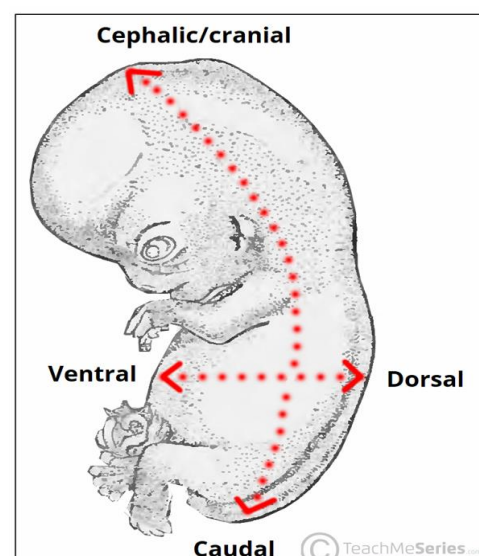
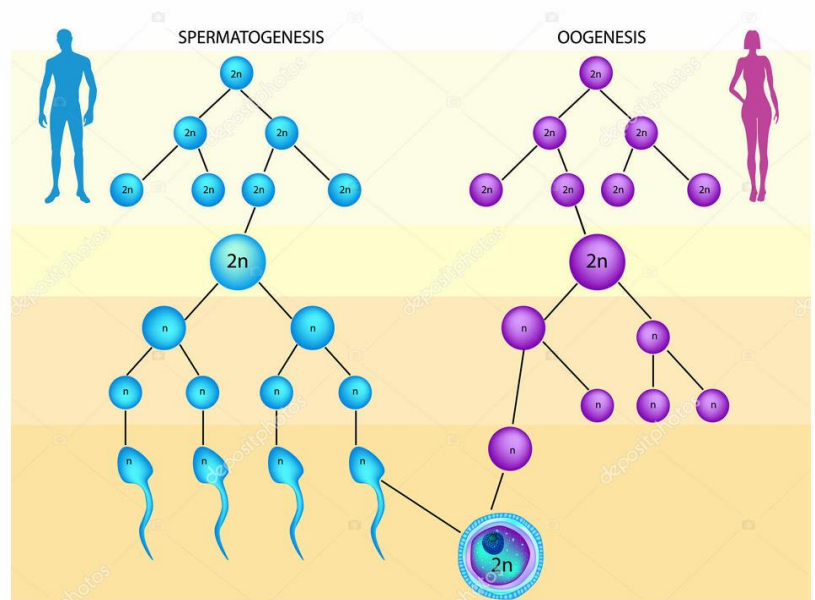
Gametogenesis : occurs at 1st week.

- Fertilization : 1st week.
- Implantation : begins one week after fertilization.
- Development of the Central Nervous System : begins at 3rd week.
- Development of Heart : begins at 3rd week.
- Embryonic Folding : 4th week

### GAMETOGENESIS

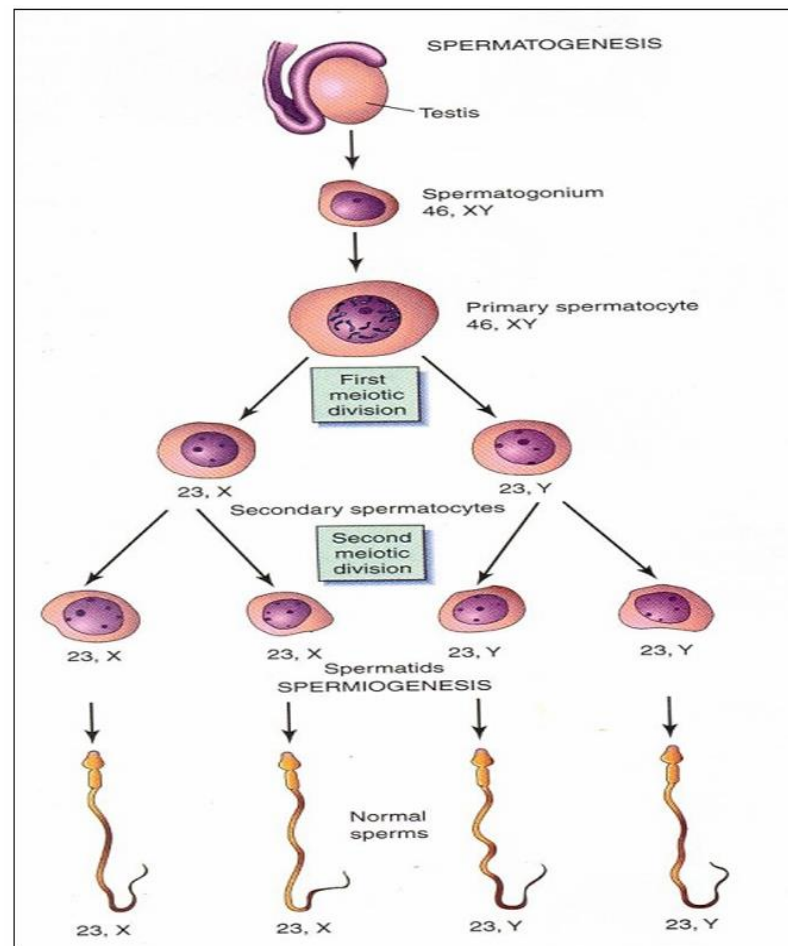
It is the production of mature gametes (sperm and ova) in the gonads (testes in males and ovaries in females).

- It is divided into:
  - 1- Spermatogenesis.
  - 2- Oogenesis.



## SPERMATOGENESIS

- It is the process of formation of mature sperms.
- Occurs in the seminiferous tubules of testis.
- Starts from puberty till old ages.
- It ends by formation of mature sperms with haploid number of chromosomes.



### Results of spermatogenesis;

- 1-Reduction of chromosomal number from the diploid to the haploid number.
- 2-Change the primitive germ cell (spermatogonia) to the motile sperm.
- 3-Increase the number of the sperms.

## OOGENESIS

- It is the process of formation of mature ovum,
- It occurs in the cortex of the ovary,
  - starts; during fetal life, completed after puberty, and fertilization and continues till menopause.
- It ends by formation of mature ovum with haploid number of chromosome .

