



Editing file

INTRODUCTION TO EMBRYOLOGY

Foundation Block - Lecture 1

Embryology
♥439



important & Doctor's notes
Extra information

Objectives :

- ❖ Define Embryology.
 - ❖ Define the developmental periods.
 - ❖ Define the significance of embryology.
 - ❖ Define the different embryological terminology.
 - ❖ Define the nomenclature used to describe body parts, positions and relationships.
 - ❖ Describe in brief the important events in embryology.
- 

Definition

Embryology refers to the prenatal (قبل الولادة) 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.

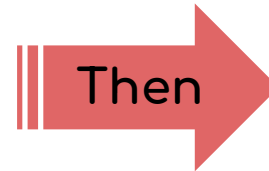
Importance

- The study of **prenatal stages** of development, especially those occurring during the embryonic period helps us understand the normal body structure and the cause of congenital anomalies (عيوب خلقية).
- So, It concerned with various **genetic** and /or **environmental factors** that disturb normal development and produce birth defect.

Developmental periods

Prenatal development:

Includes the main developmental changes occurring before birth (from zygote to before birth), **and is divided into 2 periods**



Postnatal development:

Includes changes occurring after birth. e.g. teeth and breast.

Embryonic period:

Begins at fertilization and ends with the end of the 8th week.
(called an **embryo**)

Fetal period:

Begins at the beginning of the 9th week and ends at birth.
(called a **fetus**)

NOTE:

- Prenatal development is more rapid than postnatal development and results in more striking changes.
- The most critical period is the **embryonic period**.

Critical Period Of Human Development

- It 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.
- The development of the embryo is most easily disrupted when the tissues and organs are forming during the embryonic period.

مرحلة حساسة ومهمة وأي تأثير راح يسبب تشوهات خلقية

Common Terminology

- **Oocyte**: the immature ovum, female germ.
- **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:

Mitotic

It occurs in **somatic** cells , the cell produces 2 cells, each contains 44 autosomes and 2 sex chromosome. (**diploid number of chromosomes**)

Meiotic (reduction)

It occurs in the **sex** cells (primitive germs cells) in the testes or the ovaries, it has 2 stages: **Meiotic 1&2**. it produces 2 cells then 4, each contains 22 autosomes and one sex chromosome. (**haploid number of chromosomes**)

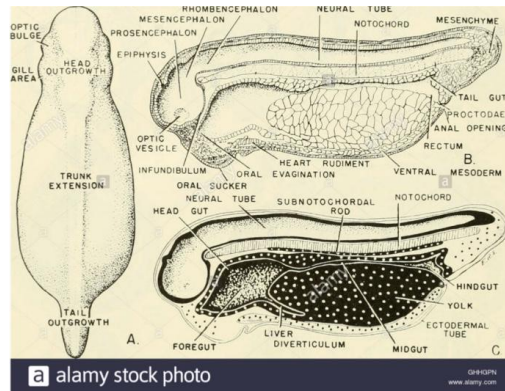
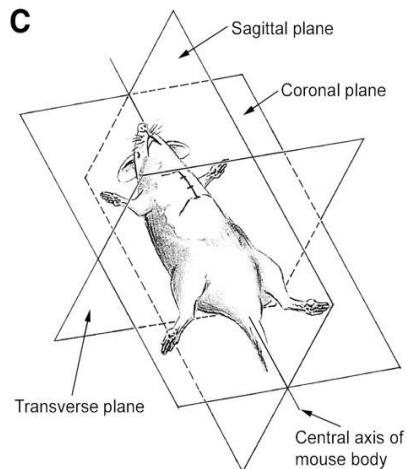
Descriptive Terms :

Directions:

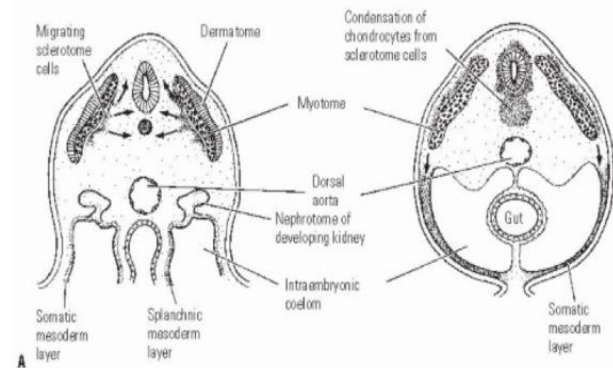
نفس المعنى

- **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.

CEPHALON=BRAIN



Longitudinal ↑



Transverse / horizontal ↑

Plans of sections:

- **Longitudinal;** median or sagittal. (makes left and right section)
- **Coronal;** frontal.
- **Transverse;** horizontal (make superior and inferior cut) فوق وتحت

Development of the Palate

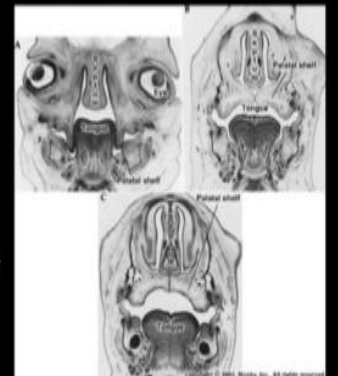
8-12 weeks in utero

Coronal sections through human embryos at approximately

(A) 7 weeks (initial disposition of palatine shelves on each side of the tongue)

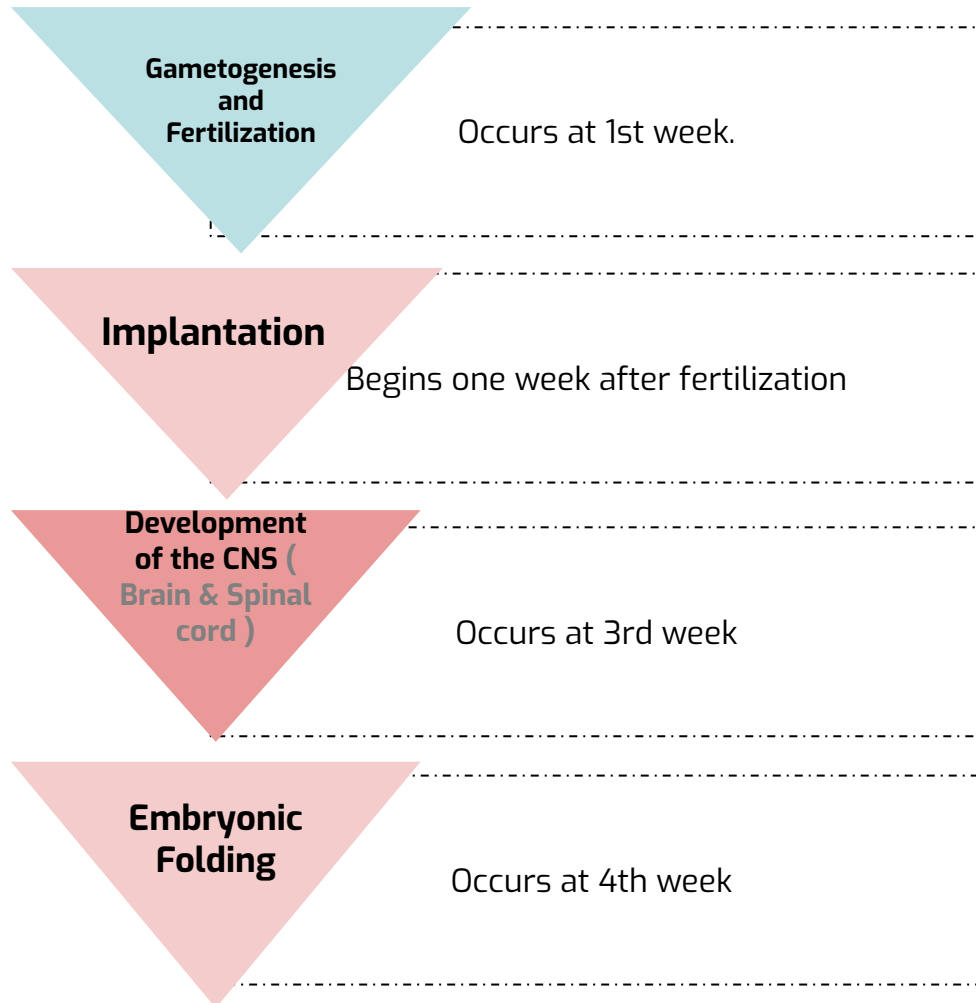
(B) 8 weeks (elevation coincident with depression of the tongue)

(C) 9 weeks (final fusion)



Coronal ↑

Major events during embryonic period



Med 438 note :-

The Bilaminar & Trilaminar discs are supposed to be present before the embryonic folding

CNS = Central Nervous System

Gametogenesis

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

It is divided into

Spermatogenesis.

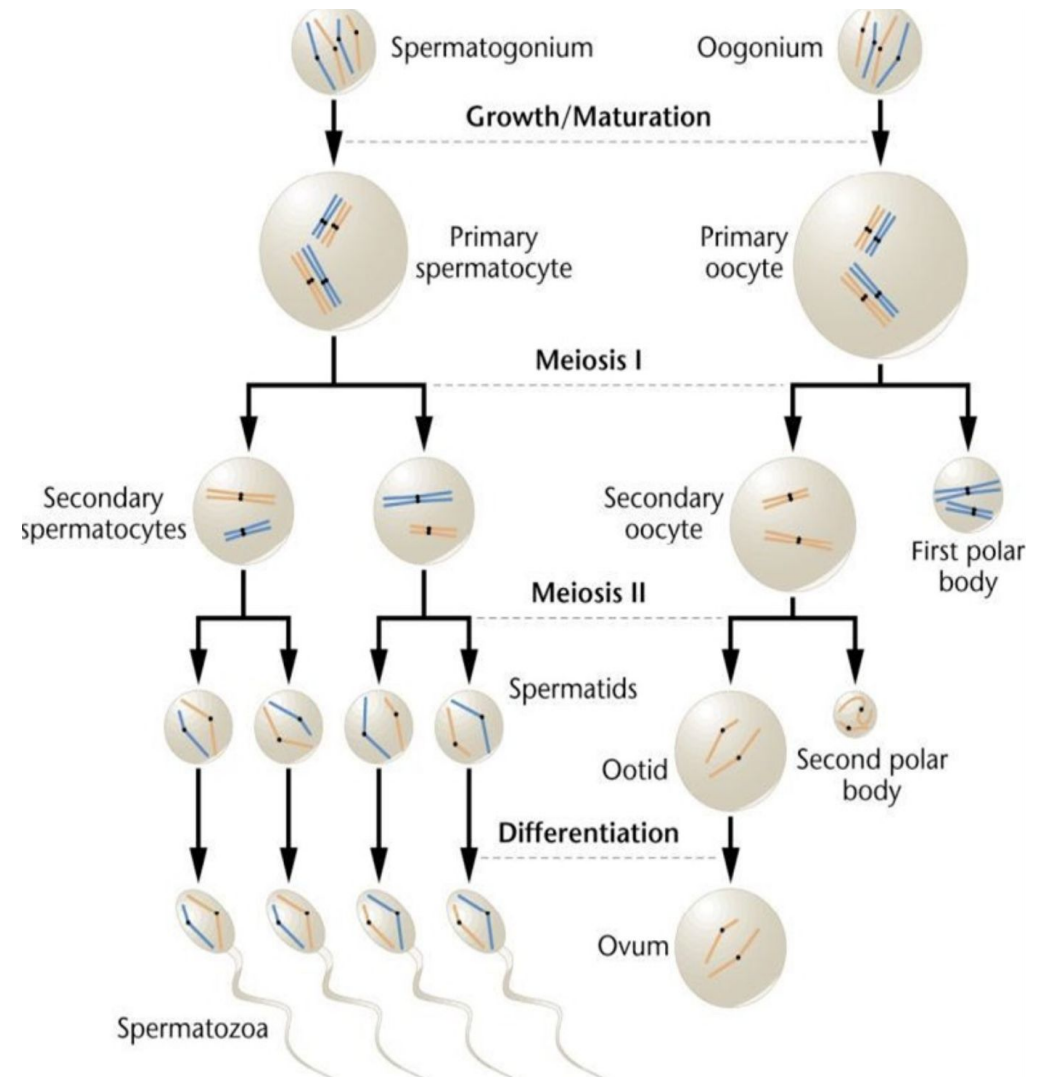
Oogenesis

Notes:

1- Spermatogonium (spermatogonia) and Oogonium are immature gametes (germ cells).

2- Meiosis occurs in gametogenesis.

| | Spermatogenesis (Males) | Oogenesis (Female) |
|------------|---|--|
| Definition | It is the process of formation of mature sperms | It is the process of formation of mature ovum . |
| Site | Takes place in the seminiferous tubules in the testis | Occurs in the cortex of the ovary. |
| Duration | Occurs continuously from puberty till old ages | Starts during fetal life, continues after puberty, and fertilization, till menopause |
| Results | 1- Reduction of chromosomal number from the diploid to haploid number. 2- Change the germ cell (spermatogonium) to the motile (mature) sperm. 3- Increase the number of the sperms. | It ends by haploid number of chromosomes |



Fertilization

It is the process during which a male gamete (**sperm**) unites with a female gamete (**mature oocyte**) to form a single cell (**zygote**).

Site: it occurs in the uterine tube

Note :
mature oocyte and ovum have the same meaning

the results of fertilization:

- The diploid number of chromosomes is restored.
- The sex of the embryo is determined.
- Initiates cleavage (cell division) of the zygote.

Implantation

It is the process of embedding of the blastocyst in the endometrium of the uterus.

- It begins one week after fertilization
- It is completed by the 12th day after fertilization

Sites of implantation

Normal site of implantation

In the upper part of the posterior surface of the uterus near the funds.

Abnormal site of implantation (ectopic pregnancy)

Most of ectopic pregnancies occurs in the uterine tube (Fallopian tube)

Bilaminar Disc

It is the differentiation of the cells into two layers:

- **Epiblast**

High columnar cells adjacent to the amniotic cavity

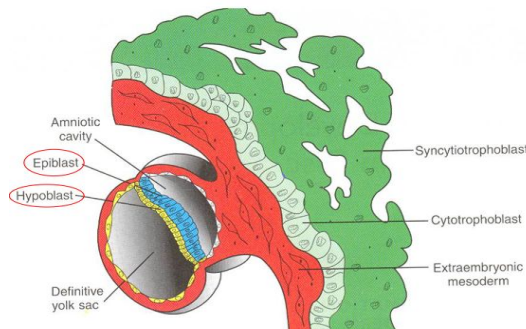
- **Hypoblast**

Small cuboidal cells adjacent to yolk sac.

Note:

Epi = up

Hypo = down



Trilaminar Disc

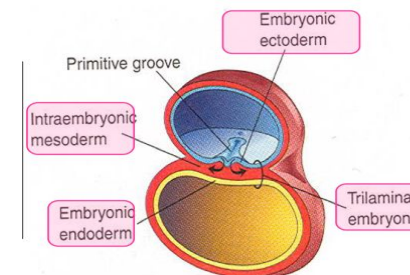
Now the embryonic disc is formed of 3 layers:

- Embryonic Ectoderm.
(FORMATION OF CNS AND SKIN)
- Intraembryonic Mesoderm.
(FORMATION OF SKELETAL MUSCLES AND CONNECTIVE TISSUES)
- Embryonic Endoderm.
(FORMATION OF CARDIOVASCULAR TISSUES)

Cells in these layers will give rise to all tissues and organs of the embryo.

Note;

- Embryonic Ectoderm → it was (or developed from) the epiblast
- Embryonic Endoderm → it was (or developed from) the hypoblast



MCQs:

1- Human embryology is the science concerned with the origin and development of a human being from ?

A-birth to puberty

B- zygote to birth or infant

C-sperm to zygote

D-4th week after birth.

2- The most critical period is the?

A-prenatal

B-fetal.

C-embryonic

D- postnatal

3- What is the term used to express immature ovum ?

A- ovum.

B- zygote

C-sperm.

D- oocyte

4- Where does the Oogenesis occur ?

A- cortex of the Ovary

B- Endometrium

C- Epididymis

D- seminiferous tubules

5- Hypoblast layer is adjacent to ?

A- Posterior surface of the uterus

B- Amniotic cavity

C- Yolk sac

D- Cortex of the ovary

6- When does the implantation process begin and end ?

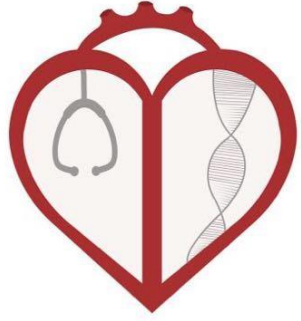
A- Fertilization to 8th week

B- Beginning of week 2 till the 12th day

C- 12th day to birth

D- Fertilization to the end of the first week

1- B
2- C
3- D
4- A
5- C
6- B



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