Editing File

Embryology 441

MED441 KING SAUD UNIVERSITY

Revised & Reviewed by Abdulaziz & Bahammam Faye Wael Sendi

Introduction To Embryology

- Red : Important
- Pink : in girls slides only
- Blue : in boys slides only
- Green : Notes
- Gray : Extra info

Objectives:

Define Embryology.

Define the developmental periods.

Define the significance of embryology.

Know the different embryological terminology.

Define the nomenclature used to describe body parts, positions, and relationships.

Describe in brief the main events in embryology.

Definition Of Embryology

This term generally refers to prenatal development (before birth, in two stages) 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 (because embryo undergoes a RAPID development of organs & structures in this 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

1-Prenatal Development

It is the main developmental changes occurring before birth, including:

Embryonic period

starts from the fertilization to the end of 8th week.

Fetal period

begins from the 9th week until birth. (you can also say that it starts at the end of the 8th week)

2-Postnatal Development

The changes occurring after birth, like teeth and breast.

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 (embryonic phase) 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

Types of Cell Division

	Mitosis	Meiosis
Occurs in	Somatic cells	Primitive germ (sex) cells in the testes or the ovaries
Produces	2 cells	2 cells then 4 cells
Stages	Only one stage	Two stages
Autosomes	44	22
Sex chromosomes	2 (Diploid number)	1 (Haploid number)

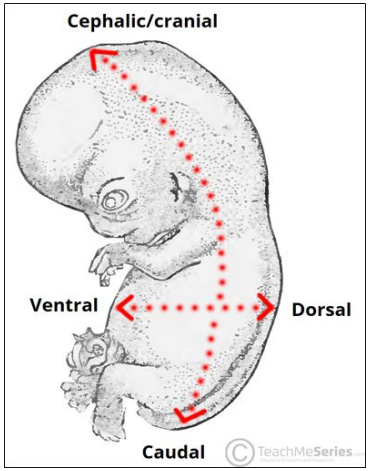
Descriptive Terms of the embryo

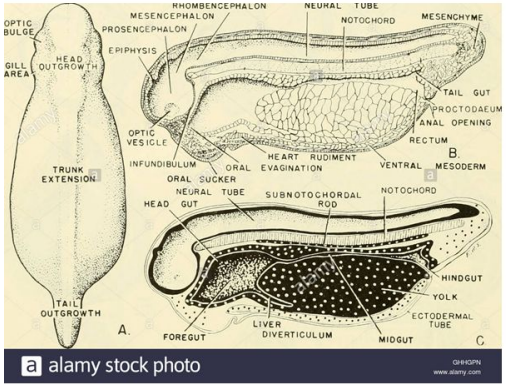
Related to the Direction:

Cranial: the top of the embryo or the head
Cephalic: superior or the head (Same as Cranial)
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 (away from the midline)

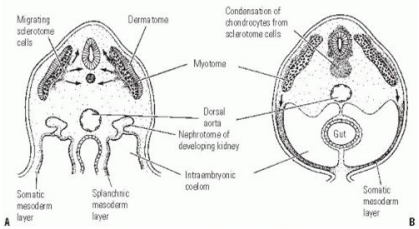
Planes or sections:

Longitudinal: median or sagittal (divides the body into right & left parts)
Coronal: frontal (divides the body into anterior & posterior parts)
Transverse: horizontal (divides the body into upper & lower parts)

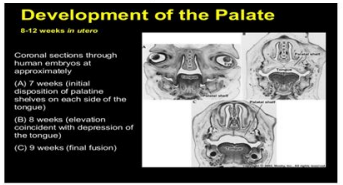




Longitudinal Section

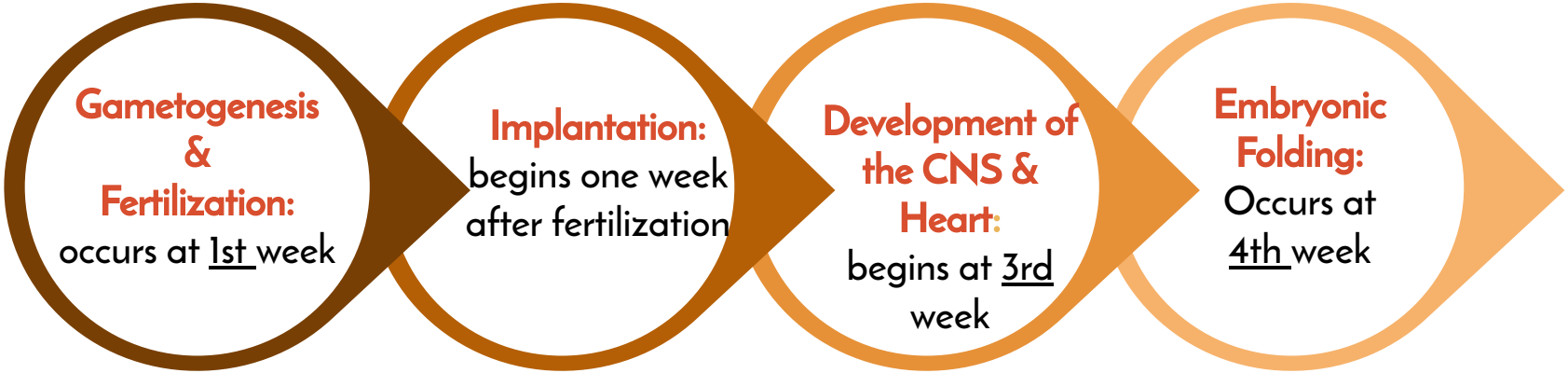


Transverse; horizontal



Coronal Section

Major events during embryonic period



A helpful mnemonic from the amazing Arwa Mobierek:

CNS كلمة

من 3 حروف فيصير بالأسبوع الثالث، و القلب و العقل دايم سوى

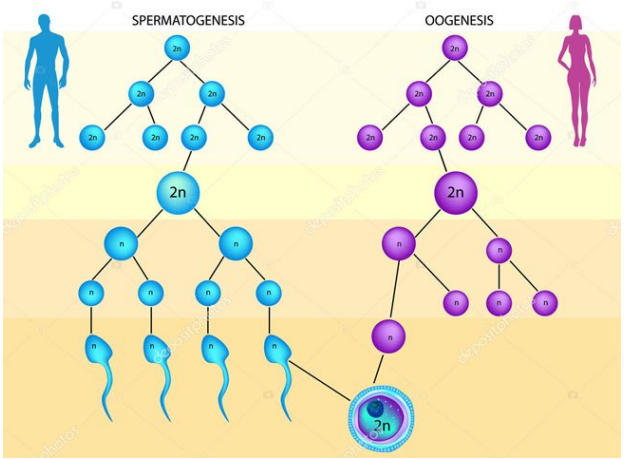
fold كلمة

من 4 حروف فيصير بالأسبوع الرابع

Gametogenesis

- the production of mature gametes (sperm in male and ova in female) by gonads (testes in males and ovaries in females).

	Gametogenesis	
	1-Spermatogenesis (male side)	2-Oogenesis (female side)
process	formation of mature sperms	formation of mature ovum
It occurs	in the seminiferous tubules of testis	in the cortex of the ovary
starts	Continuously from puberty till old ages	during fetal life, continues after puberty, and fertilization, till menopause.
It ends	Mature sperm with haploid number of chromosomes(23)	Mature ovum with haploid number of chromosomes(23)



Mature oocyte = ovum

After Puberty Secondary Oocytes are produced

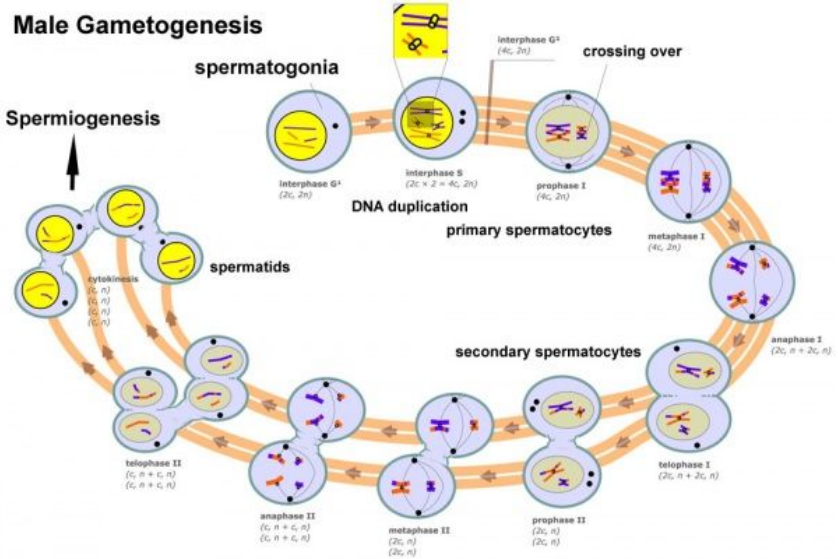
Gametogenesis cont

Results of spermatogenesis:

1- Reduction of chromosomal number from the diploid (23 pairs of chromosomes) to the haploid (23 chromosomes) number.

2- Change the primitive germ cell (spermatogonia) to the motile sperm. (for movement during the fertilization with the ovum)

3- Increase the number of the sperms. (for each spermatogonia = 4 motile sperm)



Fertilization

•Definition: the process during which a mature male gamete (sperm) unites with a female gamete (oocyte) to form a single cell (ZYGOTE).

• Site: It occurs in the Uterine tube.

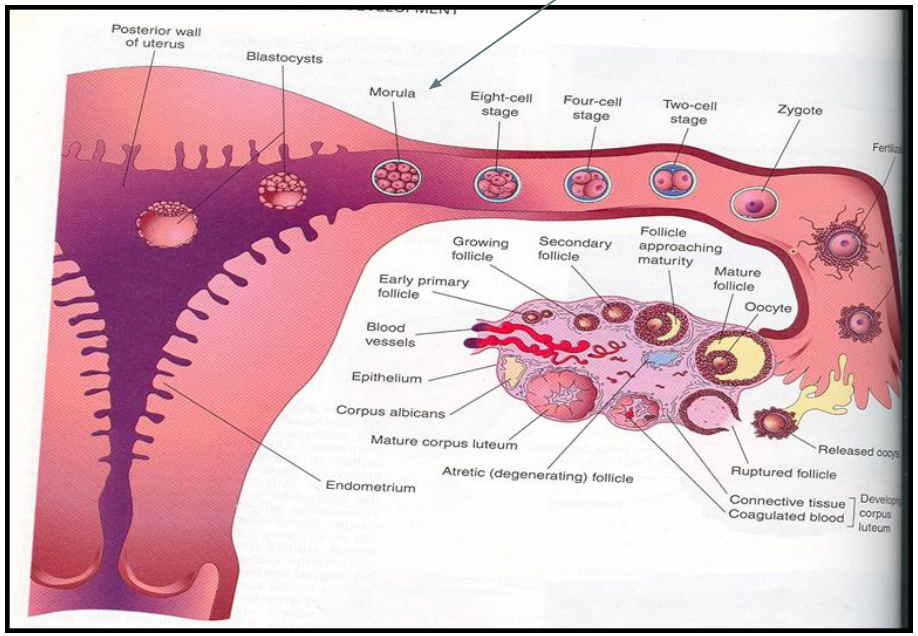
Results of fertilization:

1- The diploid number of chromosomes is restored. (sperm 23 + ovum 23)

2- The sex of the embryo is determined. (male or female)

3- Initiates cleavage (cell division) of the zygote. (via mitosis)

(the 16 cells stage is called morula علقه)



Implantation

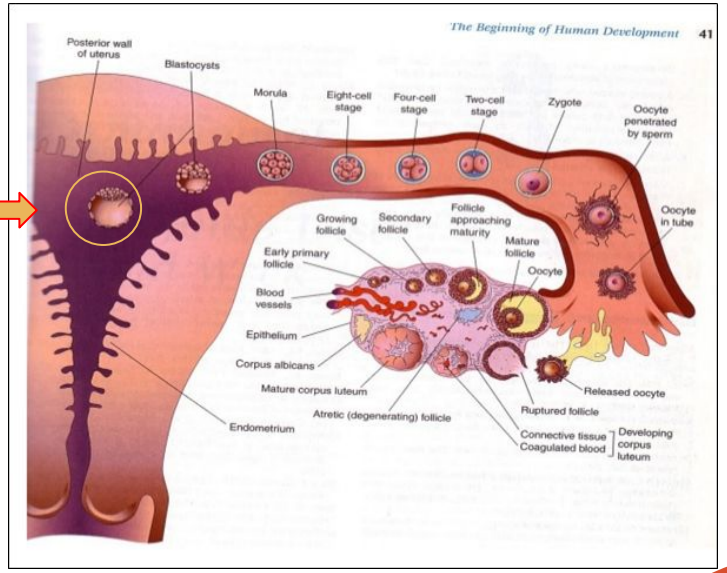
- It is the process of embedding of the blastocyst in the endometrium of the uterus.
- It begins one week after fertilization.
- It is completed by the 12th day after fertilization.

Normal site of implantation :

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

Abnormal site of implantation (ectopic pregnancy):

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



Bilaminar Disc

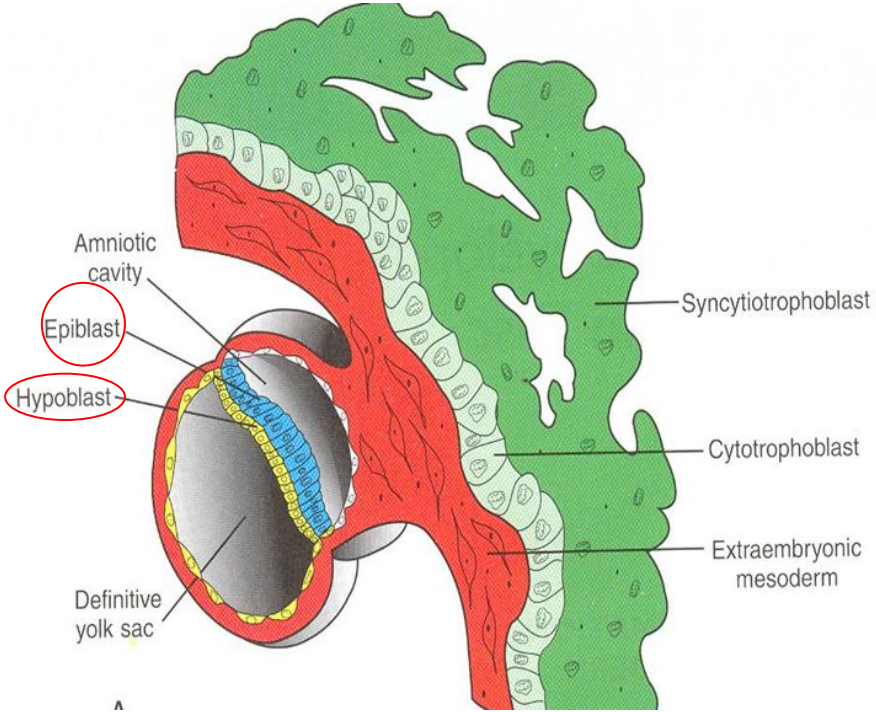
It is the differentiation of the cells into two layers:

- Epiblast:

High columnar cells adjacent to the amniotic cavity

- Hypoblast:

Small cuboidal cells adjacent to yolk sac



Trilaminar Disc

Now the embryonic disc is formed of 3 layers:

Embryonic Ectoderm.
(FORMATION OF CNS AND SKIN)

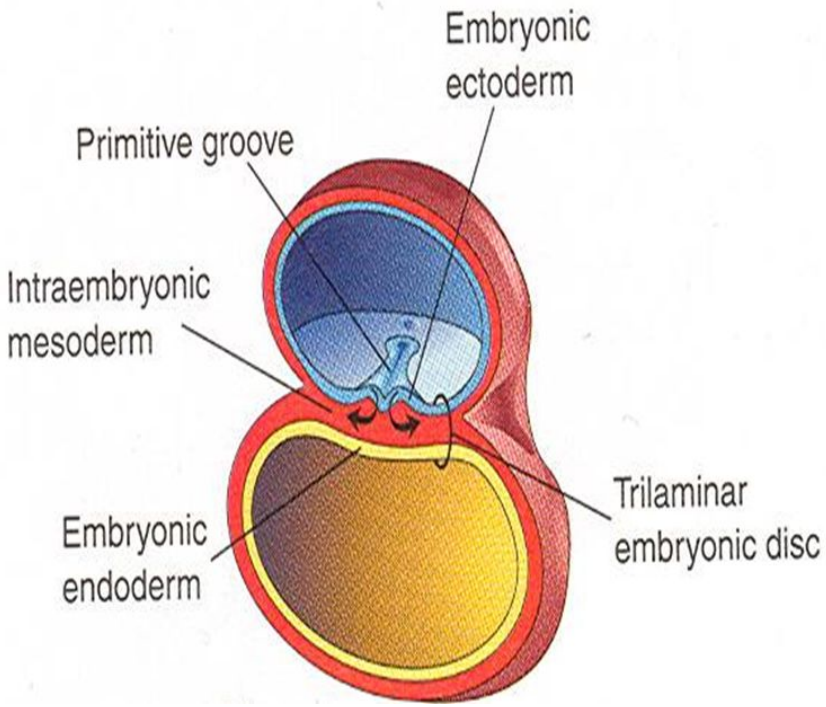
Intraembryonic Mesoderm.
(FORMATION OF SKELETAL MUSCLES AND CONNECTIVE TISSUES)

Embryonic Endoderm.
(FORMATION OF CARDIOVASCULAR TISSUES)

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

Epiblast develops into Embryonic Ectoderm.

Hypoblast develops into Embryonic Endoderm.



MCQs:

1- The most critical period is the			
A-embryonic	B-fetal	C-prenatal	D-postnatal
2- When does the fetal period begin and end?			
A-fertilization to 8th week	B- 9th week until birth	C-puberty till old ages	D-4th week till birth
3- Epiblast layer is adjacent to			
A-yolk sac	B-cortex of the ovary	C-uterus	D-amniotic cavity
4- Implantation is the process of embedding of the blastocyst in the			
A-perimetrium	B-cervix	C-endometrium	D-myometrium
5- Autosomes in meiosis			
A-23	B-46	C-22	D-44

Answers	
1	A
2	B
3	D
4	C
5	C

Team members:

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Embryology
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