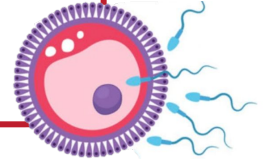


Gametogenesis and uterine cycles

Reproductive block-Embryology -Lecture 2

Editing file



Objectives

Color guide :
Only in boys slides in **Green**
Only in girls slides in **Purple**
important in **Red**
Notes in **Grey**

 **At the end of the lecture, students should be able to:**

- Describe the female cycles (Ovarian & Uterine).
- Define and differentiate the types of gametogenesis.
- Describe briefly the process of spermatogenesis.
- Describe briefly the process of oogenesis.
- Do people seriously read these?:)



Female Reproductive Cycles

- The reproductive cycle starts at **puberty** normally continues until the menopause
- Reproductive cycles depend upon activities & coordination of:

▼ Hypothalamus ▼ Pituitary gland ▼ Ovaries ▼ Uterine tubes ▼ Uterus ▼ Vagina ▼ Mammary glands.

1- GnRH (Gonadotropin-releasing hormone)

- The cycle starts by the release of GnRH by neurosecretory cells of the **hypothalamus**
- It is carried to the Anterior Pituitary gland to stimulate the release of two Hormones that act on **Ovaries** (FSH and LH)

2- FSH (Follicle-Stimulating Hormone)

- It is secreted by the anterior pituitary gland

Functions:

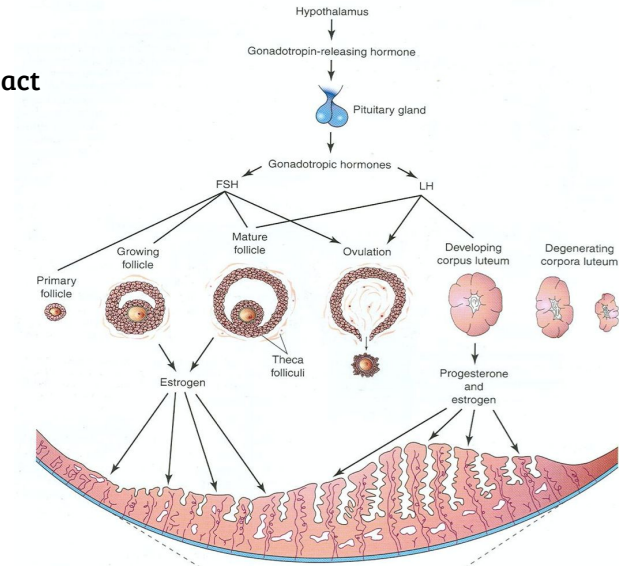
1. It stimulates the **ovarian** primary follicle to become mature (Follicular Phase)
2. It stimulates the follicular cells to produce estrogen which regulates the development and functions of the reproductive organs

3- LH (Luteinizing Hormone)

- It is secreted by the anterior pituitary gland

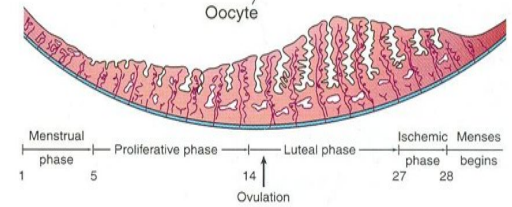
Functions:

1. It serves as a trigger for ovulation
2. Stimulates the corpus luteum to produce progesterone
3. **Stimulates the mature follicles to produce Estrogen.**



Menstrual (Uterine) Cycle

- It is a cyclic change that occurs in the endometrium of the uterus due to the effect of estrogen and progesterone
- The menstrual cycle ranges from 23-35 days in 90% of women and the average is about 28 days It sometimes varies in the same woman.
- It is divided into 4 phases:

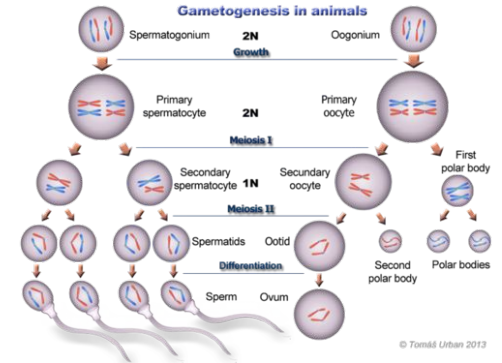
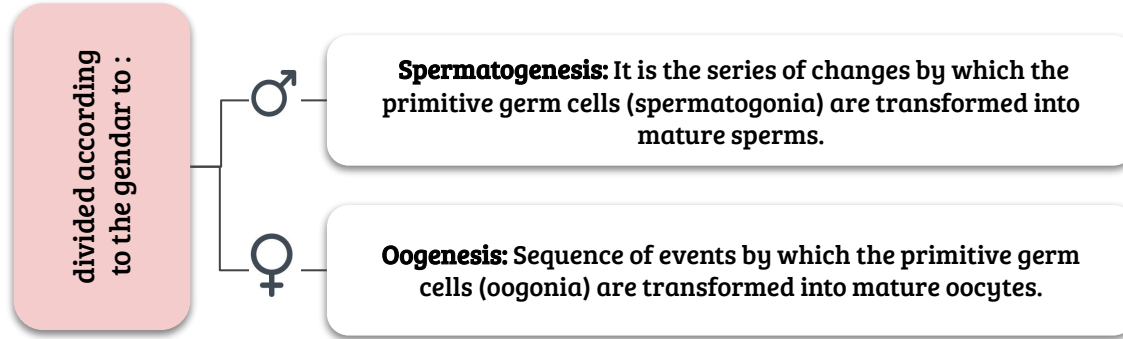


Phase	Menstrual	Proliferative (Follicular)	Luteal	Ischemic
Start	1st day	5th day	14th day	27th day
Duration	Lasts for 4-5 days	Lasts for 9 days	Lasts for 13 days	Lasts for ONE day
Description	<ul style="list-style-type: none"> • The functional layer of the endometrium is sloughed off and discarded. • Blood is discharged from the vagina with small pieces of endometrial tissue 	<ul style="list-style-type: none"> • Is a phase of repair and proliferation. • Coincides with the growth of the ovarian follicle • it is controlled by Estrogen which increases the thickness of the endometrium into 2-3 folds also increases in number and length of uterine glands • Branches of the uterine artery elongate and become spiral 	<ul style="list-style-type: none"> • It is also called secretory of progesterone phase • Coincides with the growth of the corpus luteum • Endometrium increases in thickness under the influence of estrogen and progesterone. • Glandular epithelium secretes glycogen rich material. • Arteries grow to the surface and become increasingly coiled • Large venous network develop and Direct arterio-venous anastomoses are the prominent features. 	<p>Degeneration of the corpus luteum leads to a decrease level of estrogen and progesterone which will lead to:</p> <ol style="list-style-type: none"> 1. Loss of interstitial fluid 2. Marked shrinkage of the endometrium 3. Spiral arteries constricts 4. Venous stasis 5. Ischemic necrosis due to ruptured vessels 6. Blood spreads to the connective tissue 7. Loss of 20-80 ml of blood 8. Entire compact and most of the spongy layer of the endometrium is discarded



Gametogenesis (Gamete formation)

- Gametogenesis is the production of mature male & female gametes (Sperms & Ova).
- Gametes are direct descendant of primordial germ cells.
- Primordial germ cells are first observed in the wall of the yolk sac the 4th week. then it migrate into the future gonad region.



Types of cell division happen in gametogenesis:

1

Mitosis: a type of cell division that results in two daughter cells each having the **same number (Diploid)** as the parent nucleus

2

Meiosis: takes place in the germ cells to produce gametes. It consists of two cell divisions, meiosis I & meiosis II, during which the **Diploid number of chromosomes (46)** is reduced to **Haploid number (23)**.

Meiosis 1: At the beginning, (**prophase**) germ cells replicate their DNA so that each of the 46 chromosomes is duplicated into sister Chromatid.

By the end, each new cell formed (Secondary Spermatocyte or Secondary Oocyte) has a **haploid (half) number** and each one of half number of chromosome of the Primary Spermatocyte or primary Oocyte.

Meiosis 2:

Spermatogenesis:

Aim	Site	Time	Duration	Store
Formation of sperms with haploid number of chromosomes.	Seminiferous tubules of the testis.	From puberty till old age	About two months.	Sperms are stored and become functionally mature in the Epididymis

1 Each spermatogonium divides by mitosis into 2 daughter Spermatogonia

2 Each daughter spermatogonia grows to give rise to primary spermatocyte (46).

3 Primary spermatocyte undergoes meiosis I to give rise to secondary spermatocyte (22+ x) or (22+y).

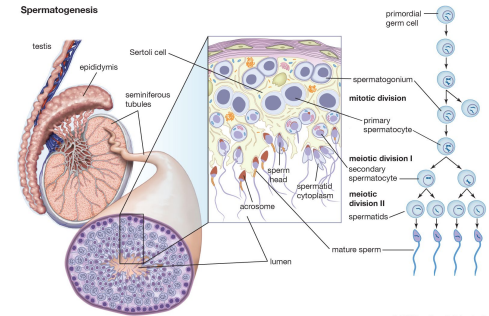
4 Each secondary spermatocyte undergoes meiosis II to form 4 haploid spermatids (half size 23).

5 Spermatids are transformed into 4 mature sperms by a process called spermiogenesis.

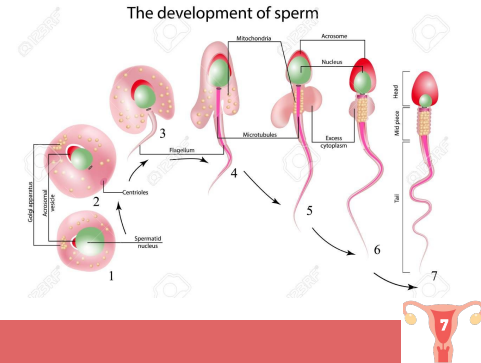
6 **Spermiogenesis:** Change in shape (metamorphosis) through which the Spermatids are transformed into mature motile Sperms:

1. Nucleus is condensed and forms most of the head.
2. Golgi apparatus forms the Acrosome, (acrosomal cap).
3. Mitochondria forms a spiral sheath.
4. Centriole elongates to form the axial filament.

Spermio**g**enesis is the last step of Spermato**g**enesis



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Oogenesis:

Aim	Site	Time	Duration
Formation of secondary oocytes with haploid number of chromosomes.	Cortex of the ovary	<ul style="list-style-type: none"> Starts very early during fetal life Completed after puberty and ends at menopause. 	It occurs monthly Except during pregnancy.

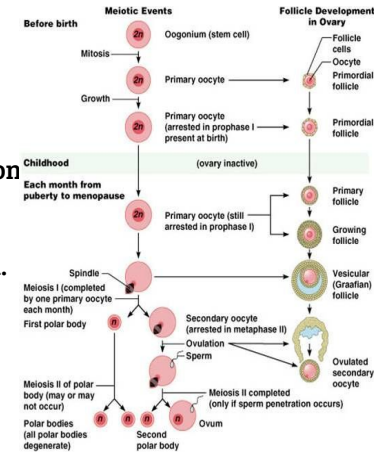
1 Before Birth (During early fetal life): primitive ova (Oogonium, Oogonia) proliferate by mitotic division into 2 daughter oogonium and enlarge to form **Primary Oocytes** with diploid number of chromosome, $(44+XX) = (46)$.

2 At Birth: all primary oocytes have completed the prophase of the 1st meiotic division **and remain arrested at prophase**

3 After Puberty: Shortly before ovulation, A reduction division by which Primary Oocyte completes its first meiotic division (which was arrested at prophase) and give rise to Secondary oocyte $(22+X) = (23)$ & First Polar Body.
 — The Secondary Oocyte receives almost all the cytoplasm.
 — The First Polar Body It is small nonfunctional cell that soon degenerates and receives very little amount of cytoplasm.

4 At ovulation: the nucleus of the secondary oocyte begins the second meiotic division but **progresses only to metaphase** where division is arrested.

5 If the secondary oocyte is fertilized: the second meiotic division is completed as the sperm penetrates the zona pellucida. otherwise it degenerates in 24 hours after ovulation. The secondary oocyte divides into mature ovum and 2nd polar body which degenerates.
 — Most of the cytoplasm is retained by the Mature Oocyte (Fertilized Oocyte). The rest is in the 2nd Polar Body which soon degenerates.



QUIZ

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
D	B	B	A	C	C	B	A

Q1: How many sperms are produced from primary spermatocyte?

- A. 1 Sperm
- B. 2 Sperm
- C. 3 Sperm
- D. 4 Sperm

Q2: what is the fate of secondary oocyte if it is not get fertilized

- A. re enter the cycle
- B. degenerates
- C. become polar body
- D. get out with the Menstrual Cycle bleeding

Q3: Which hormone will be released at ovulation?

- A. Progesterone
- B. LH
- C. GnRH
- D. FSH

Q4: When does the primary oocyte complete its first meiotic division?

- A. Shortly before ovulation
- B. After fertilization
- C. after birth
- D. Before puberty

Q5: In which phase does the secondary oocyte arrest in?

- A. Anaphase
- B. Telophase
- C. Metaphase
- D. Prophase

Q6: Menstruation is caused by decline in the level of?

- A. FSH
- B. LH
- C. Progesterone
- D. Estrogen

Q7: site of the Oogenesis

- A. Cortex of the uterus
- B. Cortex of the ovary
- C. medulla of the ovary
- D. medulla of the uterus

Q8: Luteal phase lasts for

- A. 13 days
- B. 14 days
- C. 9 days
- D. 2-3 days



Members board



Team leaders



Abdulrahman Shadid

• **Ateen Almutairi**

Boys team:



Mohammed Al-huqbani

- **Salman Alagla**
- **Ziyad Al-jofan**
- **Ali Aldawood**
- **Khalid Nagshabandi**
- **Sameh nuser**
- **Abdullah Basamh**
- **Alwaleed Alsaleh**
- **Mohaned Makkawi**
- **Abdullah Alghamdi**
- **Badr Alshehri**

Girls team :

- **Ajeed Al Rashoud**
- **Taif Alotaibi**
- **Noura Al Turki**
- **Amirah Al-Zahrani**
- **Alhanouf Al-haluli**
- **Sara Al-Abdulkarem**
- **Renad Al Haqbani**
- **Nouf Al Humaidhi**
- **Jude Al Khalifah**
- **Nouf Al Hussaini**
- **Danah Al Halees**
- **Rema Al Mutawa**
- **Maha Al Nahdi**
- **Razan Al zohaifi**
- **Ghalia Alnufaei**

Contact us:

