

وسهلا



أهلا

يُمنع أخذ السلايدات بدون
إذن المحرر واي اجراء
يخالف ذلك يقع تحت طائلة
المسؤولية القانونية
جميع المعلومات للاستخدام
التعليمي فقط

الأستاذ الدكتور يوسف حسين

كلية الطب - جامعة مؤتة - الأردن

دكتورة من جامعة كولونيا المانيا

Prof. Dr. Youssef Hussein Anatomy - YouTube

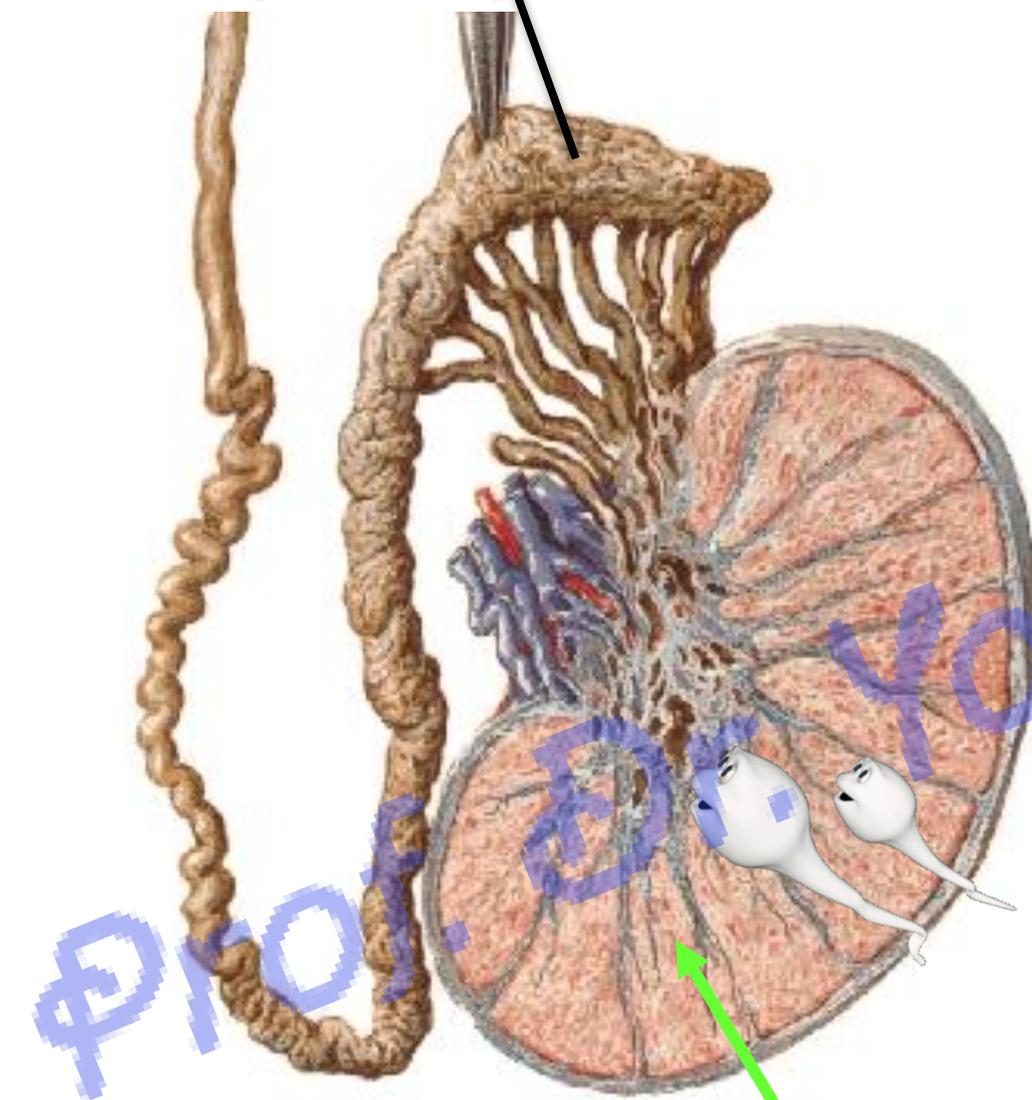
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SPERMATOGENESIS

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- ** Definition:** It is the process of formation of the sperm (mature male gamete) from the primordial germ cell (spermatogonia)
- **Time: starting at puberty (15-17 years) and continues till old age.**

epididymis



seminiferous tubules

- Site of spermatogenesis
- in seminiferous tubules in testis and sperms stored in epididymis.
- **Testis** primary Male sex gland, Located in the Scrotum.
- Produce Sperms.
- Testis have interstitial cells (**Leydig cells**) that produce male sex hormone (**testosterone** hormone).
- Seminiferous tubules is structural unit of testes, site of developmental phases of sperms, **containing Sertoli cells.**

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❖ Functions of Sertoli cells

1. Secrete protein for **nutrition** of developing sperms So called **mother cells or Nurse cells**
2. **Phagocytosis** for apoptotic cells and foreign bodies .
3. Maintain the **environment** necessary for development and maturation of sperms via forming a **blood-testis barrier**.
4. **Secrete anti-Mullarian hormone** during early stage of fetal life which plays an important role in the development of the sex organs. AMH levels are higher in male babies, as this prevents them from developing female reproductive organs.
5. **Secrete inhibin and activin hormones** which control pituitary gland to regulate FSH which helps control the menstrual cycle and stimulates the growth of eggs in the ovaries.
6. **Secrete androgen binding protein** leading to increase testosterone hormone to stimulate spermatogenesis

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Stage of proliferation

Stage of growth

1st meiotic division

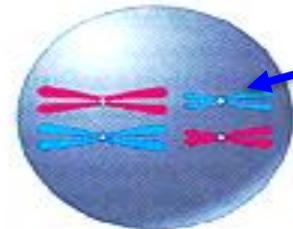
Stage of maturation

2nd meiotic division

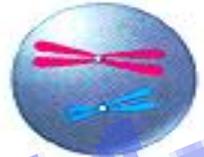
Stage of transformation



Daughter Spermatogonium 46



primary spermatocytes 46



secondary spermatocytes 23



Spermatid 23



Mature sperm

At puberty

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Spermatozoa

** Stages of spermatogenesis

** It includes 4 stages:

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(1) Stage of proliferation

- Each primordial germ cell (**spermatogonium**, 46 chromosome) undergo many rounds of **mitotic division** successively to form a large stock of **daughter spermatogonia** (each one contains 46 chromosomes).

(2) Stage of growth

- A number of daughter spermatogonia acquired more cytoplasm and increased in size forming **primary spermatocyte** (46 chromosomes).
- **Other numbers of daughter spermatogonia** remain a source of new **Spermatogonium cells**.

(3) Stage of maturation

- After many mitotic divisions, The primary spermatocytes, divide by **meiotic division** as follows:

I) **1st meiotic division (reduction division)**: each primary spermatocyte divide by meiotic division into two **secondary spermatocytes** {23 chromosome (one contains 22+X and one 22+Y)}.

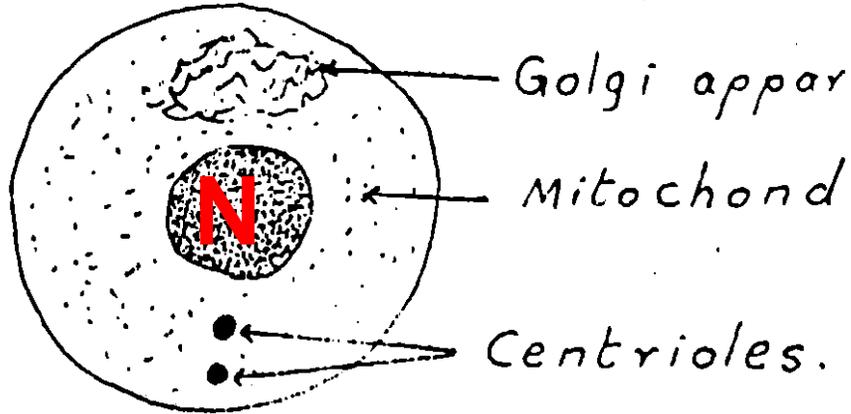
II) **2nd meiotic division (equational division)**: each of the developed secondary spermatocytes divide into two cells called **spermatids** (each contains 23 chromosomes 22+X or 22+Y).

N.B; Each **daughter spermatogonium** gives 4 spermatids (2= 22+X and 2= 22+Y).

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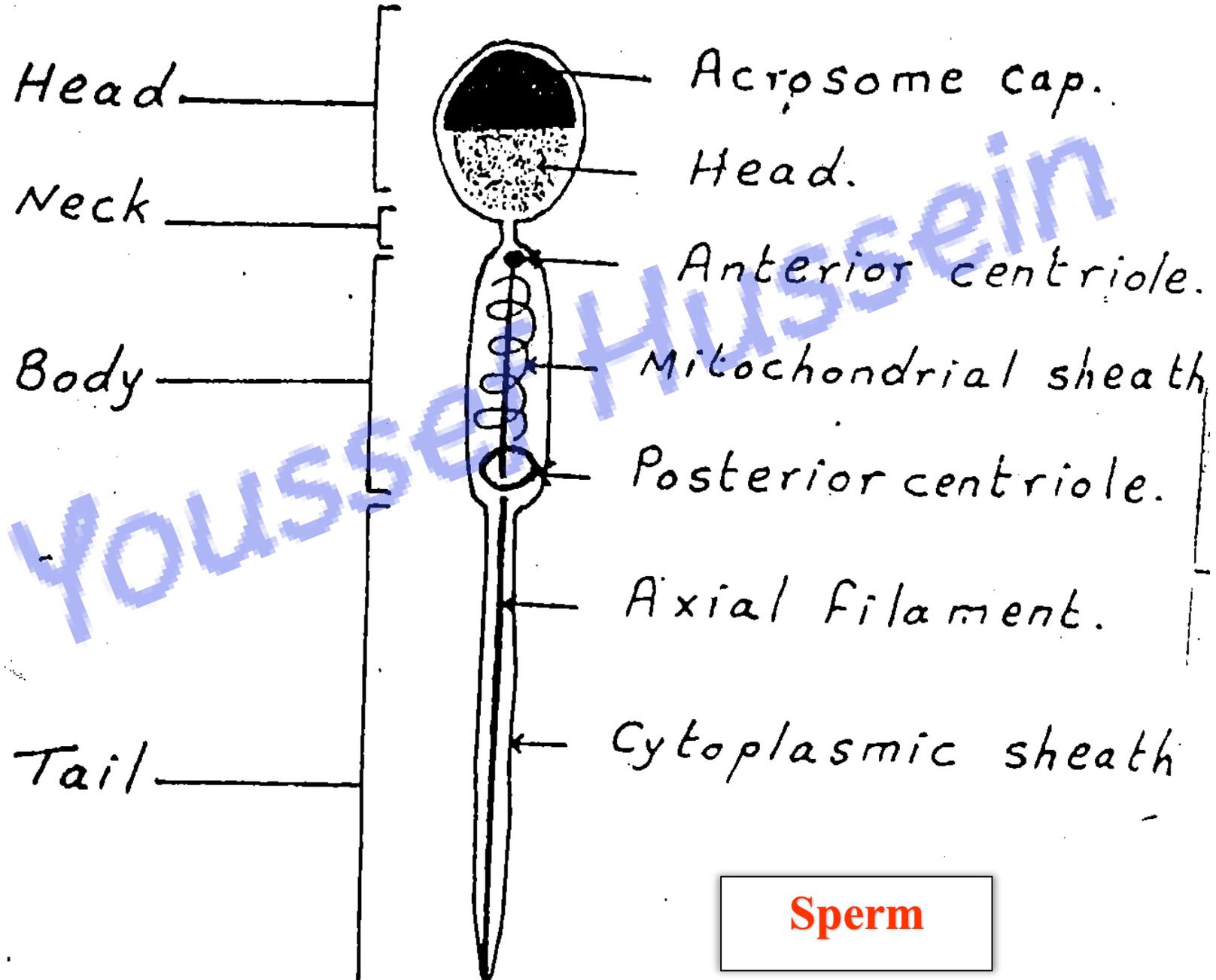
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Spermatid

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Stage of transformation



Sperm

(4) Stage of transformation (Spermiogenesis):

- It occurs in male only.
- Transformation of the spermatid into a mature sperm.
- The **length** of the sperm is about **50- 60 micrometer**
 1. The **nucleus** forms the **head** of sperm.
 2. The **Golgi** apparatus forms **acrosomal cap** contains **hydrolytic enzymes** which covers the anterior 1/2 of the head.
 3. **Centrioles**,
 - a- **Anterior** centriole: in the neck, immediately behind the head.
 - b- **Posterior** centriole: forms a **ring** shaped structure at end of the body.
 - **Axial filament** arises from anterior centriole and passes through the ring shaped posterior centriole to the tail.
 4. **Mitochondria** forms a mitochondrial sheath around axial filaments between centrioles.
 5. **Cytoplasmic membrane** forms a cytoplasmic sheath around the neck, body and tail (longest part).

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- **Characters of normal sperm**

- 1. Number of sperm** about 20-200 million per ml and survive on fructose.
- 2. Parts of mature sperm:** head, neck, body and tail.
- 3. Motile of sperm at ejaculation:** more than 80%.
- 4. Rate of movement of sperms** in the female genital tract about 1- 3 mm per minute.
- 5. Survival of sperm** in the female genital tract about 3-4 days, up to 5 days.
- 6. The average volume of semen** at ejaculation is 3-5 ml
- 7. Appearance** is whitish to gray
- 8. PH** is 7.2 – 8.0 (If low is acidic while high is alkaline)
- 9. The seminal fluid is secreted by** testis, seminal vesicle, prostate, and bulbourethral glands (Cooper's gland)

- **Abnormal spermatogenesis**

- i) **Azoospermia**: absence of sperms in the seminal fluid
- ii) **Oligospermia**: decreased number of sperms in the seminal fluid
- iii) **Asthenospermia** reduced sperm motility
- iv) **Necrospermia**: sperms found dead.
- v) **Genetic abnormalities**: Sperm having abnormal chromosomal content
- vi) **Morphological Abnormalities**: If more than 20% affect fertility
 - Giant. - Dwarf. - Joined in head or in tail.



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Oogenesis

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**** Definition:** It is a process by which mature ovum is formed from primitive germ cell (oogonium)

• OOGENESIS

**** Site:** in the cortex of ovary in female.

**** Time:**

- It **started** during foetal (intrauterine) life
- **Continues** after puberty
- **Completed** after fertilization
- **Arrested** at the age of menopause.

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- Many of the primary oocytes degenerate before birth
- At birth, the ovary contains about **two million primary oocyte**, most of them degenerate and, by puberty, when ovulation begins only about **300,000- 400,000 primary oocytes** are left in one ovary.

Before birth

Stage of Proliferation

daughter

Daughter oogonium

Stage of growth

Primary oocyte

primary oocyte

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1st meiotic division

At puberty (ovulation)

Stage of maturation

Secondary oocyte

First polar body

2ry oocyte and 1st polar body

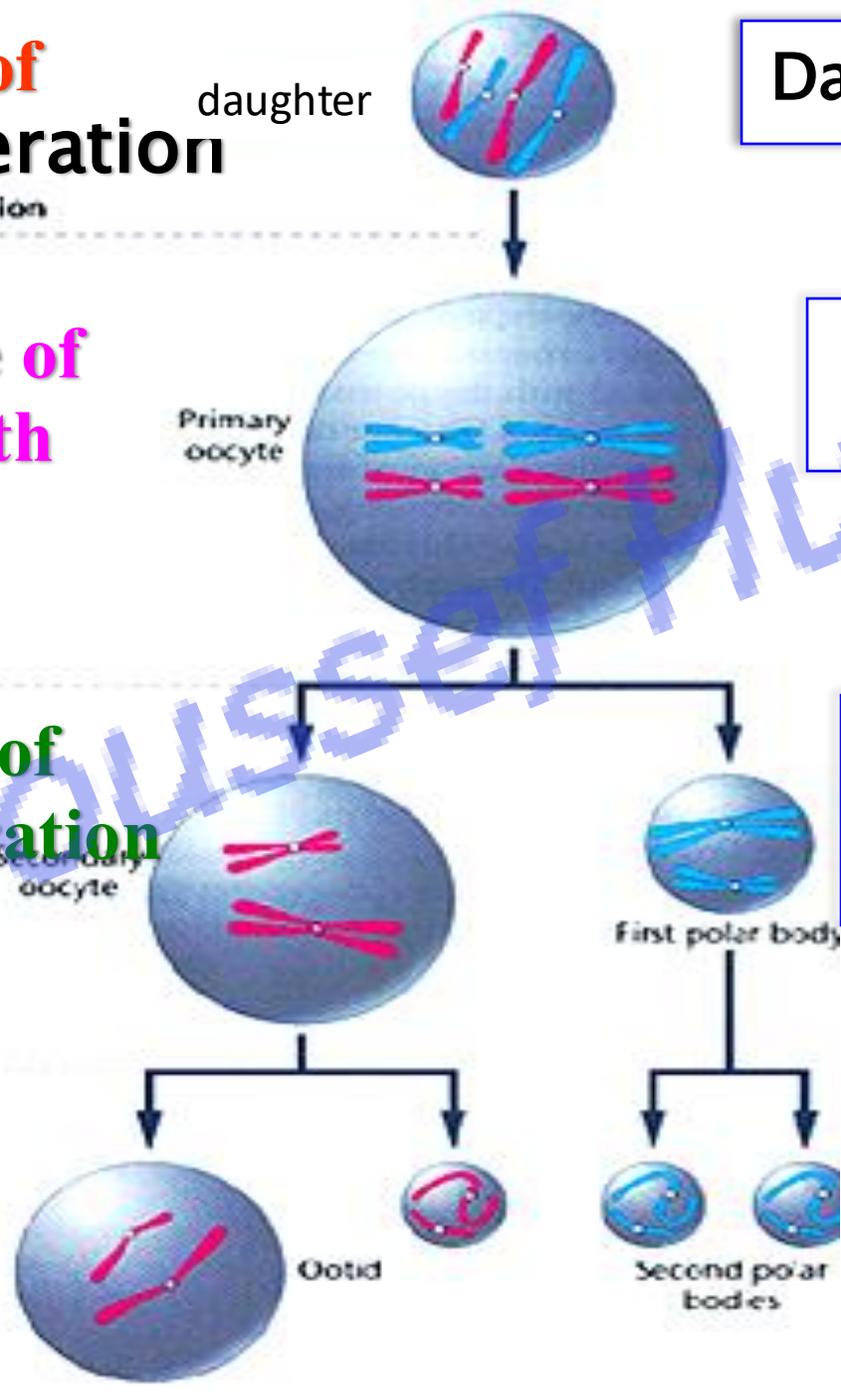
2nd meiotic division

At fertilization

Ootid

Second polar bodies

Ovum and 2nd polar body



**** Stages of Oogenesis**

A- During foetal life

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(1) Stage of proliferation:

- Each primordial germ cell; {**oogonium**} (46 chromosome) is divided by mitosis into 2 **daughter** oogonia (each contains 46 chromosomes).

(2) Stage of growth:

- Each of the daughter oogonia increases in size forming the **primary oocyte** containing 46 chromosomes (at birth).

B- After puberty

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(3) Stage of maturation:

- I) **1st meiotic division (reduction division):** each primary oocyte divide by meiotic division into one **secondary oocytes** (contains 22 +X chromosomes and **1st polar body** (contains 22 +X chromosomes and minimal amount of the cytoplasm)).

C- After fertilization

II) 2nd meiotic division (equational division):

- The secondary oocyte divides into **mature ovum** (contains 23 chromosome, 22 + X and most of the cytoplasm) and **2nd polar body** (contains 22 +X chromosomes and minimal amount of the cytoplasm) in the Fallopian tube.
- The 1st polar body divided by **secondary meiotic division** into two **2nd polar bodies**.

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N.B;

- The role of the polar body is to reduce the number of chromosomes. Later on decay and disintegrated

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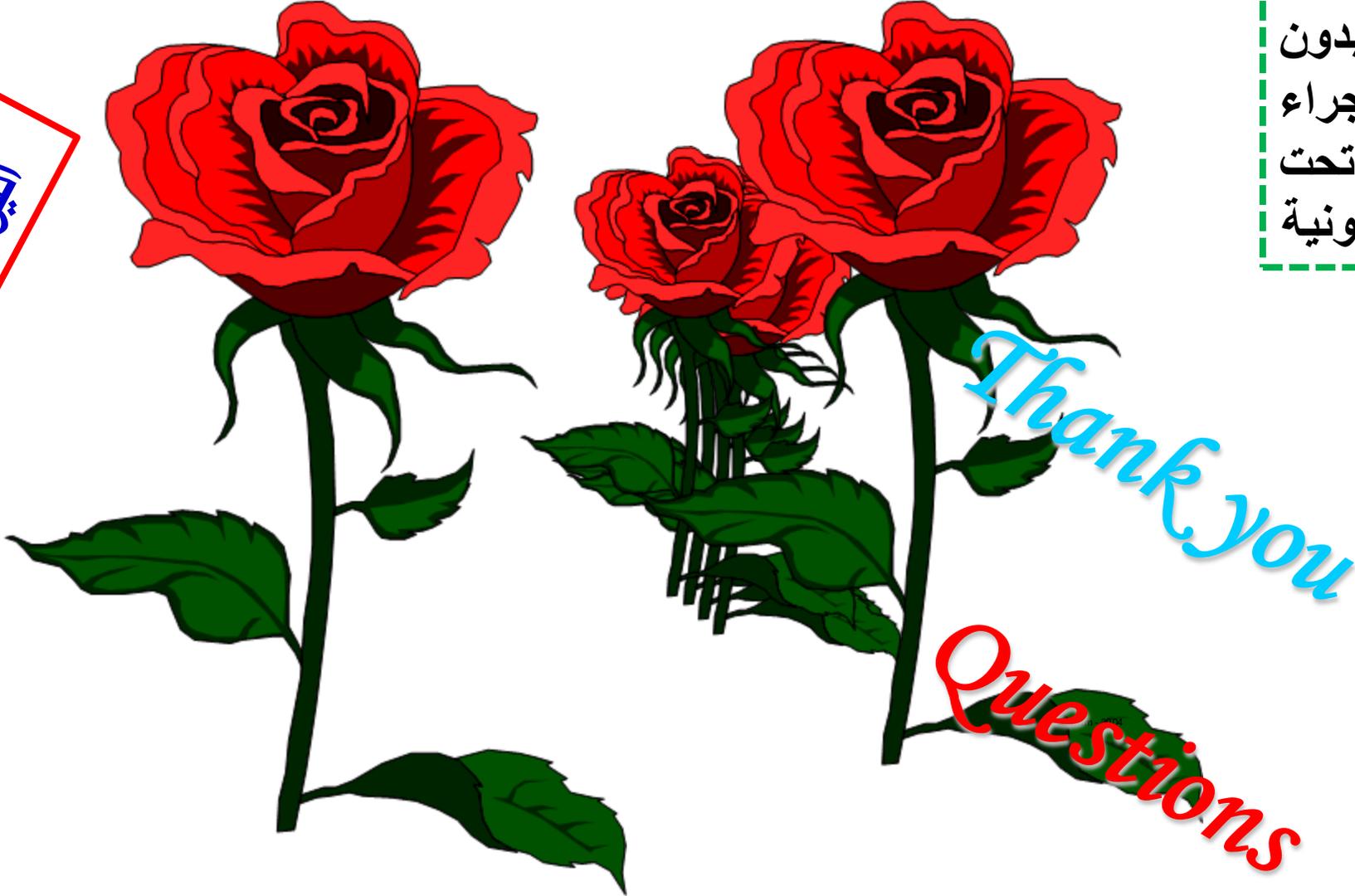
• Differences between spermatogenesis and oogenesis

	Spermatogenesis	Oogenesis
Definition	Formation of the sperms from the primordial germ cells.	Formation of the ova from the primordial germ cell.
Site	In the seminiferous tubules of testis	In the cortex of the ovary
Time	<p>- It started at puberty and continues till very old age (all over life).</p> <p style="border: 2px solid red; padding: 5px; display: inline-block;">البيوتوب د. يوسف حسين</p>	<p>- It started during intrauterine life, and continues after puberty to be completed after fertilization.</p> <p>- It arrested at the age of menopause.</p>
Hormones	- Testosterone, Follicle stimulating hormone, Luteinizing hormone	- FSH and LH (Released by the anterior pituitary gland)
Stages	Proliferation, growth, maturation and transformation.	Proliferation, growth, maturation (No transformation stage)
Results	Each daughter spermatogonium gives 4 sperms.	Each daughter oogonium gives 1 ova and 3 polar bodies.

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