

وسهلا

أهلا

يُمنع أخذ السلايدات بدون  
إذن المحرر واي اجراء  
يخالف ذلك يقع تحت  
طائلة المسؤولية القانونية



# الأستاذ الدكتور يوسف حسين

أستاذ التشريح وعلم الأجنة - كلية الطب - جامعة الزقازيق - مصر

رئيس قسم التشريح و الأنسجة و الأجنة - كلية الطب - جامعة مؤتة - الأردن

دكتورة من جامعة كولونيا المانيا

جروب الفيس د. يوسف حسين (استاذ التشريح)

Prof. Dr. Youssef Hussein Anatomy - YouTube

اليوتيوب د. يوسف حسين

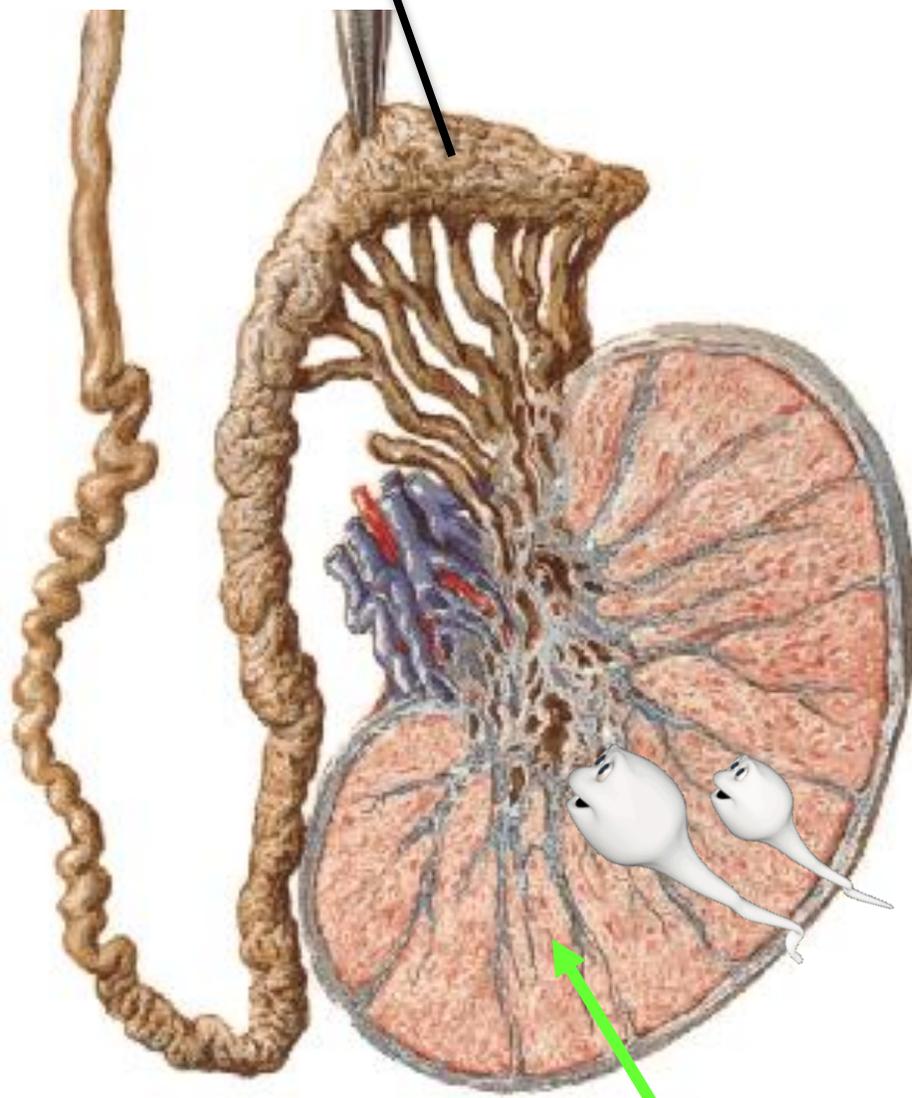
<https://www.youtube.com/@ProfDrYoussefHusseinAnatomy/playlists>

# SPERMATOGENESIS

البيوتوب د. يوسف حسين

- \*\* Definition:** It is the process of formation of the sperms (mature male gametes) from the primordial germ cells (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 and androgen hormone.
  - Testis have interstitial cells (**Leydig cells**) that produce male sex hormone (**testosterone**).
  - Seminiferous tubules is structural unit of testes, site of developmental phases of sperms, containing **Sertoli cells**.

## ❖ **Functions of Sertoli cells**

1. Secret protein for **nutrition** of developing sperms So called **mother cells or Nurse cells**
2. **Phagocytosis** for residual cytoplasm from spermatogenesis.
3. Epithelial **supporting** cells
4. Maintain the environment necessary for development and maturation of sperms via **formation of blood testis barrier**.
5. **Secret anti-Mullarian hormones** during early stage of fetal life
6. **Secret inhibin B and activin** after puberty to regulate FSH
7. **Secret androgen binding protein** leading to increase testosterone hormone to stimulate spermatogenesis

**Stage of proliferation**

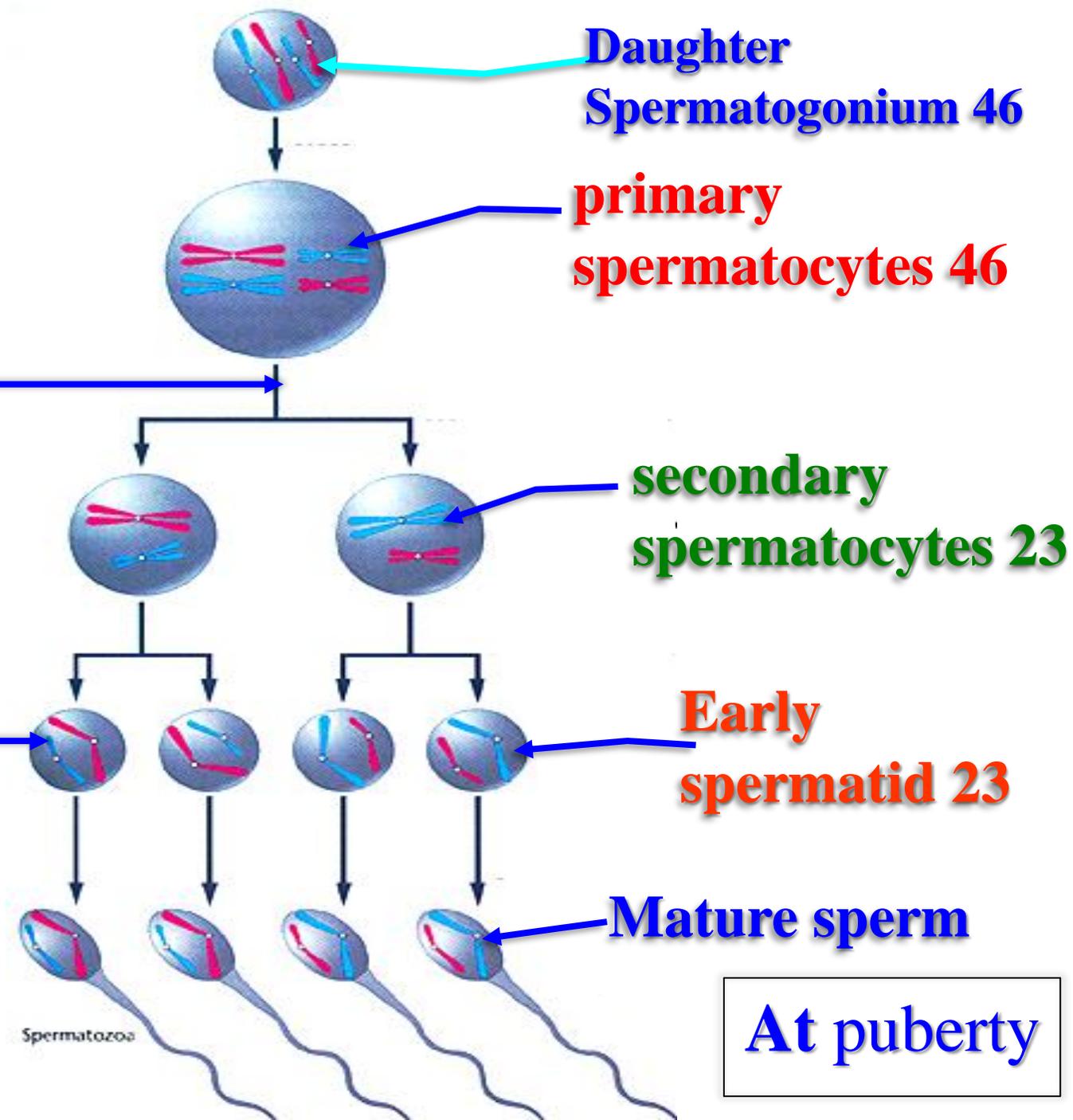
**Stage of growth**

**1<sup>st</sup> meiotic division**

**Stage of maturation**

**2<sup>nd</sup> meiotic division**

**Stage of transformation**



## \*\* Stages of spermatogenesis

\*\* It includes 4 stages:

### (1) Stage of proliferation

- Each primordial germ cell (**spermatogonium**, 46 chromosome) is divided by **mitotic division** into 2 **daughter spermatogonium** (each contains 46 chromosomes).

### (2) Stage of growth

- Each of the daughter spermatogonia acquired more cytoplasm and increased in size forming **primary spermatocyte** (46 chromosomes).

اليوثيوب د. يوسف حسين

<https://www.youtube.com/@ProfDrYoussefHusseinAnatomy/playlists>

### (3) Stage of maturation

- In this stage the primary spermatocytes divide by **meiotic division** as follows:

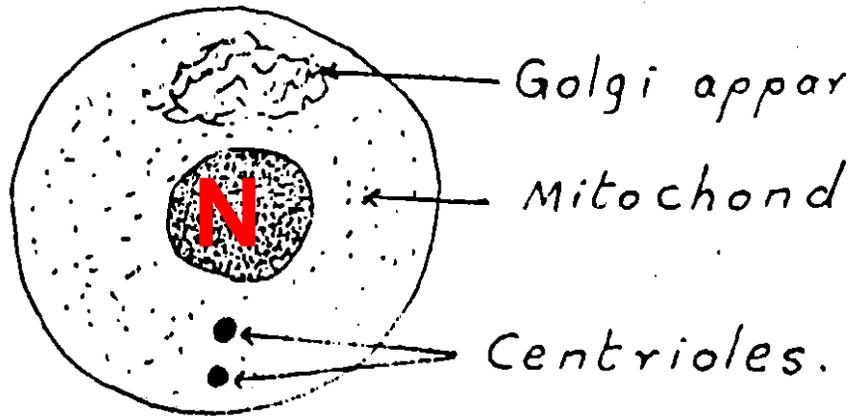
**I) 1st meiotic division (reduction division):** each primary spermatocyte divide by meiotic division into two **secondary spermatocytes** {23 chromosome (one contains 22+X and one 22+Y)}.

**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 primordial germ cell gives 8 spermatids (4= 22+X and 4= 22+Y).

اليوثيوب د. يوسف حسين

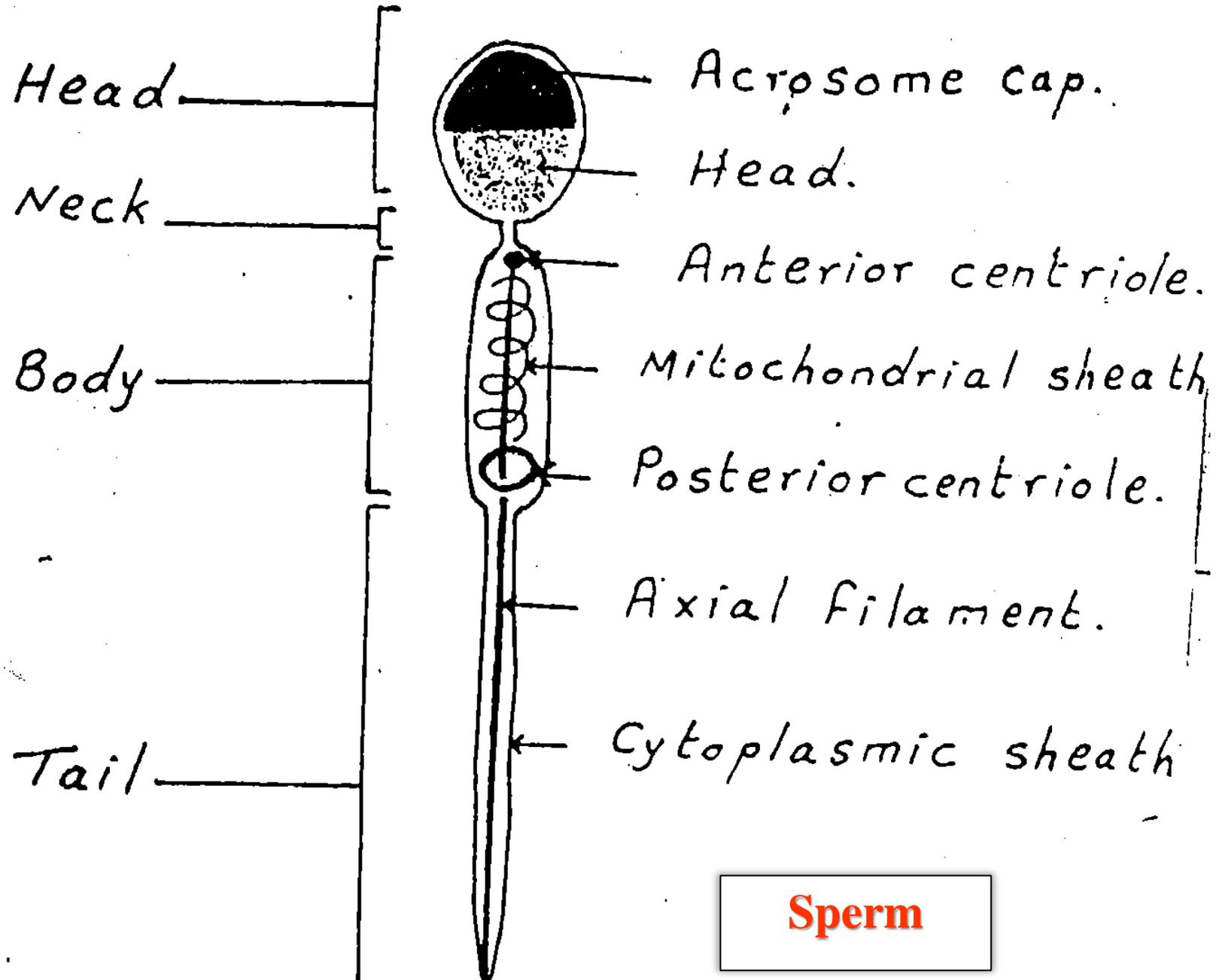
<https://www.youtube.com/@ProfDrYoussefHusseinAnatomy/playlists>



**Spermatid**

اليوثيوب د. يوسف حسين

**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: 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 body and tail.

اليوثيوب د. يوسف حسين

dr\_youssefhussein@yahoo.com

- **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.
- 6. The average volume of semen** at ejaculation is 3-5 ml
- 7. Appearance** is whitish to gray
- 8. PH** is 7.2 - 7.8 (If low is acidic while high is alkaline)
- 9. The seminal fluid is secreted by** testis, seminal vesicle, prostate, and bulbourethral glands

- **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.

اليوتيوب د. يوسف حسين



<https://www.youtube.com/@ProfDrYoussefHusseinAnatomy/playlists>

# Oogenesis

البيوتوب د. يوسف حسين

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

## • **OOGENESIS**

dr\_youssefhussein@yahoo.com

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

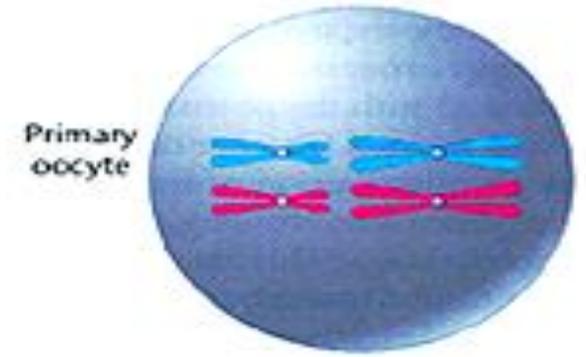
**Period of Proliferation**



Daughter oogonium

**Before birth**

**Period of growth**

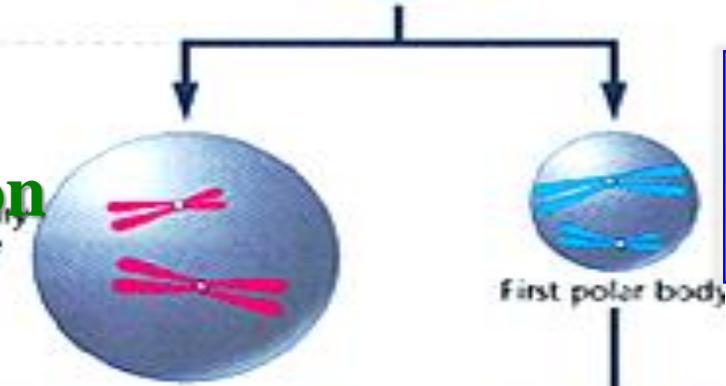


primary oocyte

1st meiotic division

**At puberty (ovulation)**

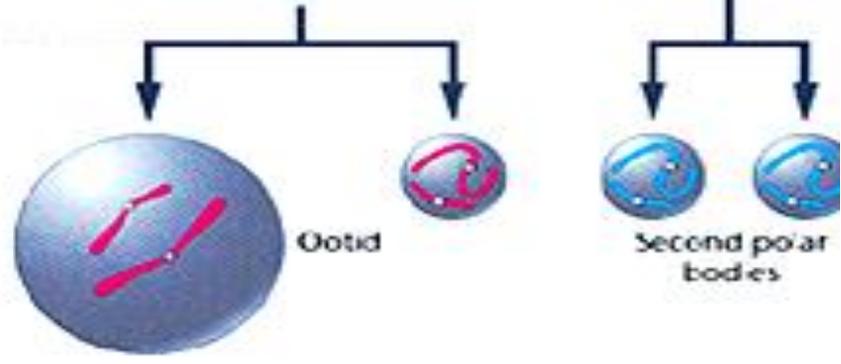
**Period of maturation**



2ry oocyte and 1st polar body

2nd meiotic division

**At fertilization**



Ovum and 2nd polar body

## **\*\* Stages of Oogenesis**

### **A- During foetal life**

[dr\\_youssefhussein@yahoo.com](mailto:dr_youssefhussein@yahoo.com)

#### **(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**

#### **(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 **1<sup>st</sup> 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 **2<sup>nd</sup> polar body** (contains 22 +X chromosomes and minimal amount of the cytoplasm).
- The 1st polar body divided by **secondary meiotic division** into two **2<sup>nd</sup> polar bodies**.

اليوثيوب د. يوسف حسين

### **N.B;**

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

<https://www.youtube.com/@ProfDrYoussefHusseinAnatomy/playlists>

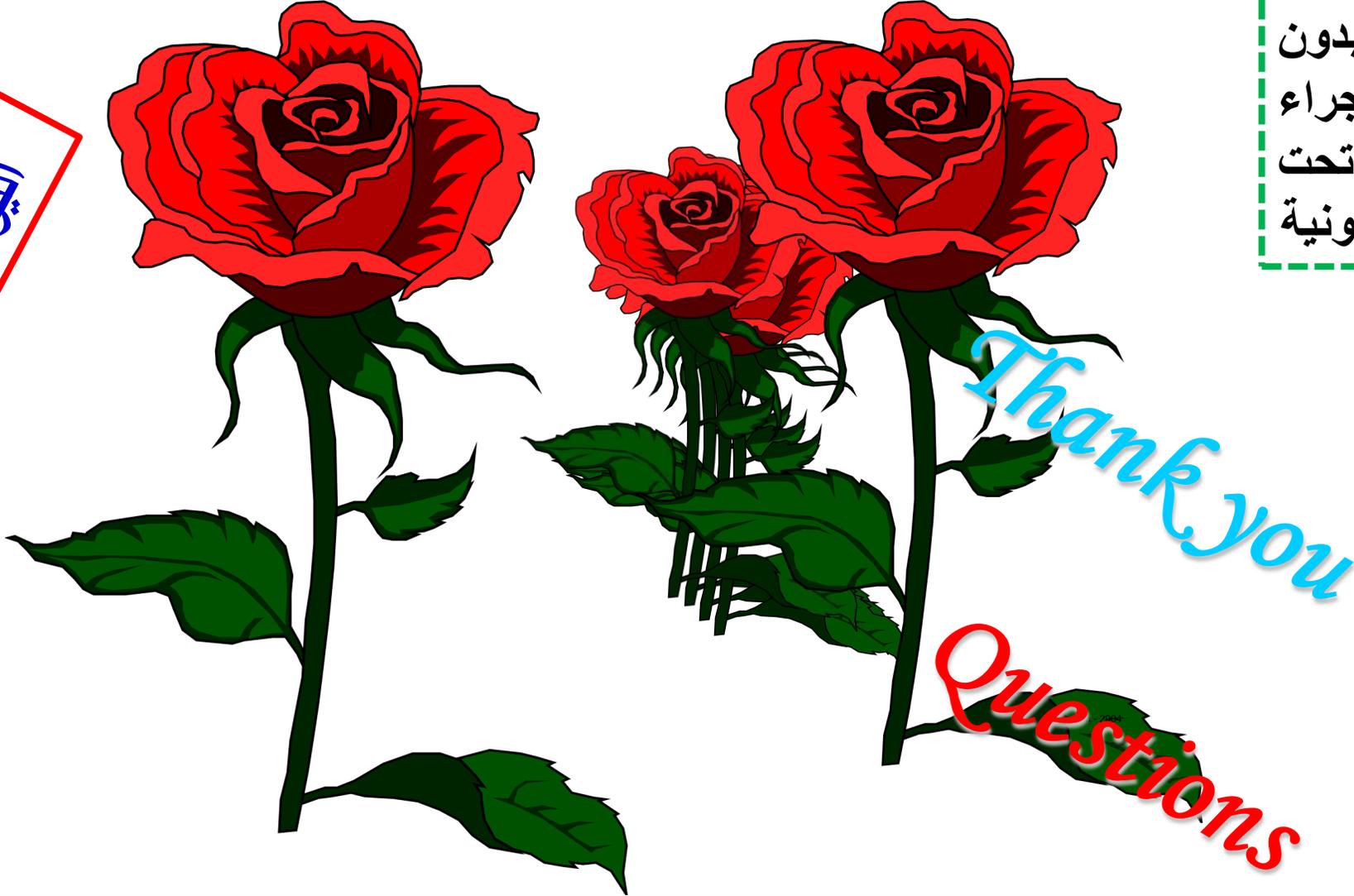
• **Differences between spermatogenesis and oogenesis**

	<b>Spermatogenesis</b>	<b>Oogenesis</b>
<b>Definition</b>	Formation of the sperms from the primordial germ cells.	Formation of the ova from the primordial germ cell.
<b>Site</b>	In the seminiferous tubules of testis	In the cortex of the ovary
<b>Time</b>	- It started at puberty and continues till very old age (all over life). <div style="border: 2px solid red; padding: 5px; display: inline-block; margin-top: 10px;">البيوتوب د. يوسف حسين</div>	- It started during intrauterine life, and continues after puberty to be completed after fertilization. - It arrested at the age of menopause.
<b>Hormones</b>	- FSH, testosterone and interstitial cell stimulating hormone (ICSH)	- FSH and LH
<b>Stages</b>	Proliferation, growth, maturation and transformation.	Proliferation, growth, maturation (No transformation stage)
<b>Results</b>	Each primordial germ cell gives 8 sperms.	Each primordial germ cell gives 2 ova and 6 polar bodies.

[https://www.youtube.com/channel/UCVSNqbibj9UWYaJdd\\_cn0PQ](https://www.youtube.com/channel/UCVSNqbibj9UWYaJdd_cn0PQ)

يُمنع أخذ السلايدات بدون  
إذن المحرر واي اجراء  
يخالف ذلك يقع تحت  
طائلة المسؤولية القانونية

اليوتيوب د. يوسف حسين



<https://www.youtube.com/@ProfDrYoussefHusseinAnatomy/playlists>