

# Human Anatomy & Embryology

**Lecture:** Reproductive system

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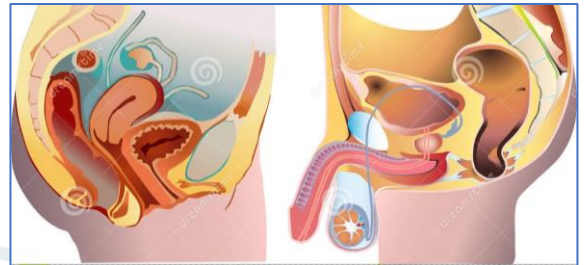
# Female reproductive system

## The male or the female genital (reproductive system) consists of:

- **Primary sex organs:** in case of the female, it is the **ovary** because it is going to produce gametes (sex cells that contain half number of chromosomes, they meet the other sex gametes and form a **zygote**, the very first cell of creating the human body).
- **Ducts:** connected in one way or another to the primary sex organ and these ducts are modified according to the Physiology of the area and they open to the outside.
- **Glands:** responsible for secretions to create normal physiological conditions.

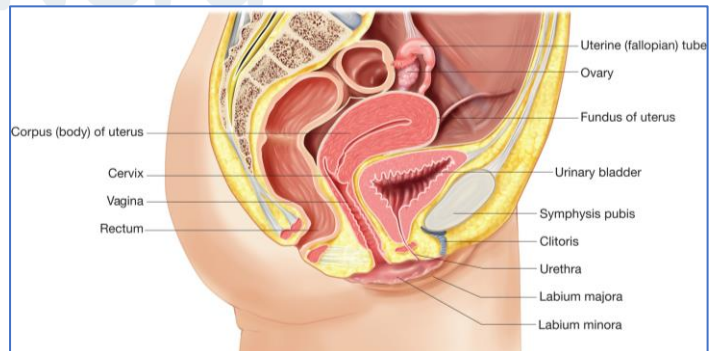
## Male VS female genital system:

- **Primary sex organs:** in case of the female the ovary is **inside the pelvis** having the normal temperature of inside of your body while in case of the male the testes are **outside the body** in a special skin sac called **scrotum** where they have lower temperature than that of the inside of the body in order to function.



## What are the structures making the female reproductive system?

- **Primary sex organ:** **ovary** (almond shape, its surface isn't smooth because it contains follicles of developing human gametes inside it).
- **Ducts:** **Uterine** or the **Fallopian** tube.
- **Midline structures:** The **uterus** (a large organ having a dome shape top which is called the fundus of the uterus, the body of the uterus and lower down we have the cervix that is the lowest part of the uterus to open into the vagina and the vagina opens to the outside which are the external genital organs).
- **External genital organs:** Vulva that is made of major lip and a minor lip they can also be called the labium majora and labium minora.

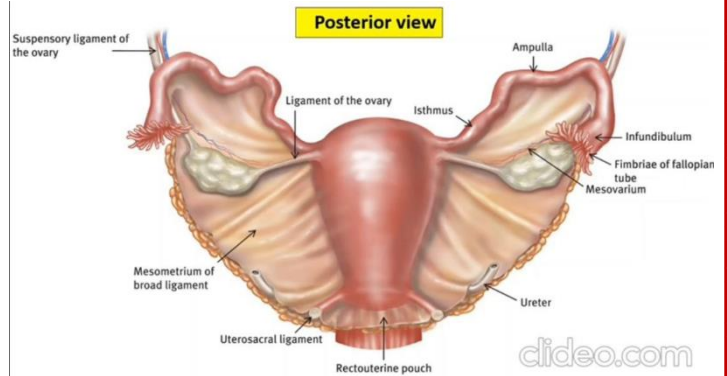


○ **Ligaments:**

**1) Broad ligament:** a ligament of the Peritoneum is made of two layers, the ovary is attached to the posterior layer, extends from the side of the pelvis coming towards the midline & covers the Fallopian tubes and the uterus

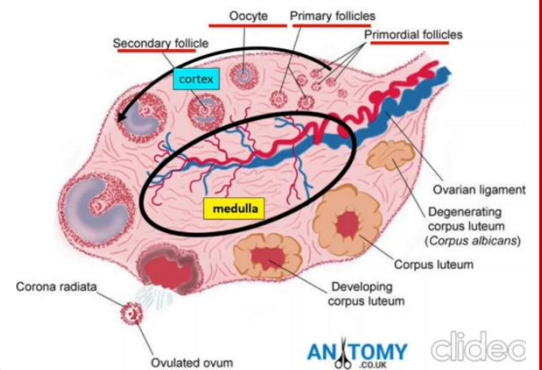
**2) Ovarian ligament:** connects the ovary to the uterus

**3) Suspensory ligament:** suspends the ovaries along the inner side of the anterior abdominal wall



❖ **The ovary** made of **inner medulla** (contains connective tissue and blood vessels but no follicles) and **outer cortex** (where **primordial follicles** are present)

❖ **Primordial follicles:** the very early developing ova of the reproductive system, develop along the way and start forming what is called primary follicles → oocyte → secondary follicles → Mature Graafian follicle in a process called oogenesis.



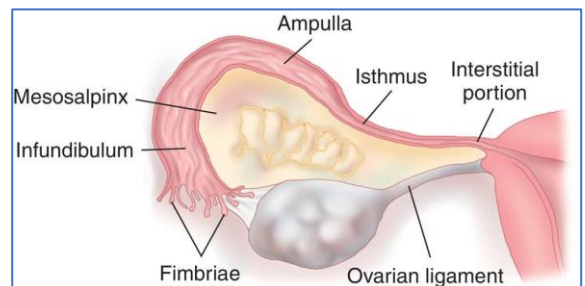
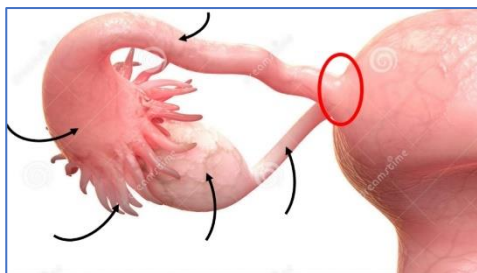
❖ **Uterine or the Fallopian tube:** the beginning of it has lots of little arms called Fimbriae (singular is Fimbria). These finger-like process and the big lateral end of the fallopian tube is not continuous with the ovary; it opens into the pelvic peritoneal cavity.

❖ The part which is next to fimbriae is called **Infundibulum** and then we have the **ampulla**.

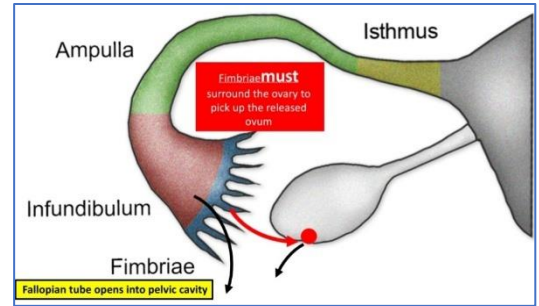
❖ As we approach the uterus, and all parts of the fallopian tube are covered by peritoneum (also called the broad ligament and then as tube approaches the uterus this part is called the **Isthmus** and then it's going to under the top of lateral part of uterus) شوف الصورة التي ببداية الصفحة

❖ Fimbriae should be free to move and when they move they go and surround the ovary

❖ The infundibulum, the ampulla, the isthmus and in this diagram, it is showing that the part of the tube passing through the wall of the uterus is called the **interstitial portion of the Fallopian tube**.

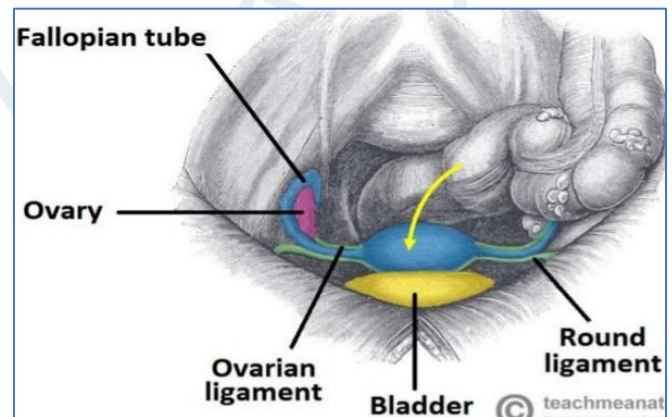
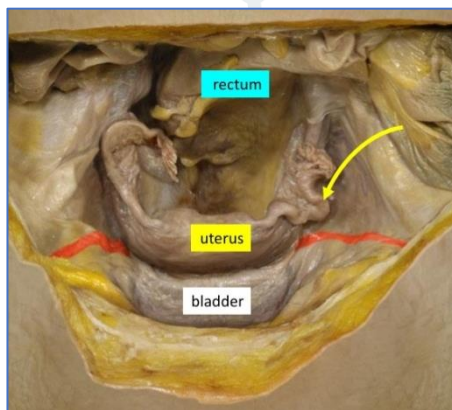


- ❖ This arrow is indicating that the cavity of the Fallopian tube opens into the pelvic cavity.
- ❖ The red circle shows that this is a follicle that will rupture and will release the ovum, the ovum should get into the Fallopian tube it should not fall down in the pelvic cavity therefore the fimbriae will come and surround the ovary so that the ovum will be picked up by the Fallopian tube.

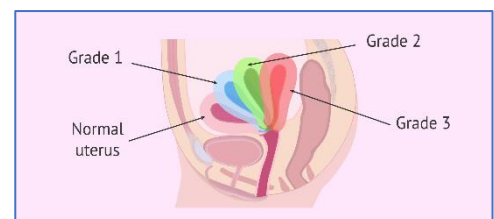


- ❖ The uterus is a midline structure that receives on both lateral parts the two Fallopian tubes.
- ❖ Its pear shape wide, covered with peritoneum, It is in the mid part of the broad ligament and it has a dome shape top which is called a fundus of the uterus.
- ❖ Anterior to the uterus is the urinary bladder which is just posterior to symphysis pubis and posterior to the uterus is the rectum the last part of GIT, all these structures are present in the true pelvis (It's the deepest part of the pelvic cavity)

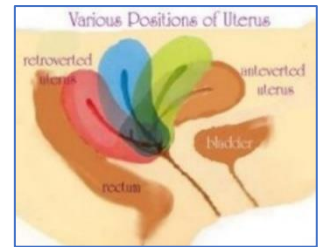
**Note:** The broad ligament divides true pelvis into an anterior part and posterior part (contains the rectum)



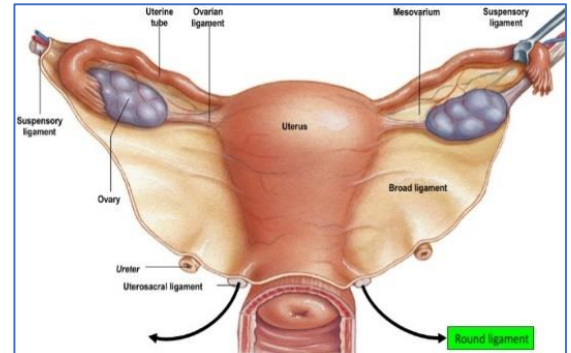
- ❖ This is the physiological position where normal pregnancy can happen but sometimes being go wrong because of some reasons the uterus is going to changes their position like:
  - ✓ Grade 1: Which is not sitting on the urinary bladder.
  - ✓ Grade 2
  - ✓ Grade 3: called retroverted.
 In grade 1,2,3 pregnancy cannot happen because the uterus is not in its normal position you will see people having these problems.



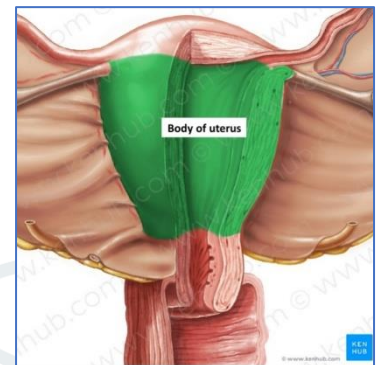
- ❖ This is another picture of normal what is called anteverted uterus uncontested and the green, blue and the red non physiological positions of the uterus.



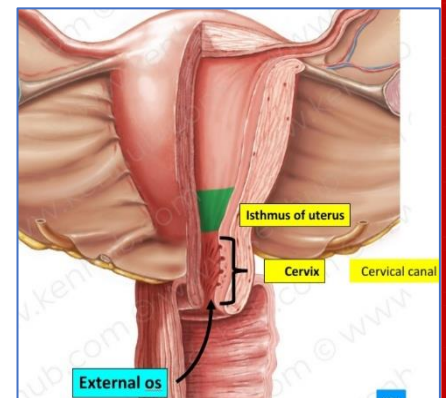
- ❖ In the lower part of the uterus there is a ligament called the **round ligament** that is going to go to enter the inguinal canal and passes through it then comes out of the external opening and inserts into labia majora (the outer lip of vulva).



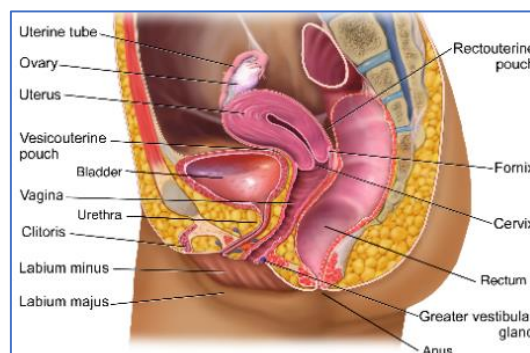
- ❖ The major part of the uterus is the body and a uterus has a cavity inside it lined with mucus membrane which is called the **endometrium**.
- ❖ The major bulk of the wall of the uterus is made of smooth muscles which is called the **myometrium** and the outside is covered by peritoneum.



- ❖ The lowest part of uterine cavity is called the Isthmus of uterus.
- ❖ This Isthmus is going to open into the neck of uterus which is the cervix (it's made of a wall which is part of the wall of the uterus and a canal which is called a cervical canal)
- ❖ the cervical canal opens to the vagina and the opening is called the **external os** (external opening) while cervical canal superiorly in the lower part of the Isthmus of the uterus is the **internal os**



**Note:** there are spaces of the vagina around the neck of the cervix these are called fornices (singular are the fornix).

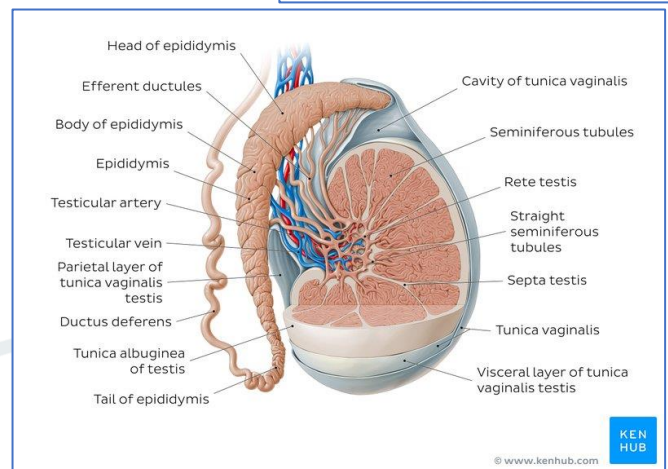
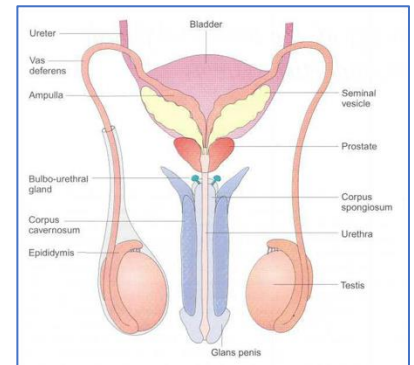


# Male's reproductive system

**Organs of this system:** (most of it are located outside the body cavity, other parts are within the pelvic cavity, and it joins the urinary system at the urethra.)

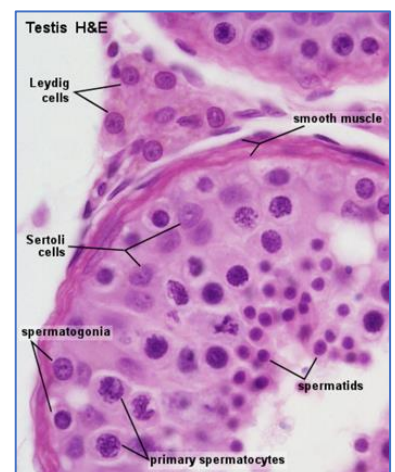
## 1. Testes: (Primary sex organ) (singular testis) (or called testicle)

- It is formed in the posterior abdominal wall, high up near the kidneys and descends down at the bottom of scrotum (if it didn't, medically we have to do it to avoid problems due to higher temperature of the body.)
- As it goes down to its proper location it takes part of the peritoneum with it and is called → **Tunica vaginalis**: gives two layers:
  1. Parietal layer: surrounds the testes
  2. Visceral layer
- Sometimes fluid collects in the space between them and cause a problem.
- **Tunica albuginea** (albuginea means white): The capsule of a testis which is a thick fibrous tissue that makes its skeleton.



1. It sends septa into cavity of the testis.
2. These septa don't meet and form an incomplete lobule of testis, these lobules contain seminiferous tubule which produce sperms.
3. The seminiferous are looped in structure, which means a shape of a circle that is connected to straight seminiferous tubule.
4. There are several tubules located in each lobule and each one is populated by different type of cells, because we can see different types of nuclei. (shape of nucleus indicates shape of cell.)
5. At center of each circle/cross-section of the seminiferous tubule there's a lumen that receives the very early developed sperm
6. Cells at the periphery of the seminiferous tubule from inside are **spermatogonia** (primitive developing gametes.)
7. On the inside we have different sheets of nuclei (large pale nucleus for large cells that will serve and nurse developing male gametes = **Sertoli cells**)
8. Toward lumen: Smaller nucleus and denser = the head of developing sperms.

It goes as spermatogonia → primary spermatocytes → (dark stained elongated and small nuclei) head of developing sperms.

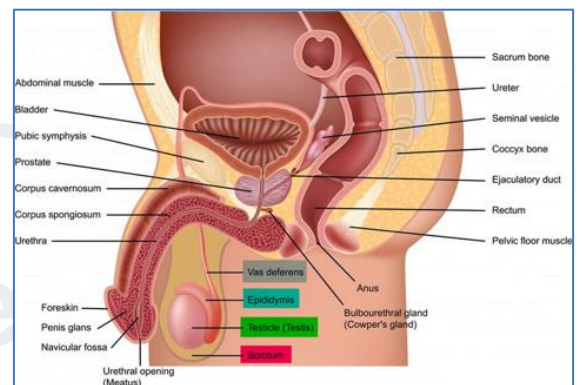


9. Between the tubules there are cells called **Lydig interstitial cells** that produces the male hormone testosterone. (not inside the seminiferous)
10. Looped seminiferous tubules → straight seminiferous tubules → Rete testis which is a mesh of tubules → straight collections called efferent ductulus → join together to meet a very long tortuous single duct which forms the epididymis (3 parts) 1. Head of epididymis 2. Body of epididymis 3. Tail of epididymis (less coiling) → and continuous as mentioned below.

- Produces male gametes.
- Produces male hormones.
- What comes out of the testes goes through the epididymis.
- Located in the scrotum:
  1. (sac of skin in lower abdomen between thighs- TO MAINTIN LOWER TEMPRATURE FOR SPERM PRODUCTION/ GAMETES)
  2. Scrotum has a muscle called dartos muscle divided by the septum into two halves (one on each side).

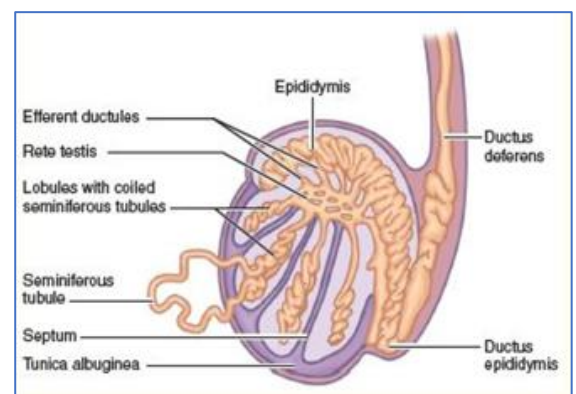
## 2. Penis: 3 cylinders (external genital area.)

- Two corpus cavernosum: Contains blood vessels and sinuses (top 2) (when filled with blood → erection and hardening).
- One corpus spongiosum: Lower median part
  1. No blood spaces
  2. Soft tissues (this is why it's called spongiosum)
  3. Contains urethra
  4. Ends as glans penis

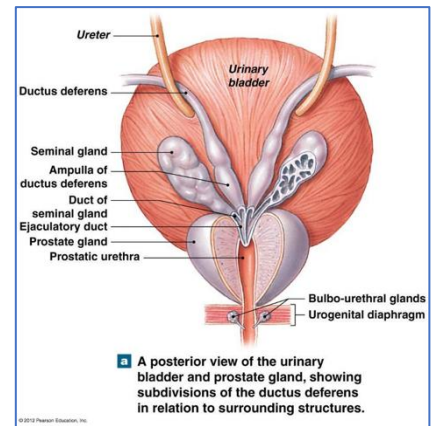


## 3. Ducts' system:

- **Epididymis:** long tube carrying sperms to their destination.
- **Vas deferens (ductus deferens):** starts at the tail of epididymis and travels through the spermatic chord along with arteries and veins through the inguinal canal → (internal opening of inguinal canal) into the pelvic cavity posteriorly to the urinary bladder from the sides (between the uterus and the urinary bladder) → (toward midline) dilates and form an ampulla.

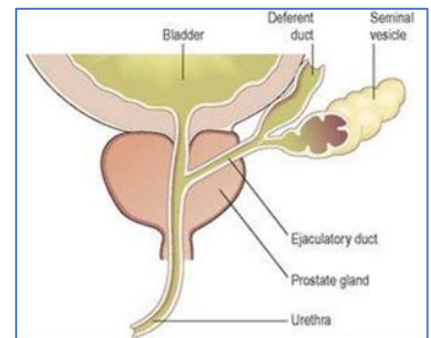


- Ampulla sends a duct to join the duct of seminal.
- The two ducts join to form ejaculatory duct which pass through the prostate into the urethra (unique because in females' genital system doesn't join the urethra).
- As urethra goes from bladder through prostate gland it will go through the penis.
- **Urethra:** Common passage for sperm and urine, it has 3 parts:
  1. Prostatic urethra: within the prostate gland (2.5-3 cm)
  2. Membranous (1.25cm) (passing through urogenital diaphragm)
  3. Spongy (the longest.) (16 cm) inside bulbo-spongiosum.
  4. Longer in males (16-20 cm) than females (4 cm)



#### 4. Glands:

- Seminal vesicles (2 one on the right and one on the left): lobulated glands which add secretions to the solution present in ampulla (containing sperms), they are posterior to the urinary bladder.
- Prostate gland is posterior to the prostatic urethra.
- Bulbo-urethral gland (Cowper's glands): Secretions to the urethra.



*Good Luck*