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## Lecture (6)

# Anatomy of Male Reproductive System

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# **ILOs**

- 1. Describe the gross anatomy of scrotum, testes, intra-testicular ducts, excretory genital ducts, penis, and genital glands (prostate, seminal vesicles)**
- 2. Study the spermatic cord, its covering sheaths, and its contents.**

# Testis

The testes (Right & Left) are the primary male sex organs.

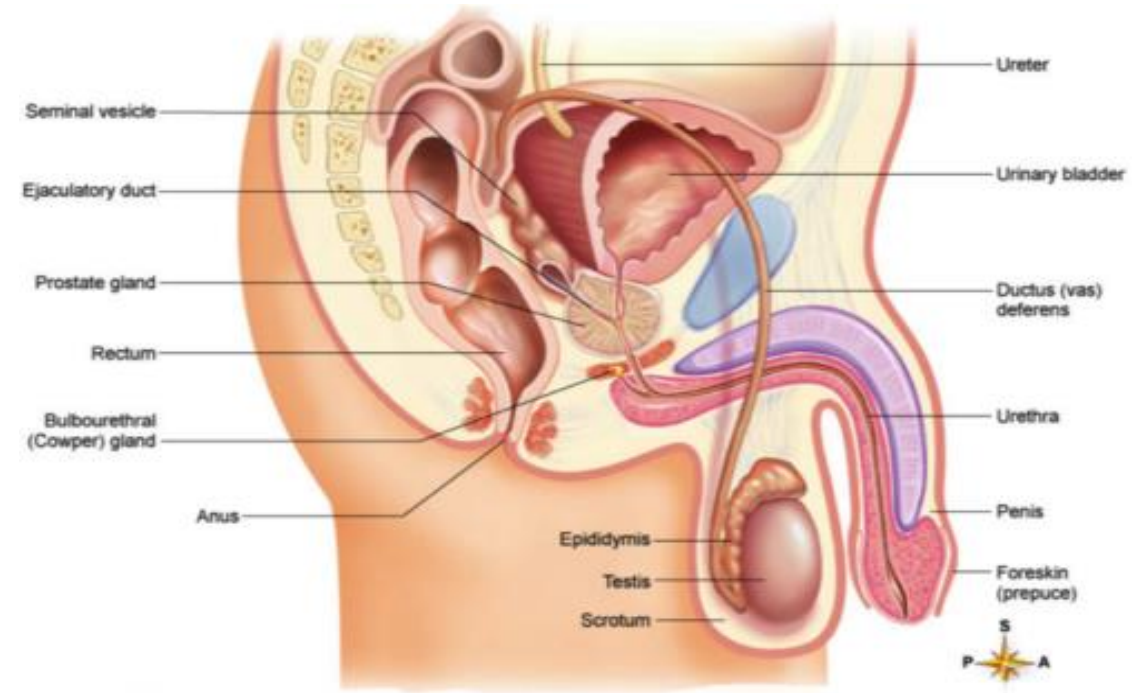
**Size:** 5cm length, 2.5cm thickness and 2.5 cm anteroposterior diameter.

**Description:** It has;

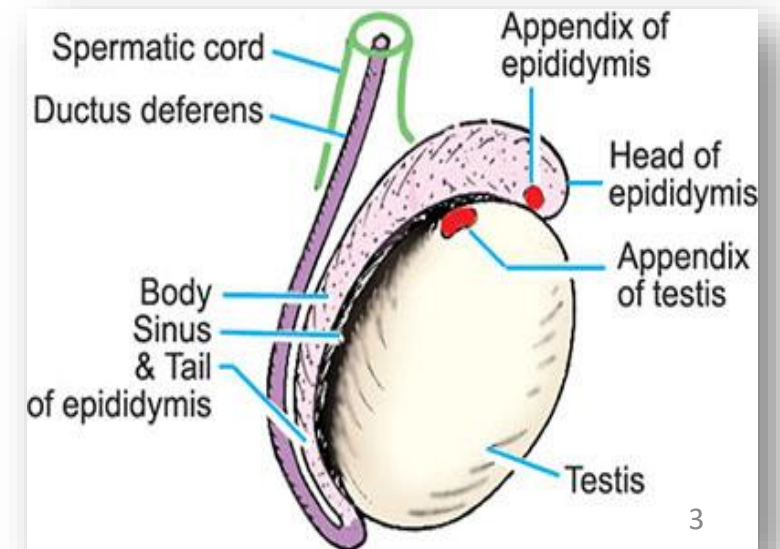
- Two poles (upper and lower).
- Two borders (anterior and posterior).
- Two surfaces (medial and lateral).

**Site:**

In the scrotum.



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## The upper pole of the testis:

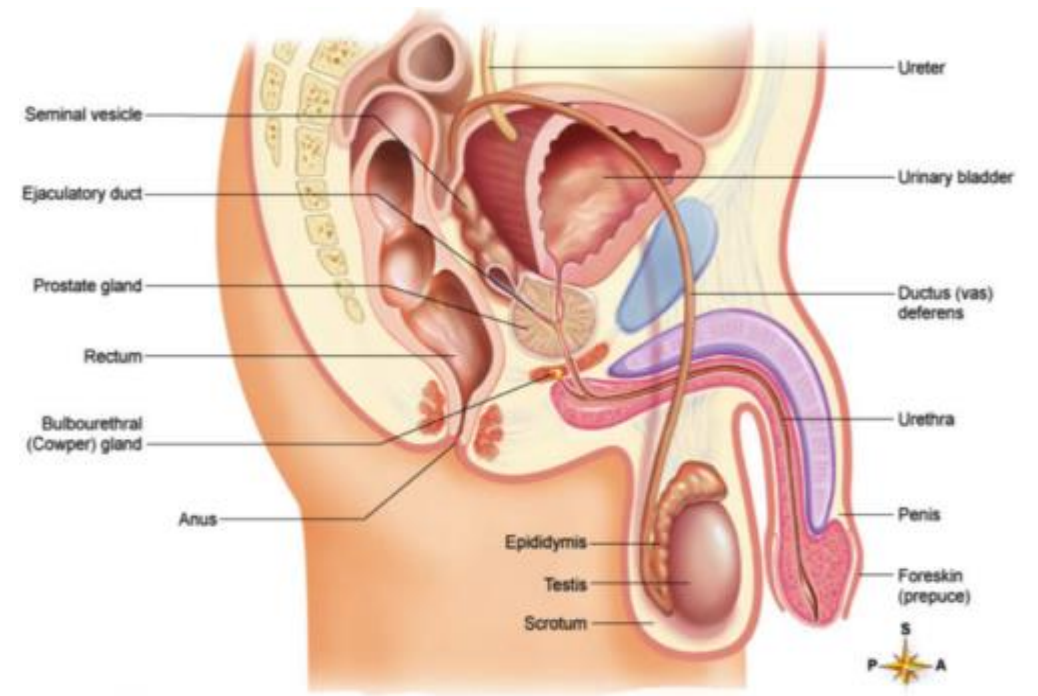
- It is covered by the head of the epididymis.

## The posterior border of the testis:

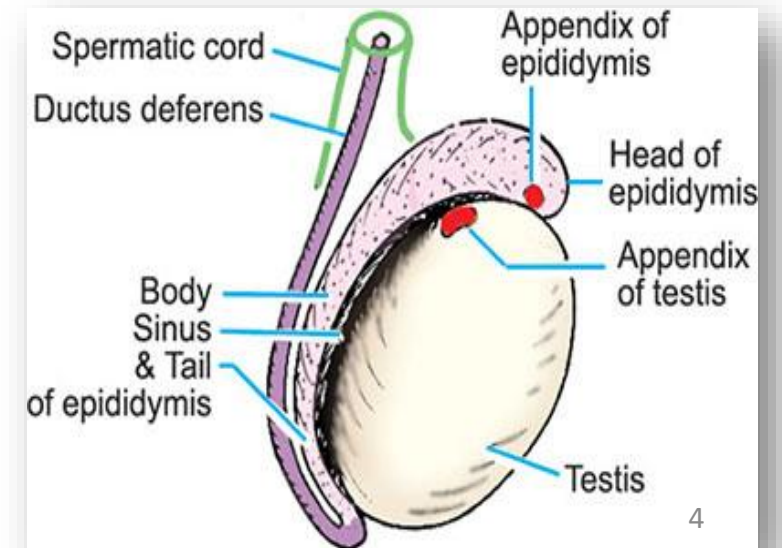
- It is closely related to the body & tail of the epididymis and the ductus deferens.

## To differentiate the lateral surface from the medial surface of the testis.

- By the sinus of epididymis, at lateral aspect.



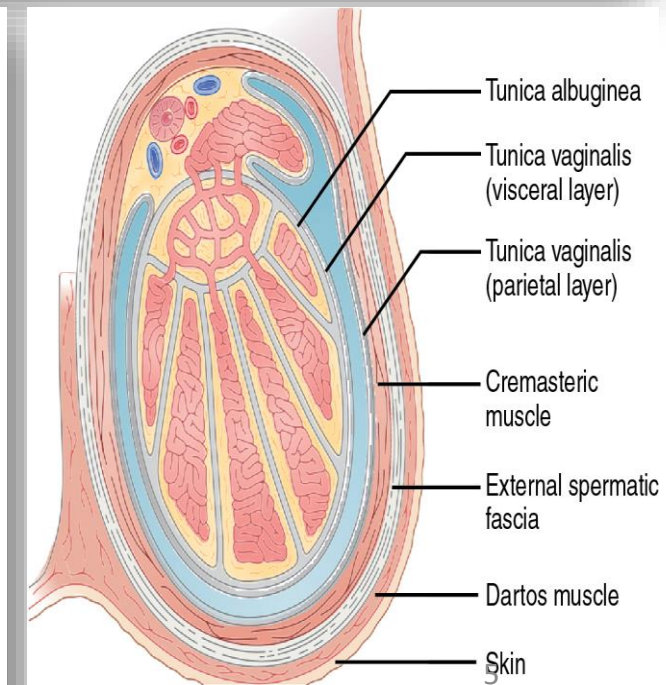
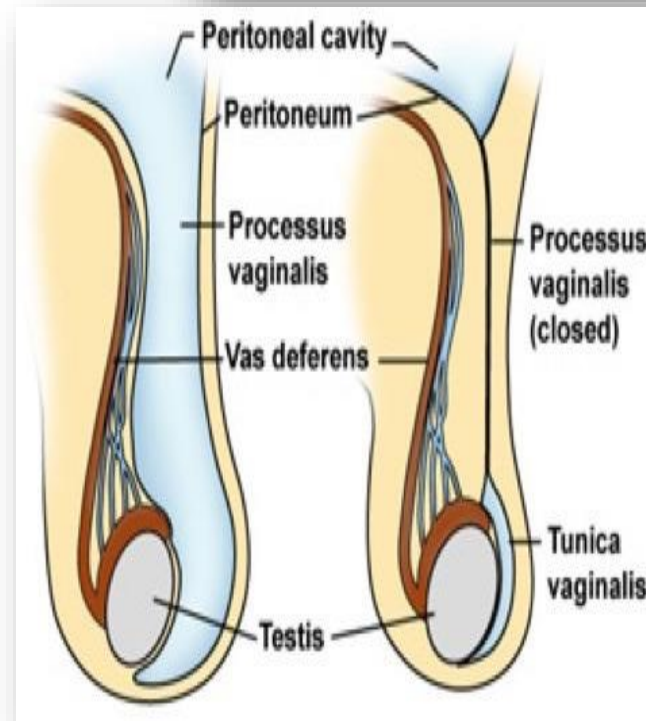
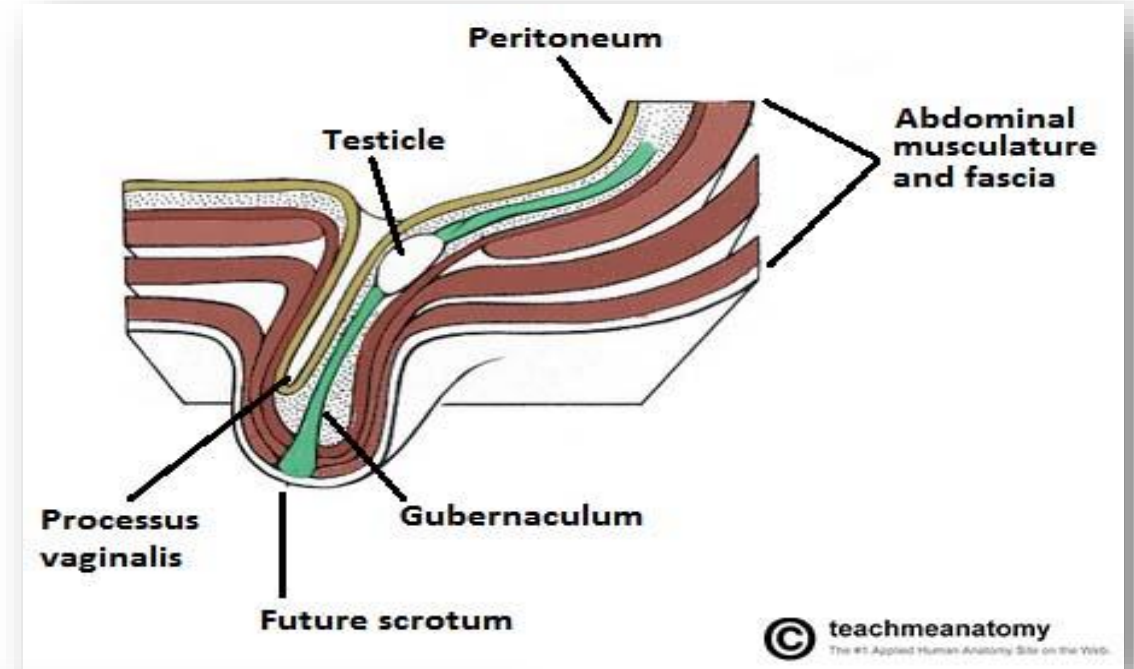
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Testes develop high up on the posterior abdominal wall and descend, normally before birth, through the inguinal canals to reach the scrotum, carrying their blood vessels, lymphatics, nerves & process of peritoneum (Processus vaginalis).

### Tunica vaginalis:

- It is a closed sac of peritoneum encloses the testis.
- **It has:**
  - a- Inner visceral layer.
  - b- Outer parietal layer.
  - c- **A tunical space:** contains thin film of serous fluid is normally present in between the two layer.



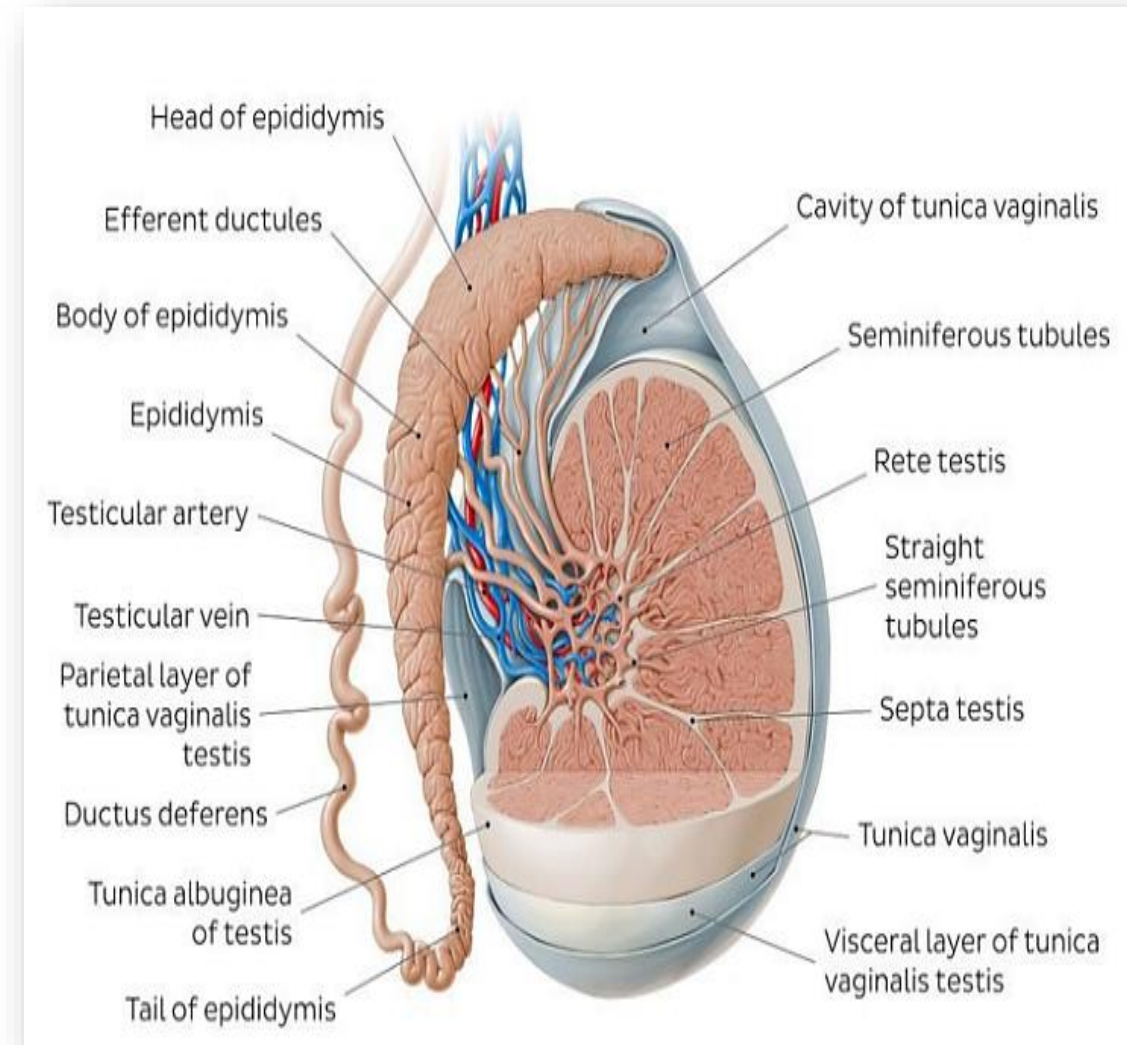
## Structure of testis:

### Tunica albuginea:

- A thick white fibrous capsule that envelopes testis.
- It is thickened along the posterior border of the testis to form the **mediastinum testis**.

### Mediastinum testis:

- It sends septa, dividing the testis into compartments (about 200-300).
- Each compartment contains 2-3 seminiferous tubules.
- Ends of seminiferous tubules toward mediastinum testis become straight (**tubuli recti**). they unite to form a network of canaliculi termed the **rete testis**.
- **Efferent ductules** (12-20) arise from the rete testis, penetrate the capsule and connect with the epididymis.



# Epididymis

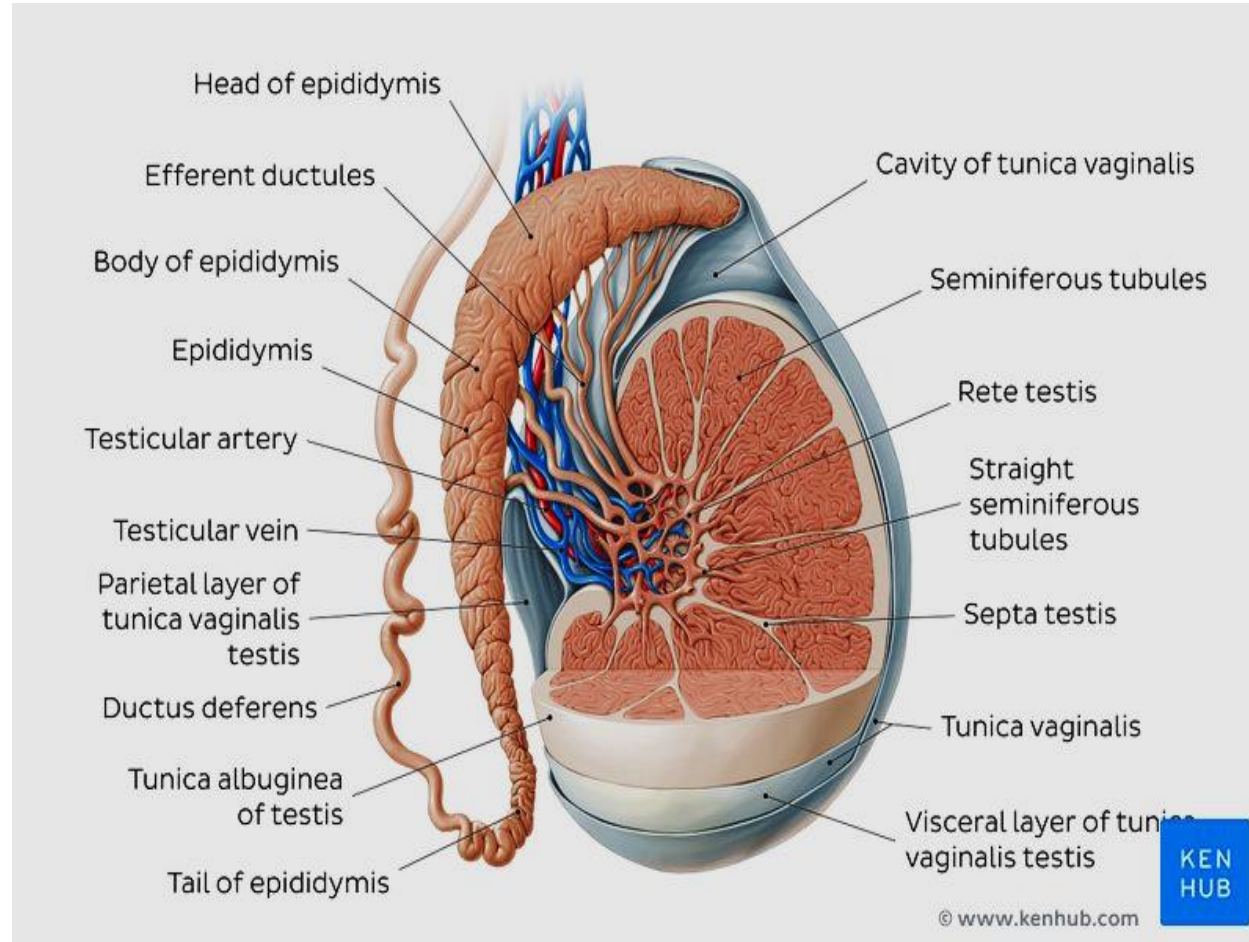
□ The epididymis is a long, coiled duct.

It is represented in 3 parts:

**1-Head of the epididymis:** It is formed by the dilated ends of the efferent ductules which unite to form a single coiled duct overlying the upper pole of the testis.

**2-Body of the epididymis:** It is the middle part of the epididymis.

**3-Tail of the epididymis:** It is the lower part of the epididymis. It is continuous with the ductus deferens at the inferior pole of the testis.



## Blood Supply of Testis and Epididymis:

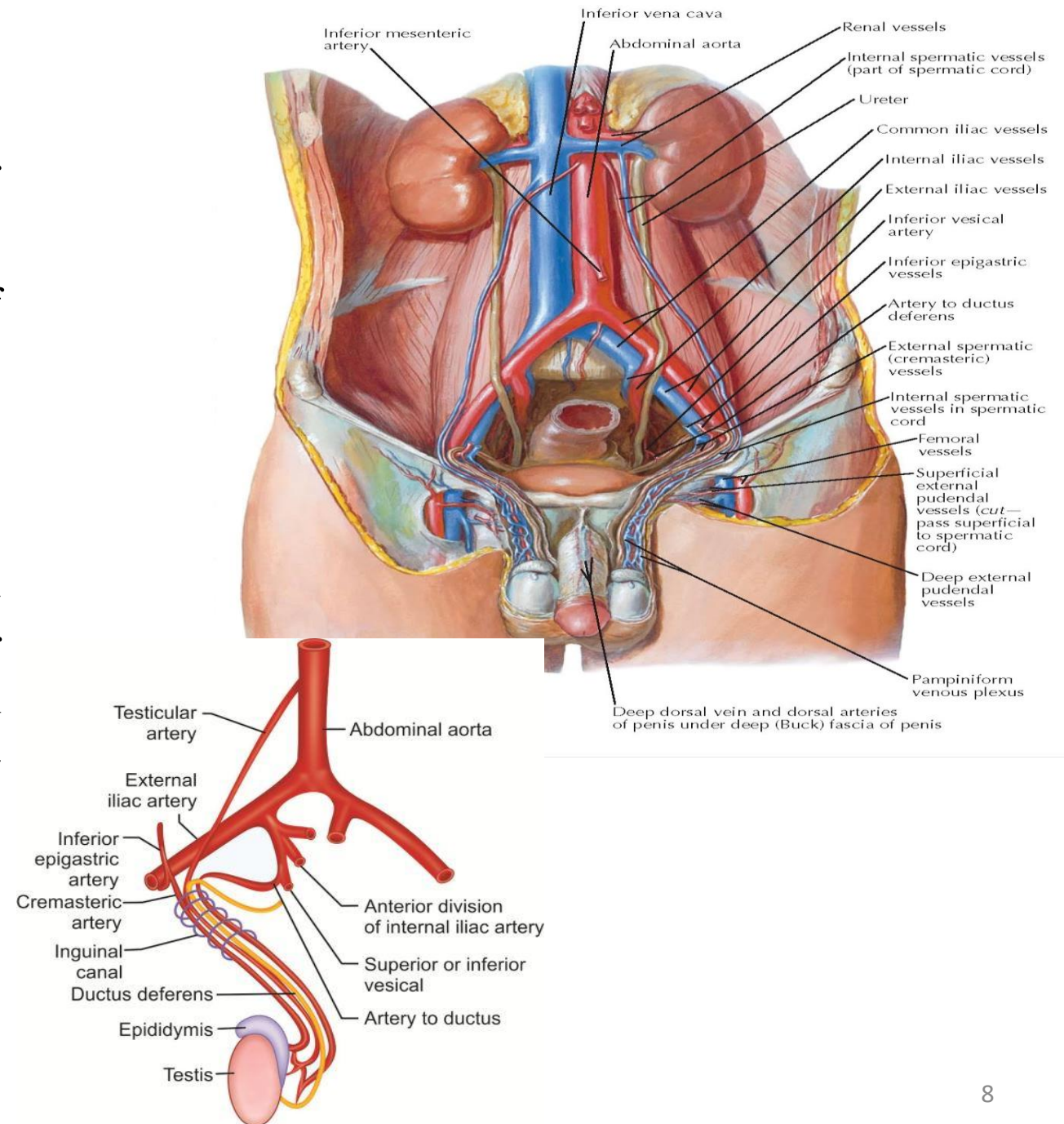
- **Arterial supply of the testis:** Testicular artery.
- **Arterial supply of the epididymis:** Artery of the vas deferens.

## Venous drainage:

- Of the testis and epididymis is through the **pampiniform plexus of veins** → testicular vein that end in the inferior vena cava on the right side in the left renal vein on the left side.

## Lymphatic drainage:

- Para-aortic lymph nodes.



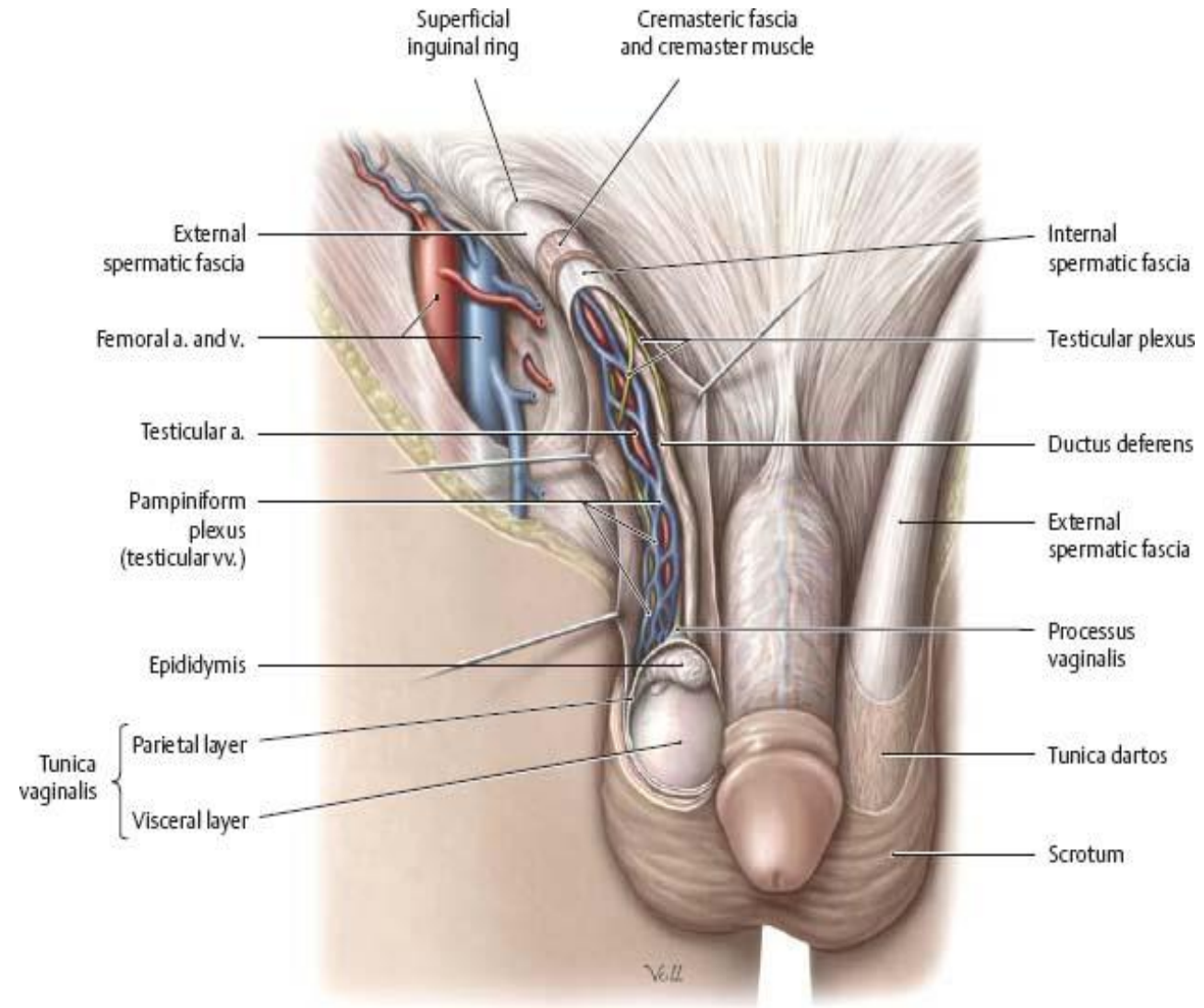


# Spermatic Cord

The spermatic cord consists of a group of structures that **pass through** the deep inguinal ring to and from the testis and **three fascial coverings** surrounding them.

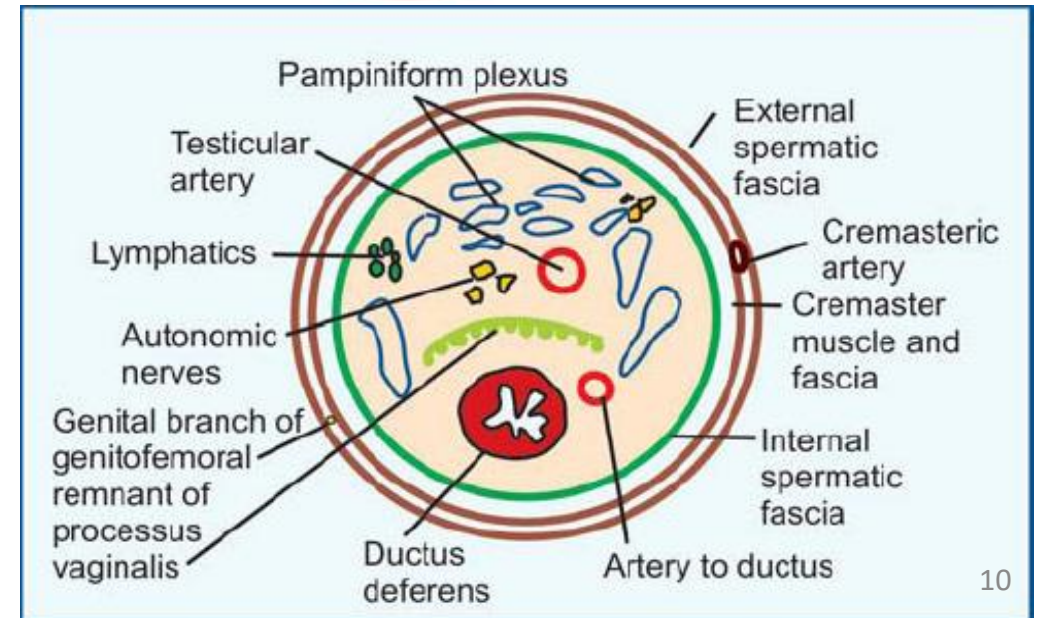
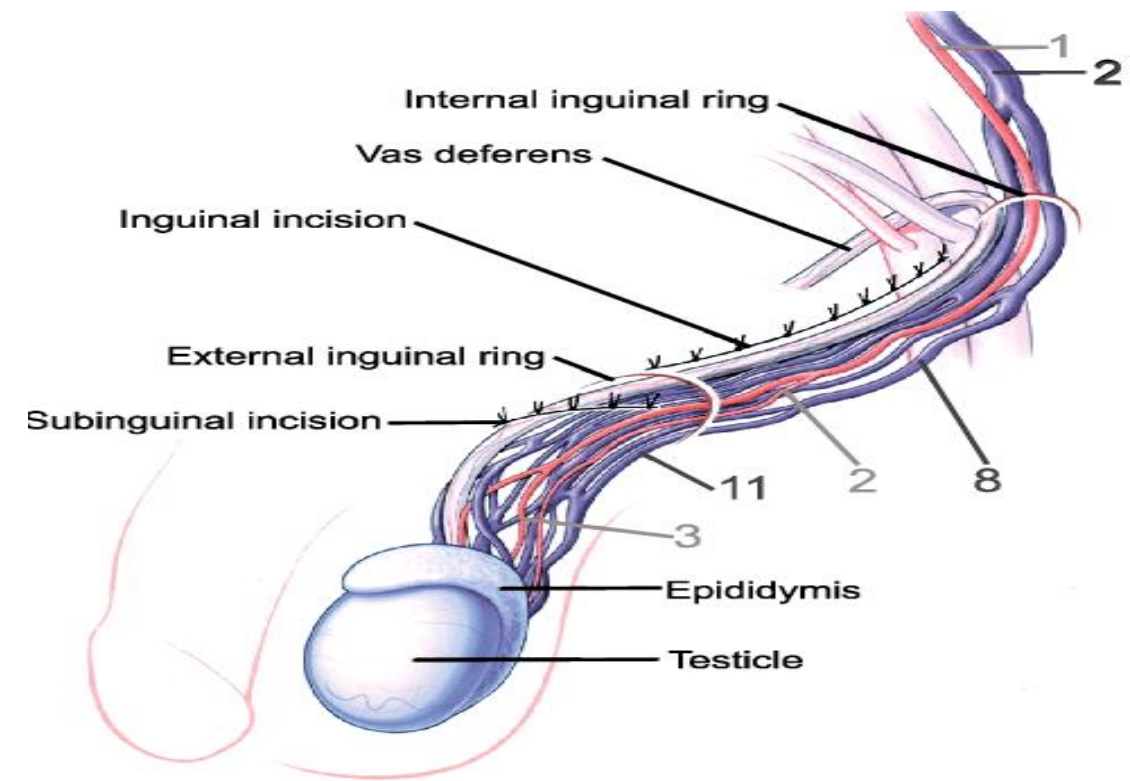
## Course and relations:

- **The spermatic cord begins at** the deep inguinal ring and ends at the testis.
- It runs partly inside the inguinal canal and partly inside the scrotum.



## Structures of spermatic cord:

- 1-Vas (ductus ) deferens: felt cord-like.
- 2-Artery of the vas.
- 3-Testicular artery.
- 4-Pampiniform plexus of veins.
- 5-Cremasteric artery.
- 6-Lymphatics.
- 7-Nerves; Genital branch of the genitofemoral nerve and sympathetic nerve fibers.
- 8-Vestigial part (remnants) of the processus vaginalis.



## Coverings of the spermatic cord:

From inside outwards;

### 1-Internal spermatic fascia:

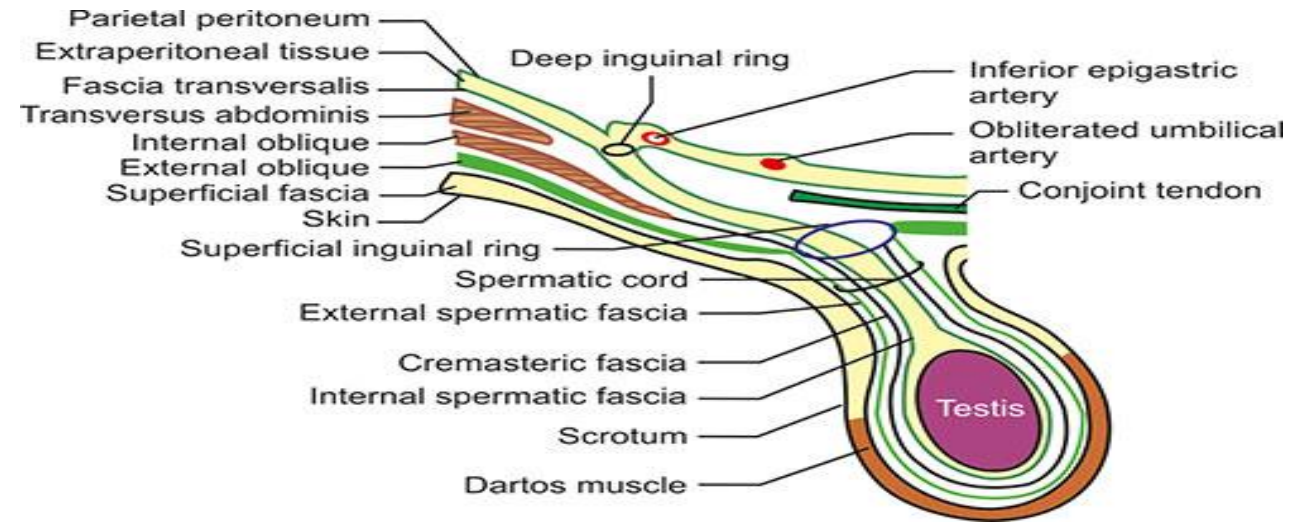
- It is a fascial prolongation from the fascia transversalis at the deep inguinal ring.

### 2-Cremaster muscle and fascia:

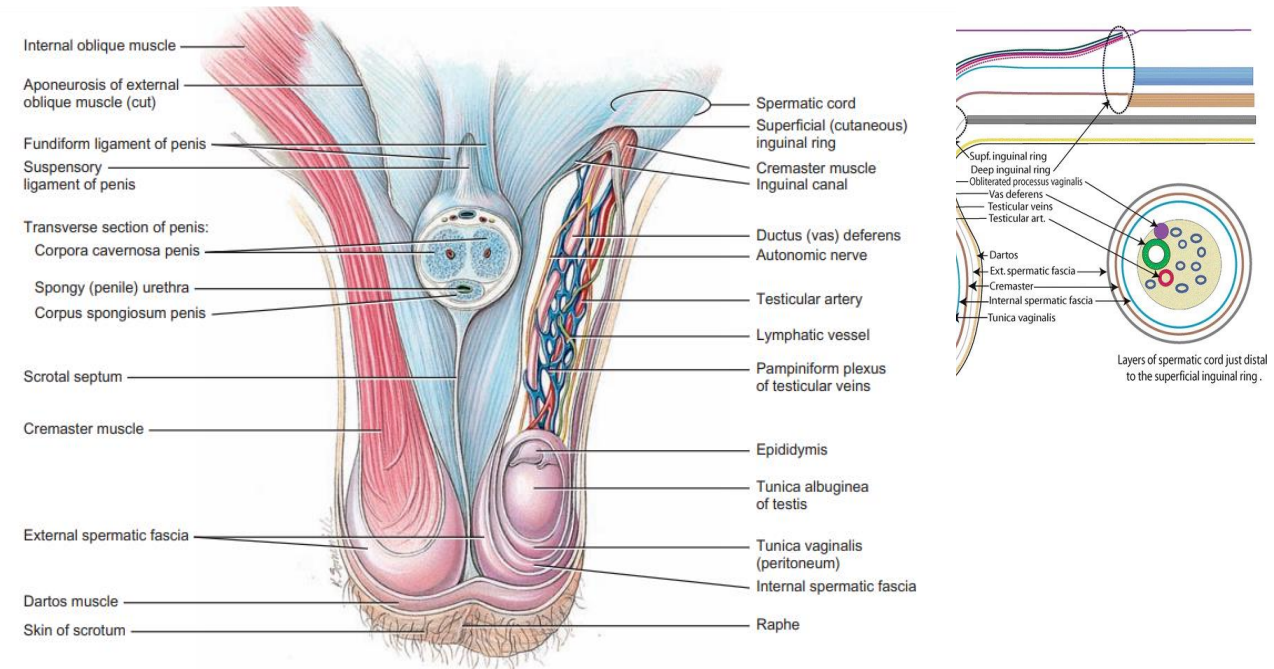
- It is derived from the internal oblique muscle in the inguinal canal.

### 3-External spermatic fascia:

- It is derived from the external oblique aponeurosis at the superficial inguinal ring.



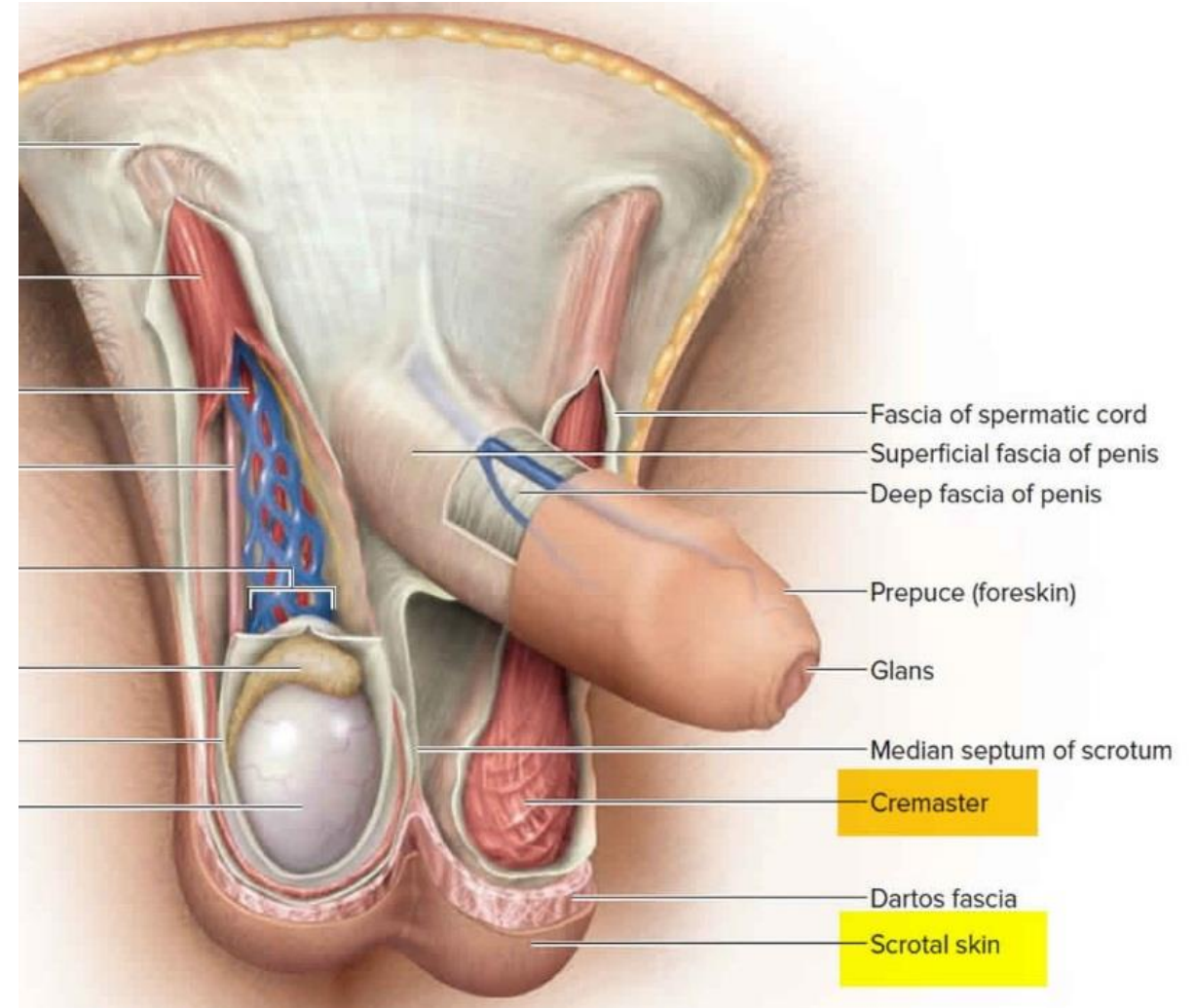
Understanding layers of the spermatic cord from Deep inguinal ring to the Scrotum



Anterior view of scrotum and testes and transverse section of penis

# Scrotum

- **It is a cutaneous bag containing** the two testes, two epididymis and the lower parts of the spermatic cords of both sides.
- **It can be considered as** an out pouching of the lower part of the anterior abdominal wall.



## Structure of the wall of the scrotum (Layers of scrotum):

**The wall of the scrotum consists of the following layers (from superficial to deep):**

**1-Skin:** It is thin, wrinkled and pigmented. It has a raised ridge in the midline.

**2-Dartos muscle.**

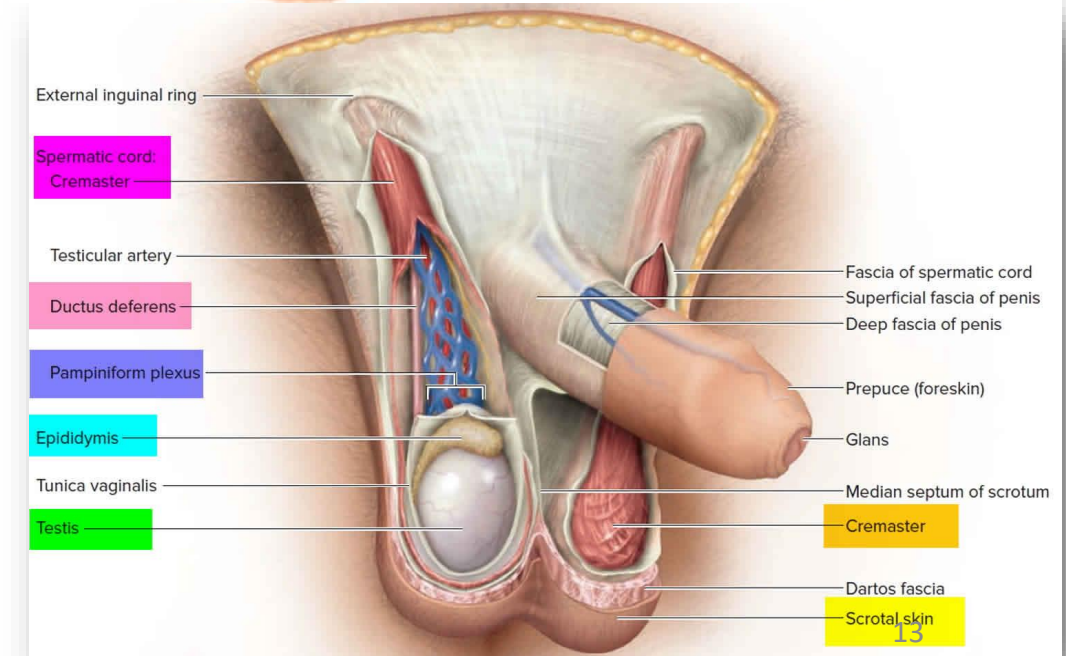
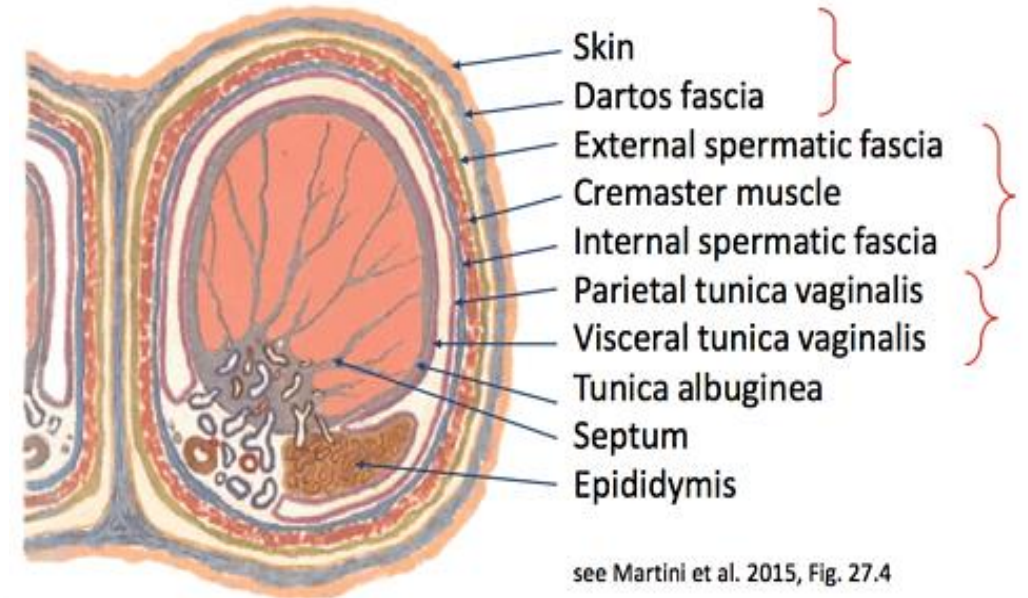
**3-Deep membranous layer (Colle's fascia).**

**4-External spermatic fascia.**

**5-Cremasteric muscle and fascia.**

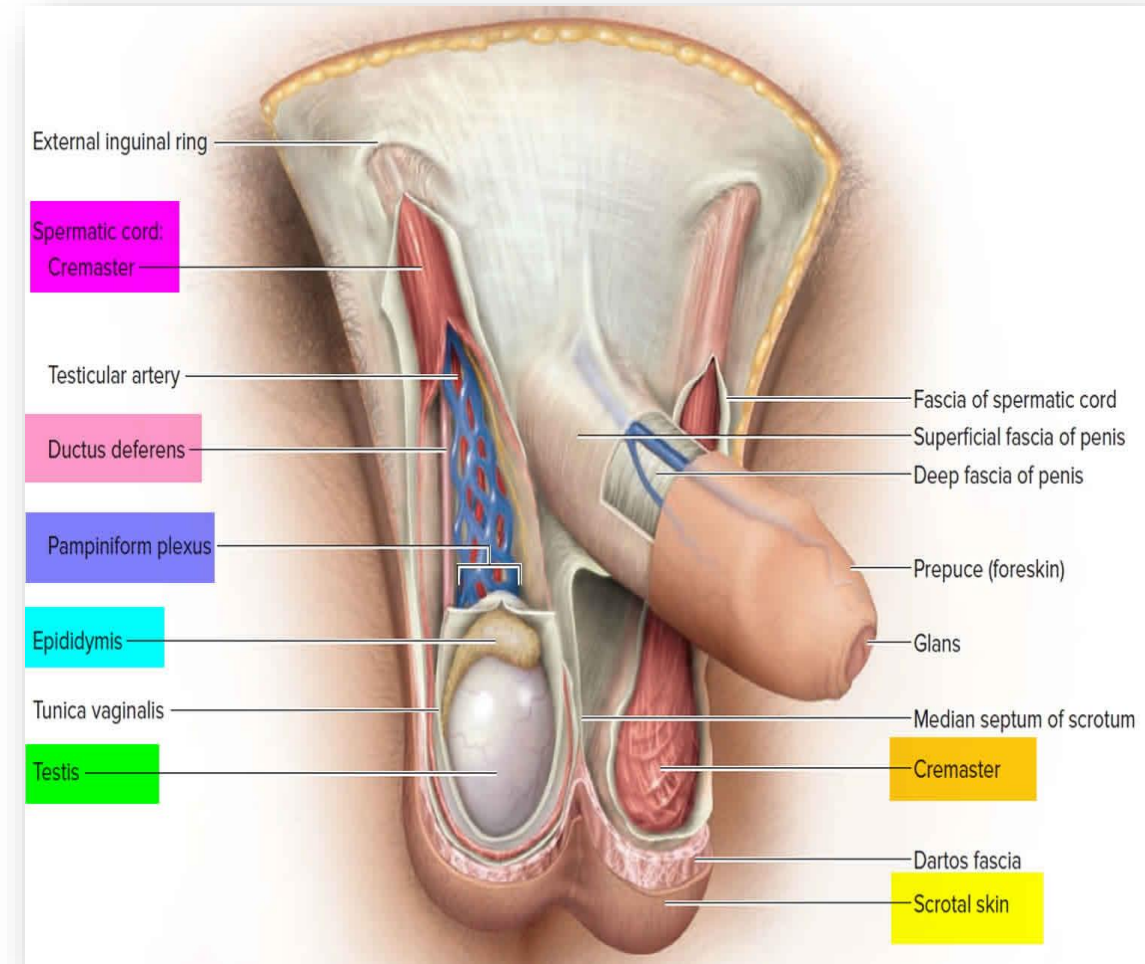
**6-Internal spermatic fascia.**

**7-Parietal layer of tunica vaginalis.**



## Dartos muscle:

- It is a thin layer of **smooth muscle fibers** (involuntary) that are adherent to the overlying skin.
- It **replaces** the superficial fatty layer in the anterior abdominal wall.
- It **sends** an inward septum in the midline dividing the scrotal cavity into two compartments (not completely separated).
- It is **innervated** by sympathetic nerve fibers and is responsible for the wrinkling of the overlying skin.
- **This muscle helps in** regulating the temperature of the scrotal cavity. This is a factor which is essential for normal spermatogenesis.



## Arterial supply of scrotum:

- 1-Anterior scrotal arteries from external pudendal arteries.
- 2-Posterior scrotal branches from internal pudendal artery.
- 3-Cremasteric artery from inferior epigastric artery.

## Venous drainage of scrotum :

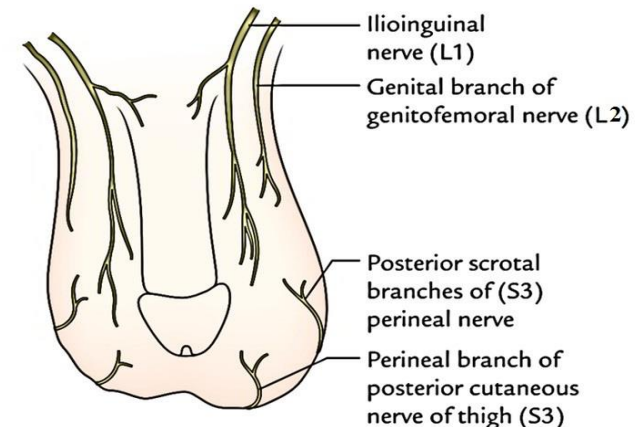
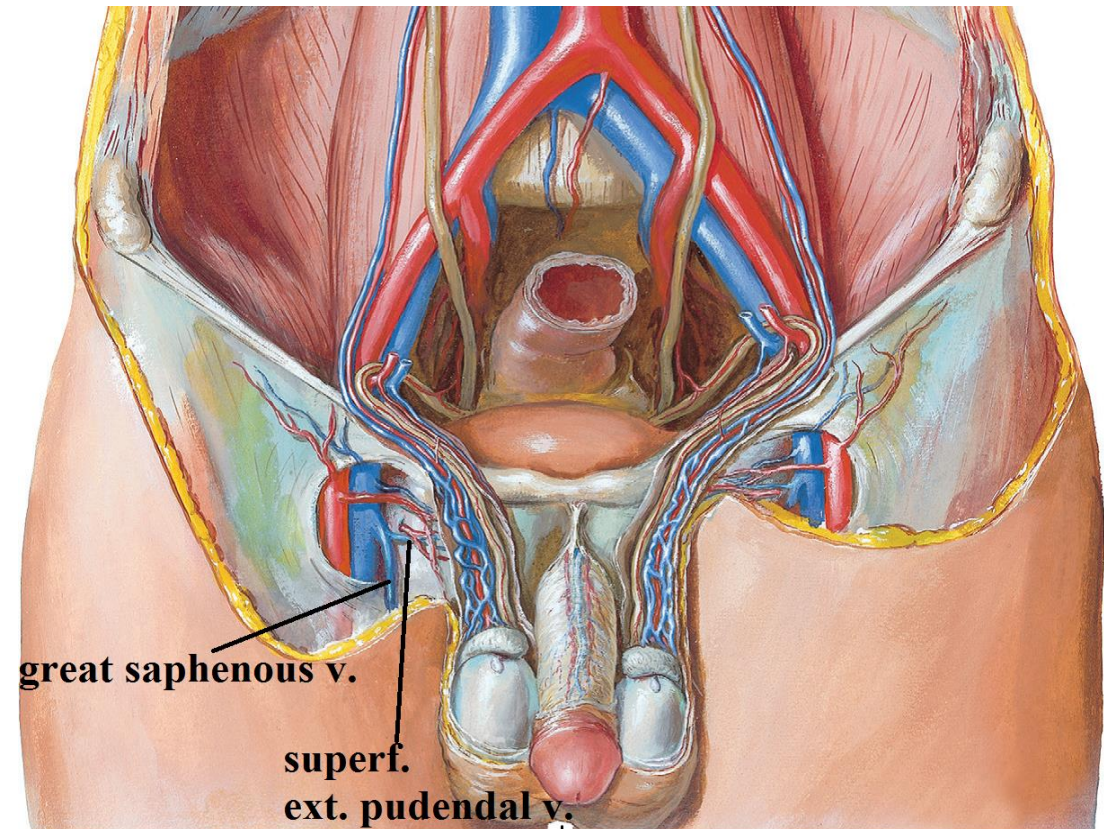
- End into femoral vein, internal iliac vein & external iliac vein.

## Lymphatic drainage of scrotum:

- Superficial inguinal lymph nodes.

## Nerve supply of scrotum:

- Posterior scrotal nerves, posterior cutaneous nerve of the thigh, and ilioinguinal nerves



# Penis

It is composed mainly of three longitudinal cylinders of erectile tissue.

a-The mid-ventral corpus spongiosum.

b-The two dorsolateral corpora cavernosa.

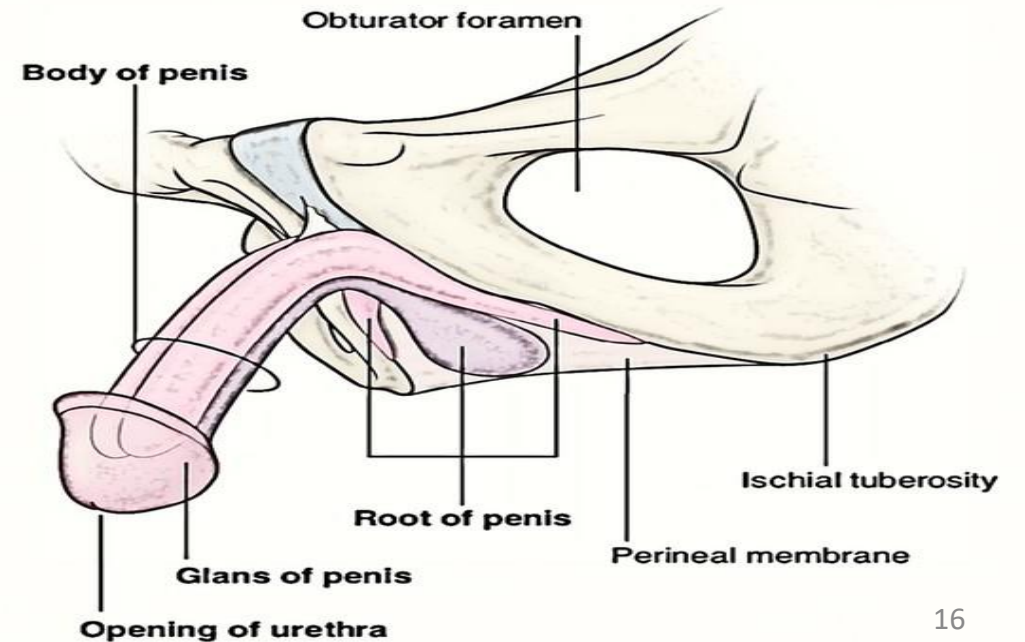
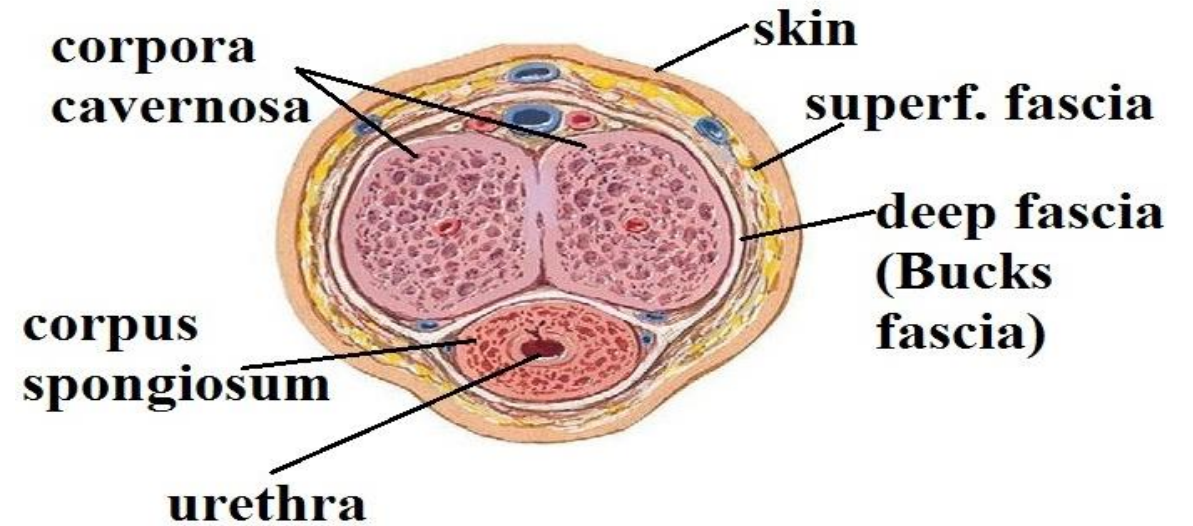
**The penis has a root (fixed part ) and a free body.**

## The root of the penis:

It is the attached portion (proximal portion).

## It consists of:

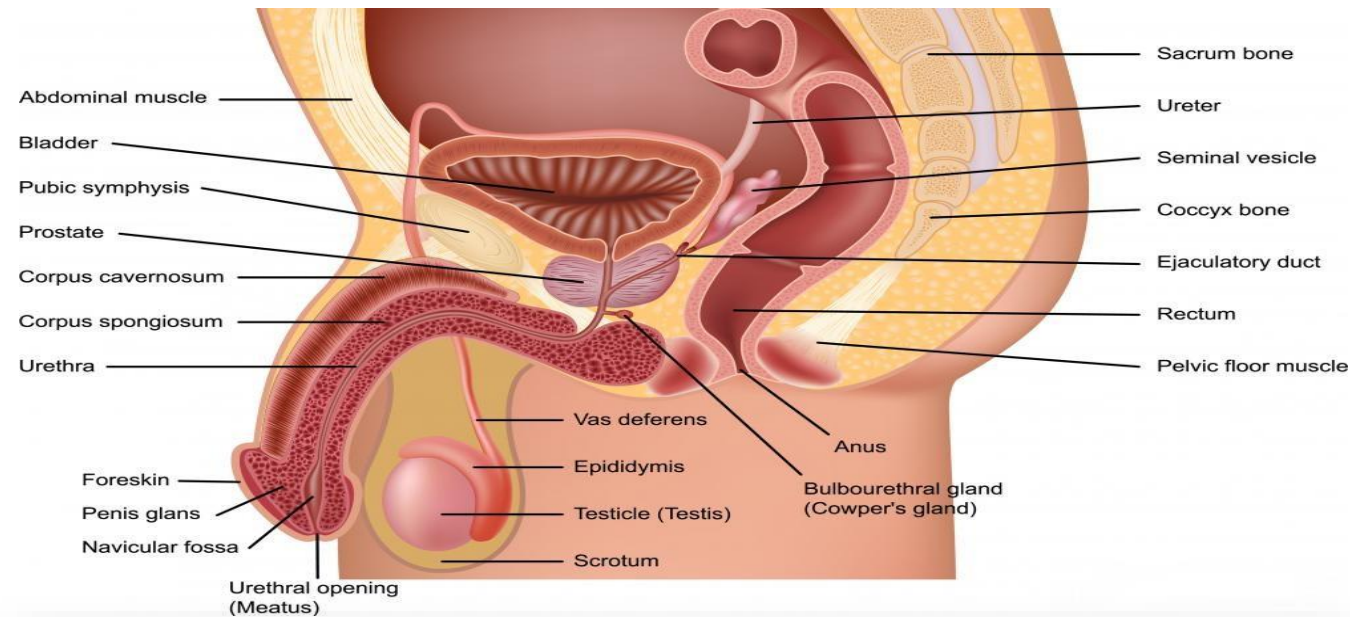
- **The two crura;** which are the proximal parts of the corpora cavernosa.
- **The bulb of the penis:** which is the proximal expanded part of the corpus spongiosum.



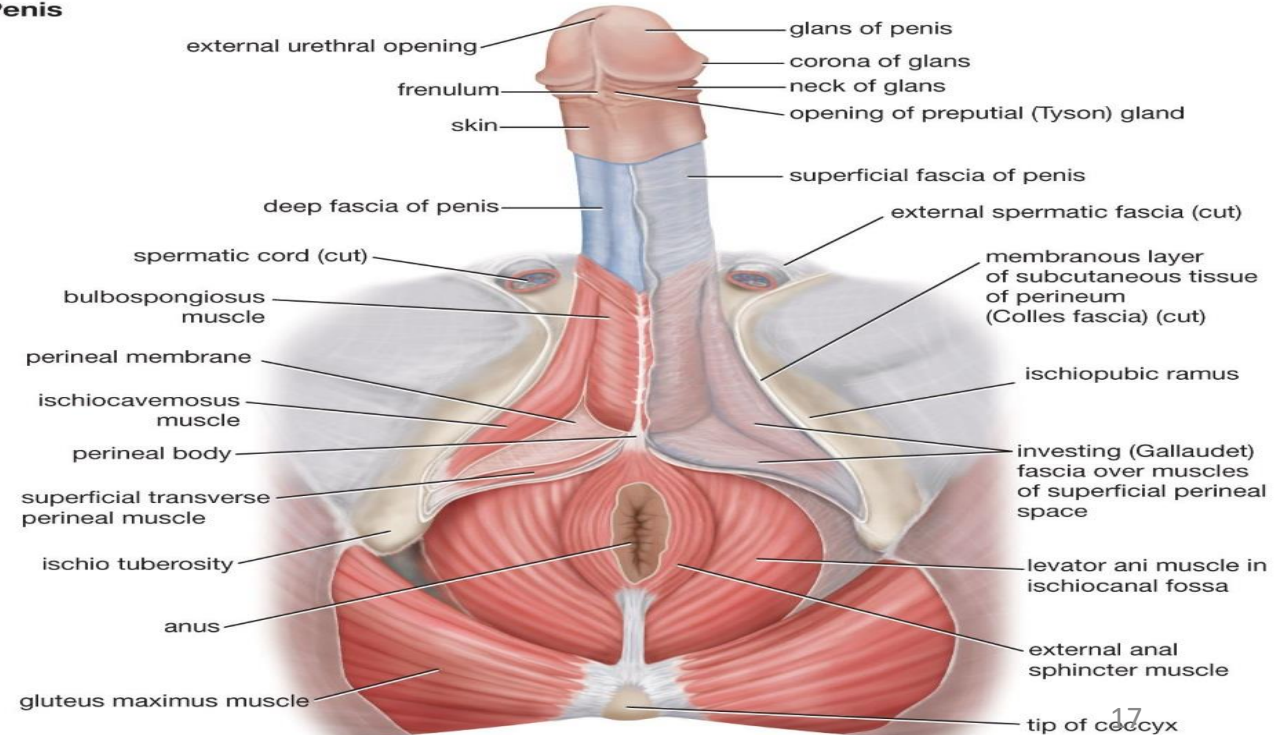


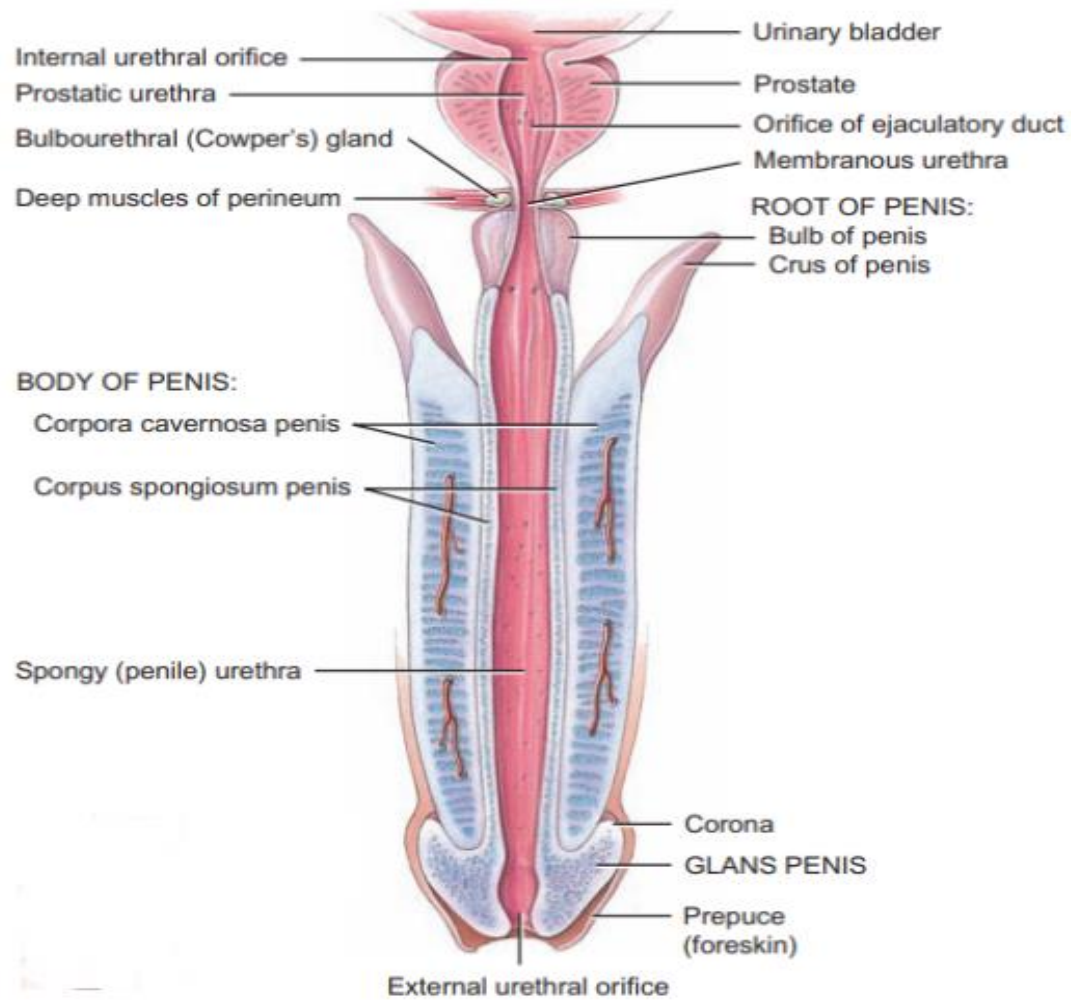
## 2-The body of the penis:

- It is entirely covered by skin&fascia and is formed by the free parts of the corpora cavernosa& corpus spongiosum.
- The corpus spongiosum expands** to form the head of the penis. It is called **glans penis**, over the distal ends of the two corpora cavernosa.
- The external urethral orifice** is a sagittal slit at the tip of the glans.
- The base of the glans forms a raised circular margin, **the corona of the glans**.
- The depression posterior to the corona is the **neck of the glans**.
- Normally a fold of skin projects from the neck of the glans to overlie the glans. This is called the **prepuce** which is removed during circumcision.

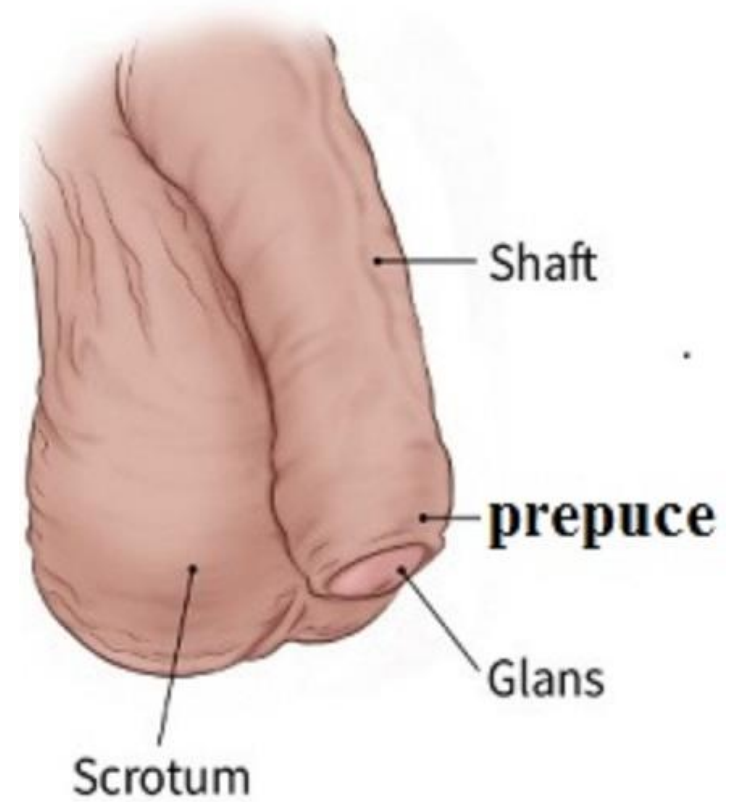


### Penis





(a) Frontal section



## Ligaments of penis:

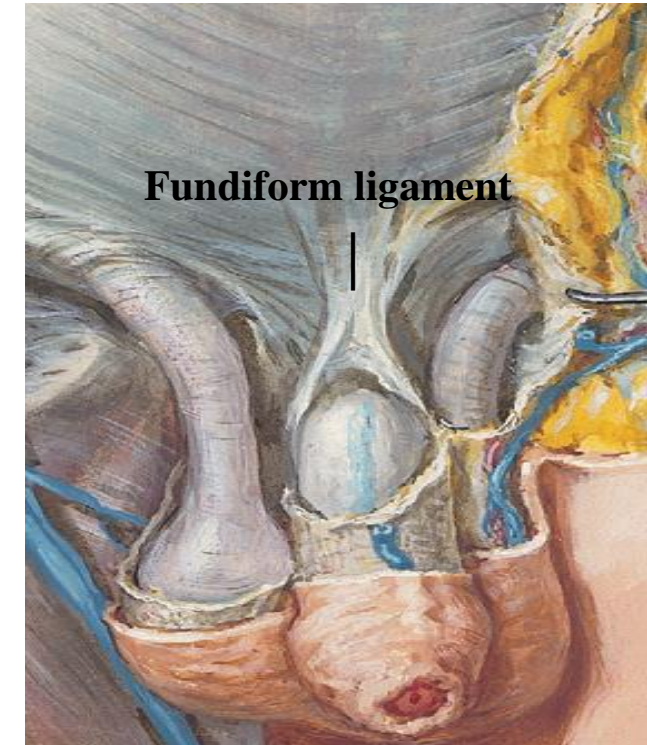
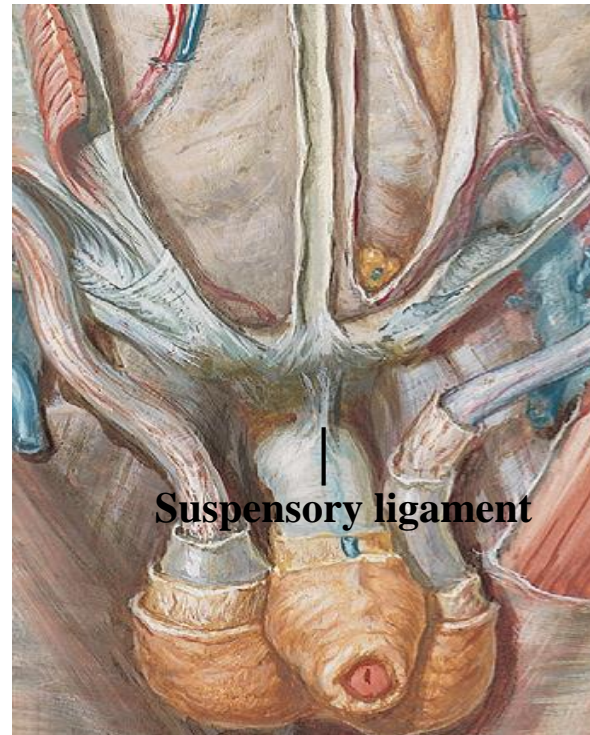
The weight of the penis is supported by two ligaments that are attached to the fascia of the penis:

### **1-The suspensory ligament of the penis;**

- It is attached to the symphysis pubis.

### **2-Fundiform ligament of the penis;**

- It is attached to linea alba.



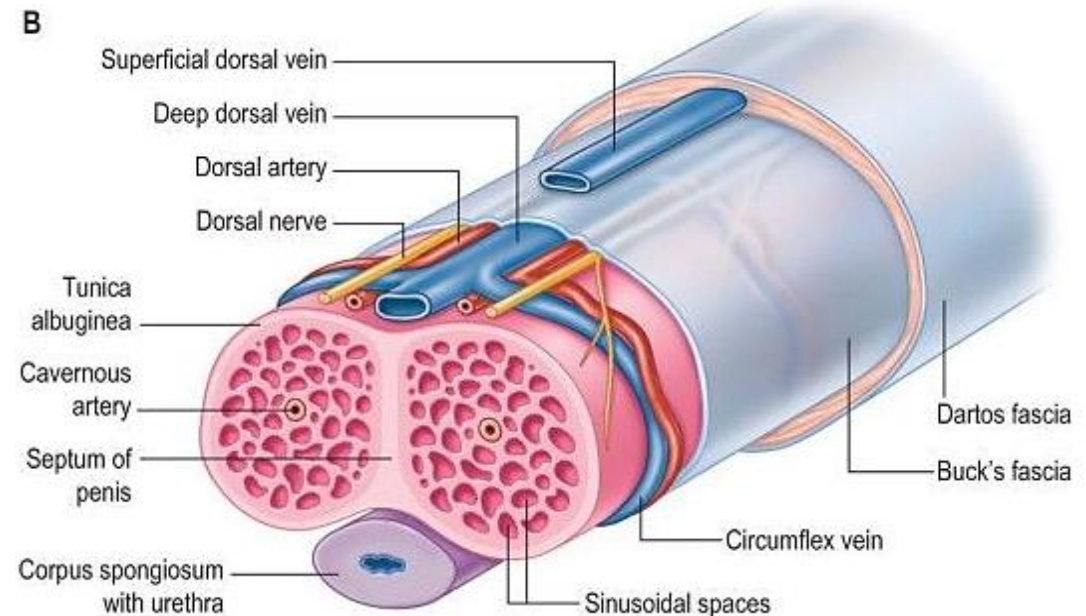
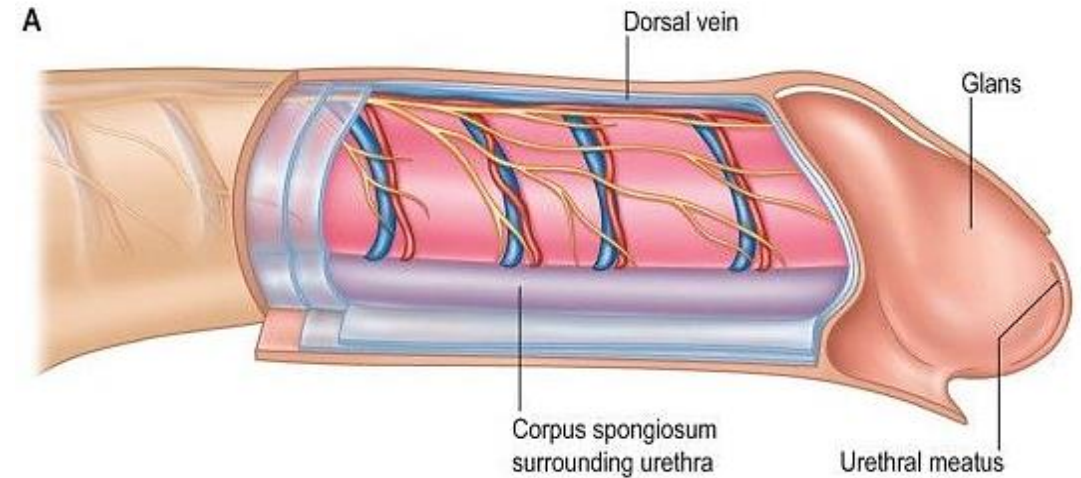
# Arterial supply of penis

## 1-Dorsal artery of penis:

- One on each side on dorsum of the penis.
- It gives branches which perforate the corpus cavernosum to open in the cavernous spaces. It also supplies glans penis.

## 2-Deep artery of penis (Cavernous artery):

- One on each side.
- It pierces the crus of penis and runs in the center of the corpus cavernosum to supply the erectile tissue of cavernosum.
- Within the corpus, the cavernosal arteries divide into branches that end in capillary networks which open into the cavernous spaces.



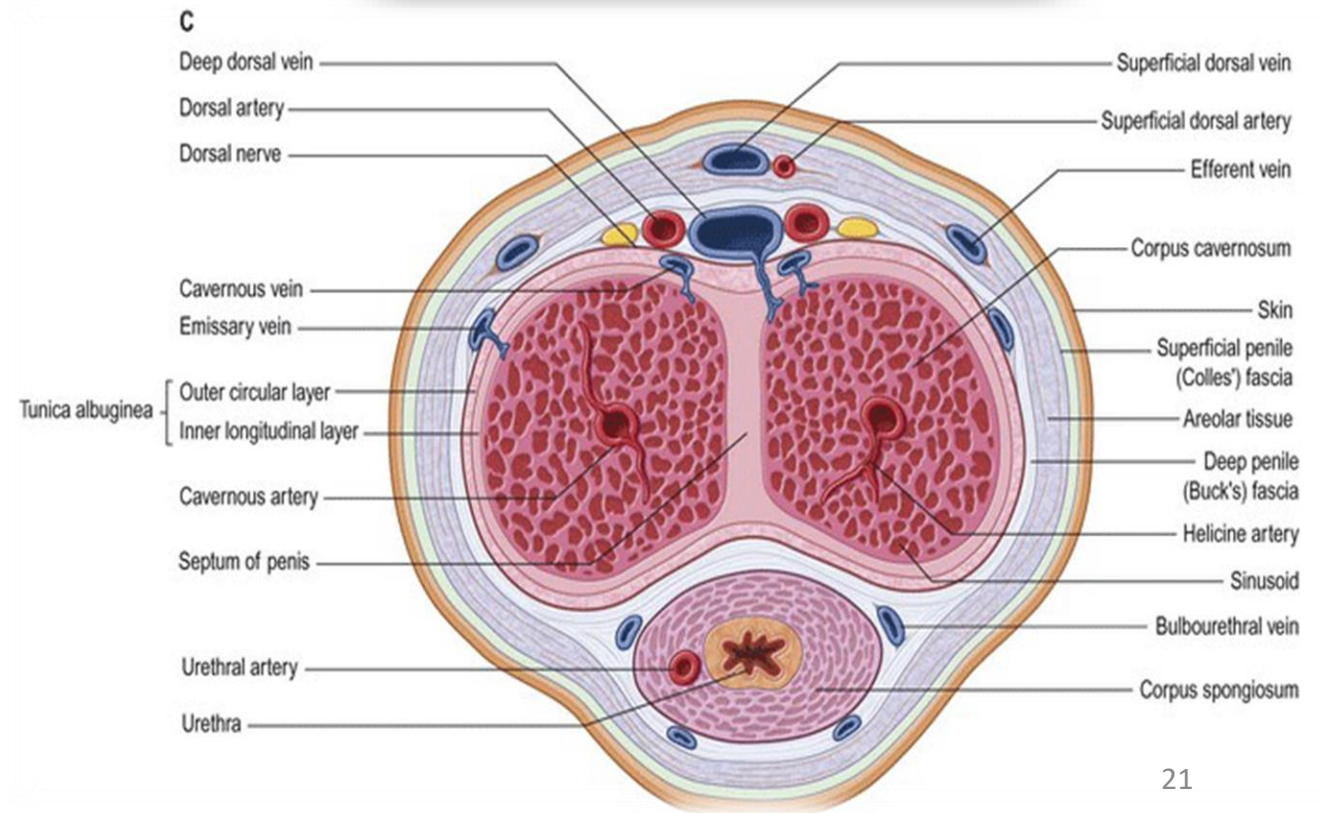
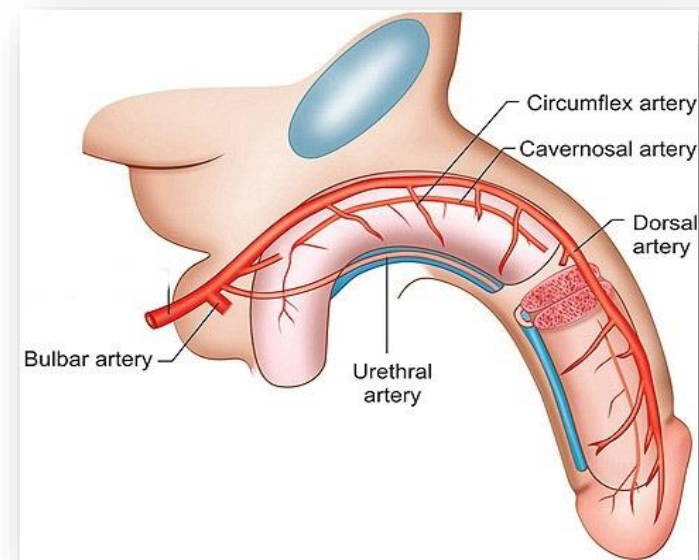
### 3-Artery of the bulb:

- One on each side.
- It supplies the bulb and corpus spongiosum.

### 4-Urethral artery:

- One on each side.
- It runs in the corpus spongiosum to supply the spongy urethra and corpus spongiosum.

All are branches from the internal pudendal artery.



# Venous drainage of penis:

## 1-Superficial dorsal vein:

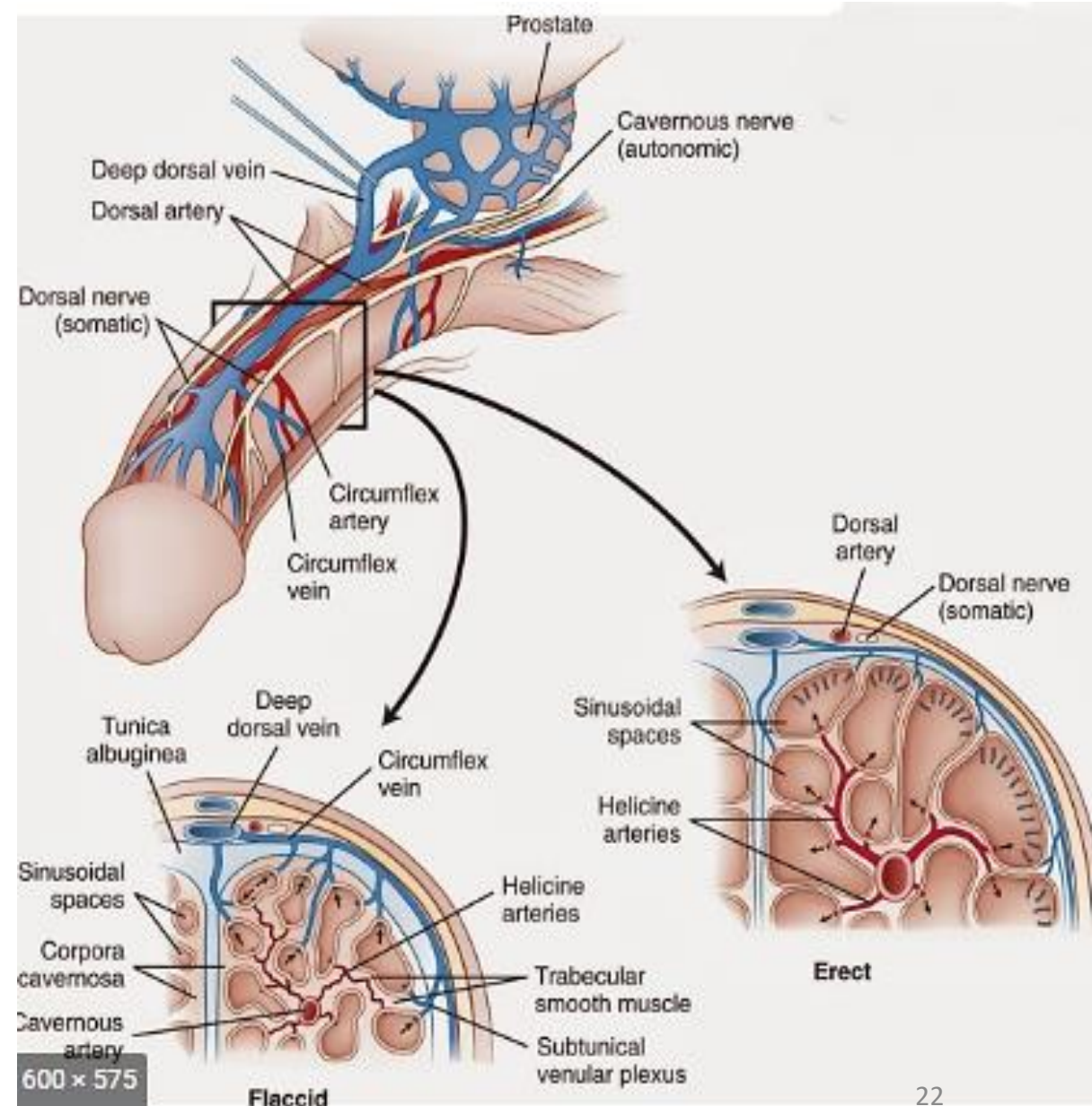
- It drains the prepuce and penile skin.
- it opens into the external pudendal vein.

## 2-Deep dorsal vein:

- It runs in the median plane on the dorsum of the penis.
- It drains glans penis and corpora cavernosa.
- it ends in the **prostatic plexus of veins**.

## Lymphatic drainage:

- 1-Skin of penis → Superficial inguinal lymph nodes .
- 2-Glans penis → Deep inguinal lymph nodes .
- 3-Deep structures of penis → Internal iliac lymph nodes.



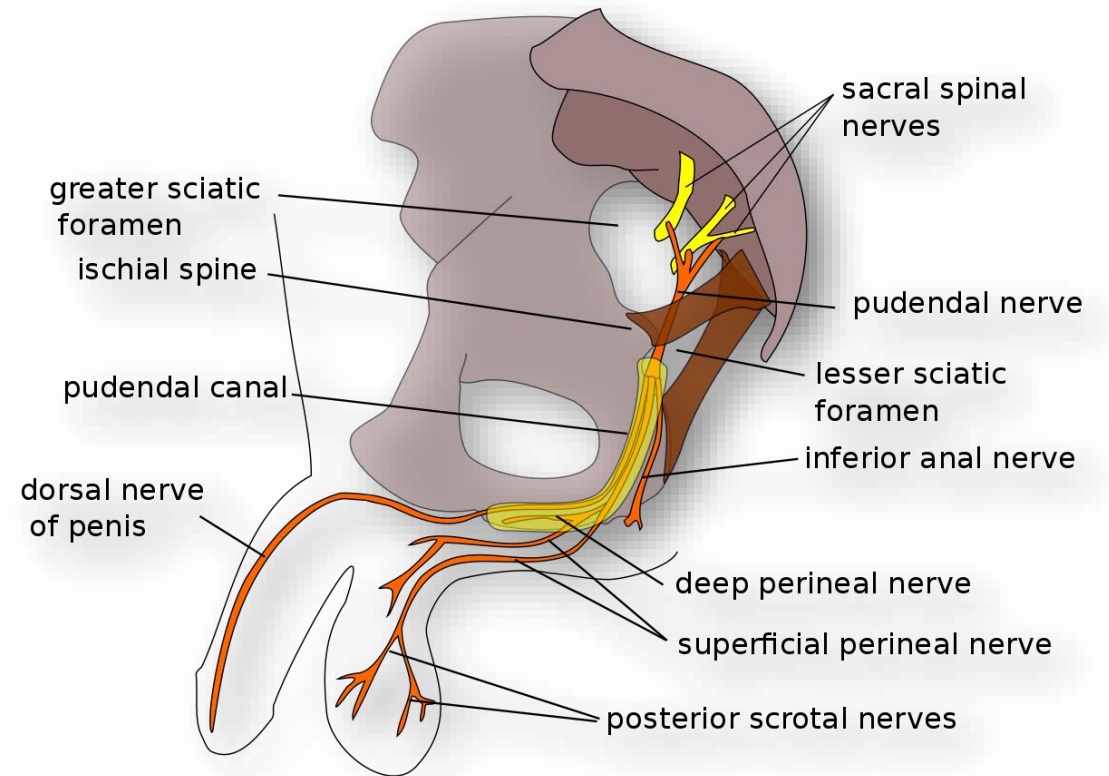
## Nerve supply of penis:

**1- Dorsal nerve of penis (pudendal):** Supplies the skin of penis.

### **3-Pelvic splanchnic nerve (S2,3,4):**

- Provides the parasympathetic supply to the cavernous tissue to allow vasodilatation of cavernous spaces for erection.

**4-Sympathetic fibers (T11-L2)** for stages of ejaculation.



# Vas (Ductus) Deferens

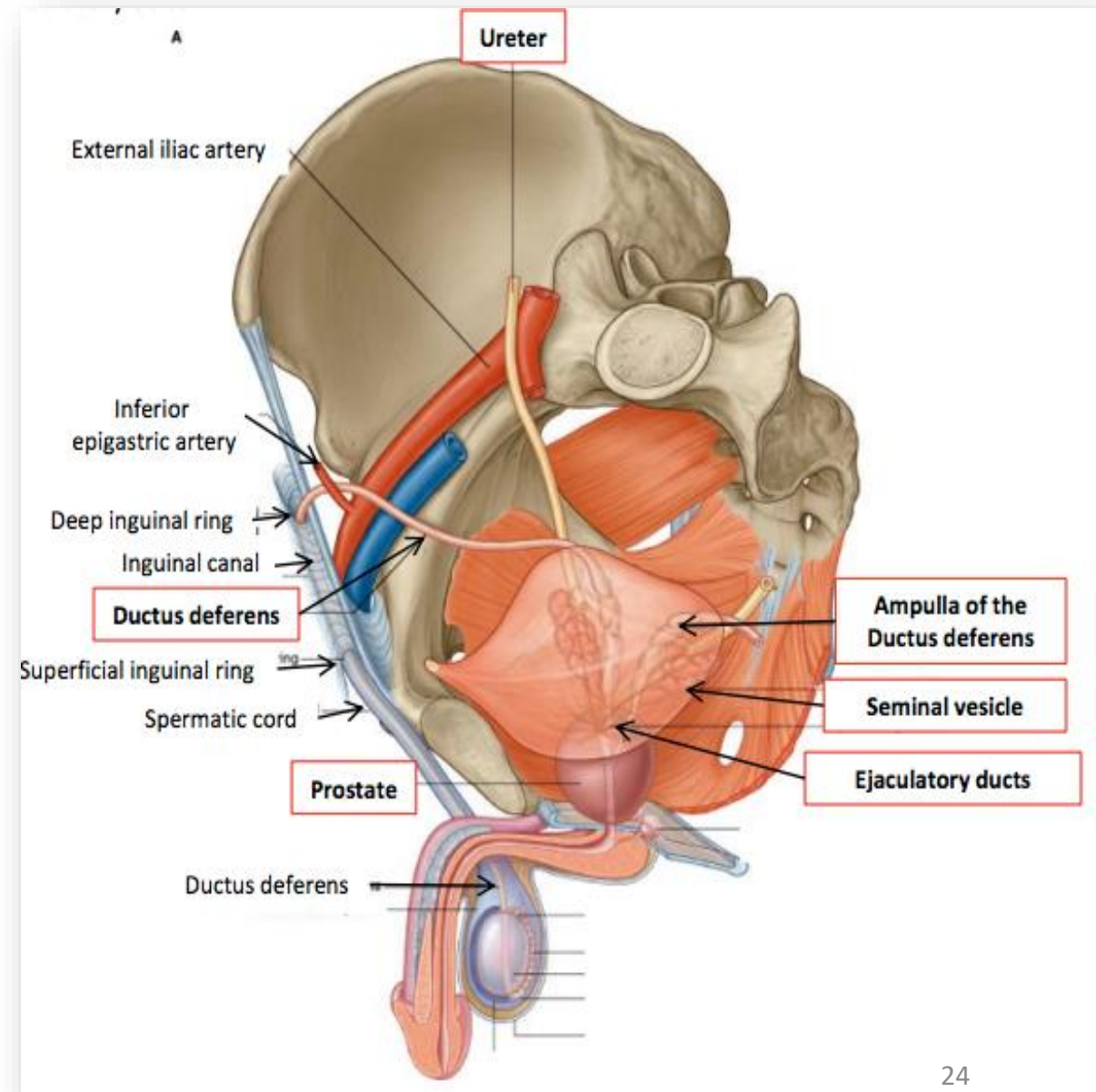
- The **ductus deferens** is a long narrow muscular duct that conveys the sperms from the tail of the epididymis to the ejaculatory duct.
- It **measures** about 45 cm long.

## Course and relations:

-Its course is divided into three parts:

### 1-Scrotal part:

- It begins as a continuation of the tail of the epididymis.
- It ascends along the posterior border of the testis till to reach the upper pole of the testis.
- Then, it ascends as one of structures of the spermatic cord.



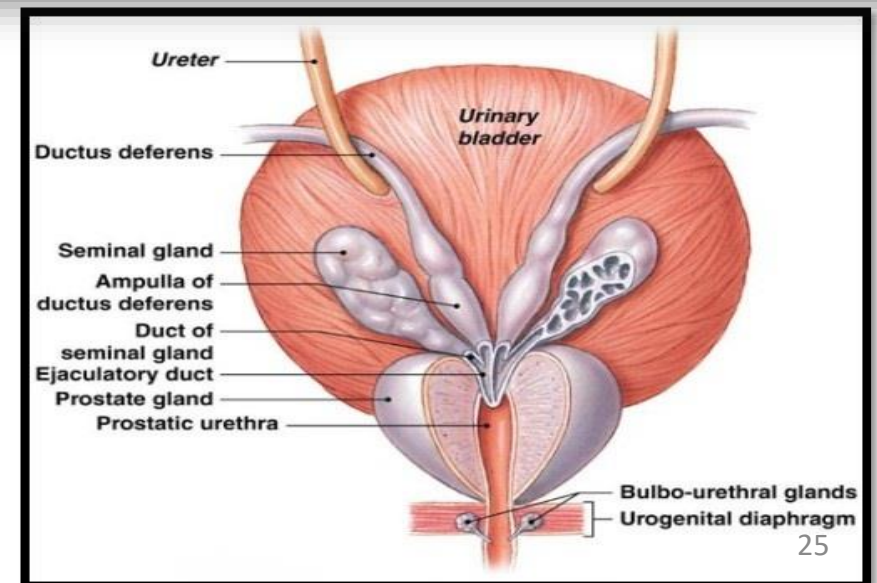
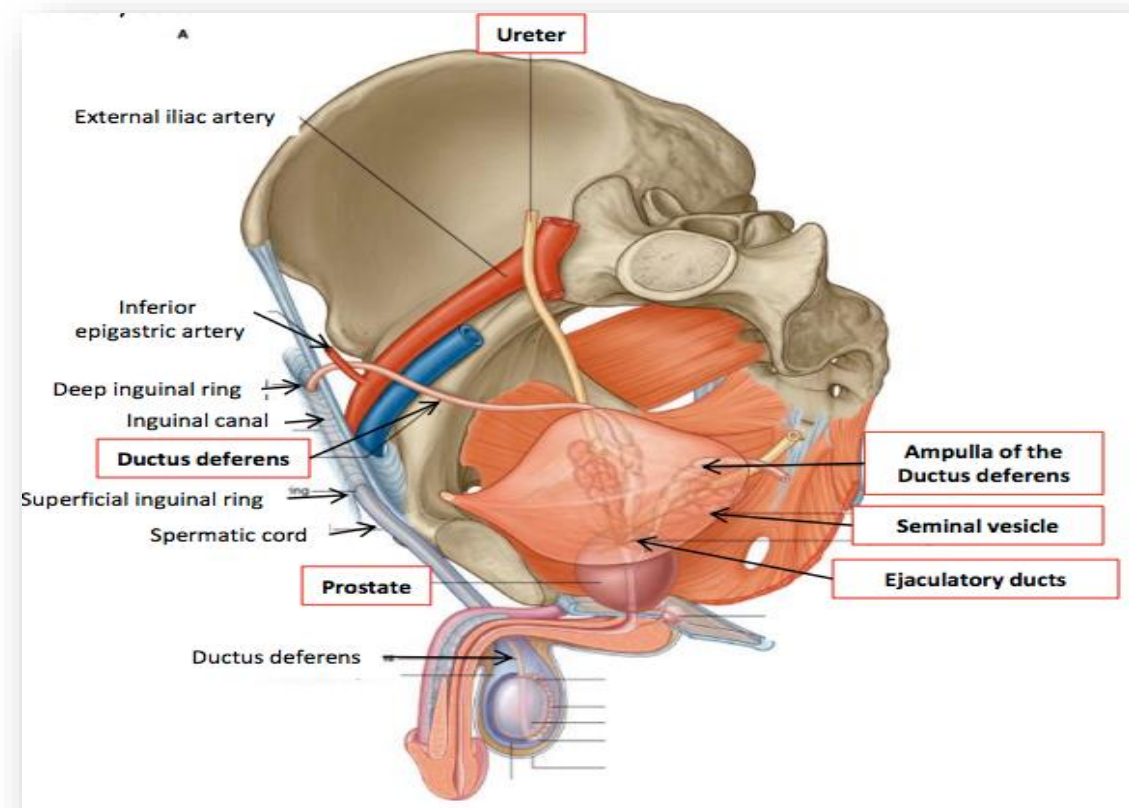


## 2-Inguinal part:

- It **passes** through the inguinal canal.
- At the deep inguinal ring, it bends medially around inferior epigastric artery and crosses the external iliac vessels to enter the pelvic cavity.

## 3-Pelvic part:

- It **descends** downwards and backwards.
- Then it **turns medially** crossing in front of the terminal part of the ureter.
- Then, it **bends** at an acute angle to descend on the base of the bladder.
- On the base of the bladder, the vas is dilated to form the **ampulla of the vas** and **ends** by **joining** the duct of seminal vesicle **forming** the ejaculatory duct.

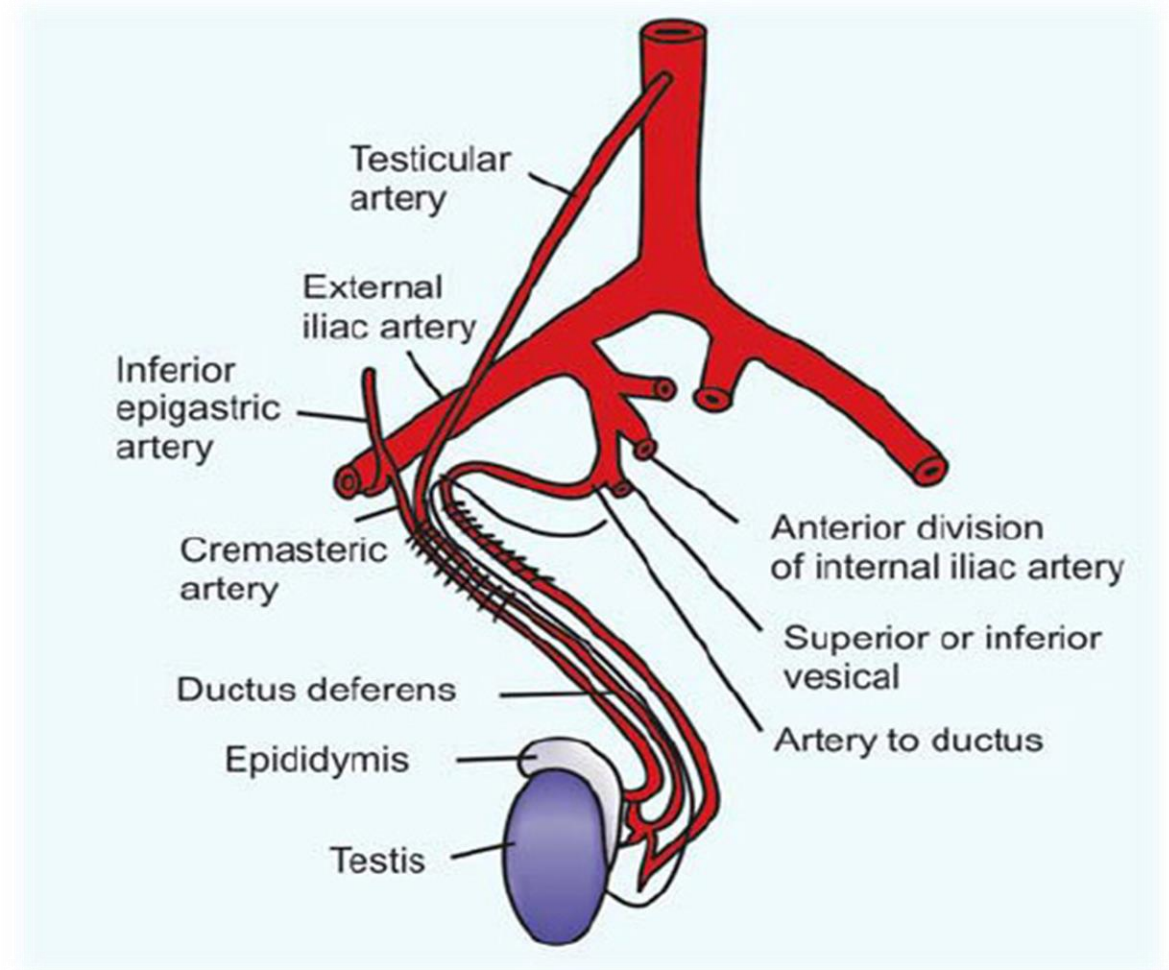


**Blood supply:**

Artery of the vas.

**Lymphatic drainage:**

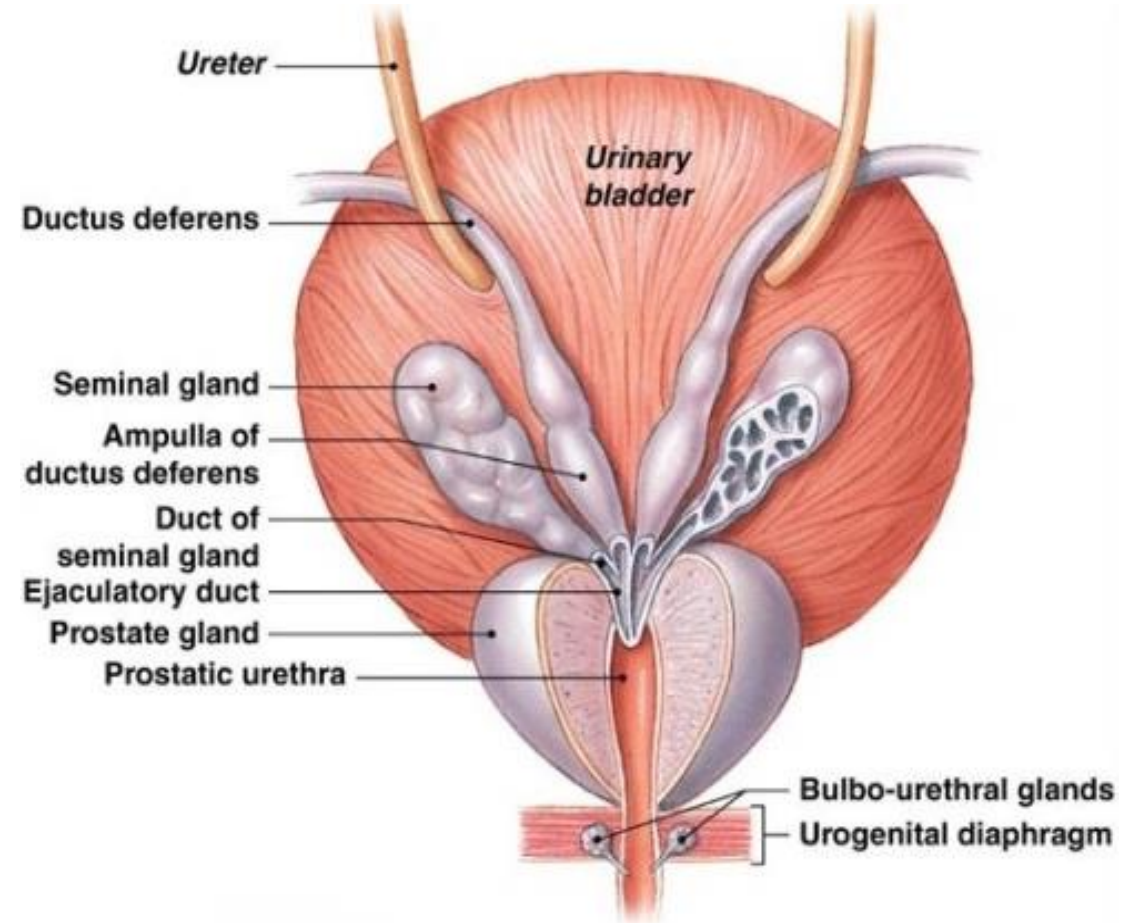
External iliac lymph nodes.



# Seminal Vesicle

## Shape and site:

- Each seminal vesicle is a coiled tube about 5 cm long.
- It has a blind upper end.
- Its other end joins the lower end of the vas to form **the ejaculatory duct**.
- **It lies** on the base of urinary bladder, below the termination of the ureter and lateral to ampulla of vas deferens.



# Ejaculatory Duct

## Formation:

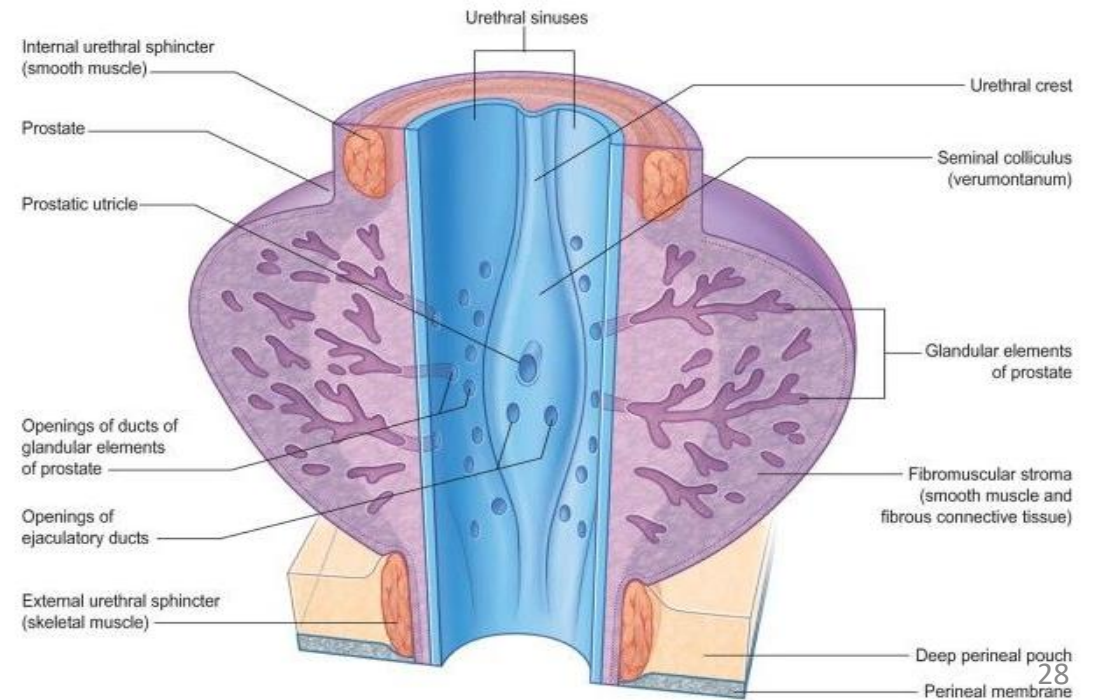
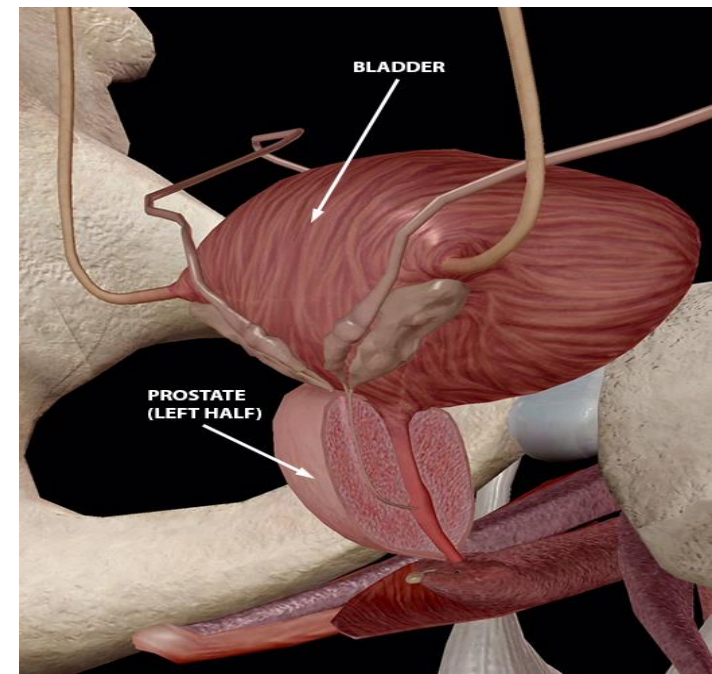
- Each duct is formed **behind** the neck of the bladder **by the union of** the duct of the seminal vesicle and the terminal part of the ductus deferens.

## Course:

- It pierces, the posterior surface of prostate and descends downwards, forwards and medially through the substance of the prostate.

## End:

- Each duct opens into the posterior wall of the prostatic urethra on the seminal colliculus, lateral to the opening of the prostatic utricle.



# Prostate Gland

## Site:

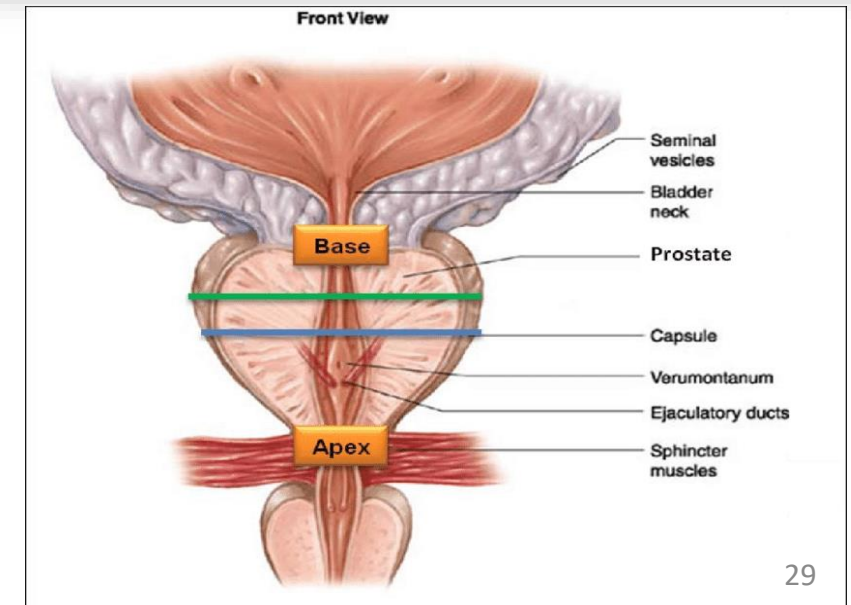
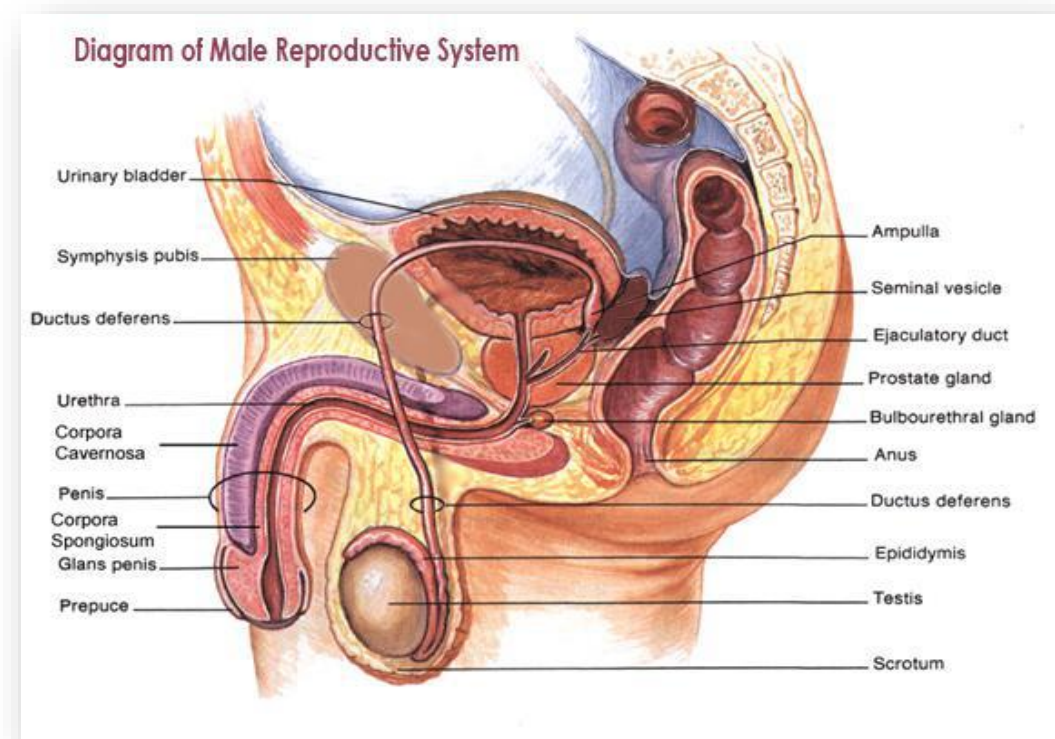
- It lies immediately **inferior to** the bladder, **posterior to** the symphysis pubis and **anterior to** the rectum.

## Shape:

- It has a **base** (upward), an **apex** (downward) and **four surfaces**; anterior, posterior and two inferolateral surfaces.

## Size:

- It measures 3 cm in its vertical diameter, 4 cm in its transverse diameter at the base.



# Relations of prostate:

## 1-Base of the prostate:

- It is directed upwards. It is pierced by the urethra. It is connected to pubic bones by the two puboprostatic ligaments.

## 2-Apex of the prostate:

- It is directed downwards.

## 3-Anterior surface:

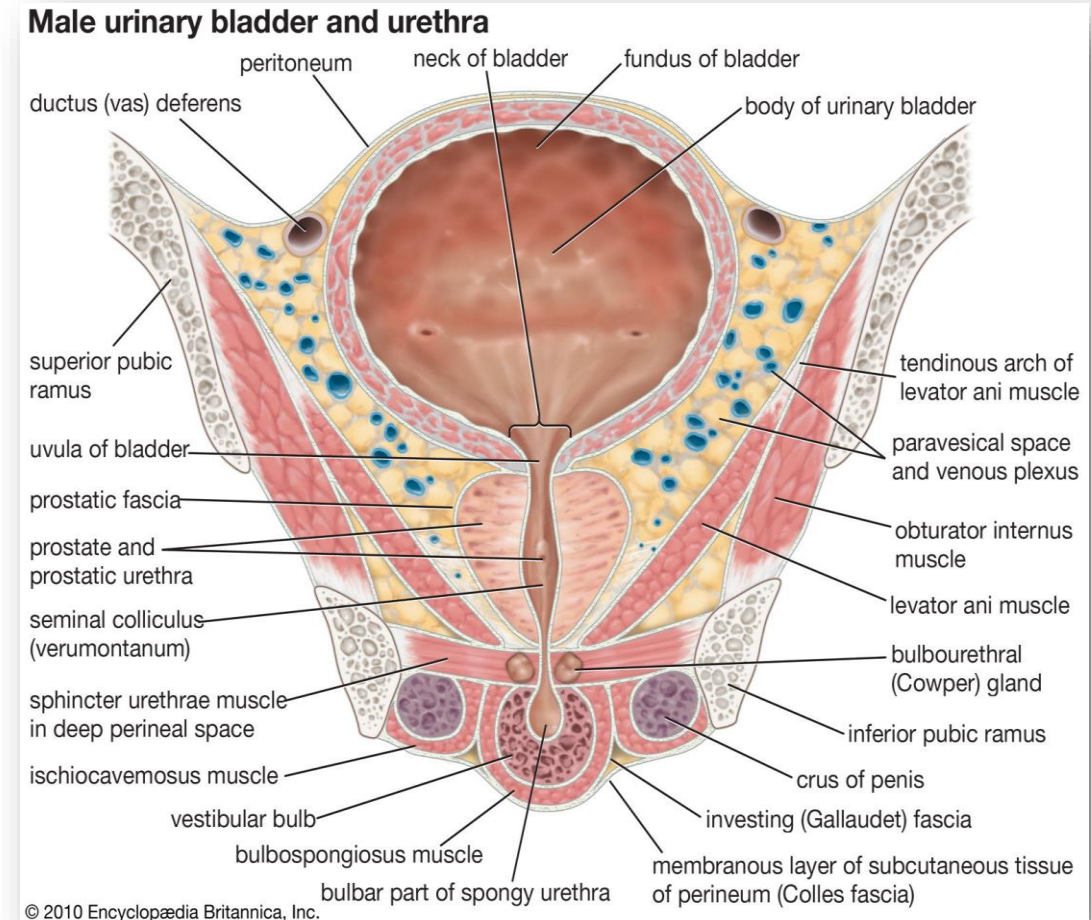
- The urethra comes out of this surface slightly above the apex of the gland.

## 4-Posterior surface:

- It is pierced by the two ejaculatory ducts at its upper border.
- This surface can be felt by P/R examination.

## 5-Inferolateral surfaces:

- One on each side they are related to (levator prostate) muscle.



## Structures inside the prostate:

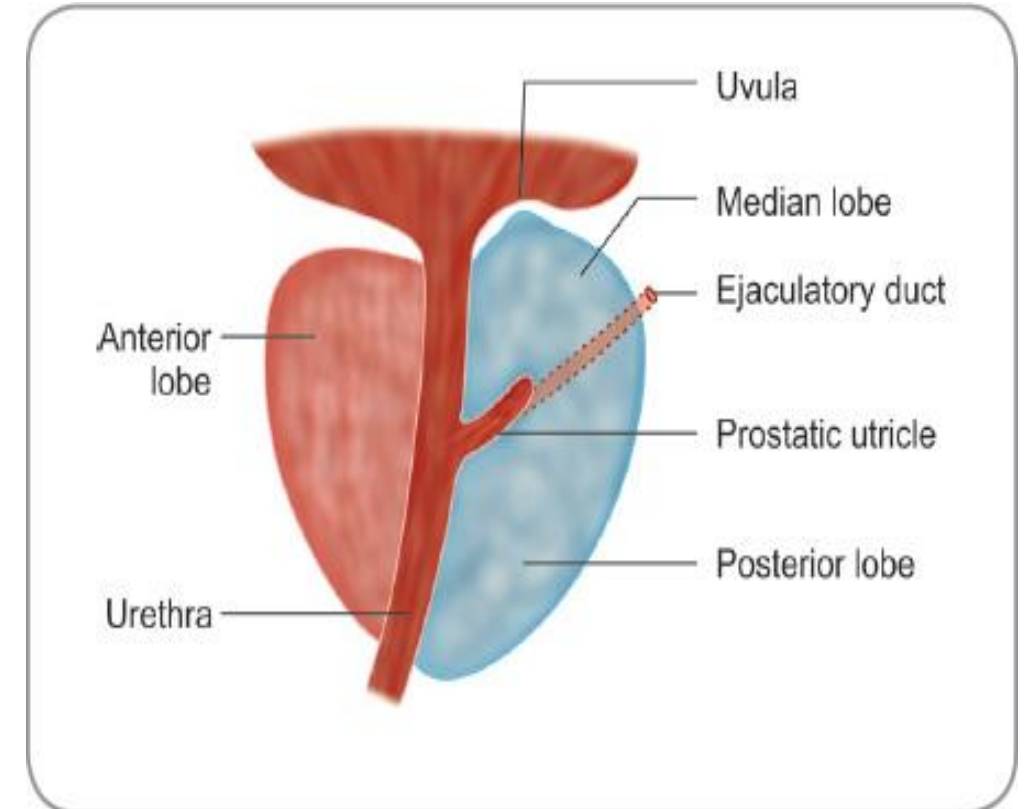
### 1- Prostatic urethra.

### 2- Two ejaculatory ducts:

- One on each side of the median lobe of prostate.

### 3- Prostatic utricle:

- It is a blind sac extending upwards into the substance of the median lobe of the prostate.
- It opens at the middle of the seminal colliculus.



# Prostatic Lobes:

## 1-Anterior lobe (isthmus):

- It is in front of the prostatic urethra, connecting the two lateral lobes.

## 2-Posterior lobe:

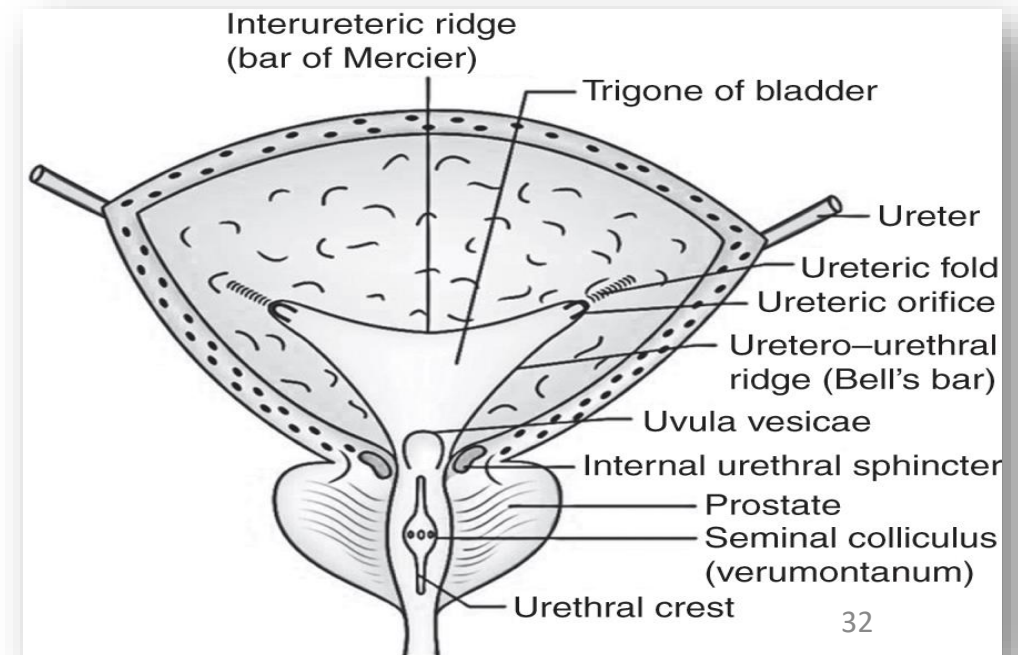
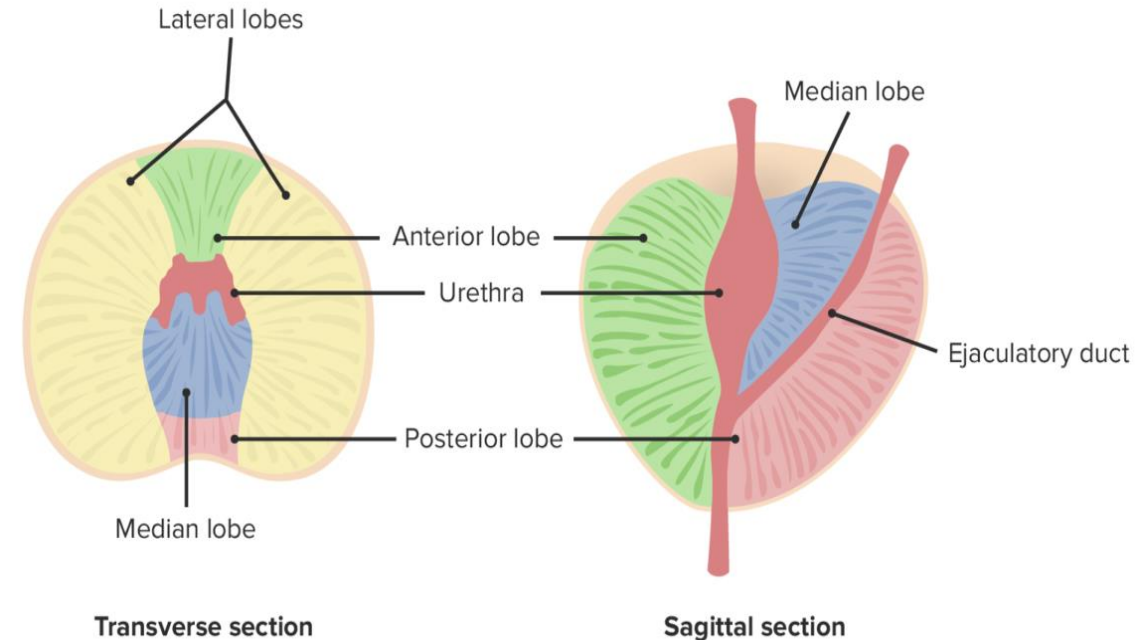
- It is behind the prostatic urethra and below the ejaculatory ducts.

## 3-Median lobe:

- It is behind the prostatic urethra & between the two ejaculatory ducts.
- It projects slightly upwards into the cavity of the bladder just behind the internal urethral orifice to form **uvula vesicae**.

## 4-Two lateral lobes:

- They form the main bulk of the gland.
- They are on either side of the prostatic urethra.





## Blood supply of prostate:

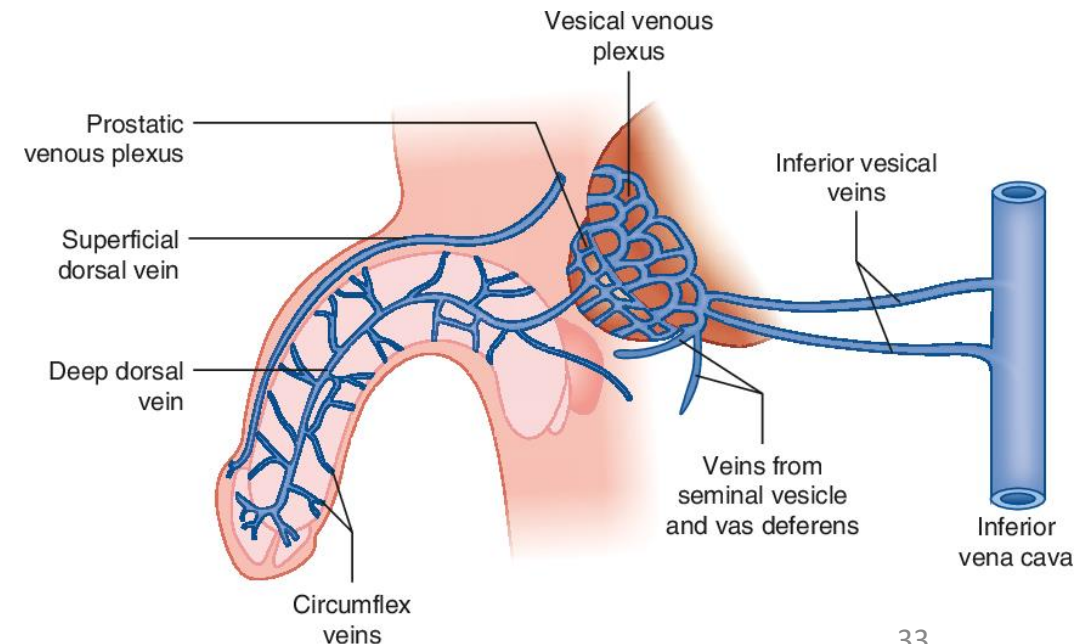
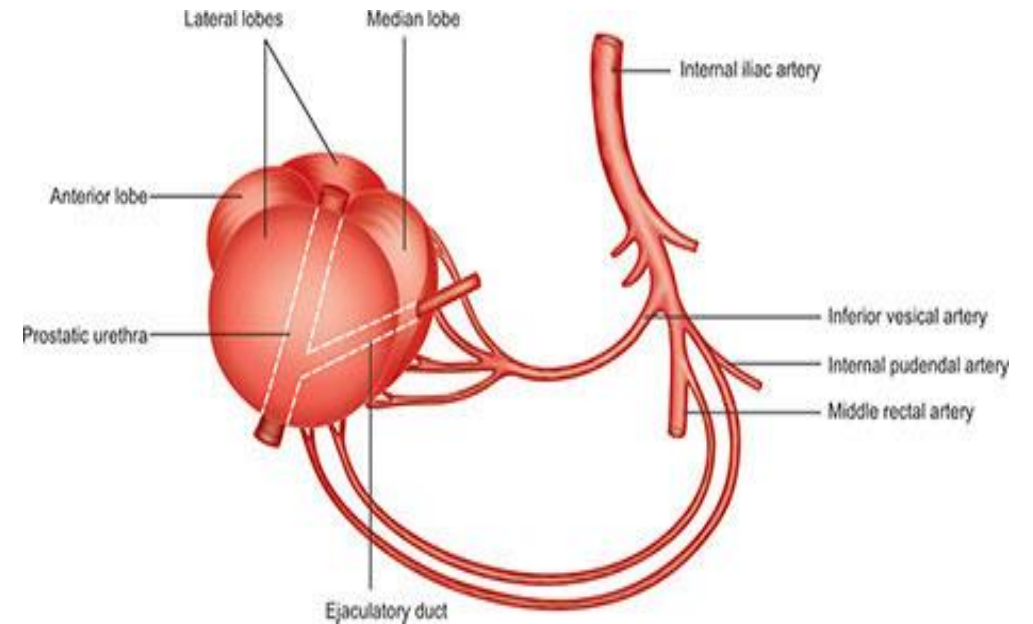
### Arteries:

- Inferior vesical, middle rectal.

### Veins:

- The veins form a plexus around prostate.
- It drains through the vesical veins into the internal iliac vein.

Applied anatomy: The prostatic venous plexus is connected to the internal vertebral venous plexus by valveless veins. This fact explains the reason why cancer prostate commonly metastases to the vertebral bodies.



**Thank  
you**