

# **DEVELOPMENT OF MALE GENITAL SYSTEM**

***By :***

***Associate Prof. :***

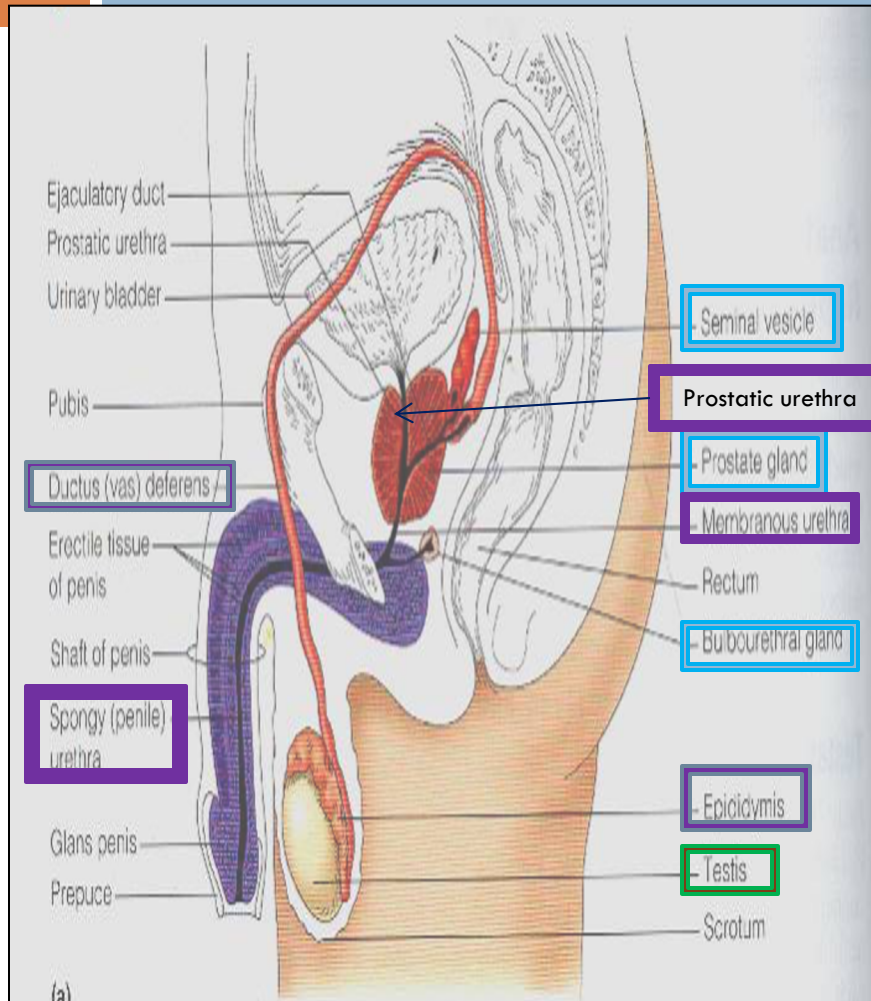
***Dr.Sanaa Alshaarawy***

# OBJECTIVES

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

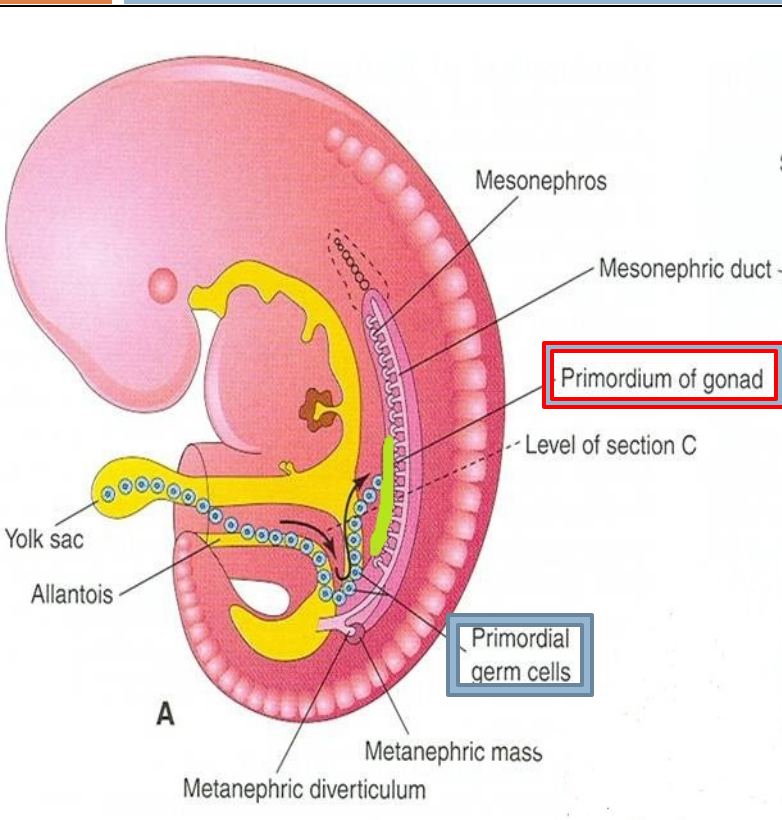
- ❑ List the causes of differentiation of genitalia into the male type.
- ❑ Describe the origin of each part of the male internal & external genitalia.
- ❑ List the causes & describe the events of descent of testis.
- ❑ List the common anomalies of male genital system & describe the causes of each of them.

# MALE GENITAL SYSTEM



- **Gonad :**
- **Testis.**
- **Genital Ducts:**
- **Epididymis.**
- **Vas deferens.**
- **Urethra.**
- **Genital Glands:**
- **Seminale vesicle.**
- **Prostate.**
- **Bulbourethral Glands.**

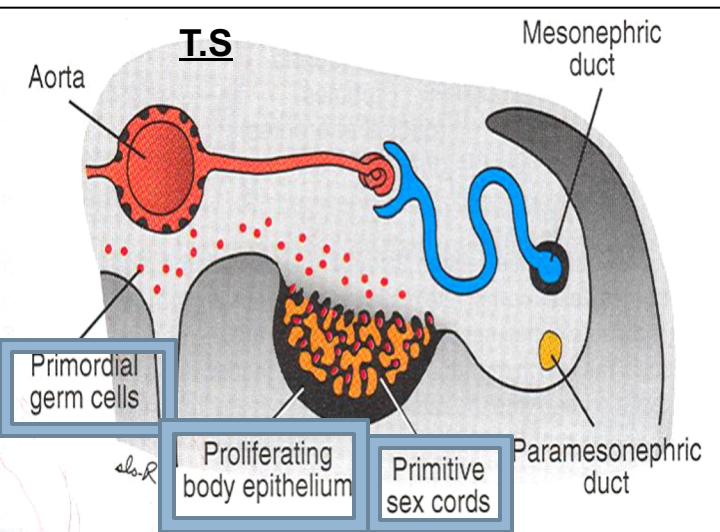
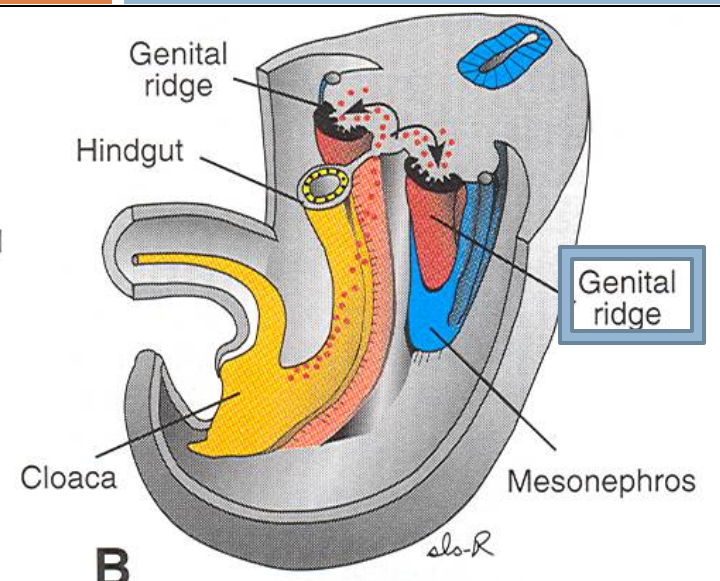
# DEVELOPMENT OF GONADS



- **During 5<sup>th</sup> week: gonadal development occurs.**
- **Until 7<sup>th</sup> week: gonads are similar in both sexes**
- **Gonads are derived from 3 sources:**
  1. **Mesothelium (epithelium lining the coelomic cavity)**
  2. **Underlying mesenchyme**
  3. **Primordial germ cells**



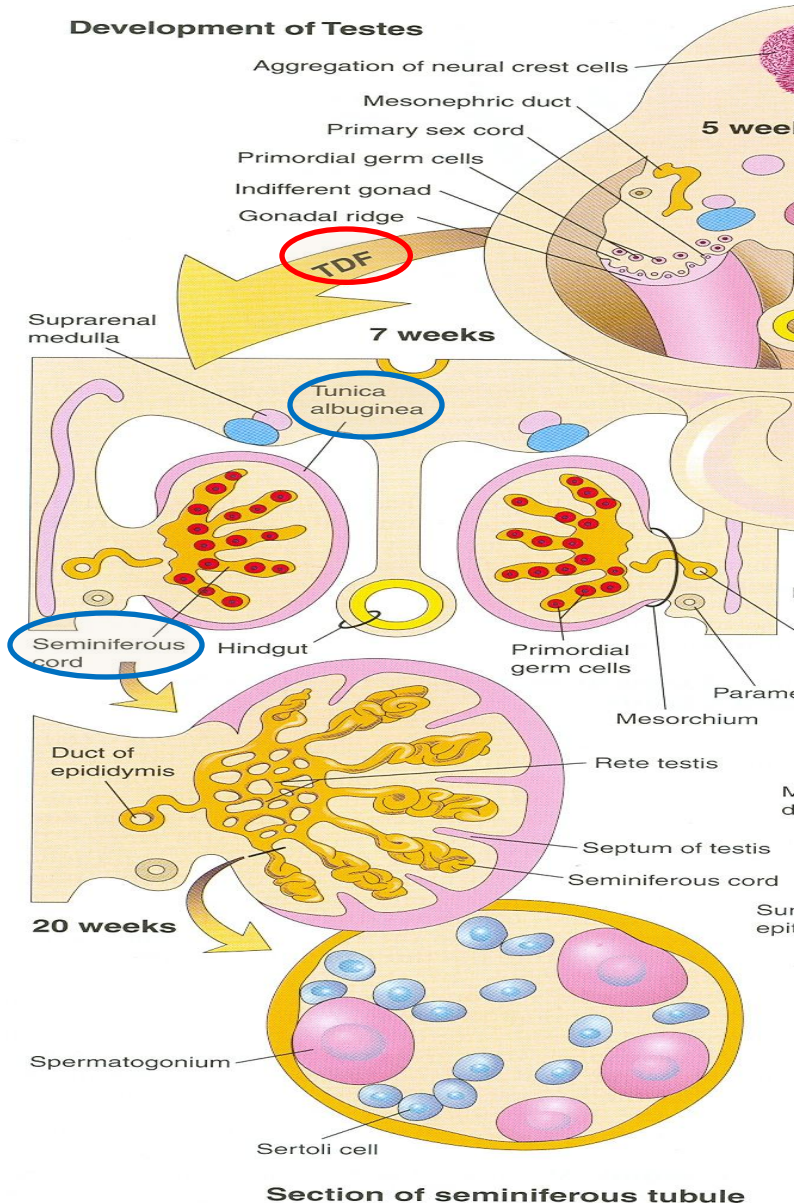
# INDIFFERENT GONADS



- **Gonadal ridge:** a bulge on the medial side of mesonephros produced by:
  1. **Proliferation of mesothelium (cortex)**
  2. **Proliferation of mesenchyme (medulla)**
- **Gonadal (primary sex) cords:** The proliferating mesothelial cells fuse and penetrate the underlying mesenchyme to form primitive gonadal cords.
- 3. **Primordial germ cells:** endodermal cells of the yolk sac migrate along dorsal mesentery of hindgut to gonadal ridge & become incorporated into gonadal cords.

# DEVELOPMENT OF TESTIS

## Development of Testes

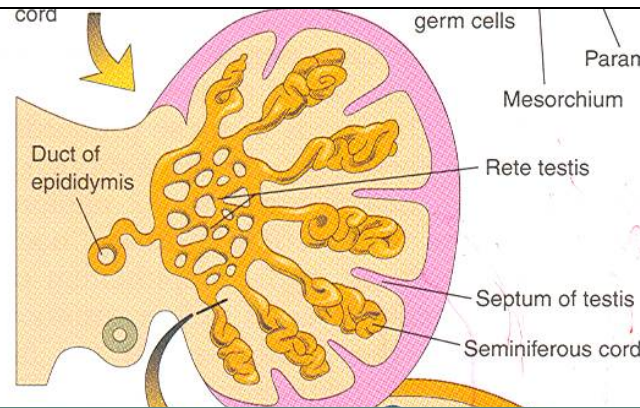


The Y chromosome has a **testis-determining factor (TDF)** that differentiates primitive gonad into testis.

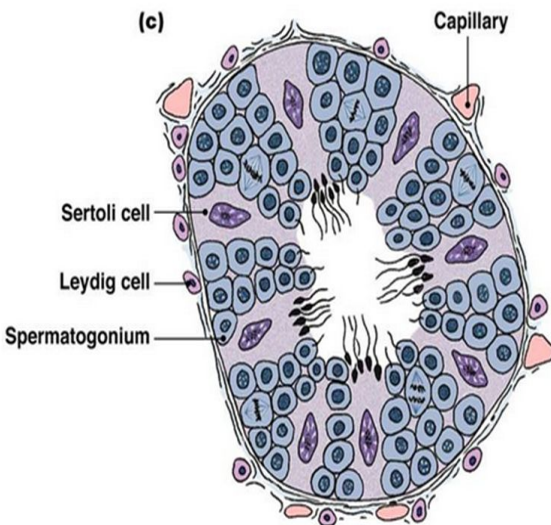
At 7<sup>th</sup> week:

- Regression of cortex & differentiation of medulla (of primitive gonad) into testis... How ?
- Gonadal cords condense & extend into all the medulla (Medullary cords) to form Seminiferous cords.
- The characteristic feature is the development of a thick fibrous capsule (**tunica albuginea**) that separates the enlarging testis from mesonephros.

# DEVELOPMENT OF TESTIS



The Seminiferous Tubule



- **Seminiferous cords** develop into: **Semineferous tubules**
- **Semineferous tubules** remain solid until puberty. Its walls are composed of:
  1. **Sertoli cells:** derived from surface epithelium of testis (*mesothelial cells*)
  2. **Spermatogonia:** derived from primordial germ cells (*endodermal in origin*).
- **By eighth week**, mesenchyme surrounding semineferous cords gives rise to *interstitial cells (of Leydig)* secreting testosterone.



# DEVELOPMENT OF MALE GENITAL DUCTS

## Leydig's cells

↓ secretes

Testosterone (8<sup>th</sup> week)



- 1) Masculine differentiation of mesonephric duct:  
epididymis,  
vas deferens, seminal glands,  
ejaculatory duct.
- 2) Masculine differentiation of **external genitalia**

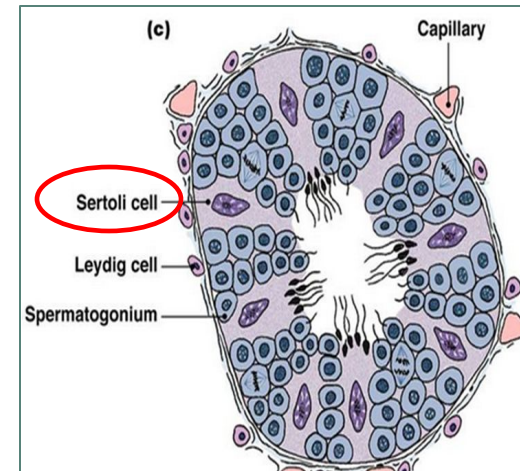
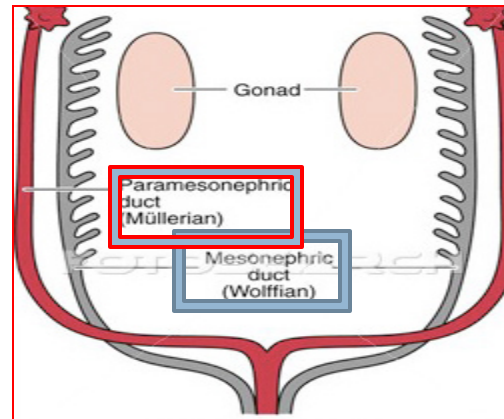
## Sertoli cells

↓ secretes

Müllerian inhibiting substance  
(Anti- Müllerian hormone) (7<sup>th</sup> week)



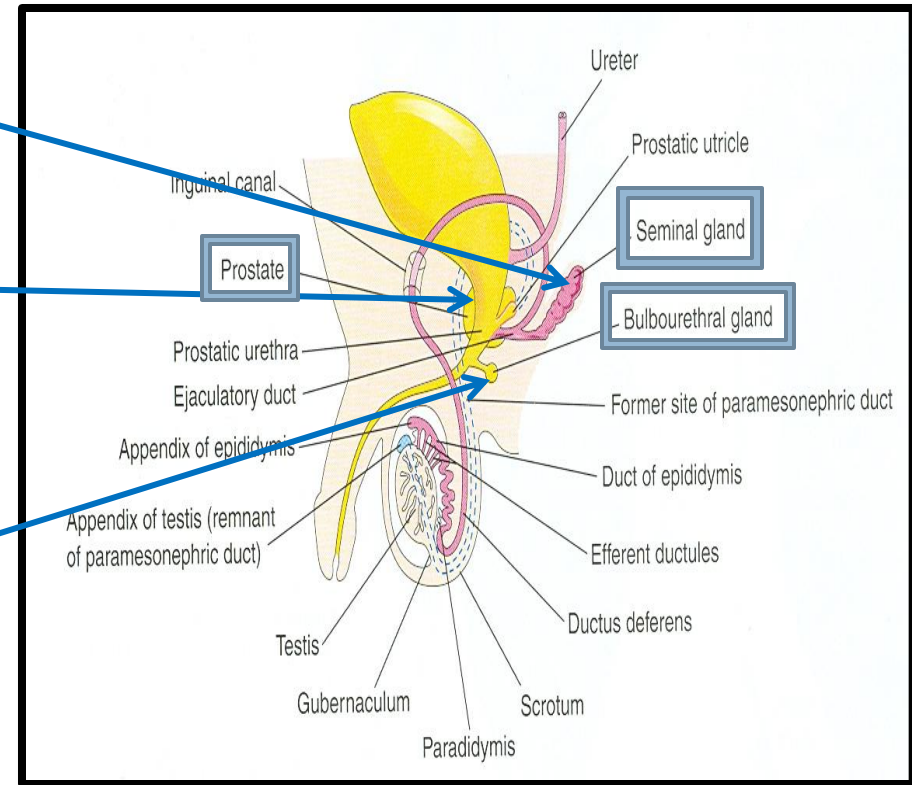
**Suppression of development**  
of **paramesonephric**  
(Müllerian) duct



# DEVELOPMENT OF MALE GENITAL GLANDS

1. **SEMINAL GLAND:**  
mesodermal outgrowth from **mesonephric duct**.
2. **PROSTATE GLAND:**  
endodermal outgrowth from **prostatic urethra**.
3. **BULBOURETHRAL GLAND:**  
endodermal outgrowth from **spongy urethra**.

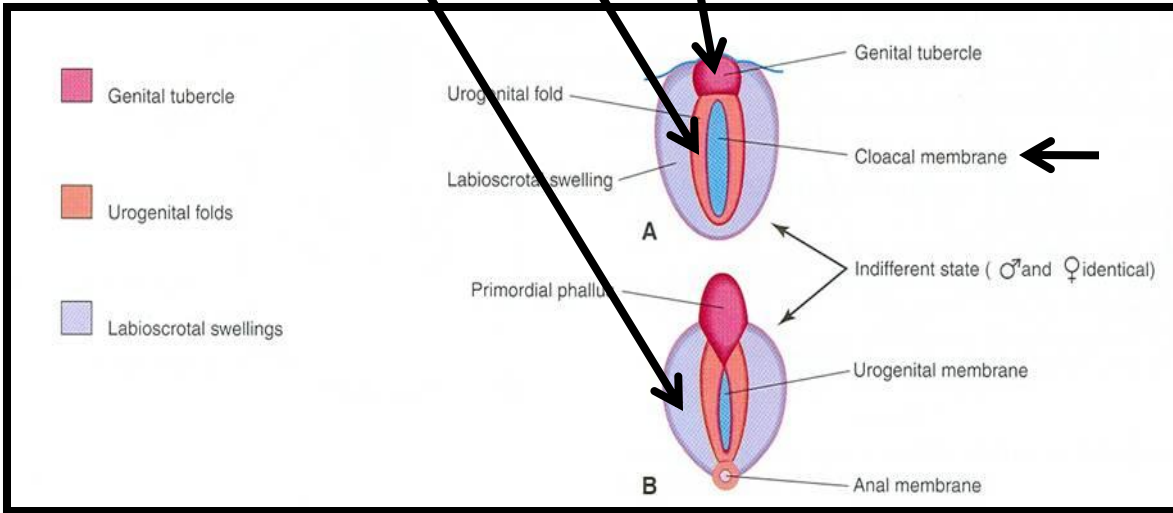
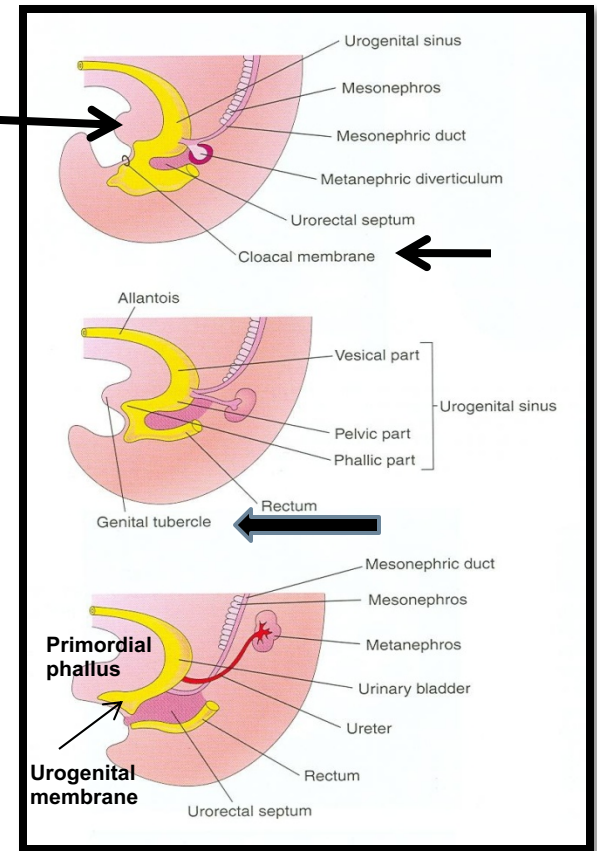
**Stroma & Smooth muscles in 2 & 3 are derived from surrounding mesenchyme**



**Genital tubercle:** produced from mesenchyme at the cranial end of cloacal membrane. It elongates to form a primordial phallus

**Urogenital folds:** develop on each side of cloacal membrane

**Labioscrotal swellings:** develop on each side of urogenital folds

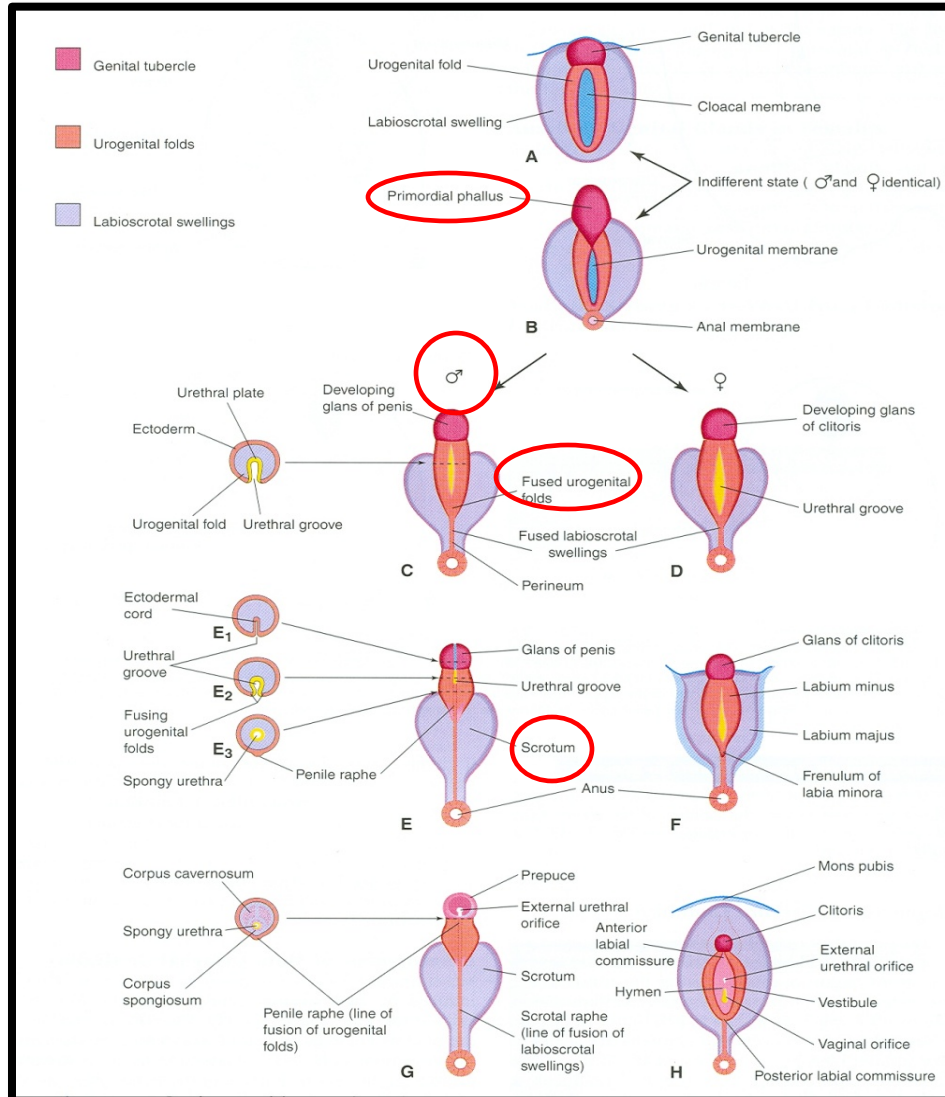


**INDIFFERENT STAGE  
OF  
EXTERNAL GENITALIA  
(from 4<sup>th</sup> to 7<sup>th</sup> week)**

# DEVELOPMENT OF MALE EXTERNAL GENITALIA (stimulated by testosterone)

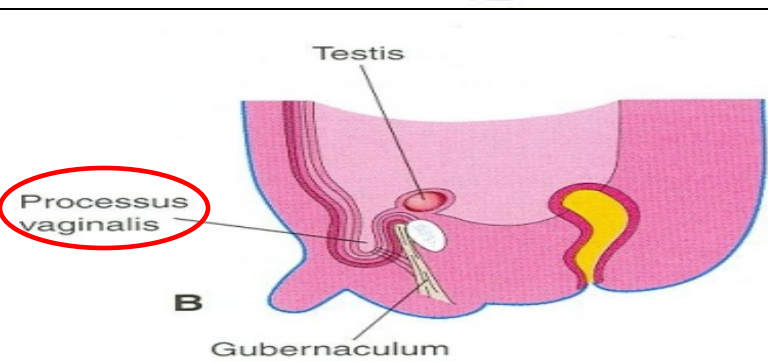
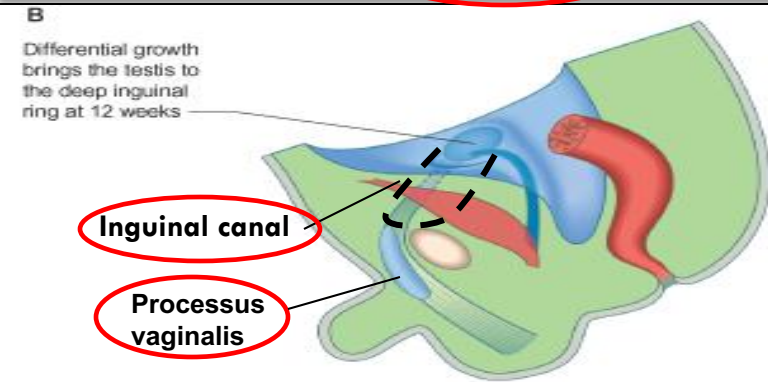
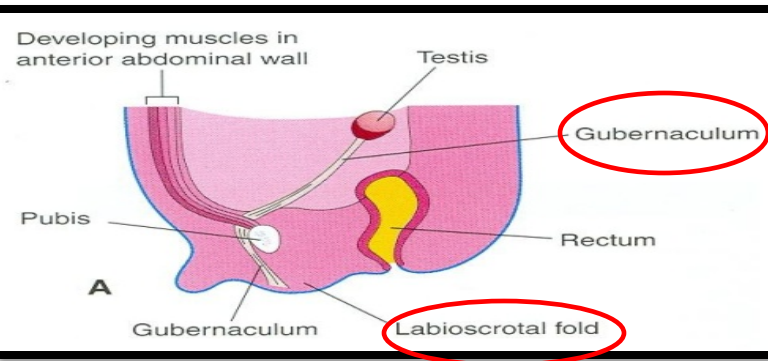
- Begins at 9<sup>th</sup> week
- Complete differentiation at 12<sup>th</sup> week:

1. **The phallus enlarges to form the penis**
2. **The urogenital folds fuse to form the spongy (penile) urethra**
3. **The labioscrotal folds (swellings) fuse to form the scrotum**



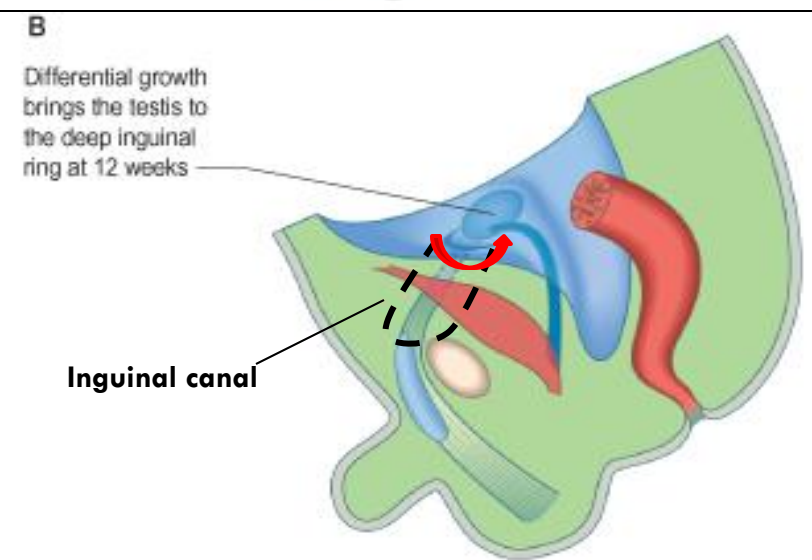
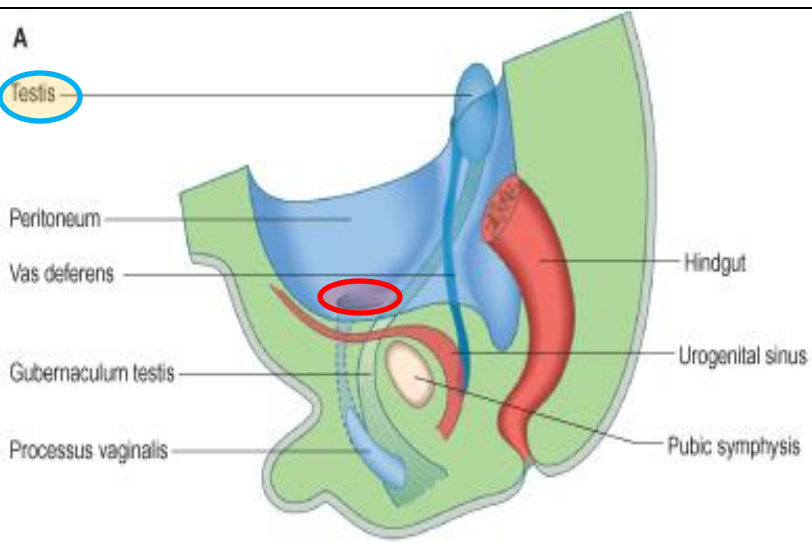


# DESCENT OF TESTIS

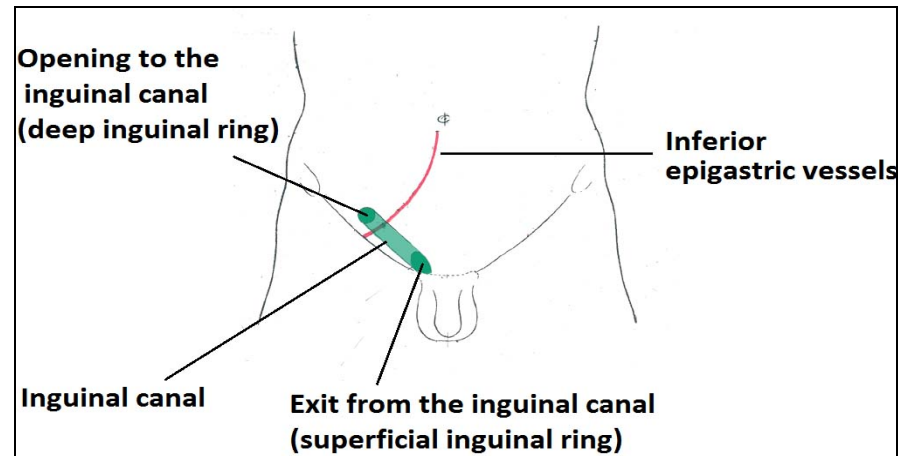


- **Gubernaculum:** a mesenchymal band extending from inferior pole of gonad to labioscrotal fold.
- **Inguinal canal:** a pathway formed by gubernaculum through layers of anterior abdominal wall.
- **Processus vaginalis:** a peritoneal fold passing through inguinal canal before testis, to facilitate its descent.

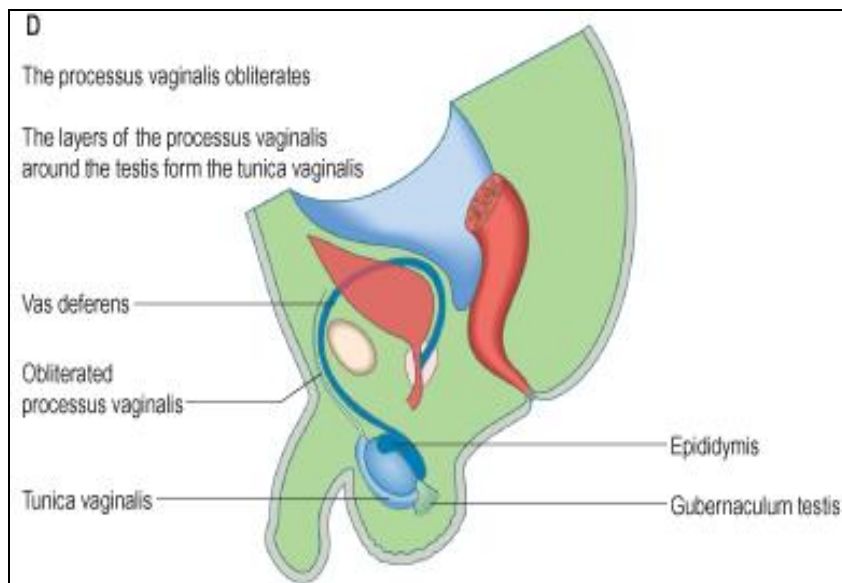
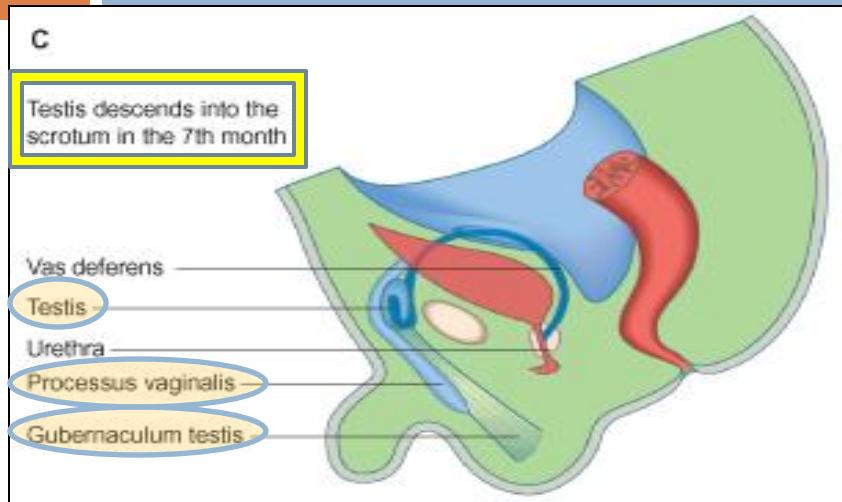
# INTERNAL DESCENT OF TESTIS



- **Definition:** Descent of testis from posterior abdominal wall to deep inguinal ring.
- **Time:** During **12<sup>th</sup> week**
- **Cause:** a *relative movement* resulting from elongation of cranial part of abdomen away from its caudal part (future pelvic cavity).



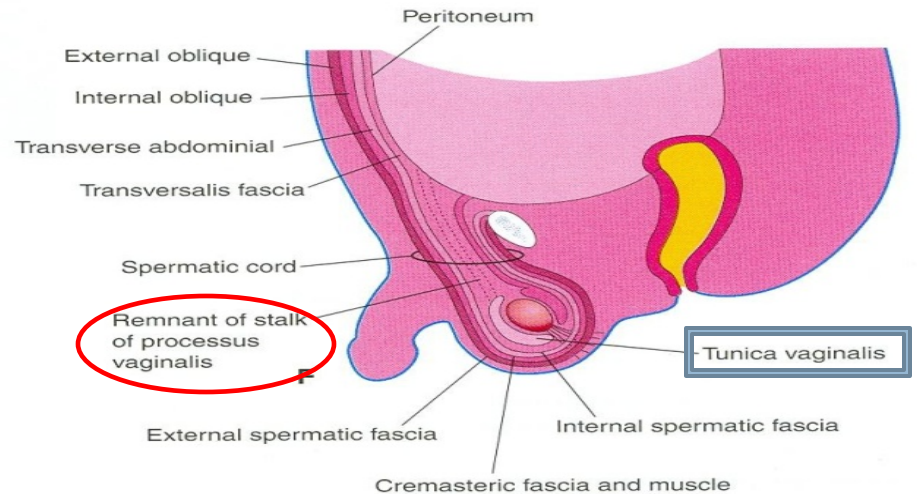
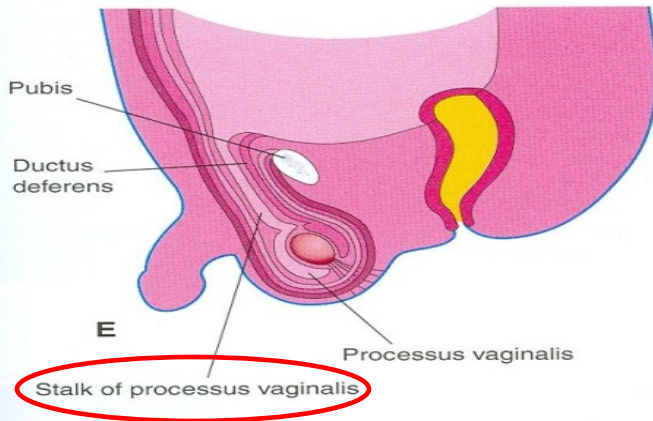
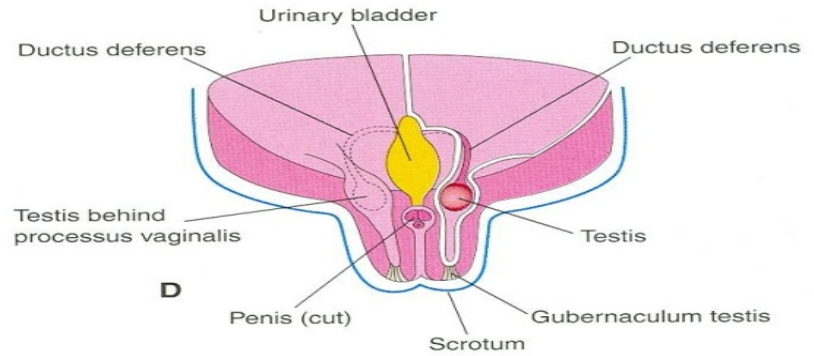
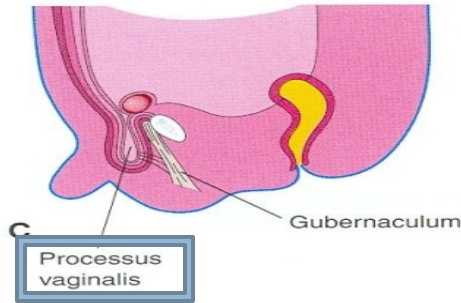
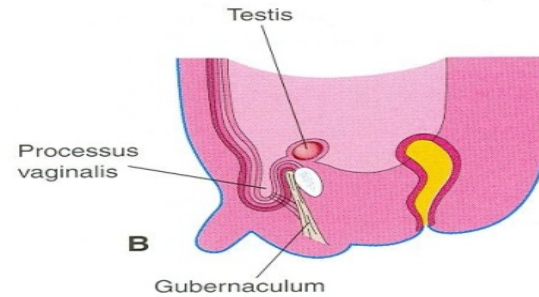
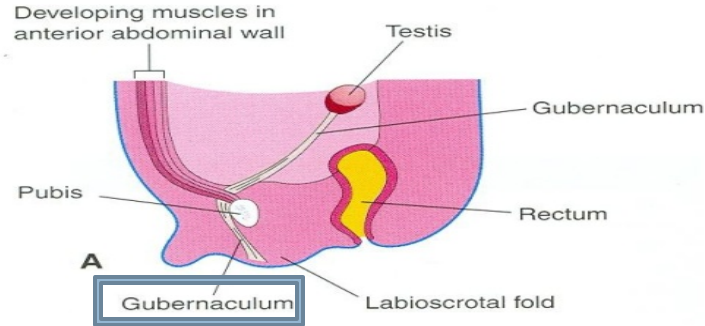
# EXTERNAL DESCENT OF TESTIS



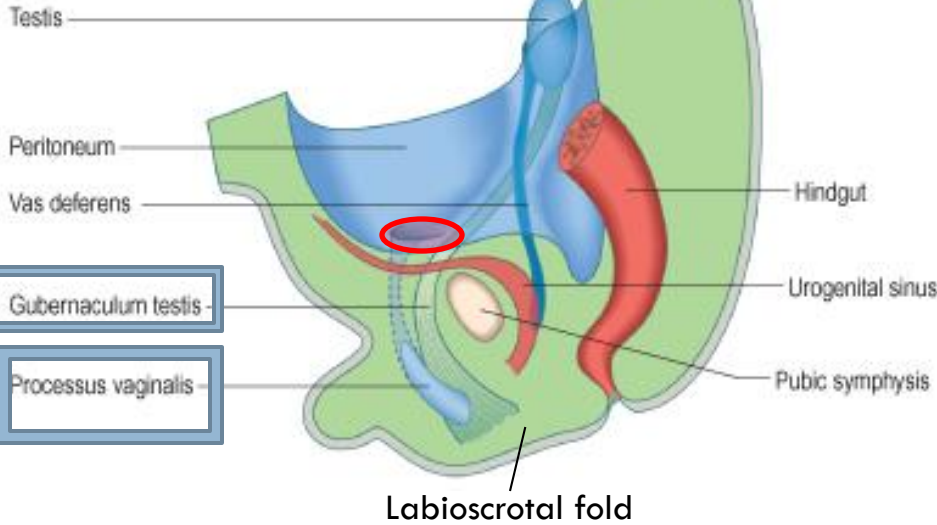
- **Definition:** Descent of testis **from** deep inguinal ring, through inguinal canal, **to** scrotum
- **Time:** Begins in **7<sup>th</sup> month** and **takes 2 to 3 days**
- **Causes:**
  1. **Controlled by androgens.**
  2. **Guided by gubernaculum.**
  3. **Facilitated by processus vaginalis.**
  4. **Helped by increased intra-abdominal pressure resulting from growth of abdominal viscera.**



# DESCENT OF TESTIS



**A**

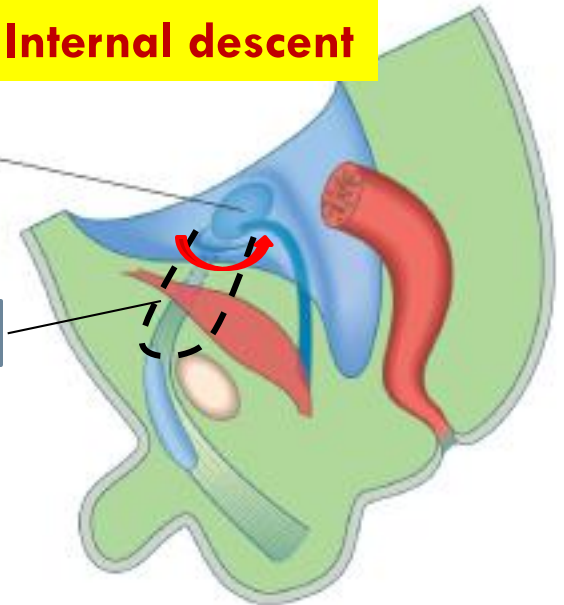


**B**

Differential growth brings the testis to the deep inguinal ring at 12 weeks

**Internal descent**

**Inguinal canal**



**C**

**External descent**

Testis descends into the scrotum in the 7th month

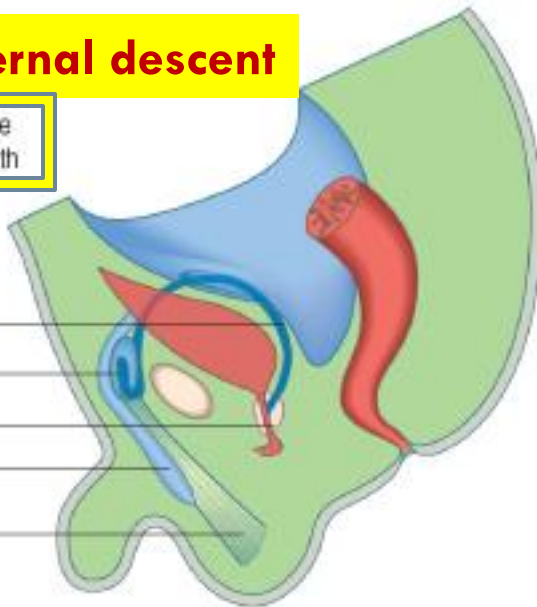
Vas deferens

Testis

Urethra

Processus vaginalis

Gubernaculum testis



**D**

The processus vaginalis obliterates

The layers of the processus vaginalis around the testis form the tunica vaginalis

Vas deferens

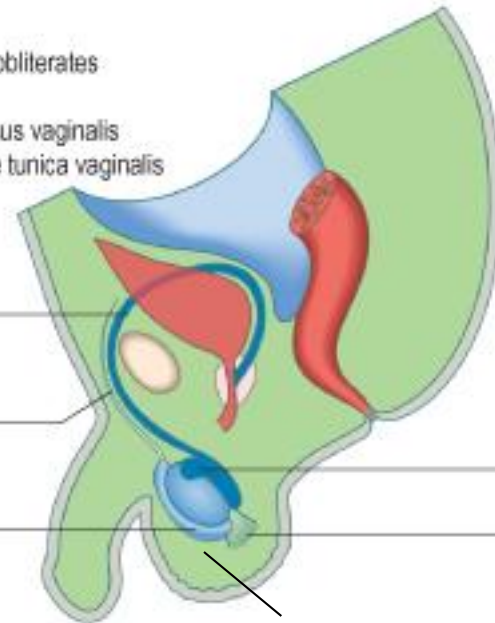
Obliterated processus vaginalis

Tunica vaginalis

Epididymis

Gubernaculum testis

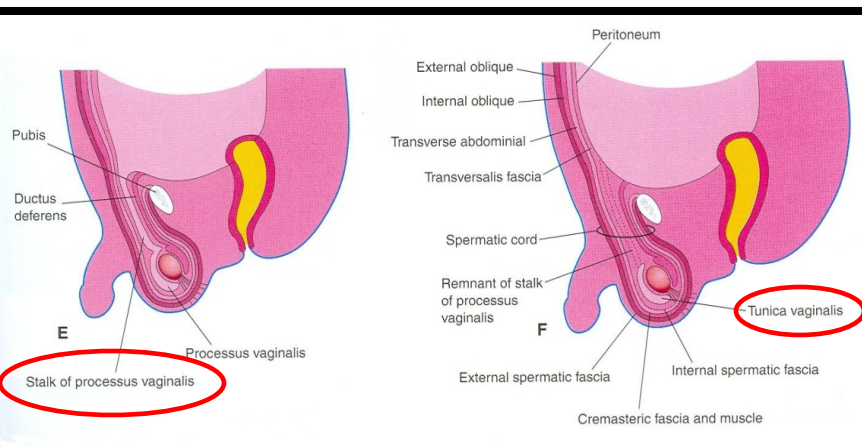
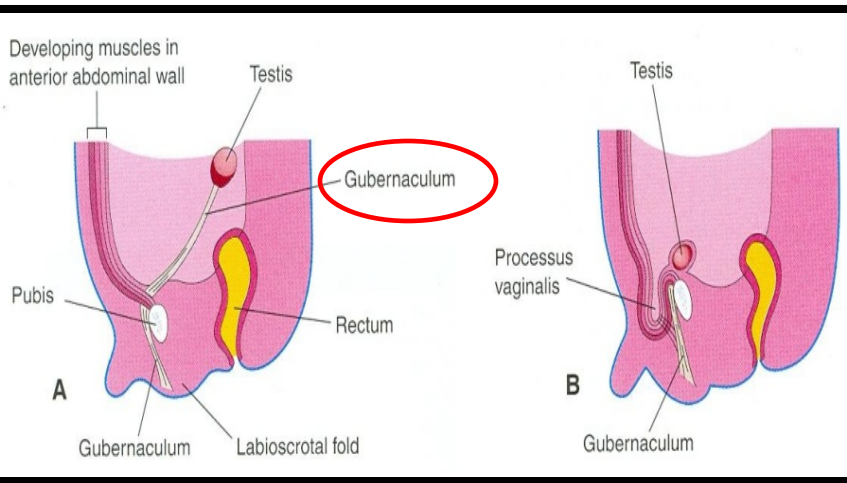
Scrotum



# EXTERNAL DESCENT OF TESTIS

1. More than 97% of full-term new born males have both testes in scrotum.
2. During first 3 months after birth, most undescended testes descend into scrotum.
3. No spontaneous descent occurs after the age of 1 year.

# EXTERNAL DESCENT OF TESTIS



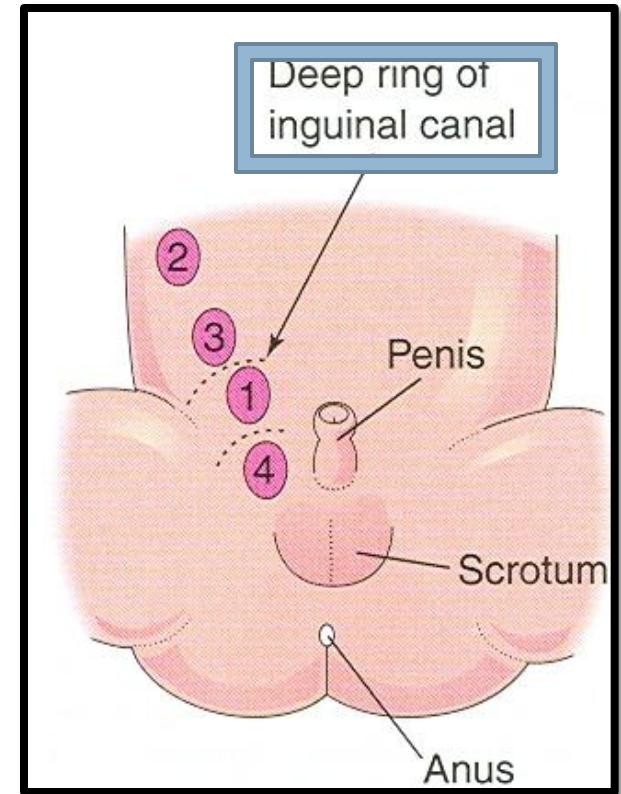
**Complete descent of testis is associated by:**

- **Degeneration of gubernaculum.**
- **Obliteration of stalk of processus vaginalis.**
- **Persistence of part of processus vaginalis surrounding the testis in the scrotum to form “tunica vaginalis”**



# CRYPTORCHIDISM (UNDESCENDED TESTIS)

- **Incidence:** is up to 30% of premature & 3-4% of full term males
- **Cause:** deficiency of androgens.
- **Common sites:** look to figure
- **Complications:**
  1. Sterility, if bilateral.
  2. Testicular cancer (20-44%).



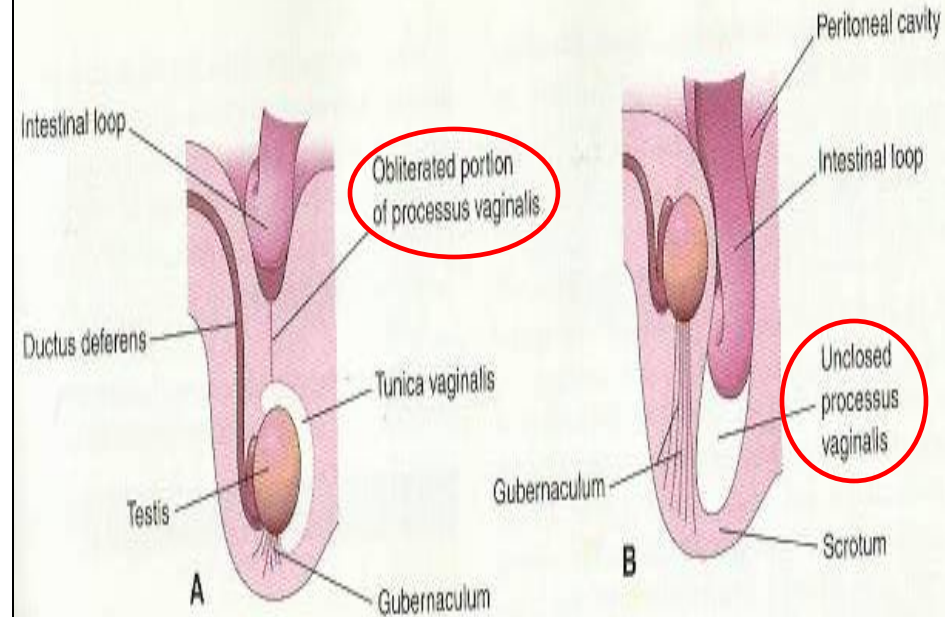
# CONGENITAL INGUINAL HERNIA

- **Definition:** Herniation of a loop of intestine through a non-obligated processus vaginalis.

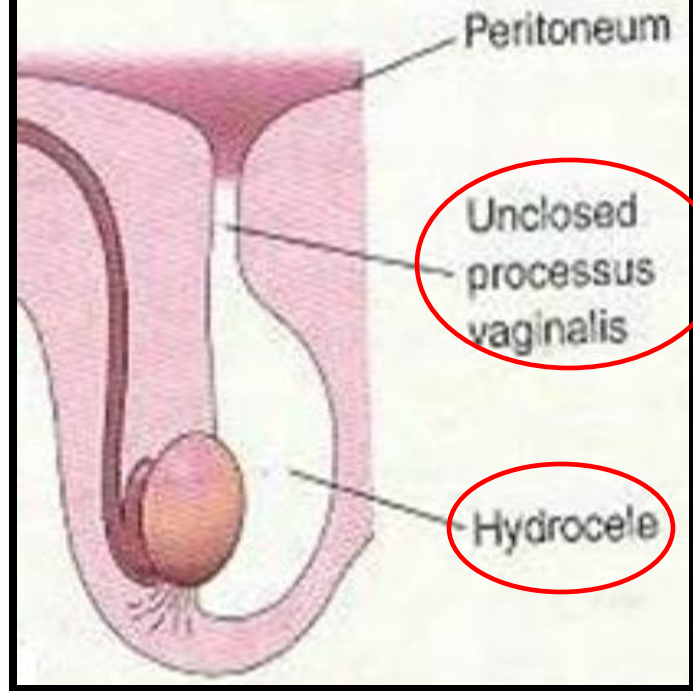
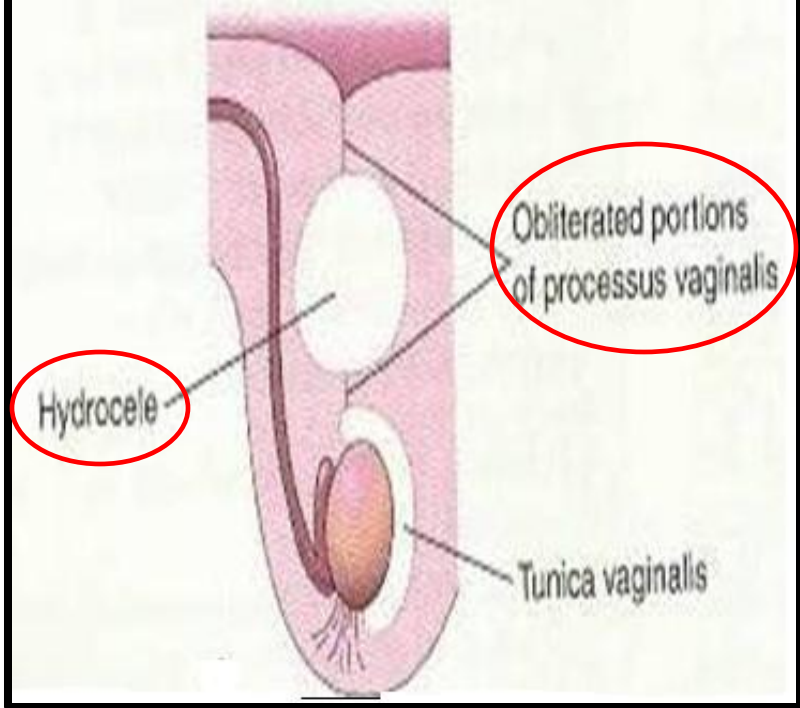
**A: incomplete**

**B: complete (in scrotum)**

- **Cause:** The processus vaginalis does not obliterate & remains in open communication with the peritoneal cavity.

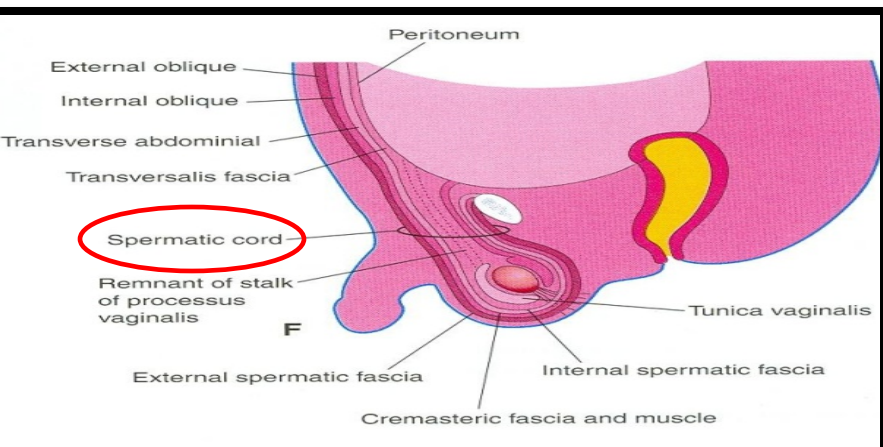


Failure of closure of processus vaginalis



**HYDROCELE OF SPERMATIC CORD**  
 Accumulation of fluid in spermatic cord  
 due to a non-obiterated  
portion of stalk of processus vaginalis

**HYDROCELE OF TESTIS**  
 Accumulation of serous fluid in tunica vaginalis  
 (in scrotum) due to non-obliteration  
 of the whole stalk of Processus vaginalis





***THANK YOU***