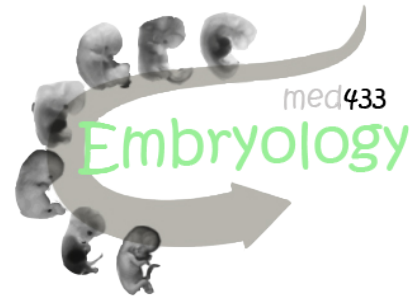


EMBRYOLOGY

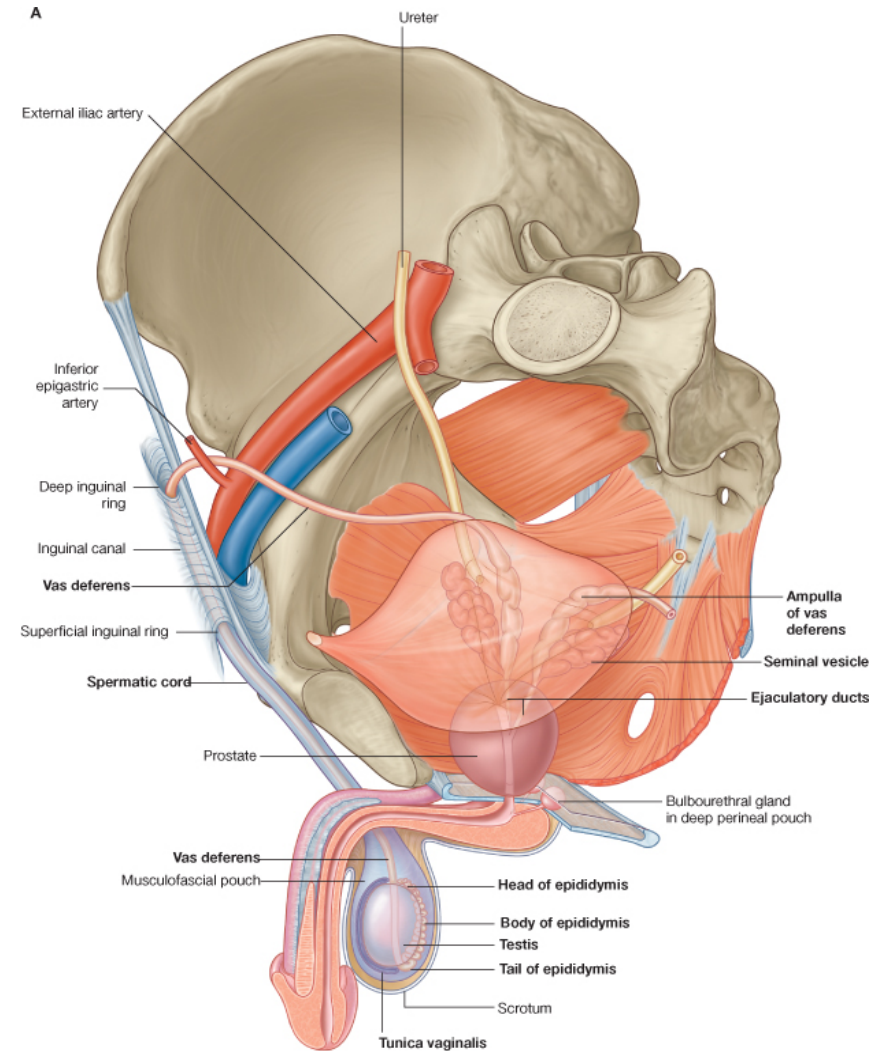
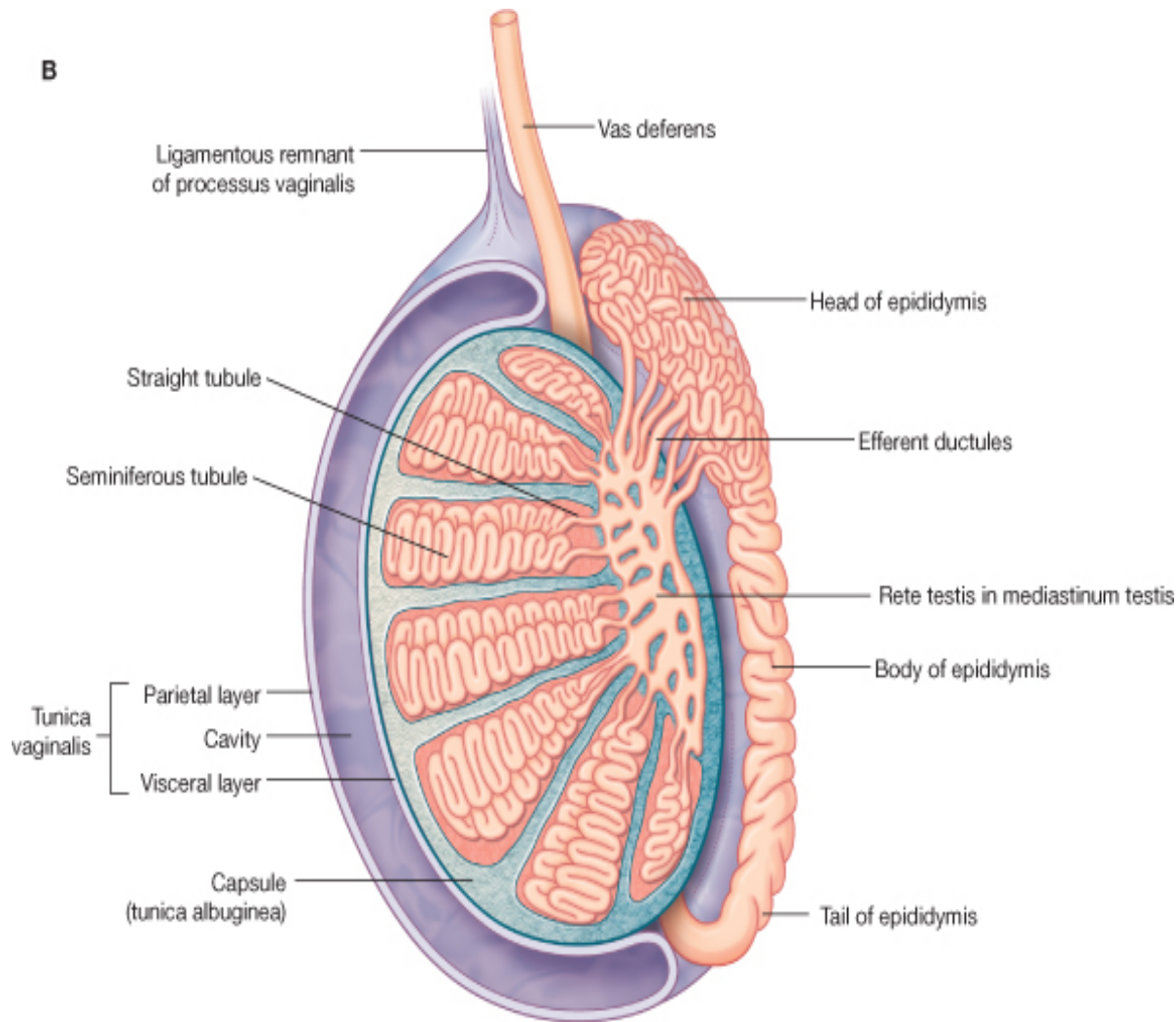
DEVELOPMENT OF MALE GENITAL SYSTEM



Lecture Objectives:

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

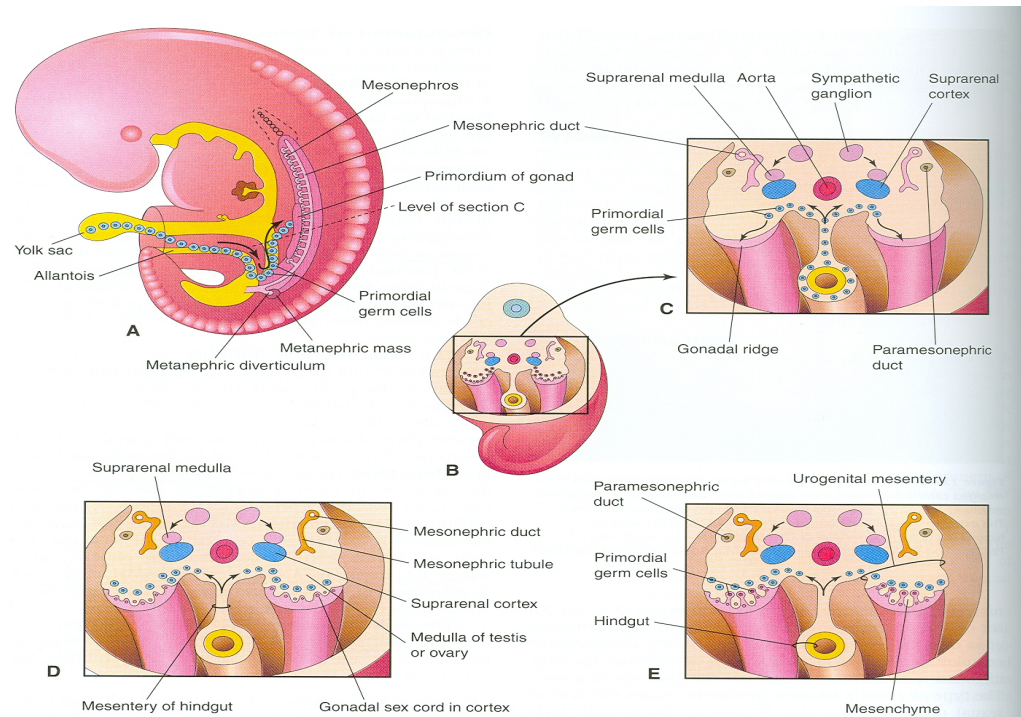
Quick revision of male genital system ANATOMY



AT FIRST, THE GONADS OF BOTH MALE AND FEMALE ARE CREATED

- That means they have same *origin*.
- However, the development will start to differentiate toward male gonads by the effect of (Testis Determining Factor), a gene on the Y chromosome.
- This occurs at the 7th week.

- The unified precursor of male and female gonads is a group of three types of cells (starts at 5th week until– 7th week)



1/Mesothelium
(mesodermal epithelium lining the celomic cavity of the posterior abdominal wall).

2/Underlying mesenchyme, which is the mesodermal cells covering the mesothelial cells.

3/Primordial germ cells, endodermal cells of the yolk sac migrating from the hind gut through the dorsal mesentery to join the gonadal ridge and become incorporated into gonadal cords.

Note

The combination of both proliferated **mesothelial cells** forming a **cortex**, and proliferated **mesenchymal cells** forming a **medulla**

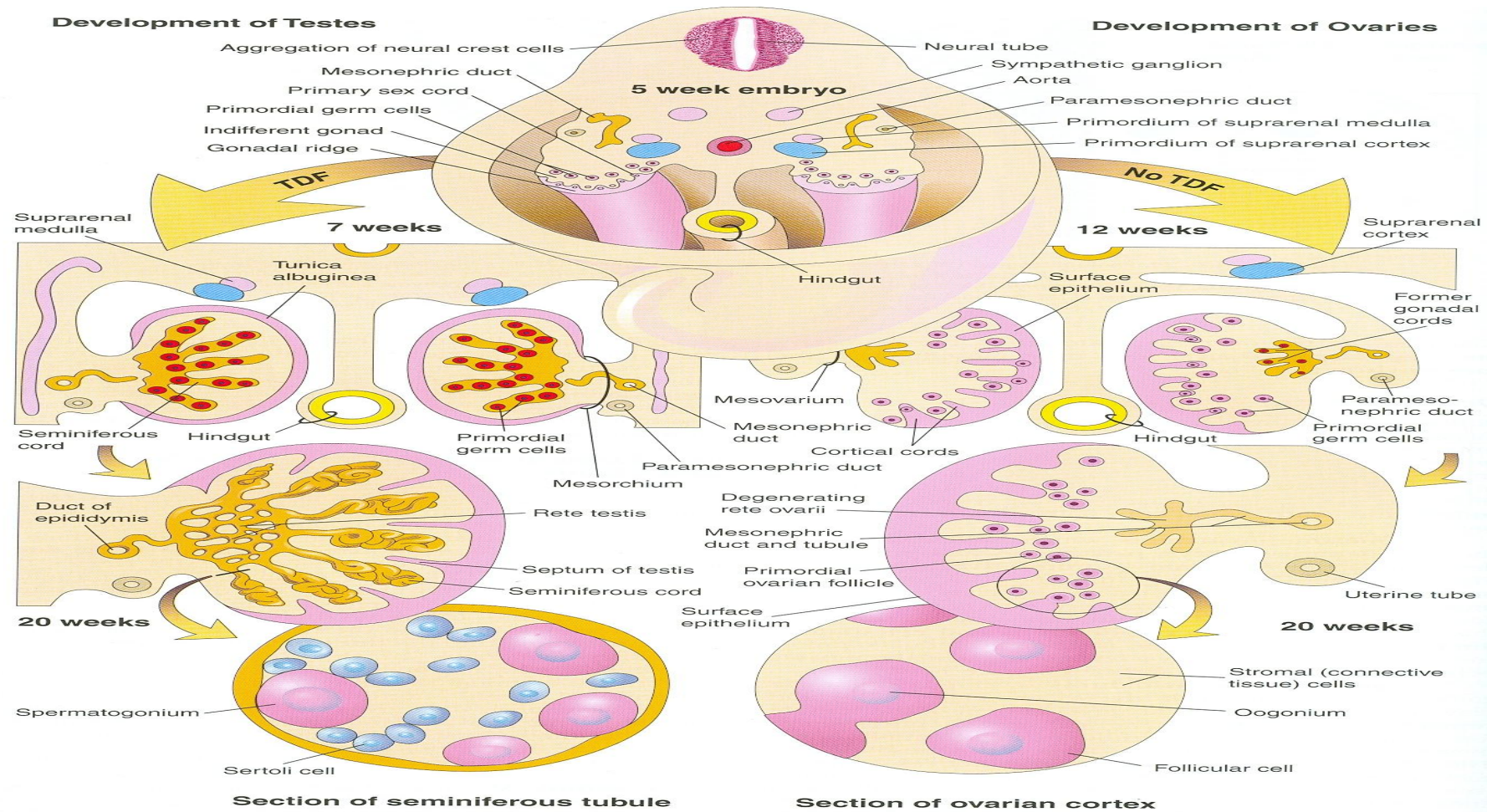
Is called **Gonadal ridge** located medial to the mesonephros

When gonadal ridge is formed, the mesothelial cells fuse and form Sex (Gonadal) cords.

*At the **7th week**, Testis determining factor (**TDF**) causes the following:*

- *Regression of cortex & differentiation of medulla into testis.*
- ***Gonadal cords** condense & extend into medulla to form **seminiferous cords**.*
- *The characteristic feature is the development of a thick fibrous capsule (tunica albuginea) that separates the enlarging testis from mesonephros.*
- ***Seminiferous cords** develop into: **seminiferous tubules***
- *Seminiferous 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*
- ***By eighth week**, **mesenchyme** surrounding seminiferous cords gives rise to **interstitial cells (of Leydig)** secreting **testosterone***

THEREFORE, INSTEAD OF UNDIFFERENTIATED GONADS, TESTIS ARE DEVELOPED.



- *The developed *Leydig cells* start to secrete testosterone by the 8th week.
- *The role of **testosterone** in the 8 weeks old fetus is

*STIMULATE MESONEPHRIC DUCT
TO FORM THE DUCTAL SYSTEM
THAT COMPOSED OF

- 1/**EPIDIDYMIS**
- 2/**VAS DEFERENS**
- 3/**SEMINAL GLANDS**
- 4/**EJACULATORY DUCT**

*MASCULINE DIFFERENTIATION
OF EXTERNAL GENITALIA

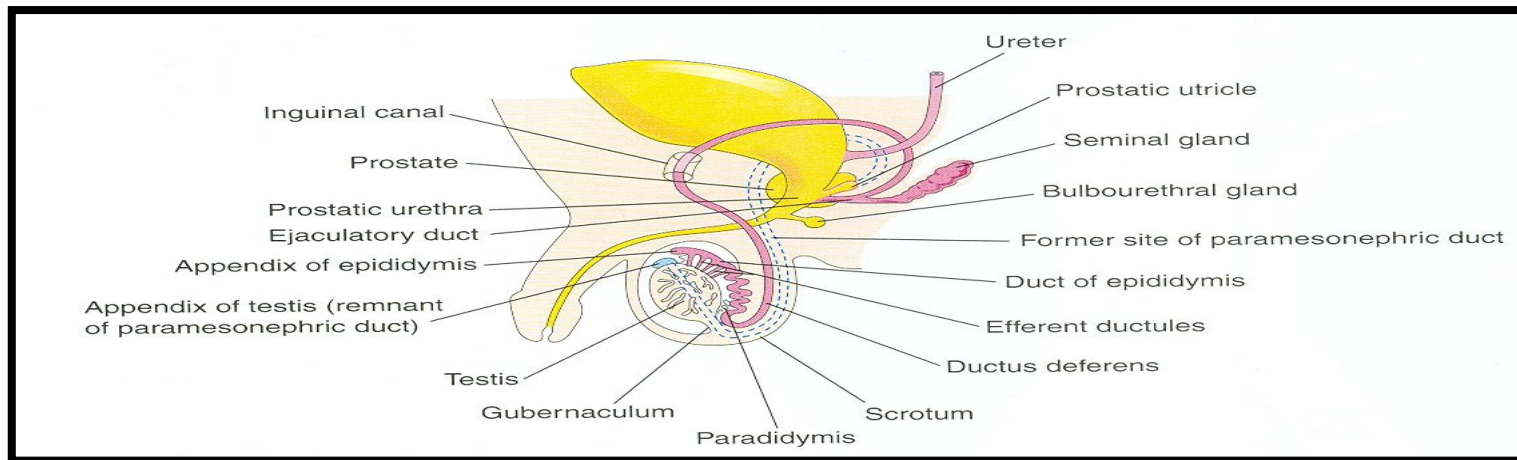
STIMULATE SERTOLI CELLS TO
SECRETE (**ANTI-MÜLLERIAN**
HORMONE) ANTAGONIZING
MÜLLERIAN HORMONE THAT HELP
IN THE FORMATION OF THE
FEMALE GENITAL SYSTEM.

DEVELOPMENT OF MALE GENITAL GLANDS

❖ Their origin is completely different from the gonads.

1-SEMINAL GLANDS	2-PROSTATE*	3-BULBOURETHRAL GLAND*
<i>MESODERMAL OUTGROWTH FROM MESONEPHRIC DUCT.</i>	<i>ENDODERMAL OUTGROWTH FROM PROSTATIC URETHRA.</i>	<i>ENDODERMAL OUTGROWTH FROM SPONGY URETHRA.</i>

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

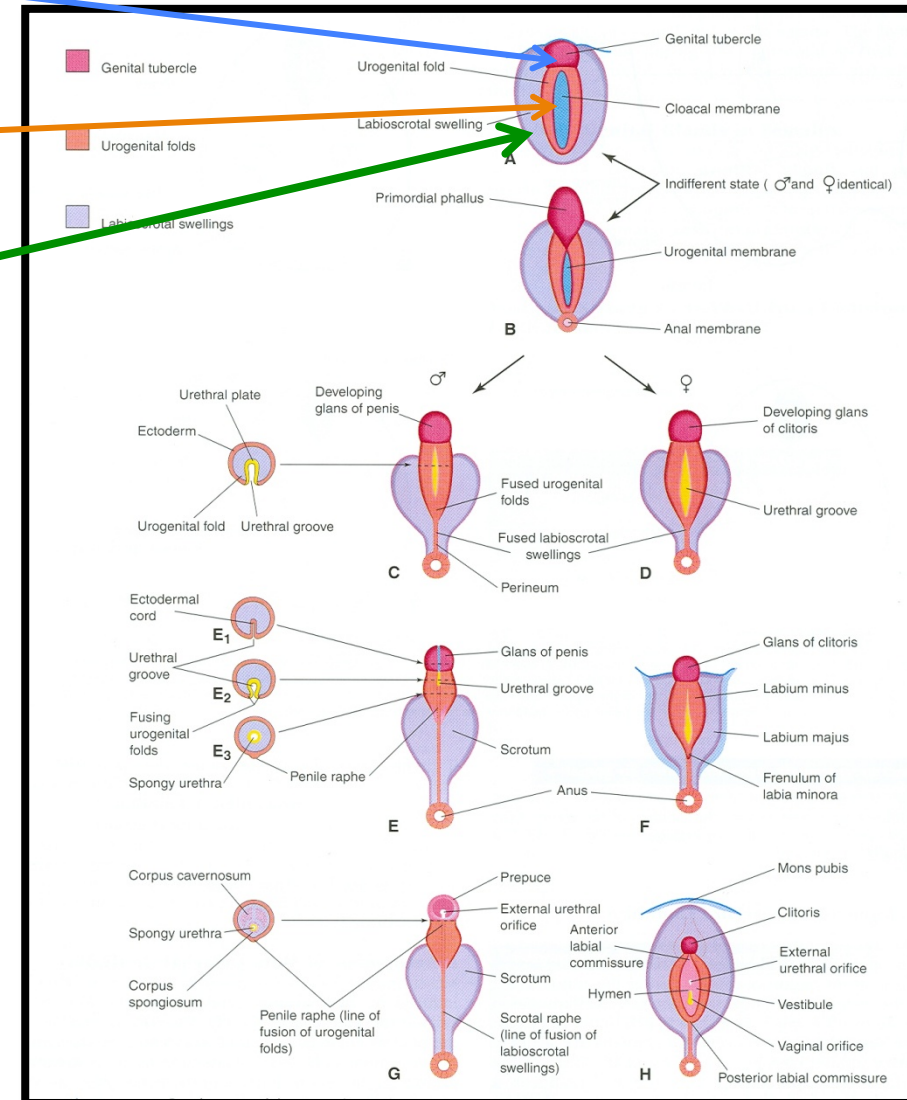


INDIFFERENT STAGE OF EXTERNAL GENITALIA (from 4th to 7th week) – IN BOTH MALE AND FEMALE

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

Urogenital folds : develop on each of cloacal membrane .

Labioscrotal swellings : develop on each side of urogenital folds.



DEVELOPMENT OF MALE EXTERNAL GENITALIA

(STIMULATED BY TESTOSTERONE)

Begins at 9th week

Complete differentiation at 12th 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*

First you have to know three terms

Gubernaculum: a mesenchymal band extending from inferior pole of gonad (testis) to labioscrotal folds.

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.

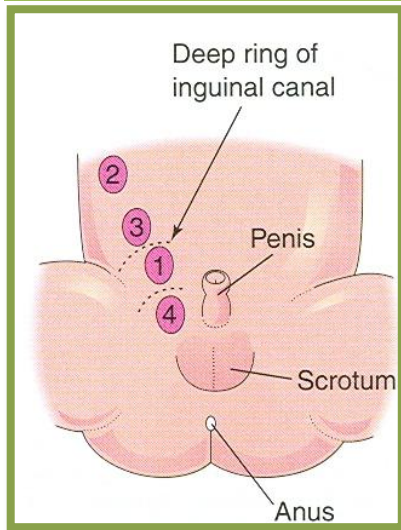
	INTERNAL DESCENT OF TESTIS	EXTERNAL DESCENT OF TESTIS
Definition	Descent of testis from posterior Abdominal wall to deep inguinal ring .	Descent of testis from deep inguinal ring through inguinal canal to scrotum .
Time	During 12 th week	Begins in 7 th month and takes 2 to 3 days
cause	A relative movement resulting from elongation of cranial part of abdomen away from its caudal part (future pelvic cavity).	<ol style="list-style-type: none"> 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.
Note that		<ol style="list-style-type: none"> 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 <p>Complete descent of testis is associated by:</p> <ol style="list-style-type: none"> 1. Degeneration of gubernaculum 2. Obliteration of stalk of processus vaginalis 3. Persistence of part of processus vaginalis surrounding the testis in the scrotum to form “tunica vaginalis”

*AT THE BIGGENING IT IS FOUND ON THE POSTERIOR ABDOMINAL WALL

CONGENITAL ANOMALIES

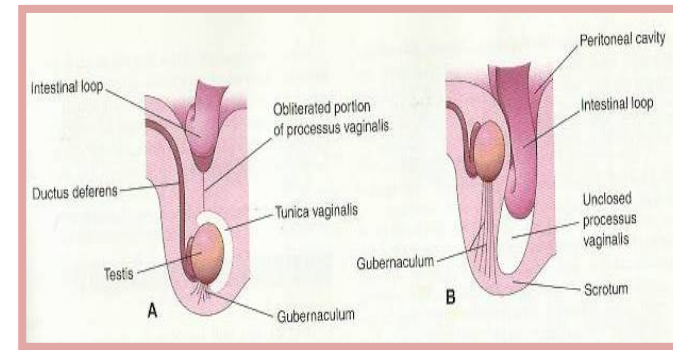
CHRYPTORCHIDISM (UNDESCENDED TESTIS)

Incidence	in up to 30% of premature & 3-4% of full term males
Cause	deficiency of androgens
Common sites	1. deep ring of inguinal canal (most common) 2,3,4 (look at the figure)
Complications	1. Sterility, if bilateral 2. Testicular cancer (20-44%)



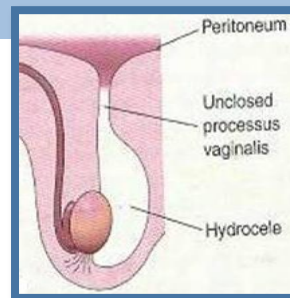
CONGENITAL INGUINAL HERNIA

Definition	Herniation of a loop of intestine through a non-obiterated processus vaginalis either A: incomplete B: complete (in scrotum)
Cause	The processus vaginalis does not obliterate & remains in open communication with the peritoneal cavity.



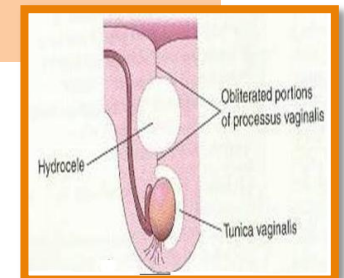
HYDROCELE OF TESTIS

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



HYDROCELE OF SPERMATIC CORD

Accumulation of fluid in spermatic cord due to a non-obliterated portion of stalk of processus vaginalis



SUMMARY

- ♣ Gonadal cords condense & extend into medulla to form seminiferous cords .
- ♣ Seminiferous cords develop into: seminiferous tubules which will remain solid until puberty, its walls are composed of 1- Sertoli cells. 2-Spermatogonia.
- ♣ **At 8 weeks:** mesenchyme surrounding seminiferous cords gives rise to interstitial cells of Leydig
- ♠ Leydig's cells → Testosterone (**8th week**).
- ♠ Sertoli cells → Müllerian inhibiting substance (**7th week**).

Development of male genital gland:

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

***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.

The development of male external genitalia Stimulated by **testosterone**. Begins at **9th week** and complete differentiation **at 12th week**

- ♣ The **phallus** give the **penis**.
- ♣ The **urogenital folds** give the **spongy (penile) urethra**.
- ♣ The **labioscrotal folds** give the **scrotum**.

. 1-which one of the following is the characteristic feature of the testicular development?

- A. rete testis.
- B. seminiferous cords.
- C. tunica albuginea.
- D. testis determining factor.

. 4-which of one the following structure is derivative of male urethra?

- A. Seminal vesicle.
- B. Prostate gland.
- C. Vas deferenc.
- D. Ejaculatory duct.

. 7-which of the following derived from primordial germ cells?

- A. Sertoli.
- B. Spermatogonia.
- C. Leydig's cells.
- D. Seminiferous cords.

2-which structure give rise the seminal gland?

- A. Genital tubercle.
- B. Mesonephric duct.
- C. Paramesonephric duct.
- D. Urogenital sinus.

5-which one of the following cells is responsible for masculine differentiation of external genitalia ?

- A. Sertoli cells.
- B. leyden's cells
- C. Mesothelium cells.
- D. Primordial cells.

. 8-which one of the following derived from mesothelium ?

- A. Sertoli cells
- B.Spermatogonia
- C.Leydig's cells.
- D. Seminiferous cords.

. 3-which of the following contributes in accumulation of fluid in scrotum?

- A. Cryptorchidism
- B. Congenital inguinal hernia.
- C. Hydrocele of spermatic cord.
- D. Hydrocele of testis

6-the most common site of cryptorchidism is ?

- A. Superficial inguinal ring.
- B. Deep inguinal ring.
- C. Peritoneal cavity.
- D. Pelvis.

Answers:

- | | | |
|-----|-----|-----|
| 1-C | 2-B | 3-D |
| 4-B | 5-B | 6-B |
| 7-B | 8-A | |



DONE BY :

ABDULHAMID SAEED ALGHAMDI

ABDULELAH SALEH ALHABEEB

MAAN JASSER ALHERBISH