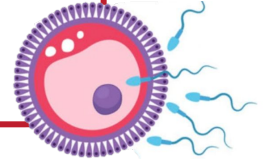


Development of the male reproductive organs

Reproductive block-Embryology-Lecture 3

Editing file



Objectives

Color guide :
Only in boys slides in **Green**
Only in girls slides in **Purple**
important in **Red**
Notes in **Grey**

 **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

1

Gonad :

- Testis.

2

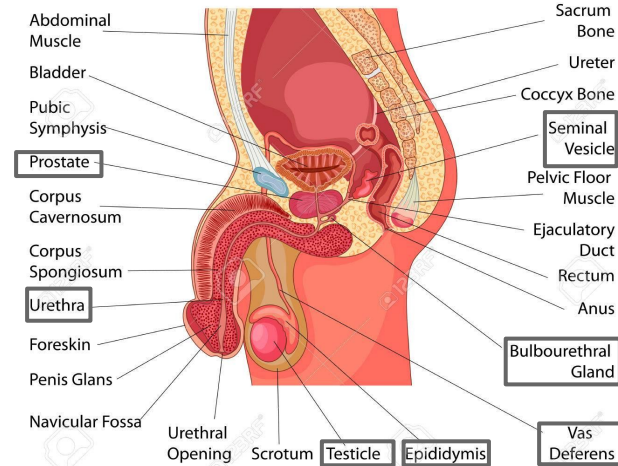
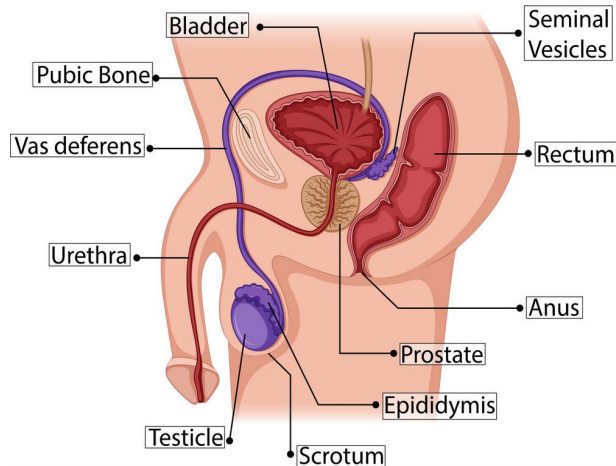
Genital Ducts:

1. Epididymis.
2. Vas deferens.
3. Urethra.

3

Genital Glands:

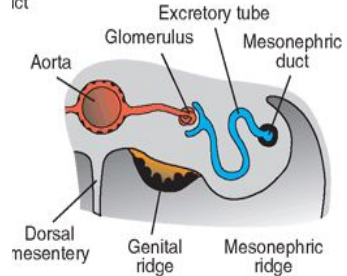
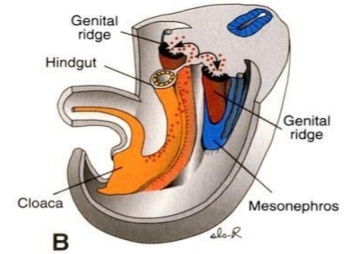
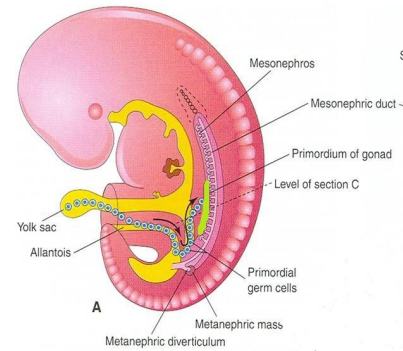
1. Seminale vesicle.
2. Prostate.
3. Bulbourethral Glands.



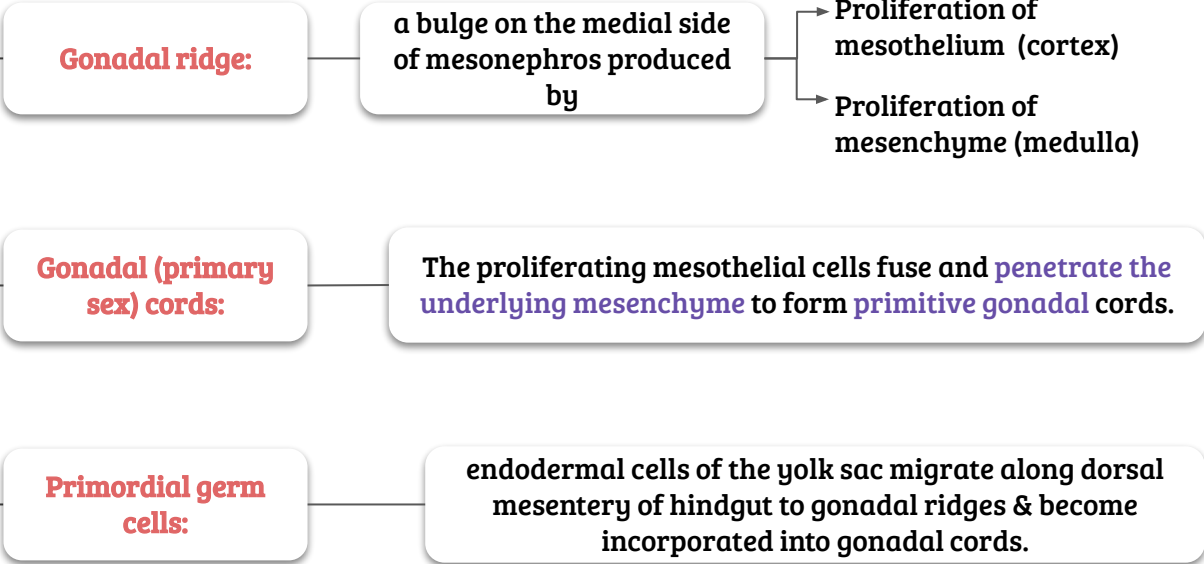
Development of Gonads

Gonads are derived from **3** sources:

- 1) Primordial germ cells
- 2) Underlying mesenchyme
- 3) Mesothelium (epithelium lining the coelomic cavity)
 - **During 5th week** gonadal development occurs.
 - **Until 7th week** gonads are similar in both sexes and called **INDIFFERENT GONADS**



Indifferent Gonads



Development of Testis

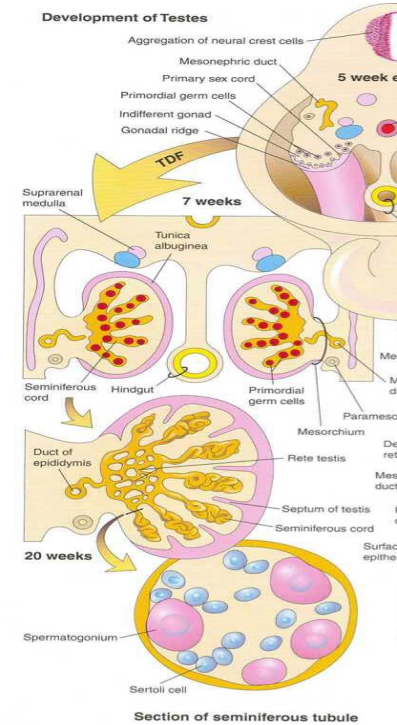
The genetic sex determined at fertilization and the presence of Y chromosome represent the male phenotype and it has a testis-determining factor (TDF) that differentiates primitive gonad into testis and also differentiates germ cell

At 7th week

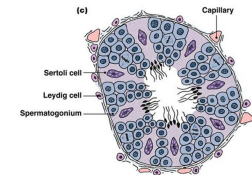
1. Regression of cortex & differentiation of medulla (of primitive gonad) into testis.
2. The characteristic feature is the development of a thick fibrous capsule (tunica albuginea) that separates the enlarging testis from mesonephros.
3. Gonadal cords condense & extend into all the medulla (Medullary cords) to form Seminiferous cords.
4. Seminiferous cords develop into → Seminiferous tubules.
5. Seminiferous tubules remain solid until puberty and its walls are composed of:
 - A) Sertoli cells → derived from surface epithelium of testis (mesothelial cells)
 - B) Spermatogonia → derived from primordial germ cells (endodermal in origin).

At 8th week

Mesenchyme surrounding seminiferous cords mesothelial cells gives rise to interstitial cells (of Leydig) secreting testosterone.



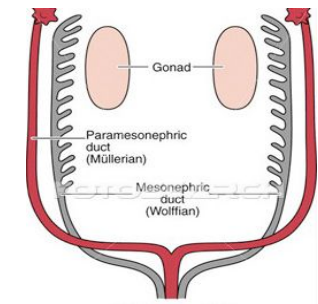
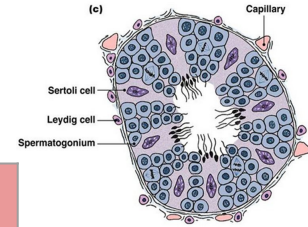
The Seminiferous Tubule



Development of internal genitalia

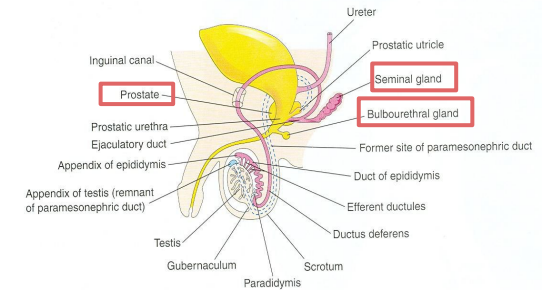
1) Ducts

Cell	Leydig cells	Sertoli cells
Secretes	Testosterone (8th week)	Müllerian inhibiting substance (Anti-Müllerian hormone) (7th week)
Function	1) Masculine differentiation of mesonephric duct : epididymis, vas deferens, seminal glands, ejaculatory duct. 2) Masculine differentiation of external genitalia	Suppression of development of paramesonephric (Müllerian) duct



2) Glands

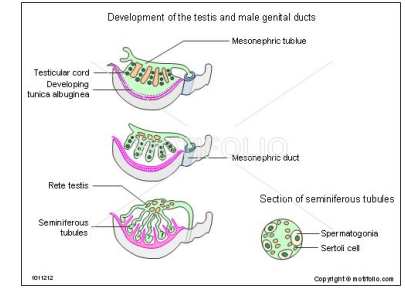
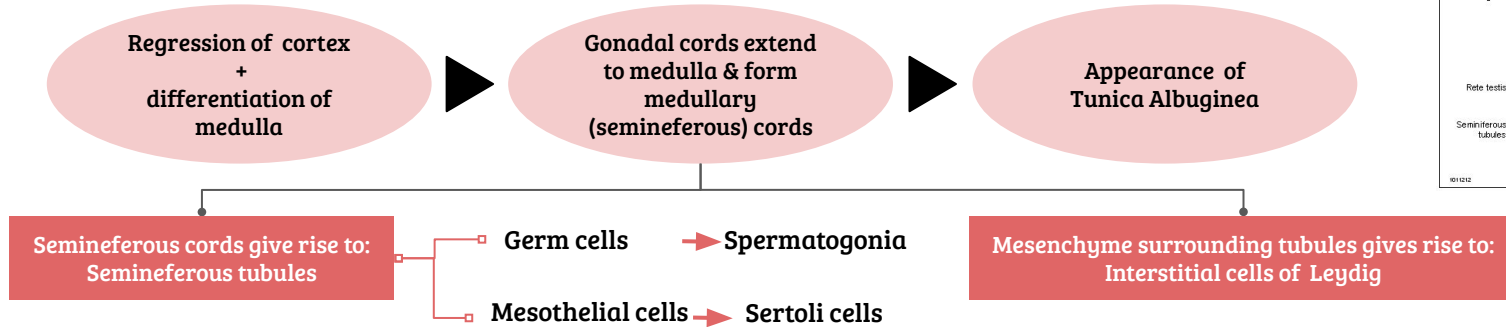
Glands	
Seminal	mesodermal outgrowth from mesonephric duct
Prostate	endodermal outgrowth from prostatic urethra.
Bulbourethral	endodermal outgrowth from spongy urethra



► Stroma & Smooth muscles in prostate and bulbourethral glands are derived from surrounding **mesenchyme**.

Summary from male slides

1) Testis



2) Internal genitalia

Mesodermal structures	Endodermal structures
Testis: from medulla of genital ridge.	Spermatogonia: from primordial germ cells of yolk sac.
Seminiferous tubules: from medullary cords of ridge.	Prostate gland: from prostatic urethra.
Sertoli cells: from mesothelial cells of ridge.	Bulbourethral gland: from spongy urethra.
Leydig cells: from mesenchyme surrounding the tubules.	
Epididymis, vas deferens, seminal gland, ejaculatory duct: from mesonephric duct.	

Development of external genitalia

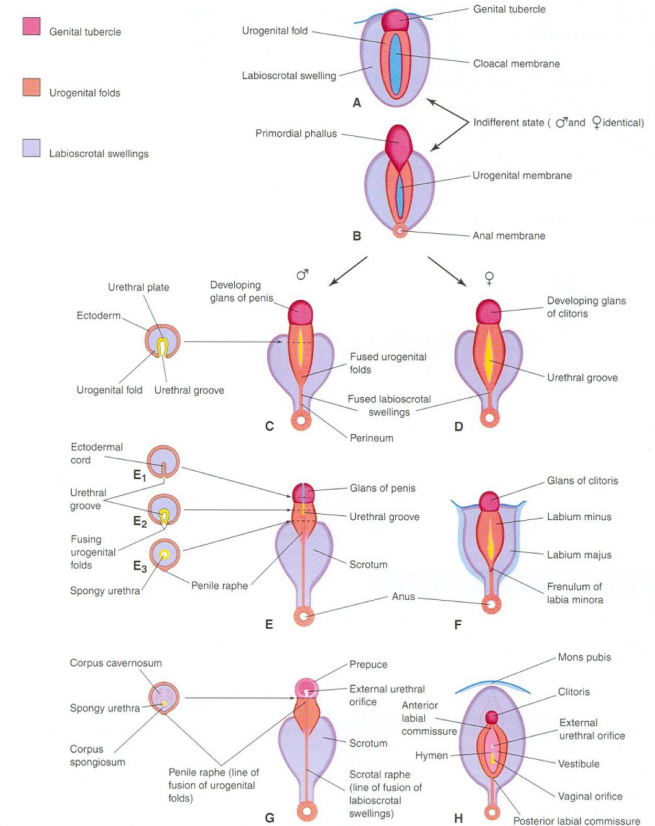
Indifferent Stage

(from 4th to 7th week)

Genital tubercle	
produced from mesenchyme at the cranial end of cloacal membrane. It elongates to form a primordial phallus	
Urogenital folds	Labioscrotal swellings
develop on each side of cloacal membrane	develop on each side of urogenital folds

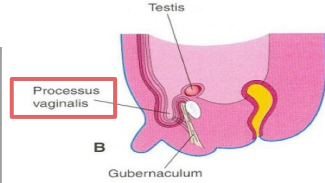
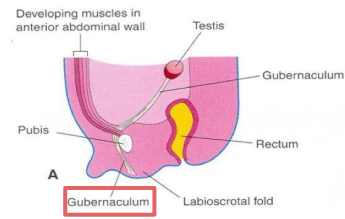
Different Stage

- 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



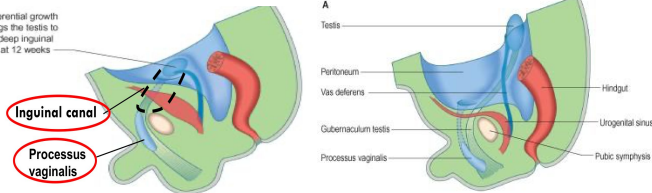
Descent of testis

- **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
- Descent of testis occurs in 2 steps:



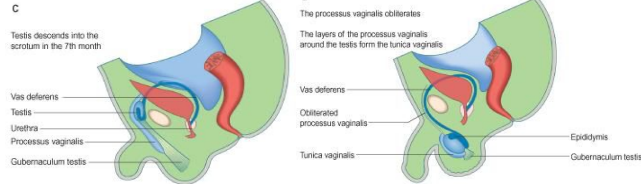
Types	1.Internal	2.External
Definition	Descent of testis from posterior abdominal wall to deep inguinal ring.	Descent of testis from deep inguinal ring, through inguinal canal, to scrotum
Time	During 12th week	Begins in 7th month and takes 2 to 3 days
Causes	a relative movement resulting from elongation of cranial part of abdomen away from its caudal part (future pelvic Inguinal canal 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.

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



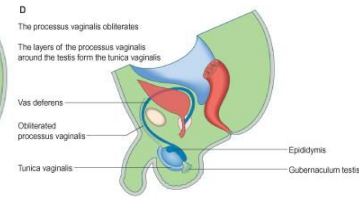
Internal Descent

C
Testis descends into the scrotum in the 7th month



External Descent

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



External Descent of Testis

1. More than 97% of full-term newborn 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.

Complete descent of testis is associated by:

1

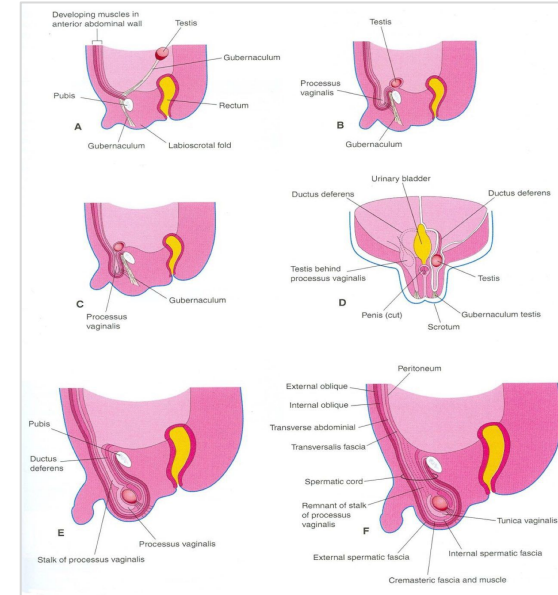
Degeneration of gubernaculum.

2

Obliteration of stalk of processus vaginalis.

3

Persistence of part of processus vaginalis surrounding the testis in the scrotum to form “tunica vaginalis”

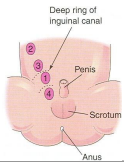


Descent of testis

Congenital Deformities

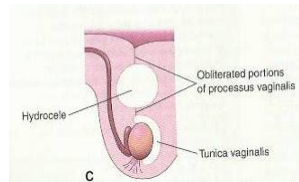
Cryptorchidism

- **Incidence:** is up to 30% of premature & 3-4% of full term males
- **Cause:** deficiency of androgens.
- **Common sites:** Cryptorchid testes may be in the abdominal cavity or anywhere along the usual path of descent of the testis, but they are usually in the inguinal canal. look to figure.
- **Complications:**
 1. Sterility, if bilateral.
 2. Testicular cancer (20-44%).



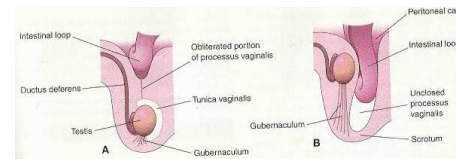
Hydrocele of spermatic cord

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



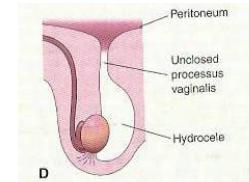
Congenital inguinal hernia

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



QUIZ

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
D	D	D	B	B	D	A	C

Q1: which one of the following is considered indifferent gonad?

- A. Gonadal ridge
- B. Gonadal cord
- C. Primordial germ cells
- D. All of above

Q2: interstitial cells (of Leydig) secreting testosterone. happen...?

- A. During 5th week
- B. During 6th week
- C. At 7th week
- D. By 8th week

Q3: Mesodermal outgrowth from spongy urethra is:

- A. Seminal gland
- B. Prostate gland
- C. Bulbourethral gland
- D. Non of above

Q4: Complete descent of testis is associated by:

- A. Formation of gubernaculum
- B. Obliteration of stalk of processus vaginalis
- C. Degradation of tunica vaginalis
- D. All of above

Q5: Deficiency of androgens cause?

- A. Inguinal hernia
- B. Cryptorchidism
- C. Hydrocele of spermatic cord
- D. Hydrocele Of Testis

Q6: Accumulation of fluid in tunica vaginalis cause:

- A. Inguinal hernia
- B. Cryptorchidism
- C. Hydrocele of spermatic cord
- D. Hydrocele Of Testis

Q7: The processus vaginalis remains in open communication with the peritoneal cavity cause:

- A. Inguinal hernia
- B. Cryptorchidism
- C. Hydrocele of spermatic cord
- D. Hydrocele Of Testis

Q8: Accumulation of fluid in spermatic cord cause:

- A. Inguinal hernia
- B. Cryptorchidism
- C. Hydrocele of spermatic cord
- D. Hydrocele Of Testis



Members board



Team leaders

- **Abdulrahman Shadid**

Boys team:

- **Mohammed Al-huqbani**
- **Salman Alagla**
- **Ziyad Al-jofan**
- **Ali Aldawood**
- **Khalid Nagshabandi**
- **Sameh nuser**
- **Abdullah Basamh**
- **Alwaleed Alsaleh**
- **Mohaned Makkawi**
- **Abdullah Alghamdi**

-  **Ateen Almutairi**

Girls team :

- **Ajeed Al Rashoud**
- **Taif Alotaibi**
- **Noura Al Turki**
- **Amirah Al-Zahrani**
- **Alhanouf Al-haluli**
- **Sara Al-Abdulkarem**
- **Renad Al Haqbani**
- **Nouf Al Humaidhi**
- **Jude Al Khalifah**
- **Nouf Al Hussaini**
- **Danah Al Halees**
-  **Rema Al Mutawa**
- **Maha Al Nahdi**
- **Razan Al zohaifi**
- **Ghalia Alnufaei**

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