

# Embryology Of urogenital system

2018-2019

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## Development of male genital system :

Describe the development of the gonad

Describe the development of testis

Describe development of ovaries

Describe the development of male and female genital ducts

Describe the development of vagina

Describe the development external genitalia

Discuss some development I abnormalities

Sex differentiation is a complex process that involves many genes. The key to sexual dimorphism is the Y chromosome, which contains the testis-determining gene called the SRY (sex-determining region on Y) gene.

Under the influence of SRY protein (testis determining factor), the male development occurs; in its absence, female development is established.

the sex of the embryo is determined genetically at the time of fertilization, the gonads do not acquire male or female morphological characteristics until the seventh week of development.

## 1. The primitive sex cords and indifferent gonad

- Shortly before and during arrival of primordial germ cells, the epithelium of the genital ridge proliferates, and epithelial cells penetrate the underlying mesenchyme. Here they form a number of irregularly shaped cords, the primitive sex cords.
- In both male and female embryos, these cords are connected to surface epithelium, and it is impossible to differentiate between the male and female gonad. Hence, the gonad is known as the indifferent gonad.

## 2. Stage Of differentiation

- If the embryo is genetically male, the primordial germ cells carry an XY sex chromosome complex. The development is under influence of the SRY gene on the Y chromosome

## Development of the Testis

The primitive sex cords continue to proliferate and penetrate deep into the medulla to form the testis or medullary cords.

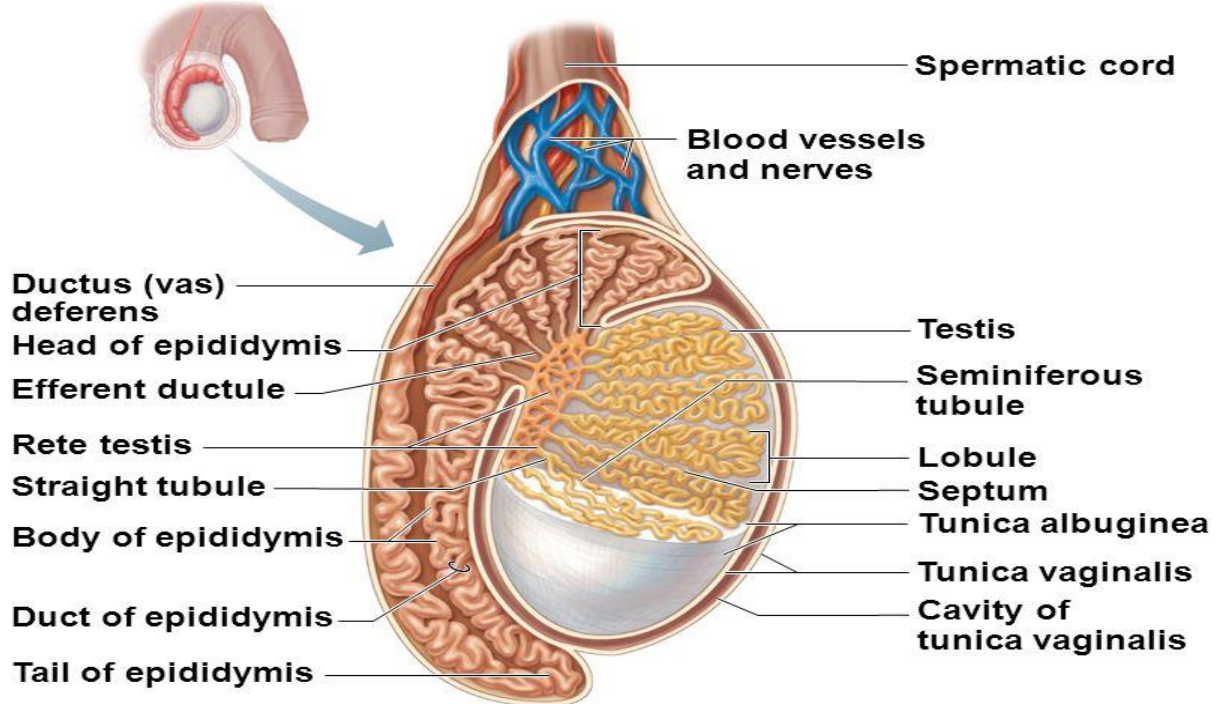
- Toward the hilum of the gland, the cords break up into a network of tiny cell strands that later give rise to tubules of the rete testis.
- During further development, a dense layer of fibrous connective tissue, the tunica albuginea, separates the testis cords from the surface epithelium
- In the fourth month, the testis cords become horseshoe shaped, and their extremities are continuous with those of the rete testis.

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Figure 27.3a Structure of the testis.



## Structures of the testis

• Testis cords are now composed of:

1. primitive germ cells
2. sustentacular cells of Sertoli derived from the surface epithelium of the gland and it produce mullerian inhibiting hormone.
3. Interstitial cells of Leydig, derived from the original mesenchyme of the gonadal ridge, lie between the testis cords. They begin development shortly after onset of differentiation of these cords. By the eighth week of gestation, Leydig cells begin production of testosterone, and the testis is able to influence sexual differentiation of the genital ducts and external genitalia.

## Descent of testes

Normally, the testes reach the inguinal region by approximately 12 weeks' gestation, migrate through the inguinal canal by 28 weeks, and reach the scrotum by 33 weeks. The process is influenced by hormones, including androgens and MIS. The testis descends through the inguinal ring and over the rim of the pubic bone and is present in the scrotum at birth

## Development of the Testis

- Testis cords remain solid until puberty, when they acquire a lumen, thus forming the seminiferous tubules.
- Once the seminiferous tubules are canalized, they join the rete testis tubules, which in turn enter the ductuli efferentes.

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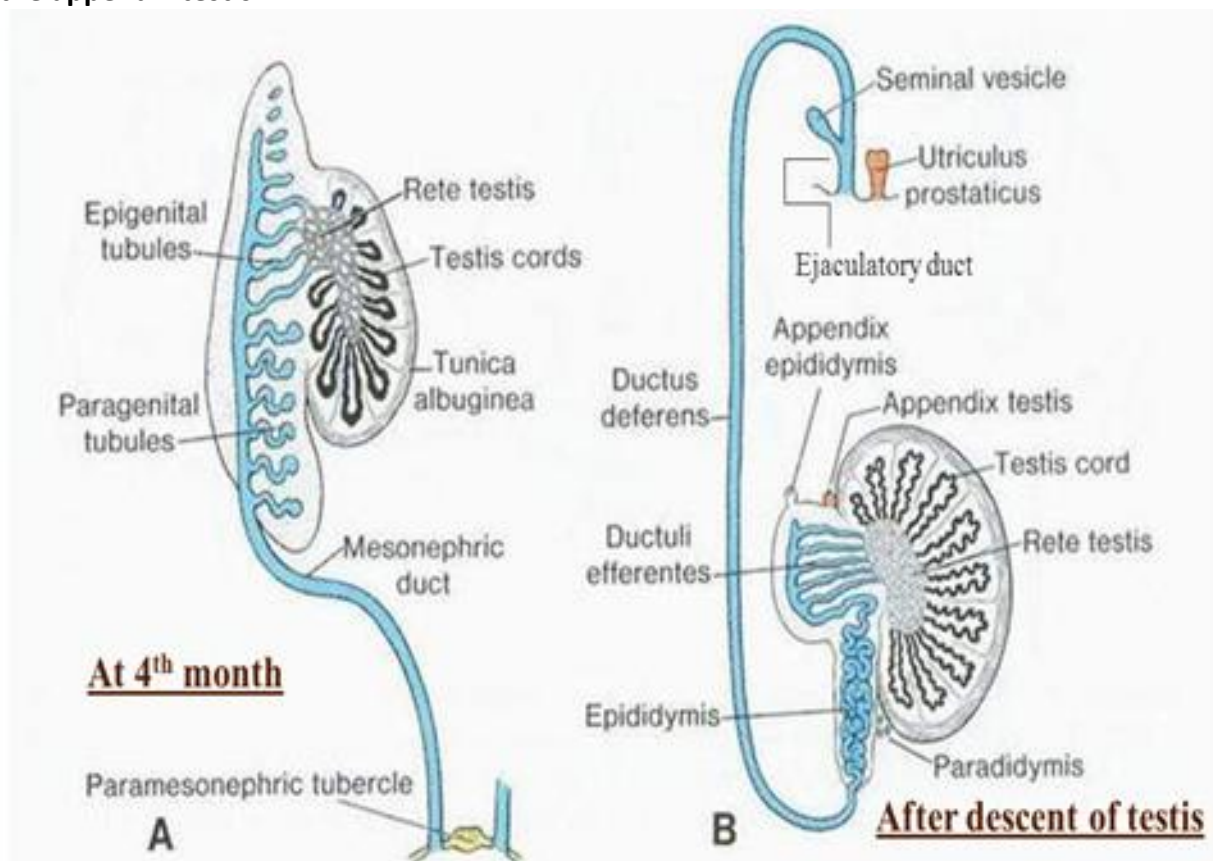
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- These efferent ductules link the rete testis and the mesonephric or wolffian duct, which becomes the epididymis and ductus deferens.

## Genital Ducts in the Male

Testosterone stimulates the mesonephric ducts to form male genital ducts, whereas MIS causes the paramesonephric ducts to regress

- The mesonephric ducts persist and form the main genital ducts.
- Immediately below the entrance of the efferent ductules, the mesonephric ducts elongate and become highly convoluted, forming the (ductus) epididymis.
- Seminal vesicle arises as out budding from mesonephric duct
- From the tail of the epididymis to the out budding of the seminal vesicle, the mesonephric ducts obtain a thick muscular coat and form the ductus deferens.
- The region of the ducts beyond the seminal vesicles is the ejaculatory duct.
- the most cranial portion of the mesonephric ducts forming the appendix epididymis,
- The paramesonephric ducts in the male degenerate except for a small portion at their cranial ends, the appendix testis.



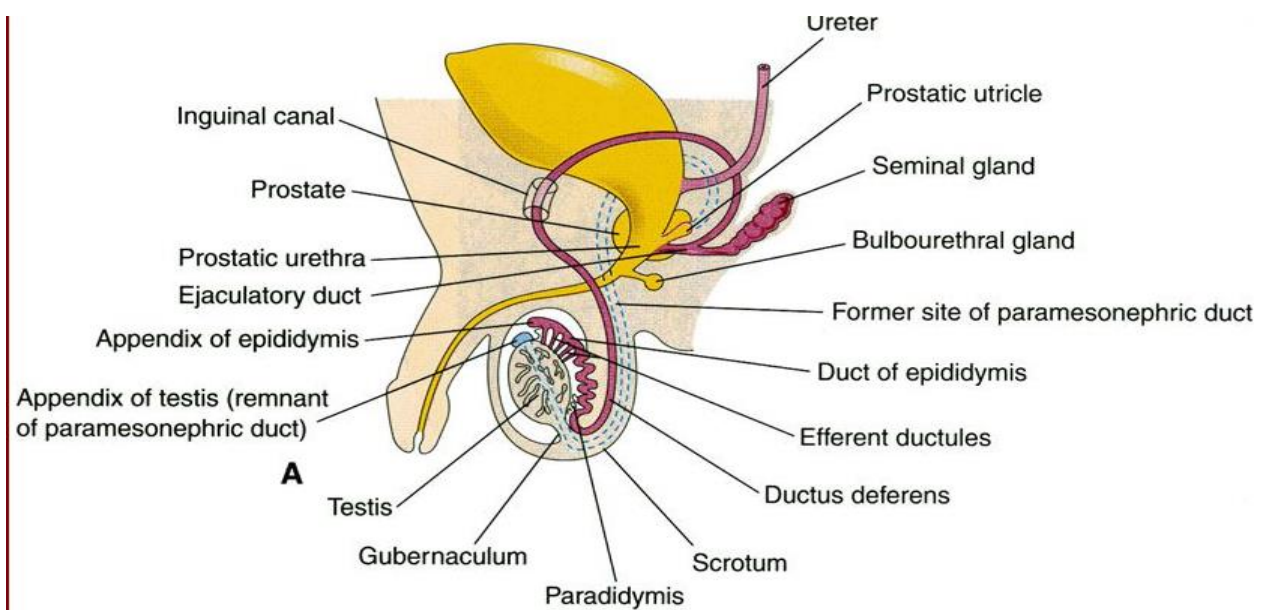
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## Development of prostate gland

The prostatic part of the urethra develops from the pelvic (middle) part of the urogenital sinus (endodermal origin). Multiple endodermal outgrowths arise from the prostatic part of the urethra and grow into the surrounding mesenchyme. The prostate glands represent the modified wall of the proximal portion of the male urethra and arise by the 9th week of embryonic life in the development of the reproductive system. Condensation of mesenchyme, urethra and Wolffian ducts gives rise to the adult prostate gland, a composite organ made up of several glandular and non-glandular components tightly fused.



## External Genitalia in the Male

- Development of the external genitalia in the male is under the influence of androgens secreted by the fetal testes
- Rapid elongation of the genital tubercle, which is now called the ( Penis)phallus.
- The phallus pulls the urethral folds forward so that they form the lateral walls of the urethral groove. This groove extends along the caudal aspect of the elongated phallus but does not reach the most distal part (the glans).
- The epithelial lining of the groove, which originates in the endoderm, forms the urethral plate.
- At the end of the third month, the two urethral folds close over the urethral plate, forming the penile urethra. This canal does not extend to the tip of the phallus.
- This most distal portion of the penile urethra is formed during the fourth month, when ectodermal cells from the tip of the glans penetrate inward and form a short epithelial cord. This cord later obtains a lumen, thus forming the external urethral meatus.

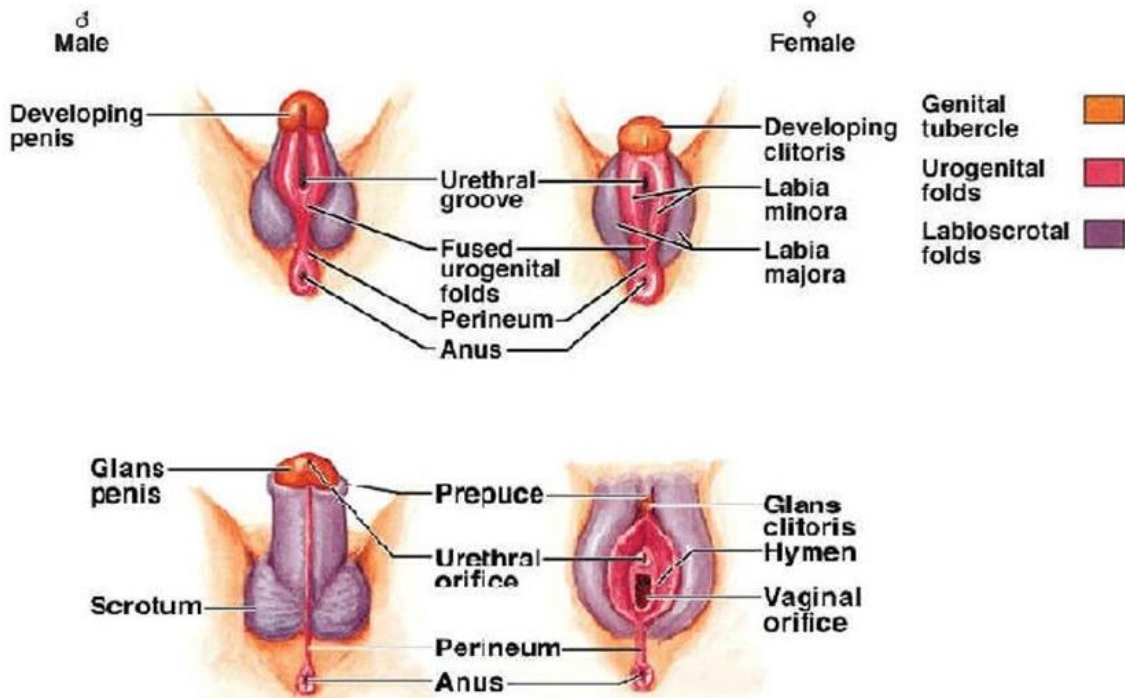
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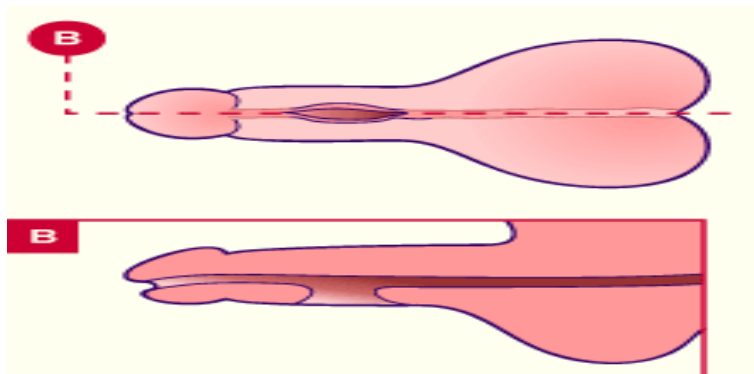
- The genital swellings, known in the male as the scrotal swellings, arise in the inguinal region. With further development, they move caudally, and each swelling then makes up half of the scrotum. The two are separated by the scrotal septum.

## Development of External Genitalia



### Congenital abnormalities of male genitalia :

1. Hypospadias of the glans penis is characterized by a urinary meatus on the underside of the glans.



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2. Cryptorchidism,. The testis remain in the abdominal cavity or somewhere on their way to the scrotum – most frequently in the inguinal canal (60% of the cases).

