

# Pohlavní systémy

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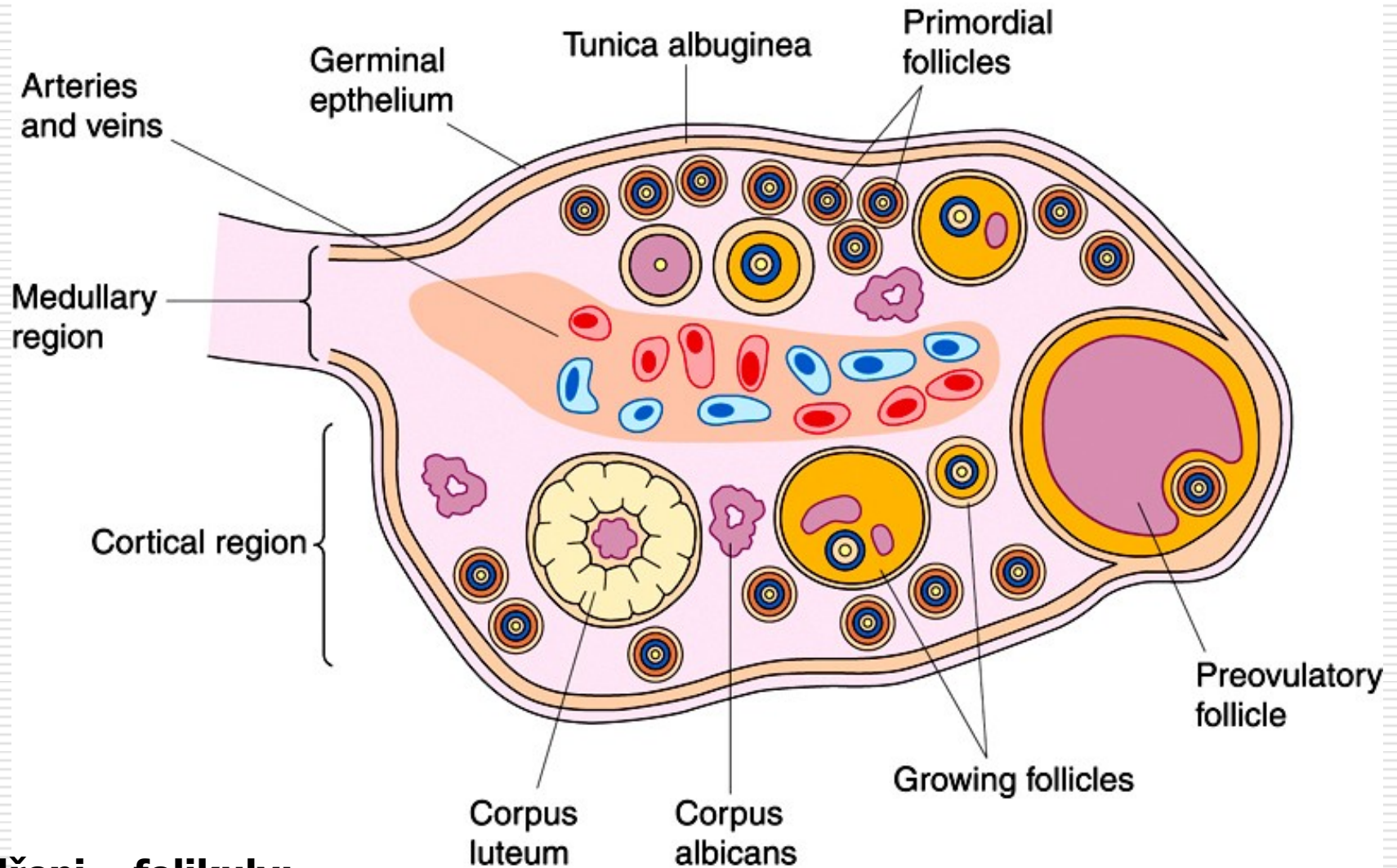


**Indiferentní základ gonád**

**Mužský pohlavní systém**

**Ženský pohlavní systém**

# Ovárium (vaječník)

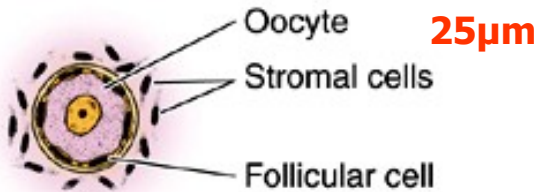


**Ve dřeni – folikuly:**

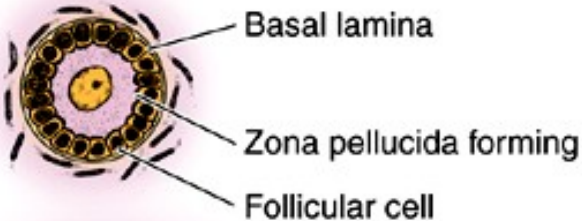
**primordiální – I. unilaminární – I. multilaminární (preantrální) – II. (antrální) – Graafův folikul (III., preovulační, zralé)**

# Typy folikulů

Primordial follicle

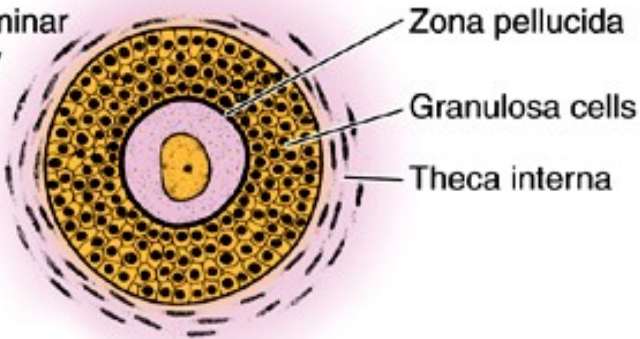


Unilaminar primary follicle

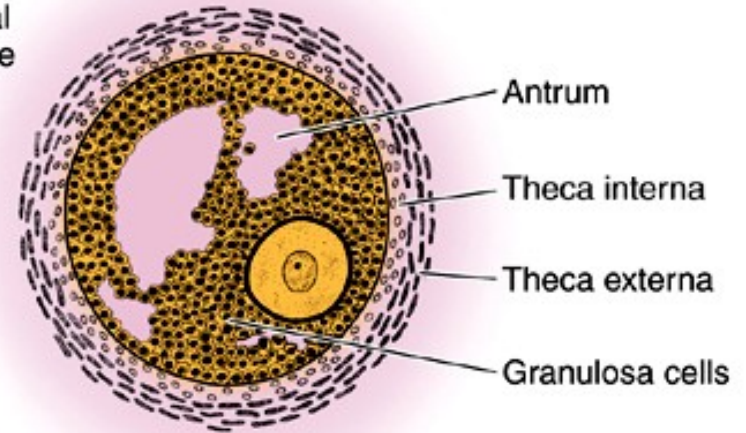


V pubertě

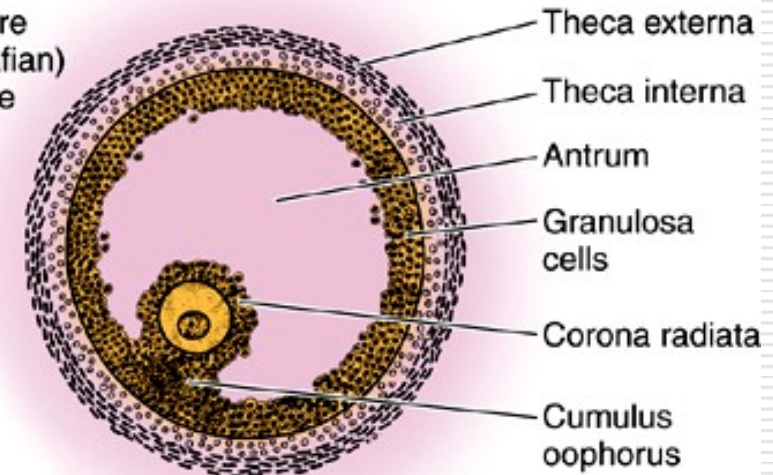
Multilaminar primary follicle



Antral follicle

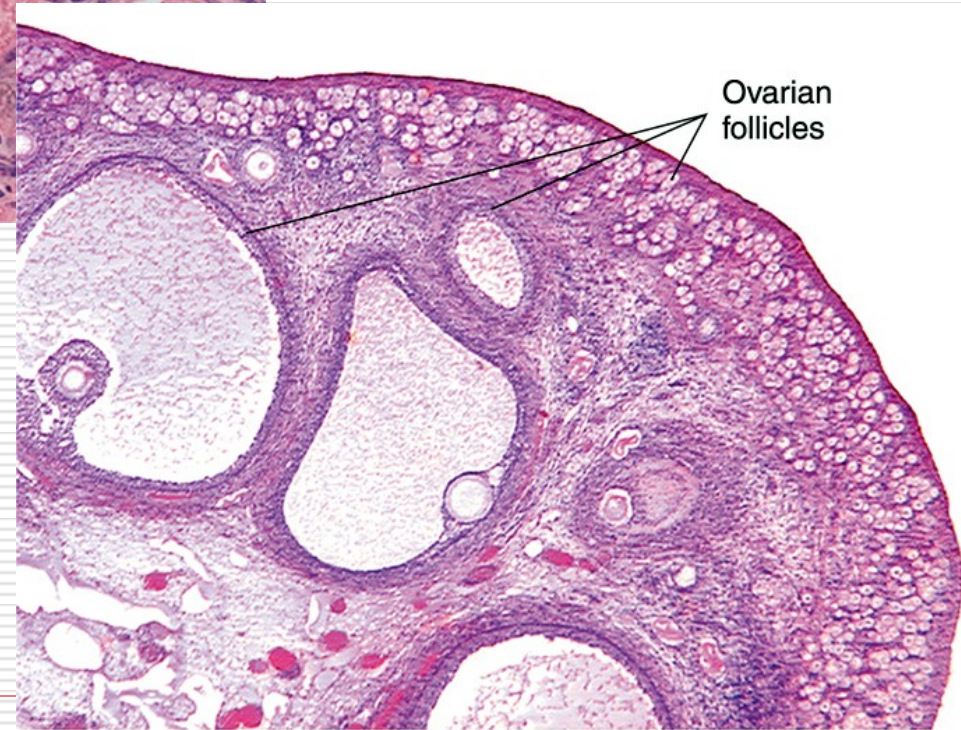
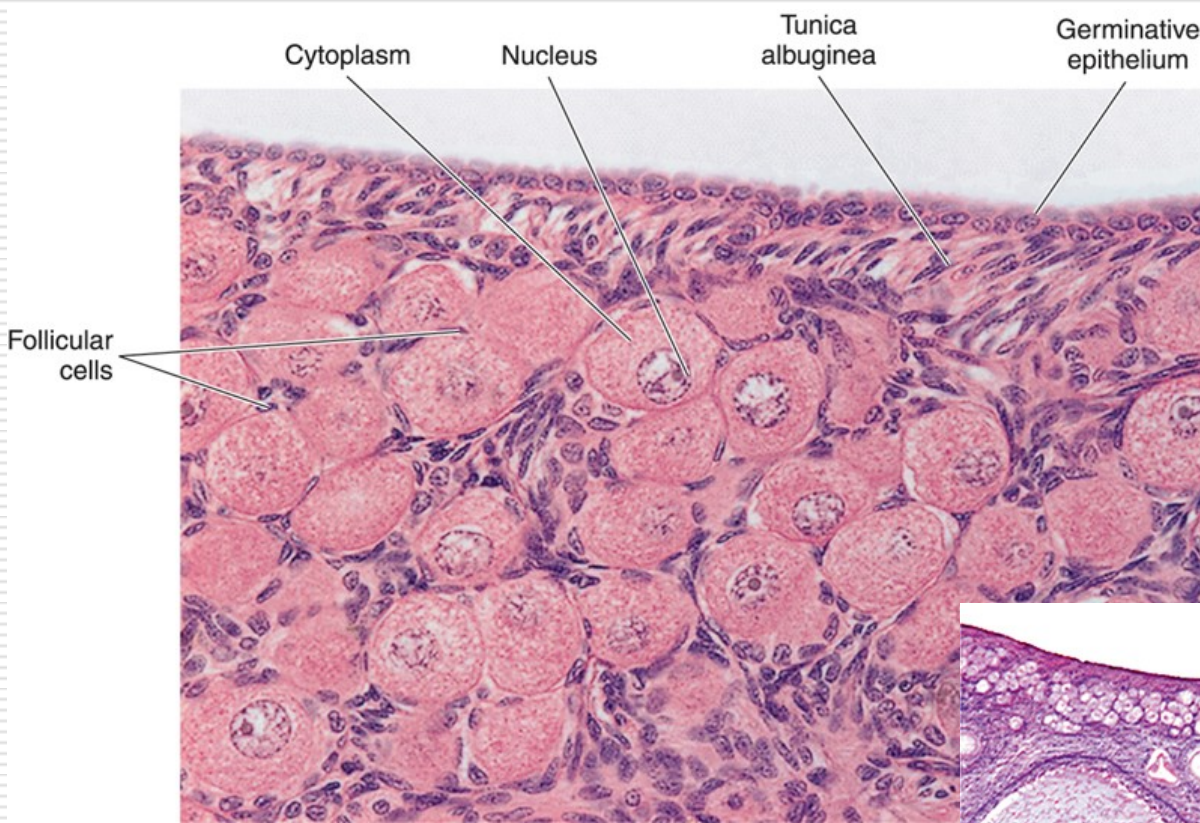


Mature (graafian) follicle



Oocyt 125-150 µm

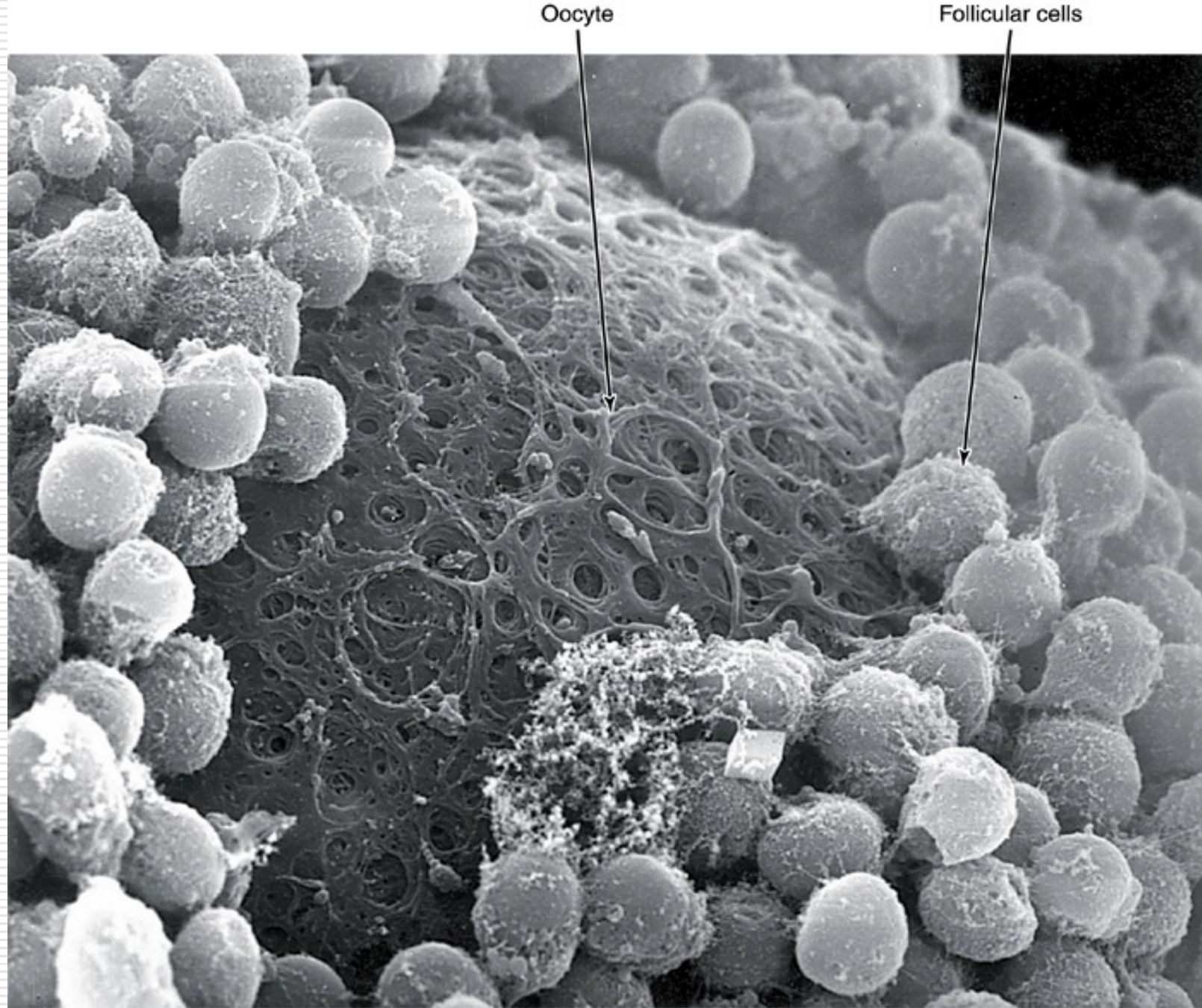
# Histologická stavba



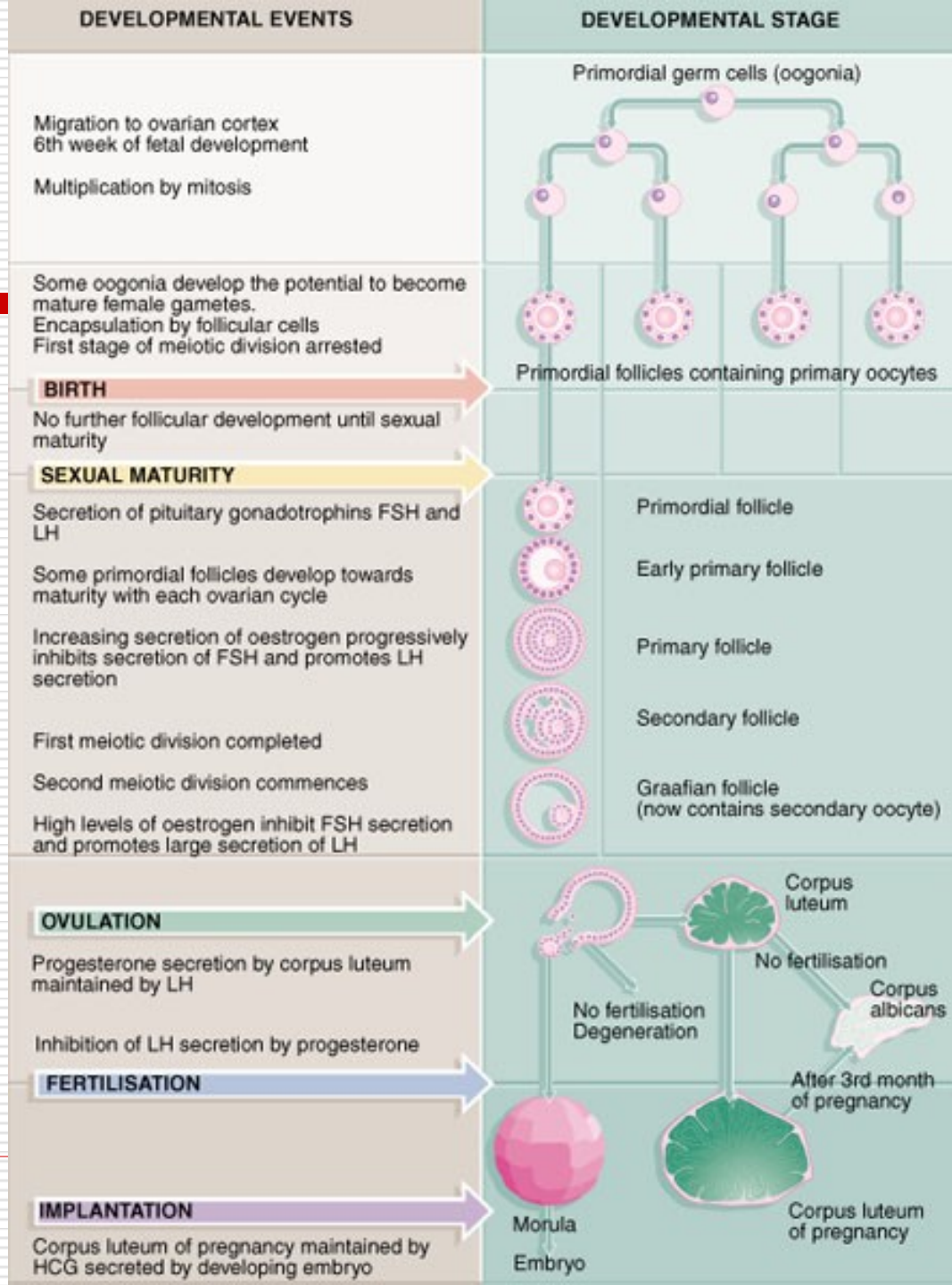
**Ve dřeni nejsou folikuly**

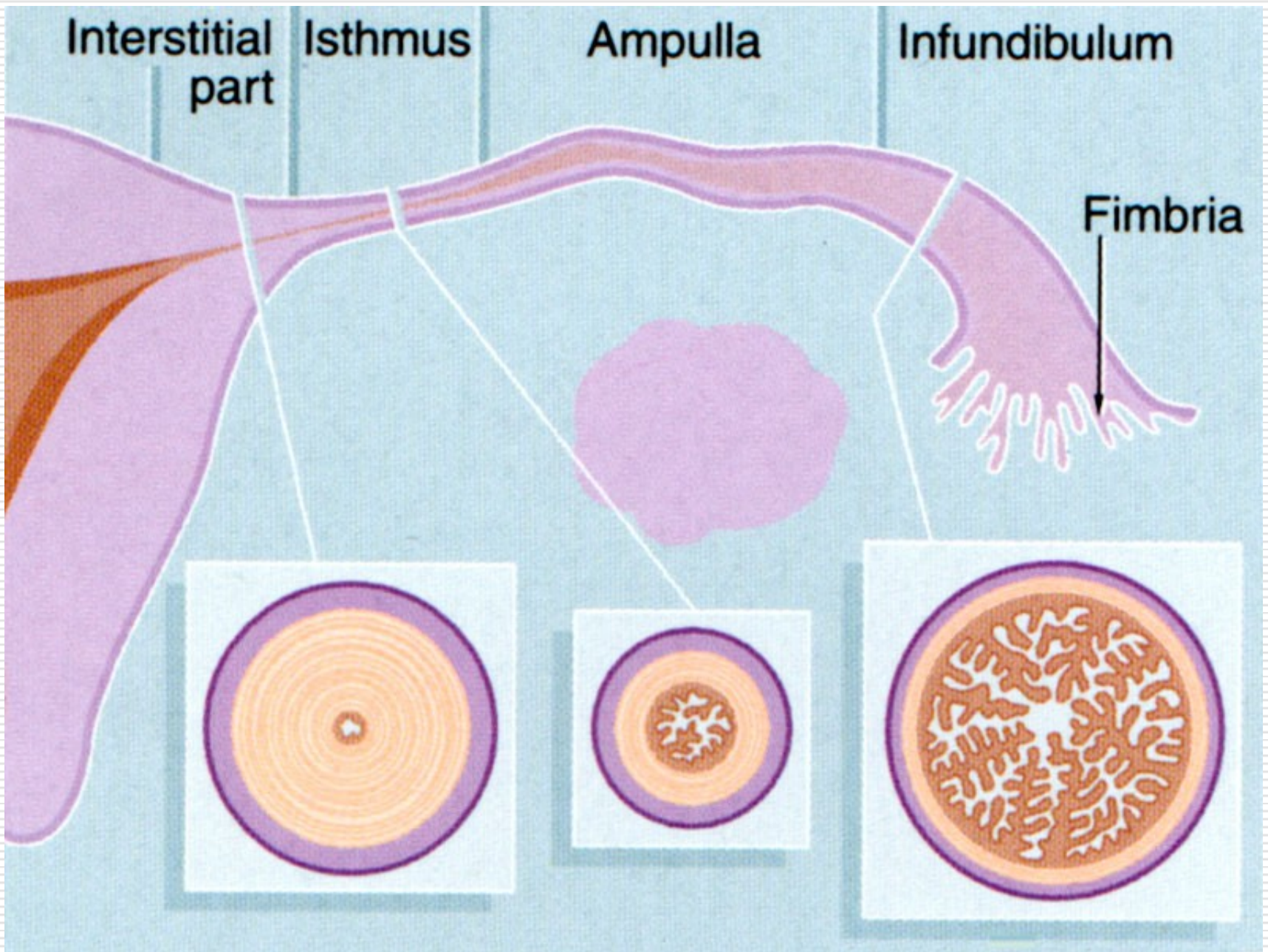
Medullary region

Cortical region

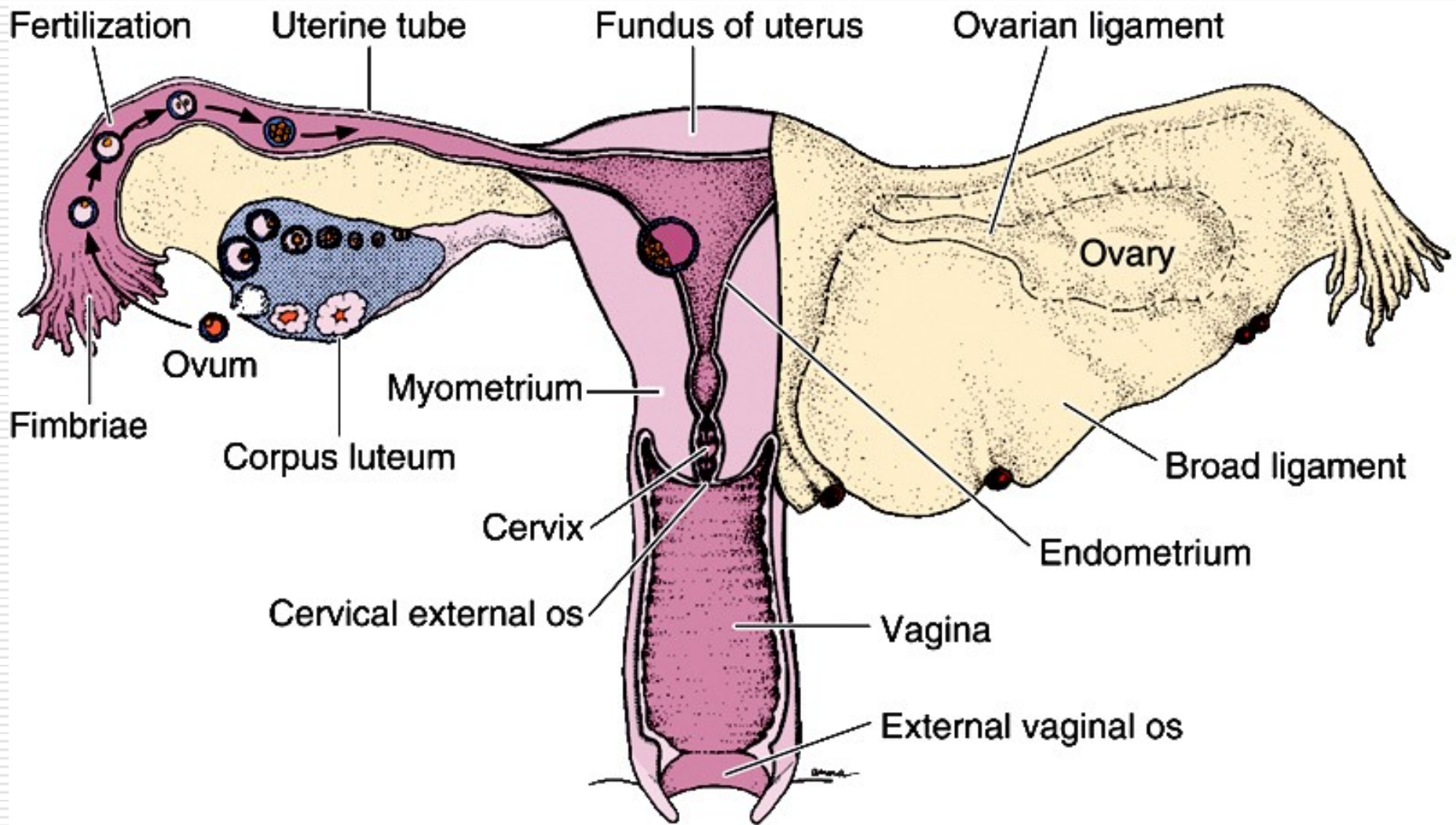


**Skenovací EM**





**Fallopian tube (uterine tube)**



Menarché, menopause



- The end of the **1st** month – migration of primordial germ cells (gonocytes) from yolk sac to primordium of gonads. After division they transform into oogonia

- The **2nd** month – **600 000** oogonia
- 

- Beginning of the **3rd** month (fetal period) – first oogonia enter prophase of the I<sup>st</sup> meiotic division – *primary* oocytes in *primordial* follicles

- Beginning of the **5th** month – **6-7 000 000** oogonia

- By the **7th** month – majority of oogonia transformed into primary oocytes, many of them lost by atresia

- **At birth** – **700 000 - 2 000 000**, no oogonia form postnatally.

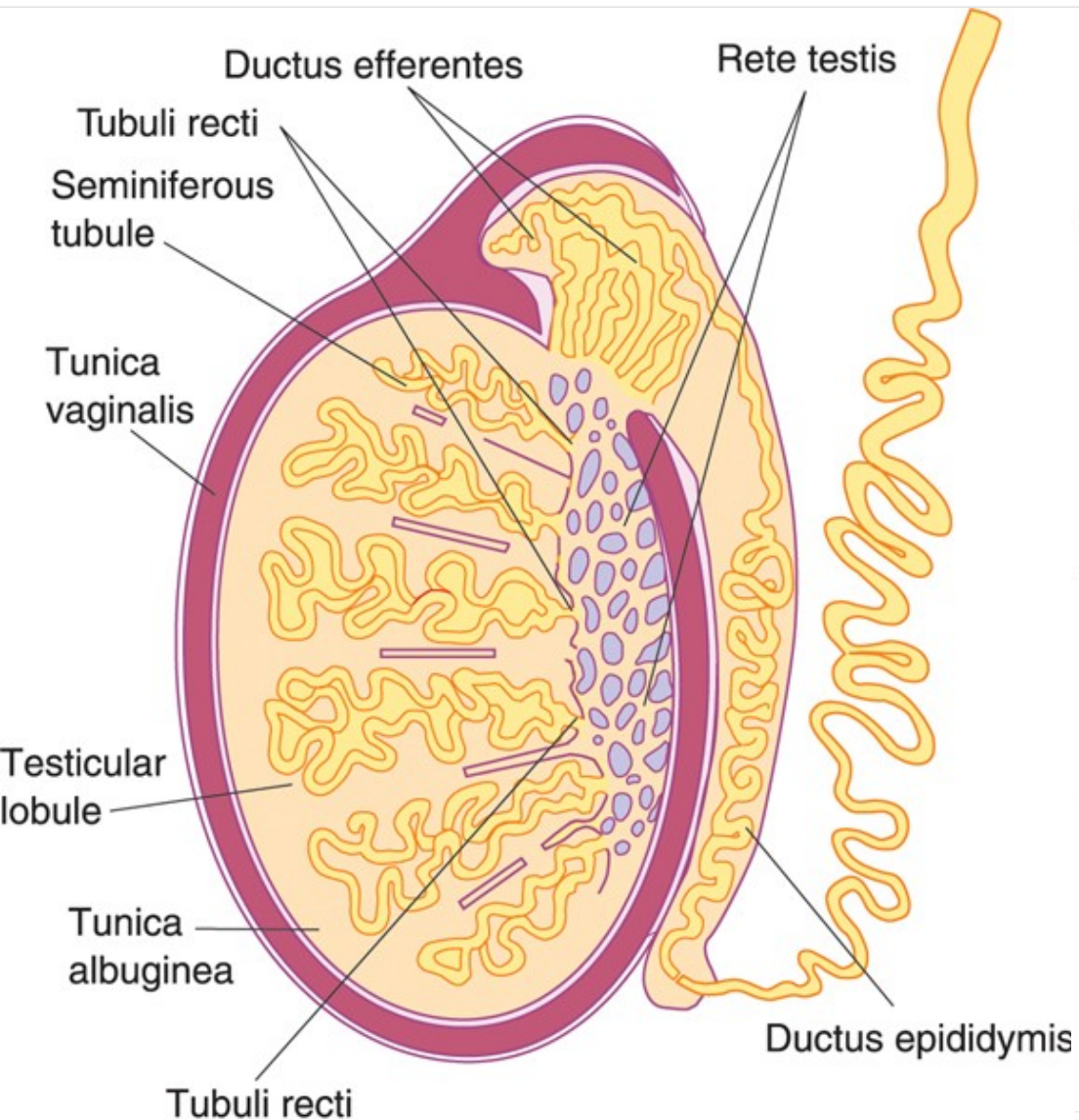
- **During childhood** – majority of oocytes become atretic

- **At puberty** – **300 000 – 400 000** oocytes/ primordial follicles

- Between **40-45 years** of age – **8 000 oocytes** left
- 

- **450** oocytes liberated during ovulation during the whole life

# Testes (varlata)



1 Tunica albuginea

2 Tunica vasculosa

3 Interstitial connective tissue

4 Seminiferous tubules

5 Interstitial cells (of Leydig)

6 Seminiferous tubule

7 Septa

8 Tunica vasculosa

9 Seminiferous tubule

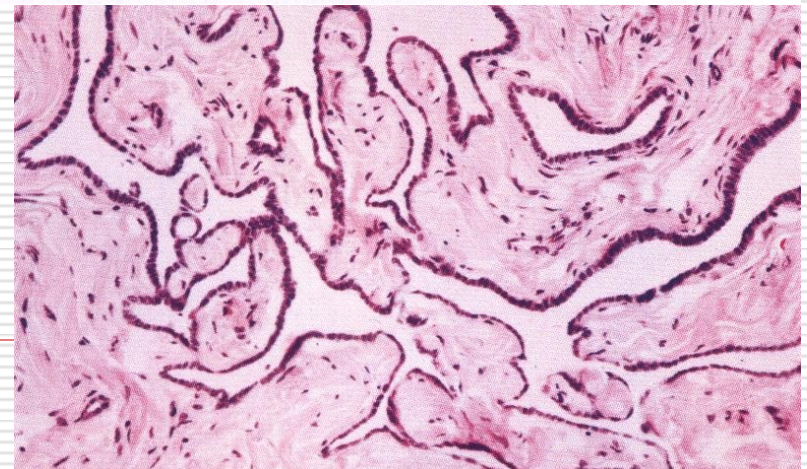
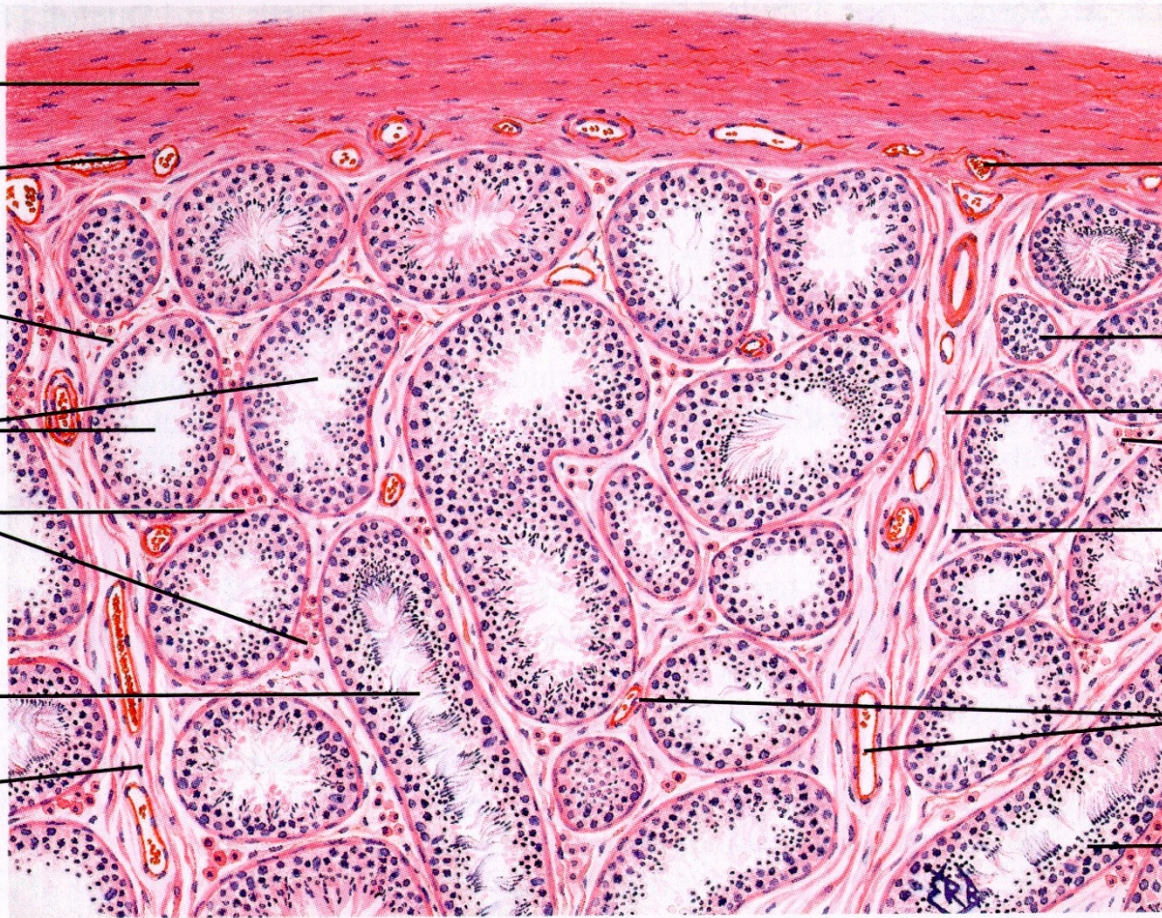
10 Septa

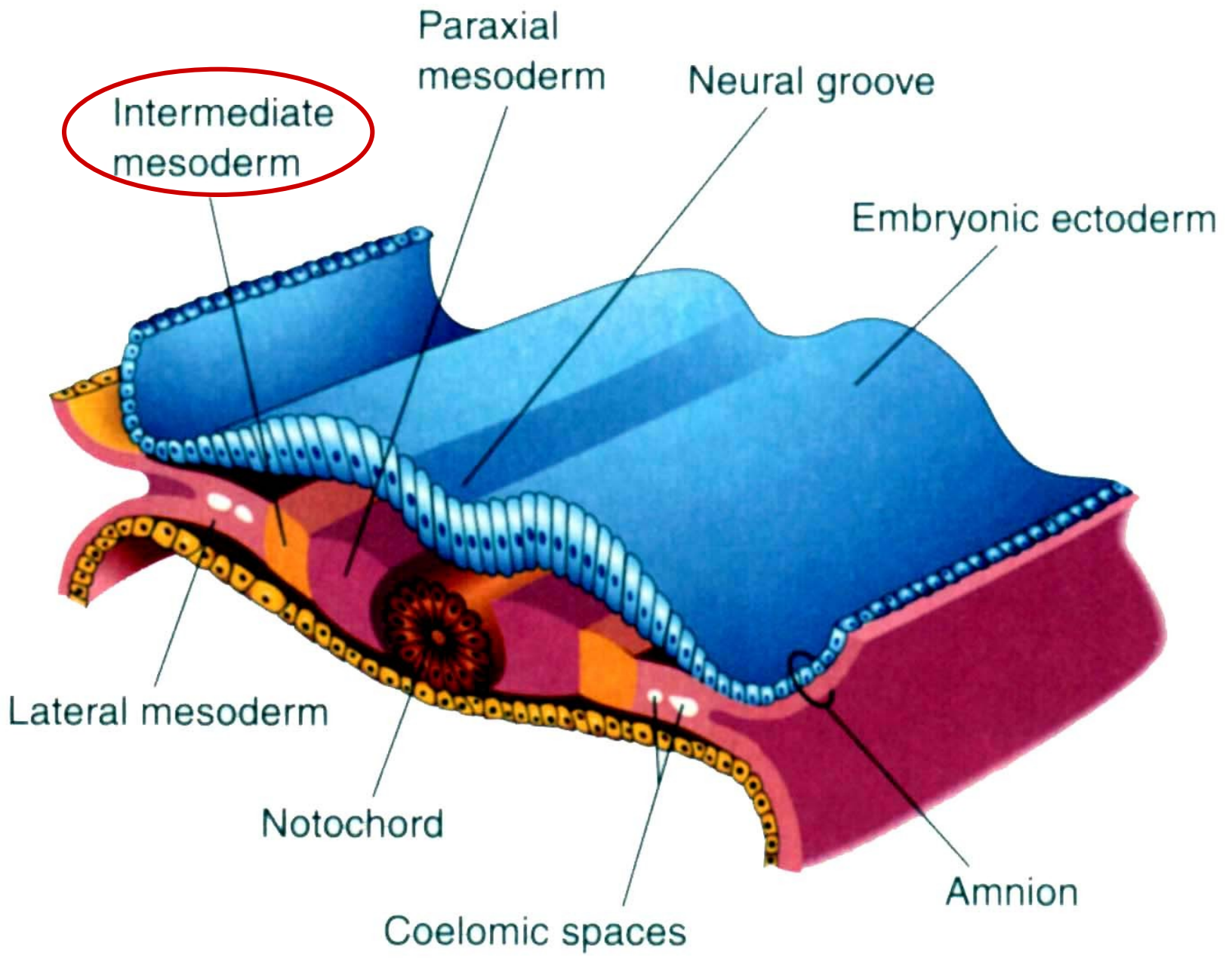
11 Interstitial cells (of Leydig)

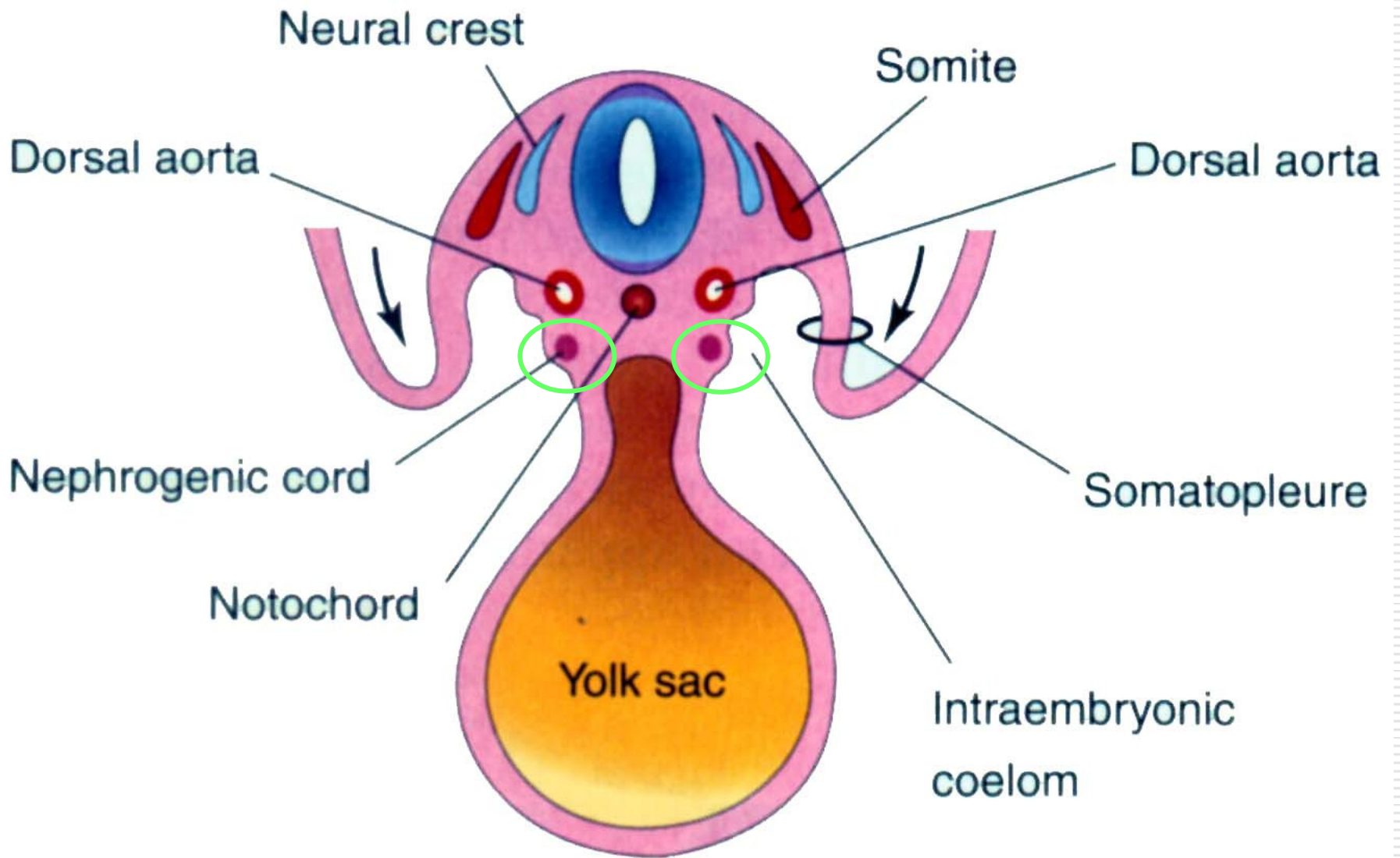
12 Interstitial connective tissue

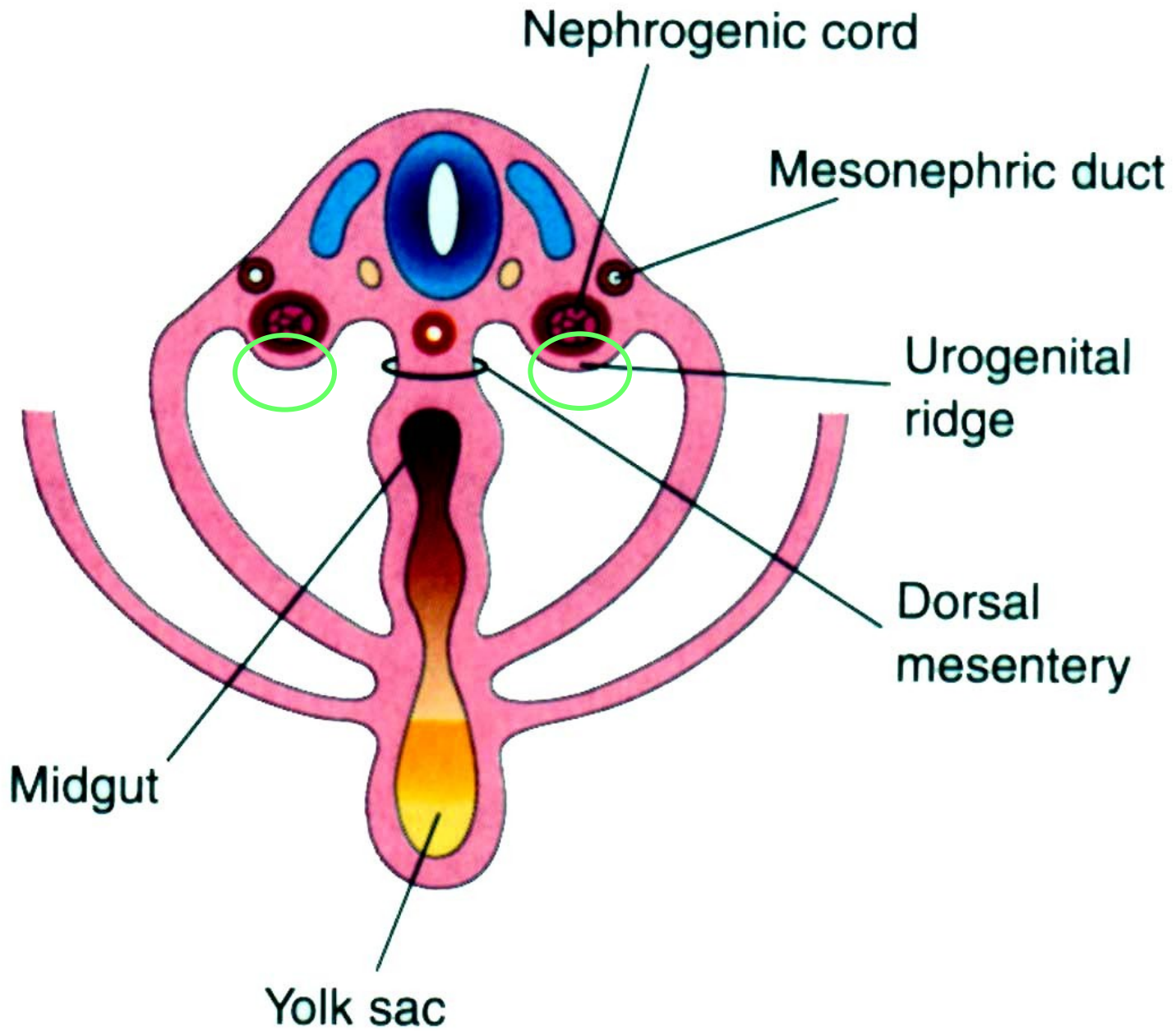
13 Blood vessels

14 Germinal epithelium









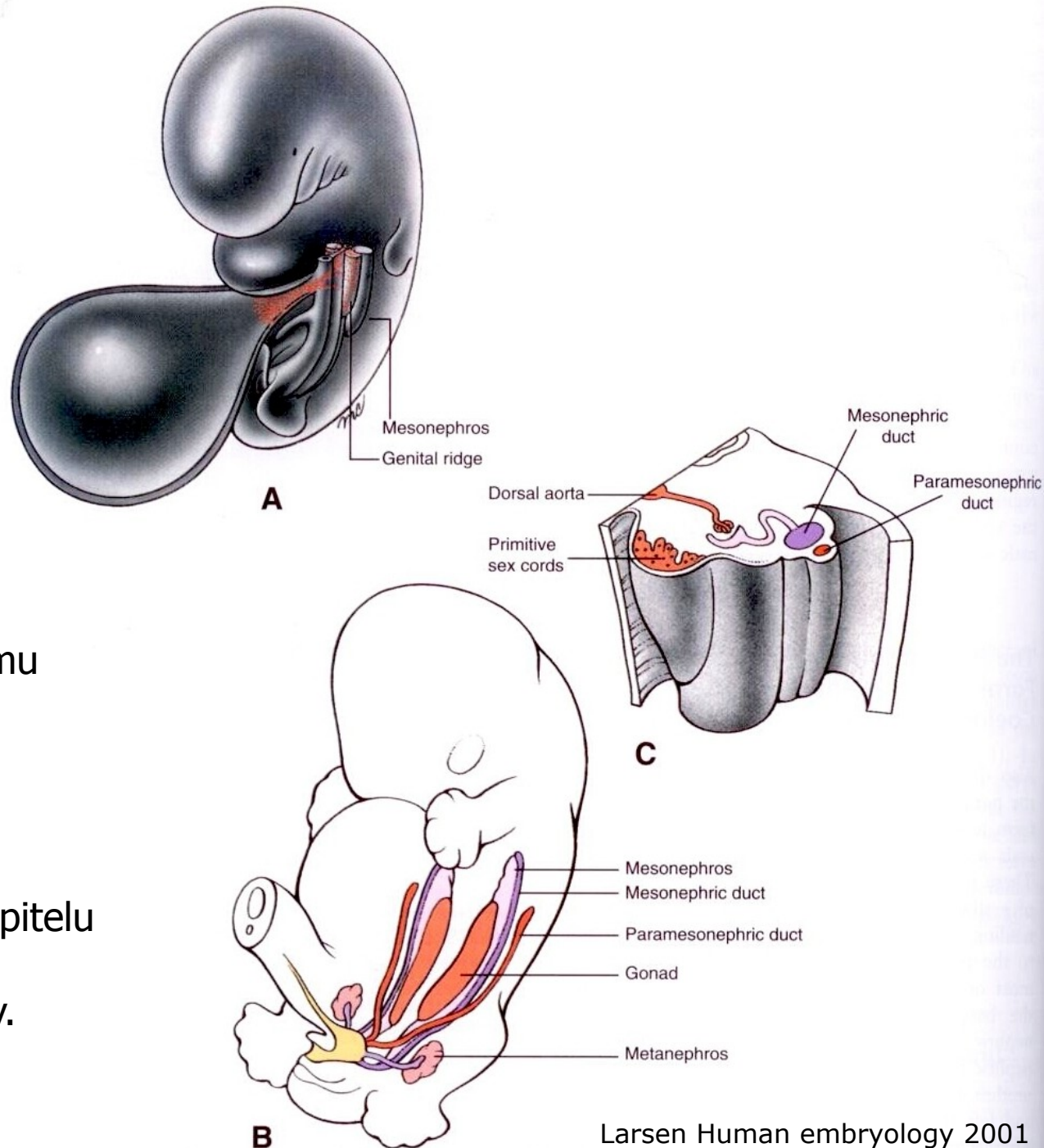
# Indiferentní gonáda

## Plica genitalis

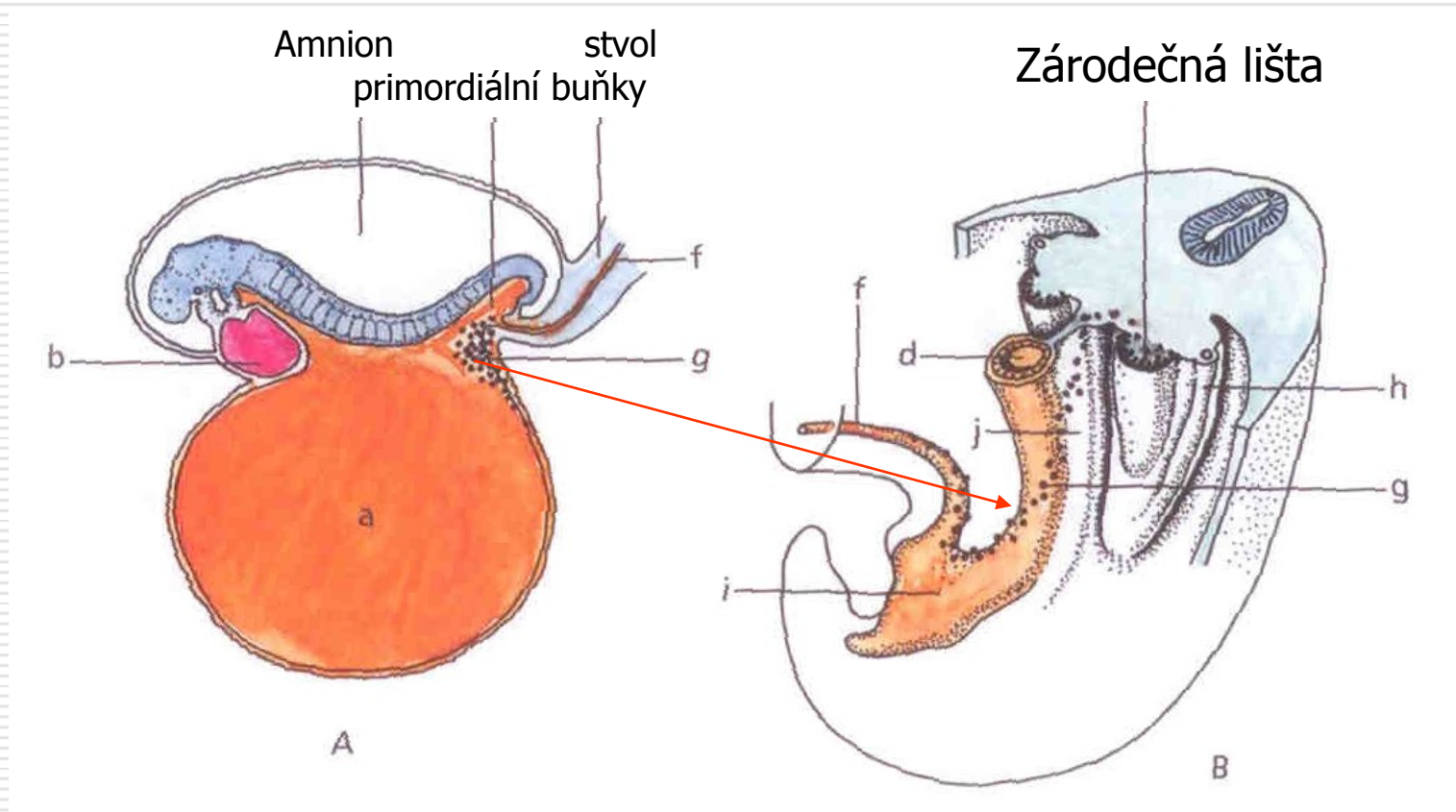
- plochý mezodermový célomový epitel
- proliferace
- migrace primordiálních pohlavních buněk
- mnohovrstevný epitel
- prorůstání do mezenchymu
- medulární provazce (směrem k mezonefros)

## Začátek 6. týdne

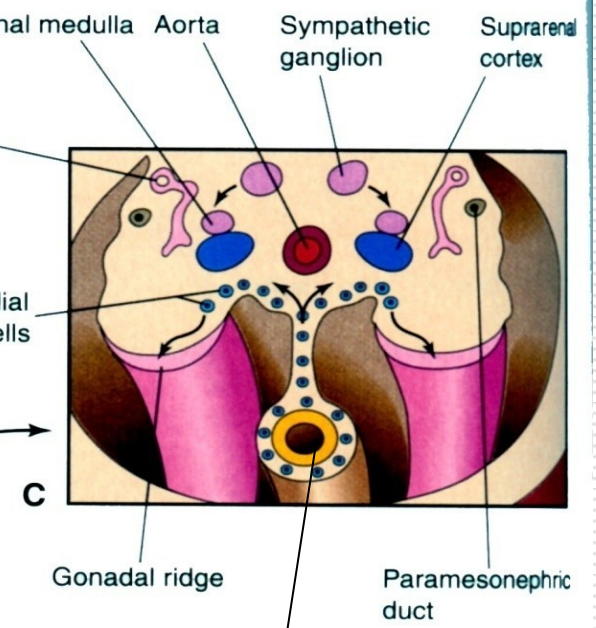
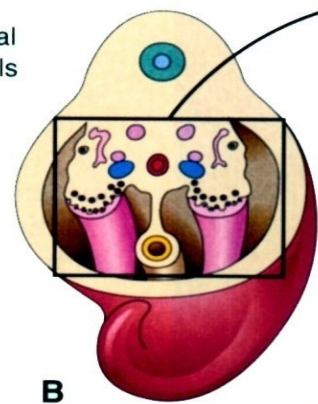
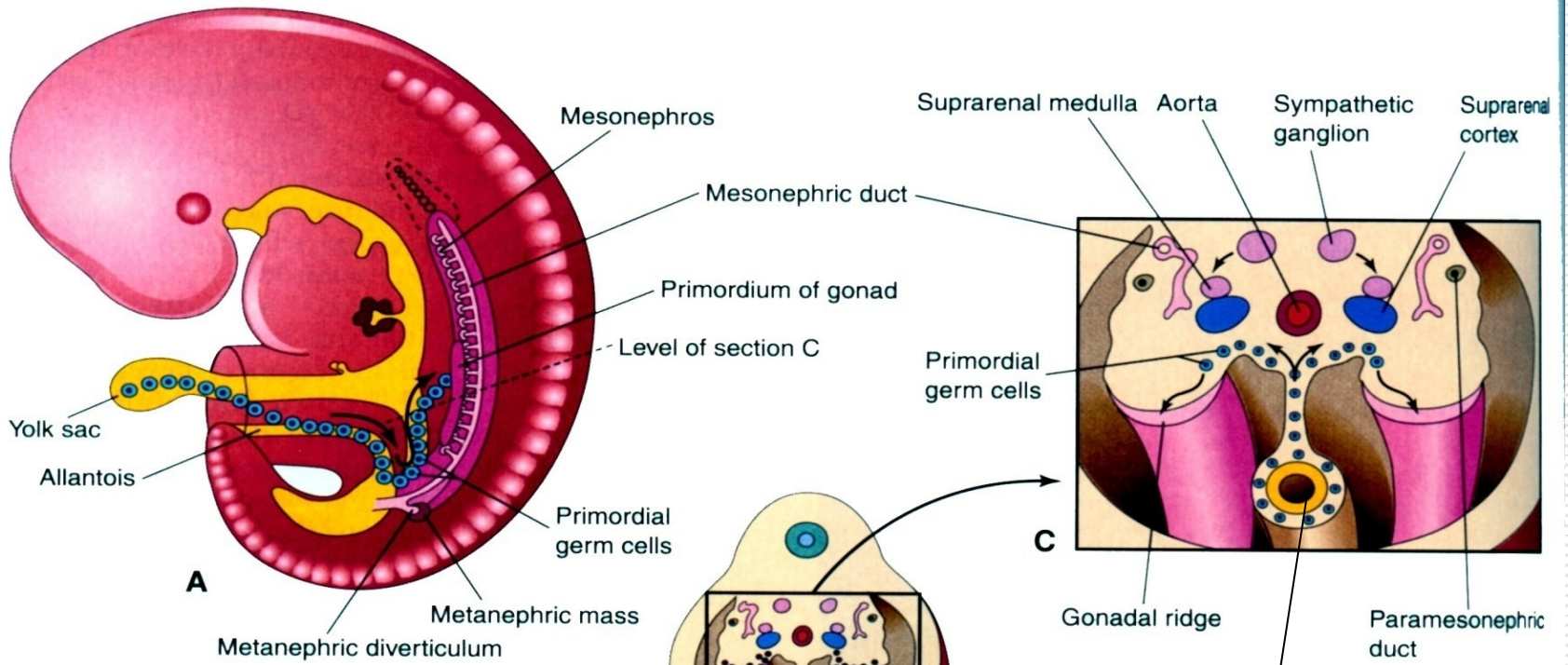
- Müllerův vývod
- vchlípení célomového epitelu zárodečné lišty
- paralelně s Wollfovým v.



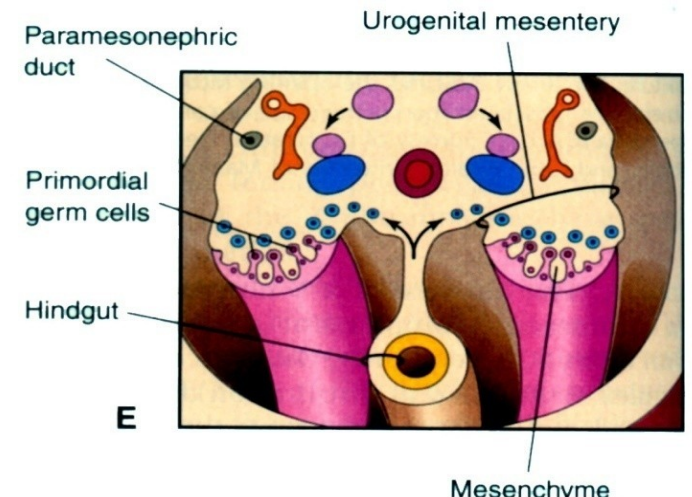
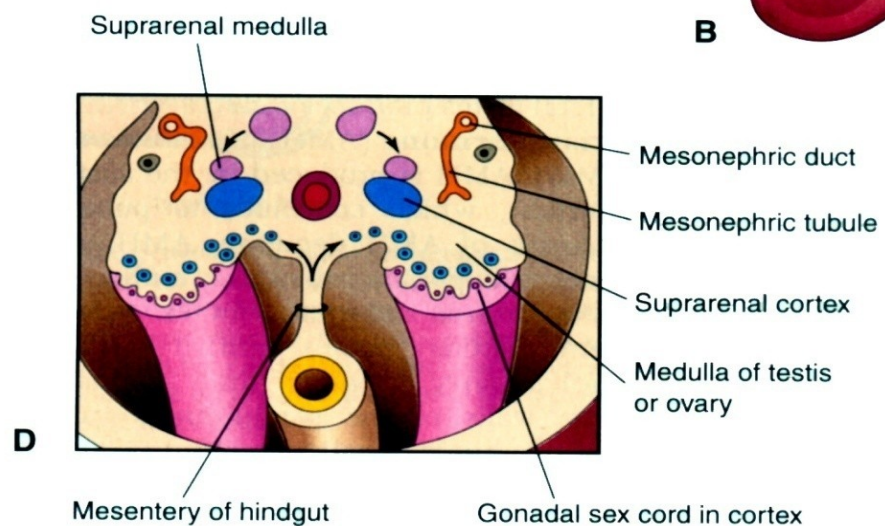
# Migrace primordiálních buněk







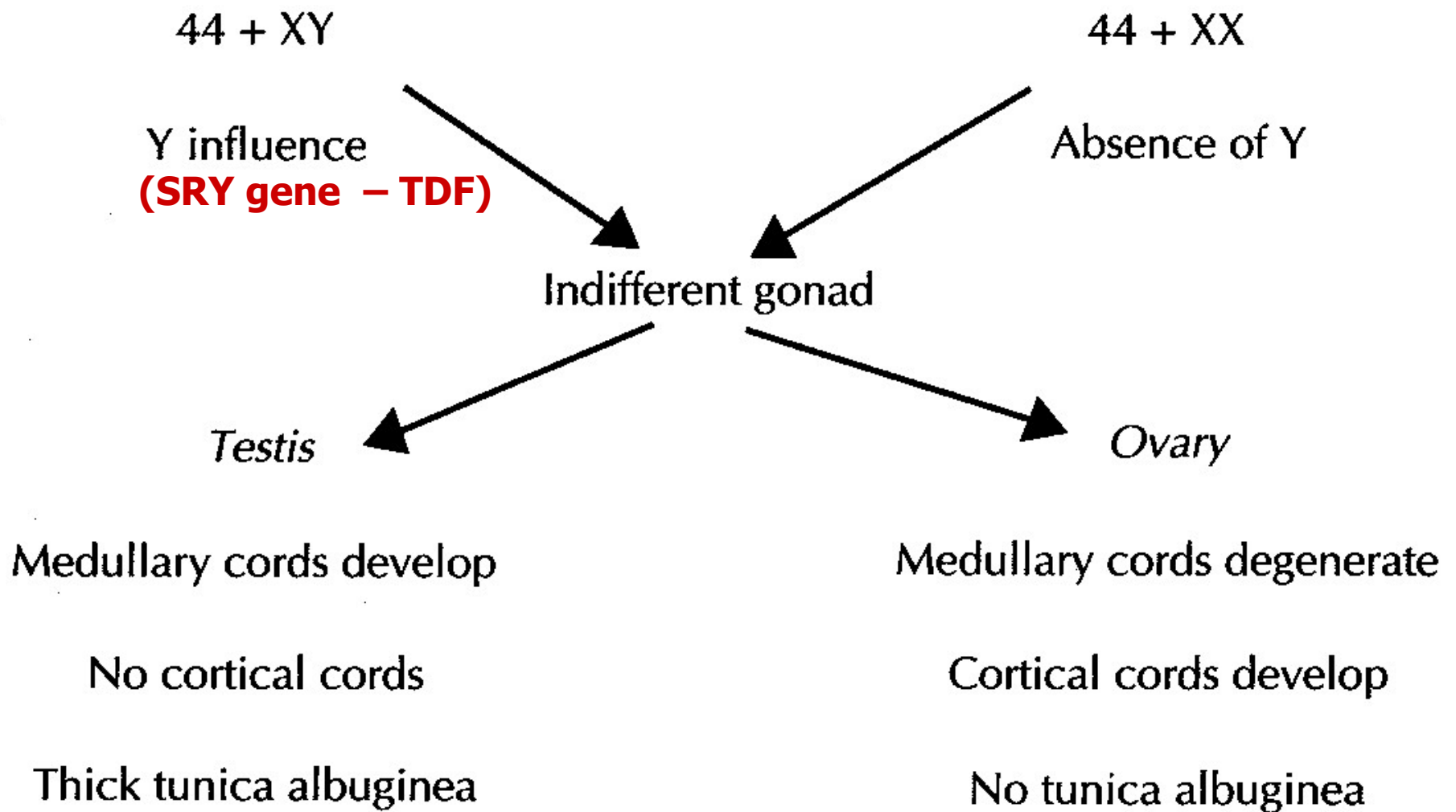
Zadní střevo



# Gonády jsou derivovány ze tří zdrojů:

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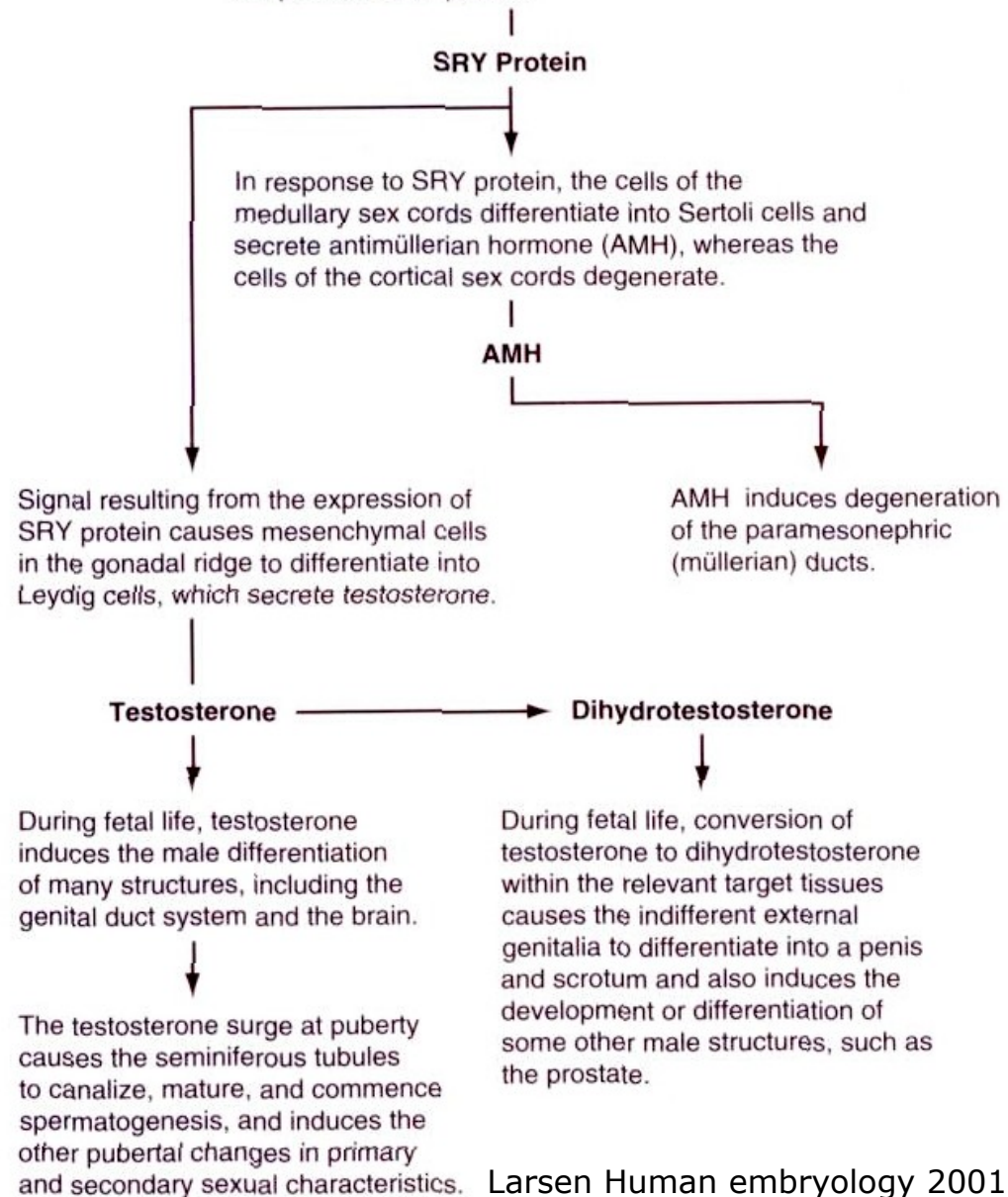
- **Epitel céloru** (mesotel = mesodermální epitel)
  - **Mezenchym pod tímto epitelem**
  - **Prvozárdečné buňky** (gonocyty) migrující ze žloutkového váčku
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**Primární diferenciace ženských gonád není závislá na hormonech**

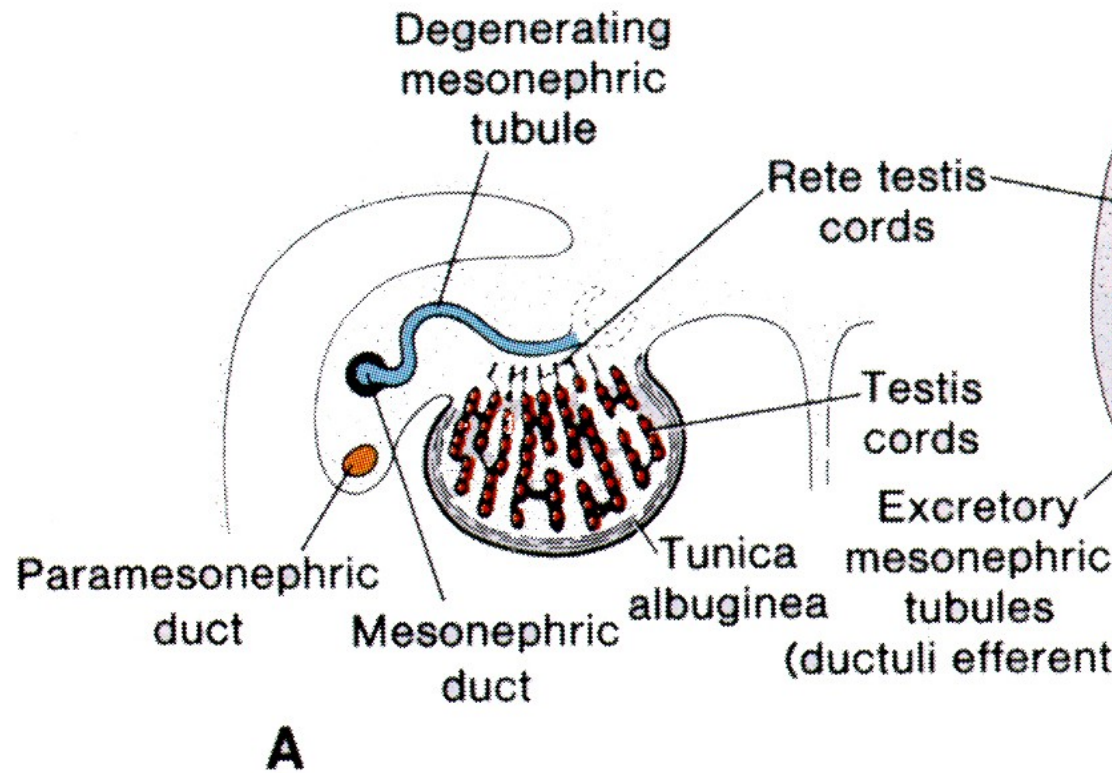
# Vliv SRY

In genetic males, the testis-determining factor gene in the sex-determining region (*SRY*) of the Y chromosome is expressed in the sex cord cells, resulting in the production of SRY protein. Genetic females lack this gene and do not produce SRY protein.

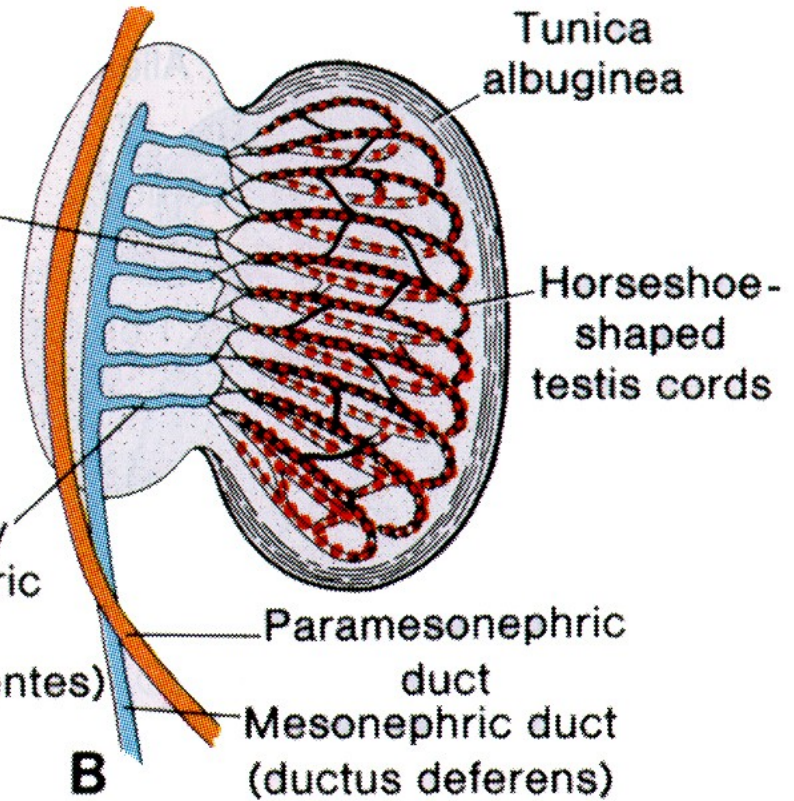


# Časný vývoj testes

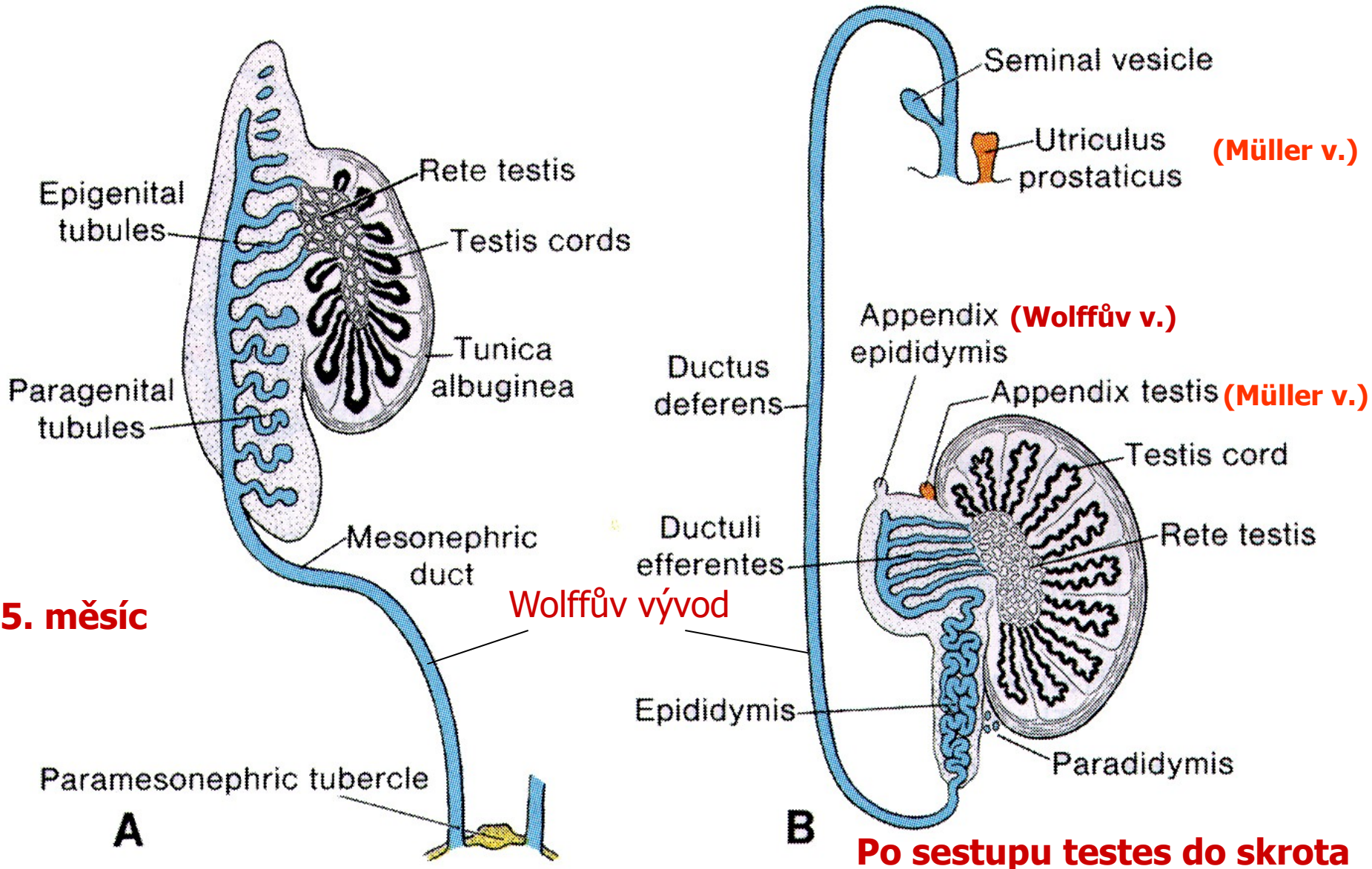
8. týden



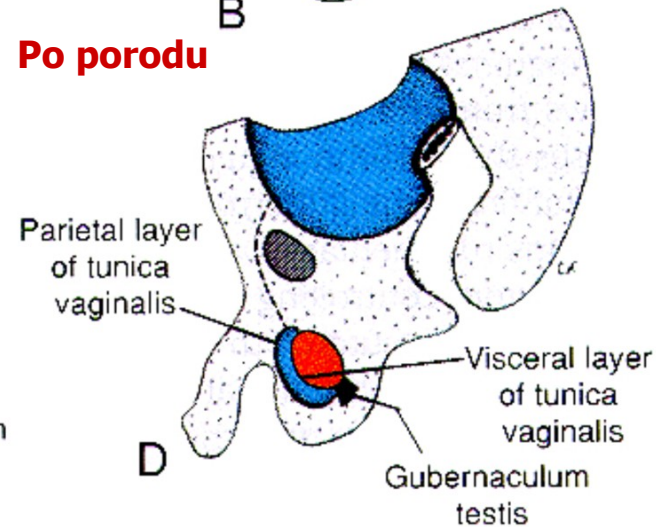
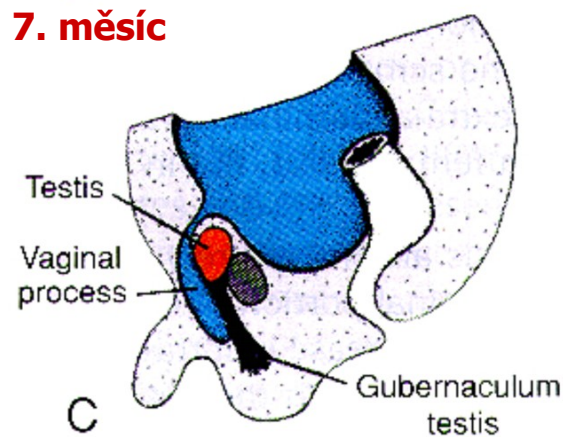
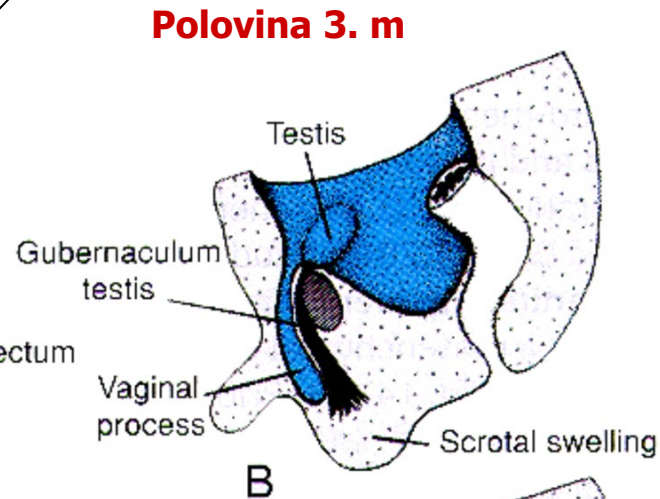
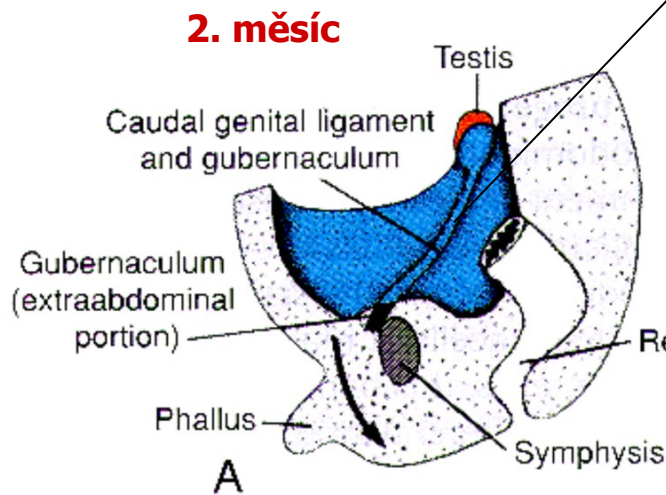
4. měsíc

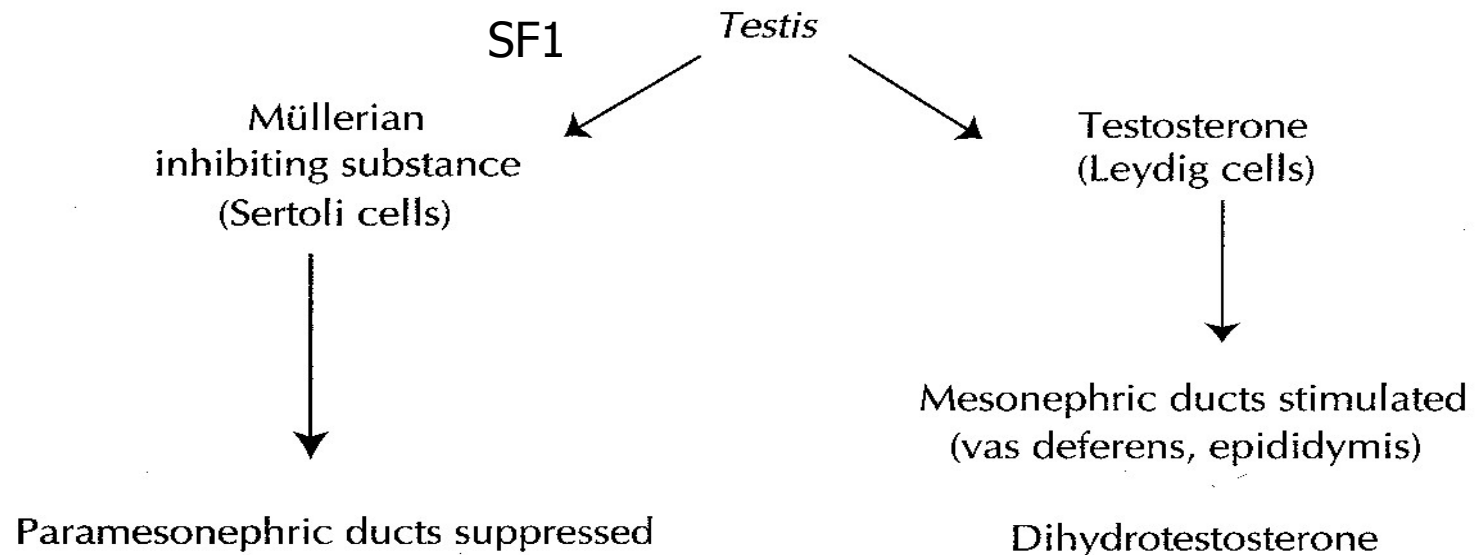


# Pozdnější vývoj testes

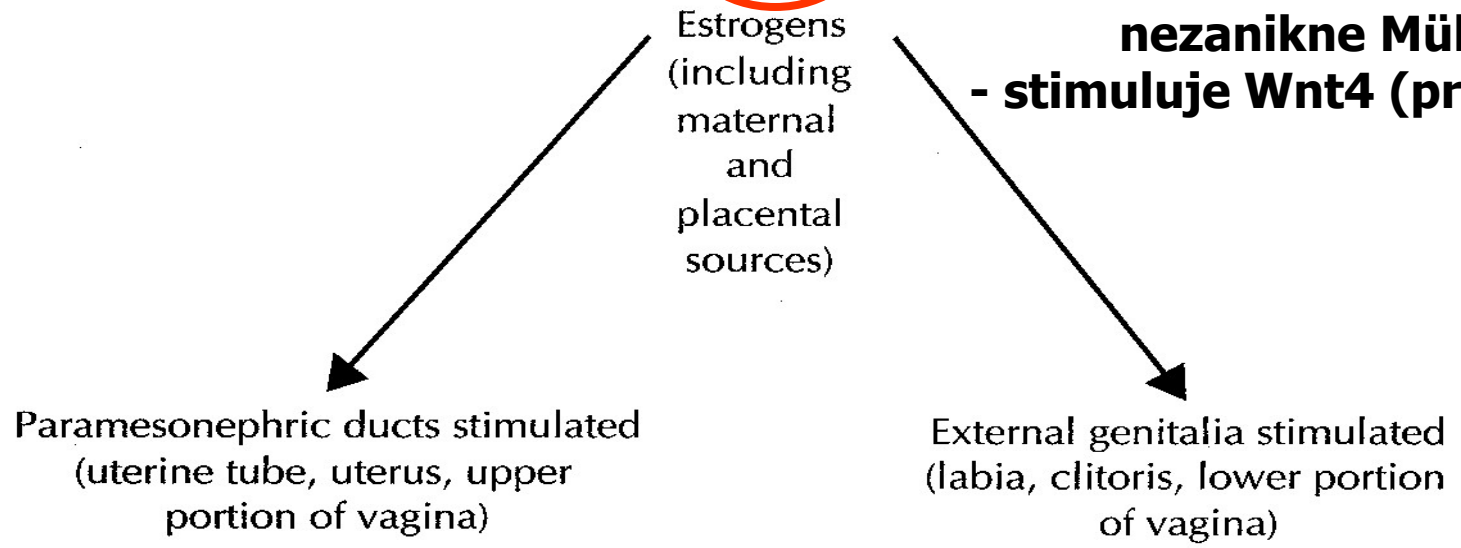


# Sestup testes inguinálním kanálem





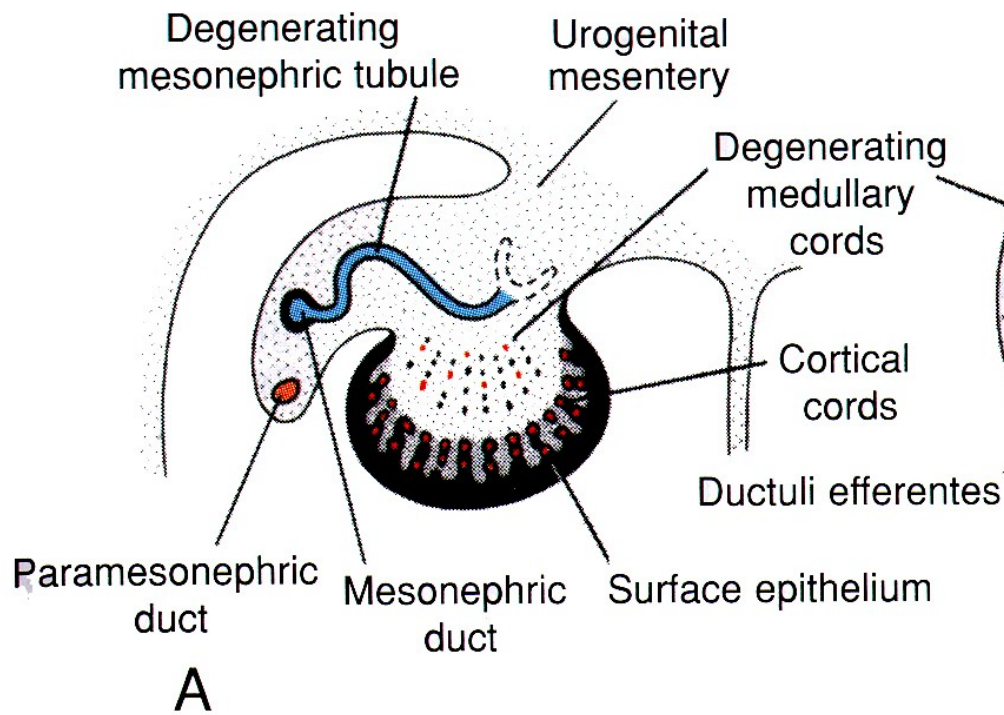
**DAX1 - inhibuje SF1 nezniknou Sertoliho b. nezanične Müllerův v. - stimuluje Wnt4 (pro ovariální)**



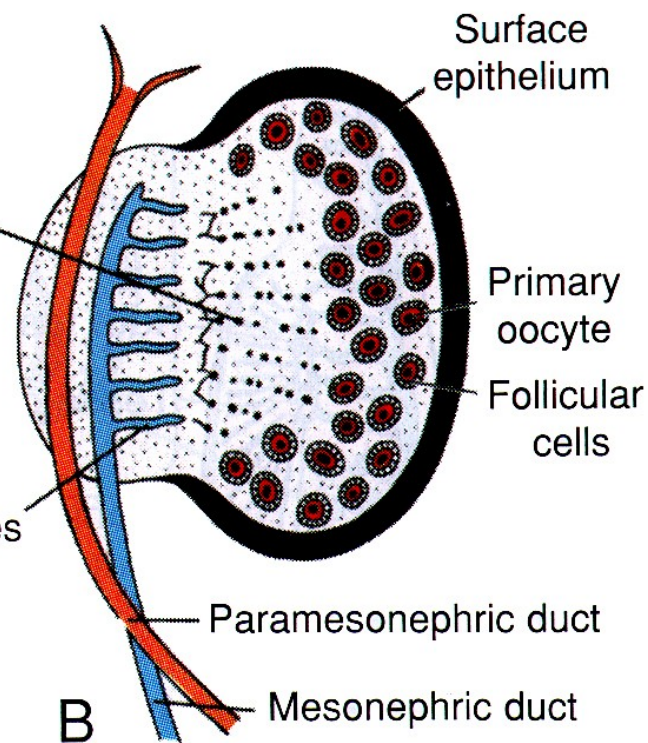


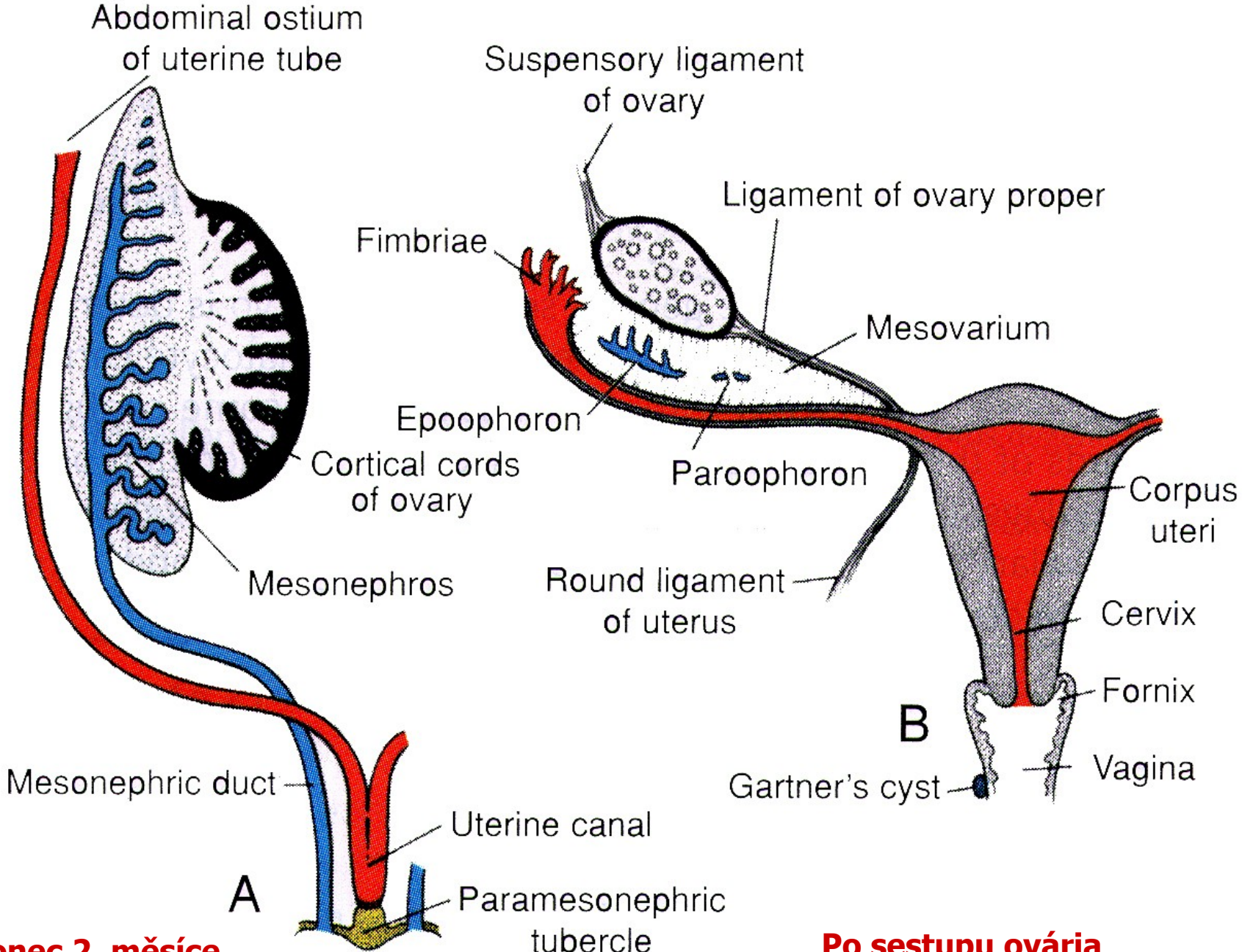
# Vývoj ovária

7. týden



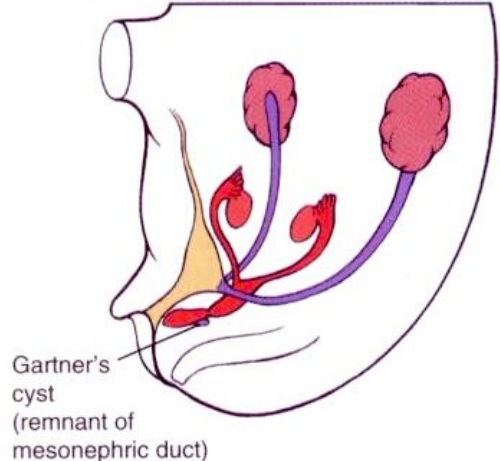
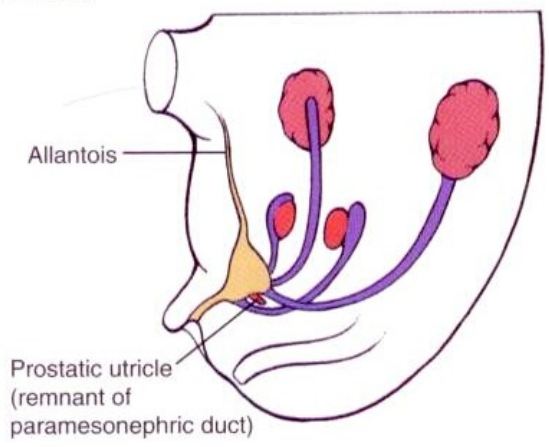
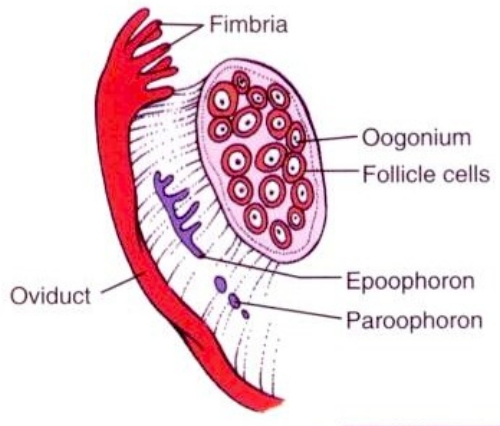
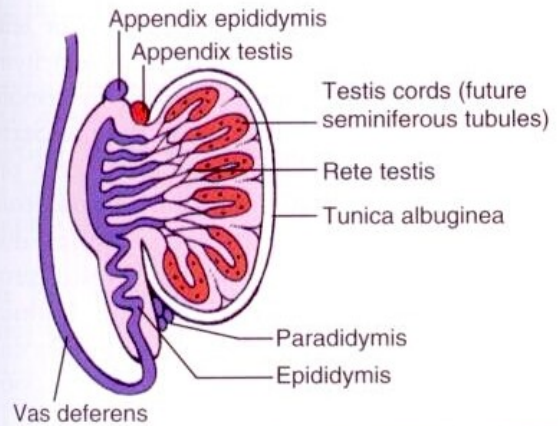
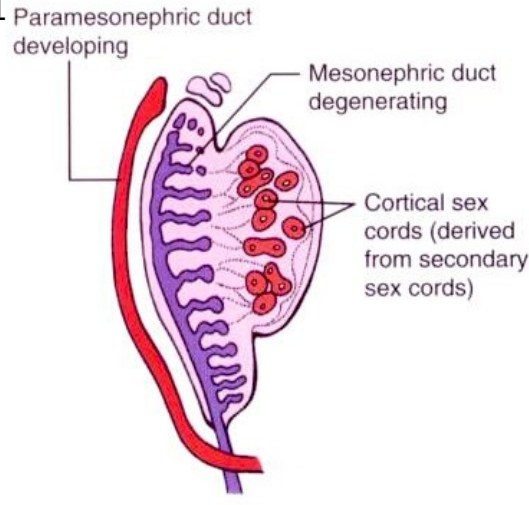
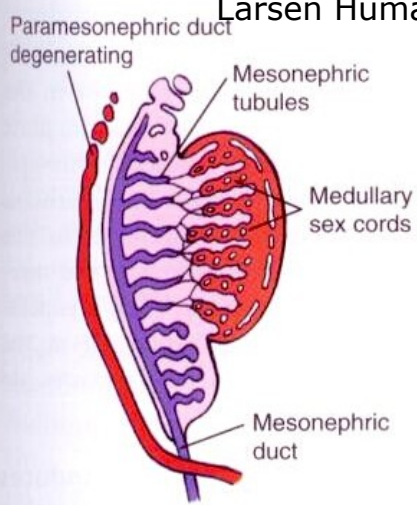
5. měsíc





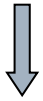
**Konec 2. měsíce**

**Po sestupu ovária**



# Deriváty vývodů

## Paramesonephrický vývod (Müller)



děložní trubice  
děloha  
horní část vagíny

## Mesonephric duct (Wolff)

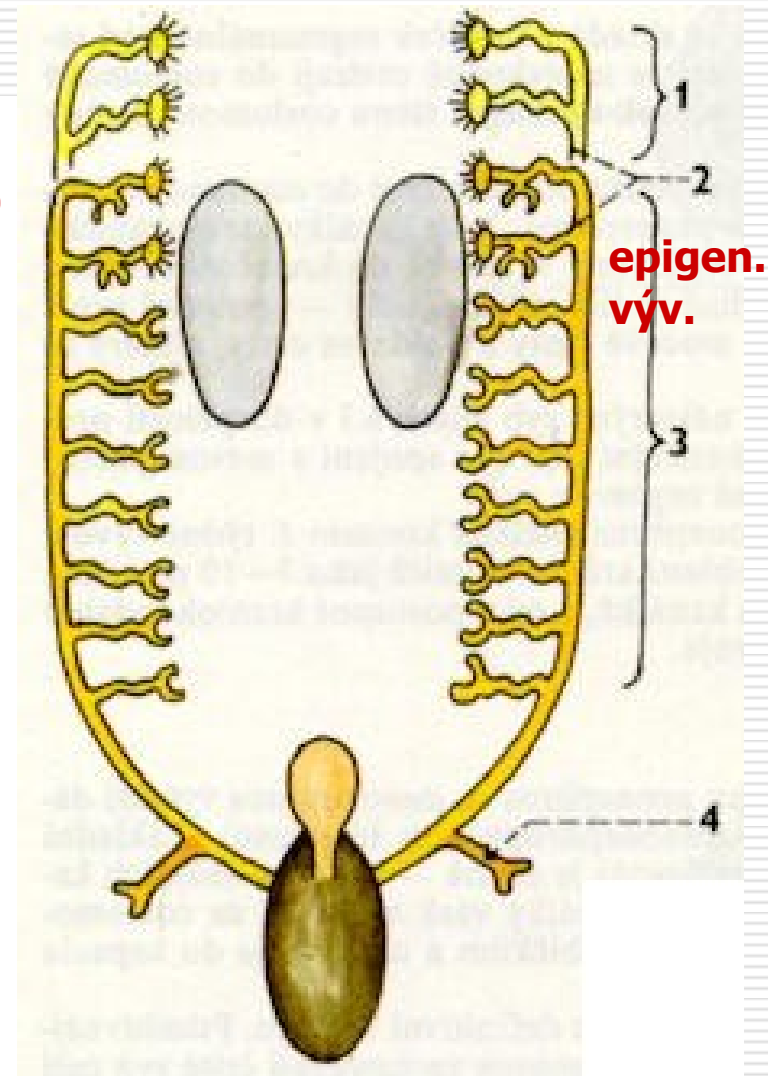


D.epididymidis  
D.deferens

## Mesonephros (epigenit. výv.)

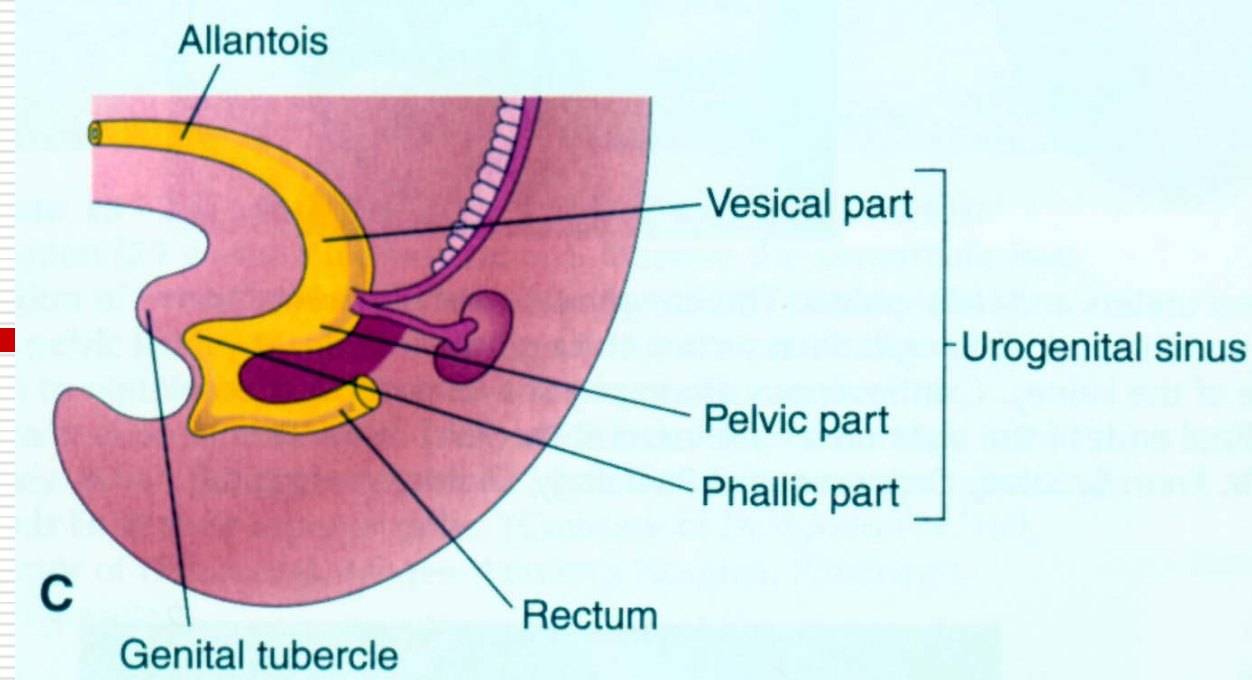


Ductuli efferentes



- 1) Regressing pronephros
- 2) Mesonephric tubules
- 3) Wolffian duct – collecting duct
- 4) Ureteral bud

# Kloaka

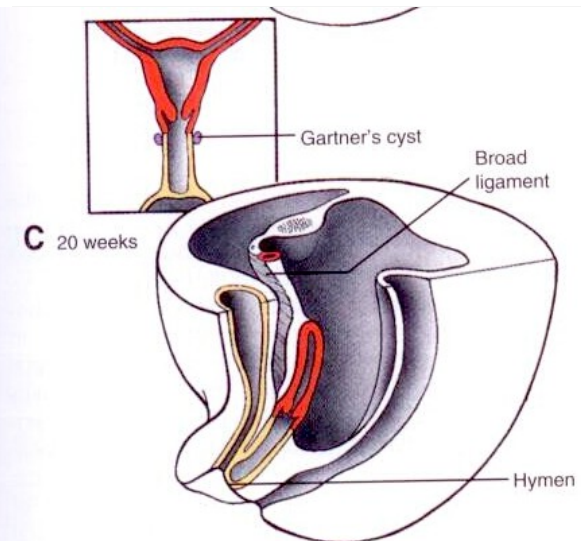
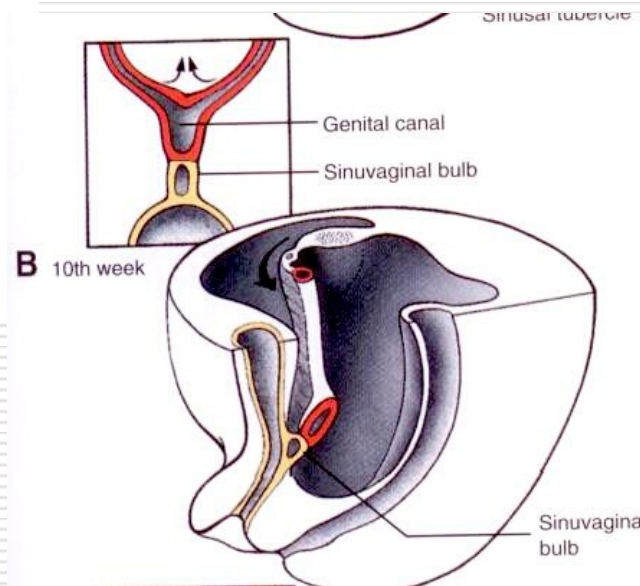
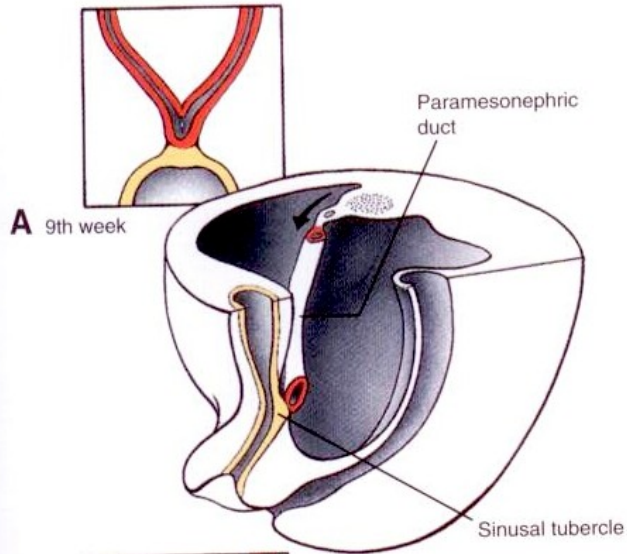


Rozdělena urorektálním septem na anorektální kanál a urogenitální sinus

- kraniální oblast – většina moč. Měchýře
- střední oblast – prostatická část močovodu mužů
  - celý močovod žen
- kaudální konec – zvětšuje se do genitálního hrbolku (močovod v penisu)

# Vývoj dělohy a pochvy

Larsen Human embryology 2001



Epitel vagíny je mezodermálního i entodermálního původu

# Zevní genitál

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## □ Indiferentní stádium

### ■ Sinus urogenitalis + pohlavní hrbolek

- zbujení mezenchymu po obou stranách kloakové membrány a srůst těchto dvou struktur

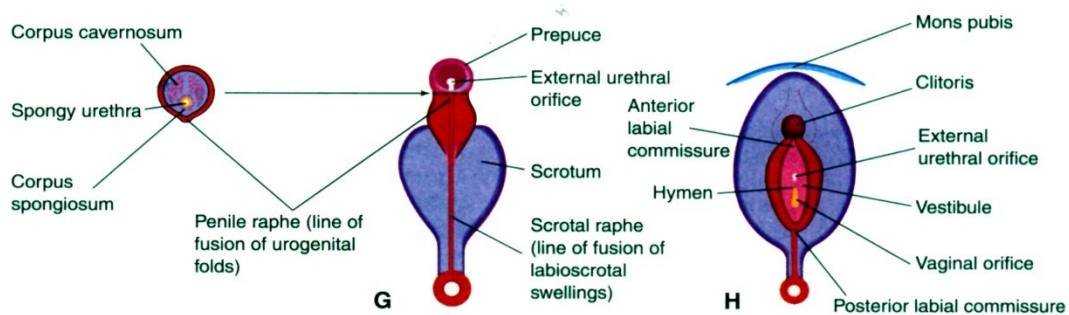
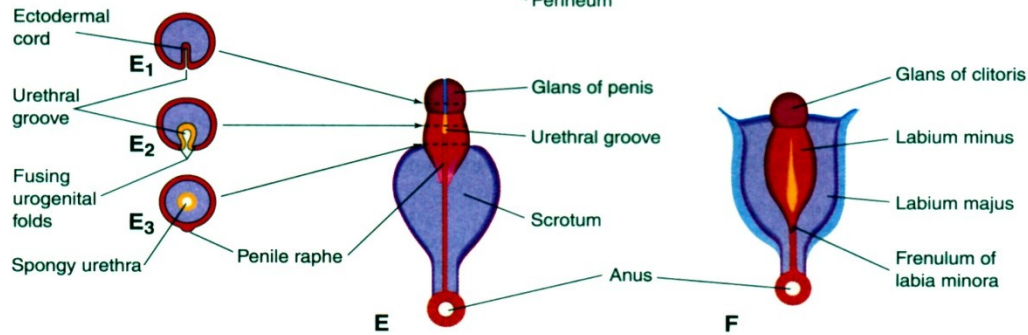
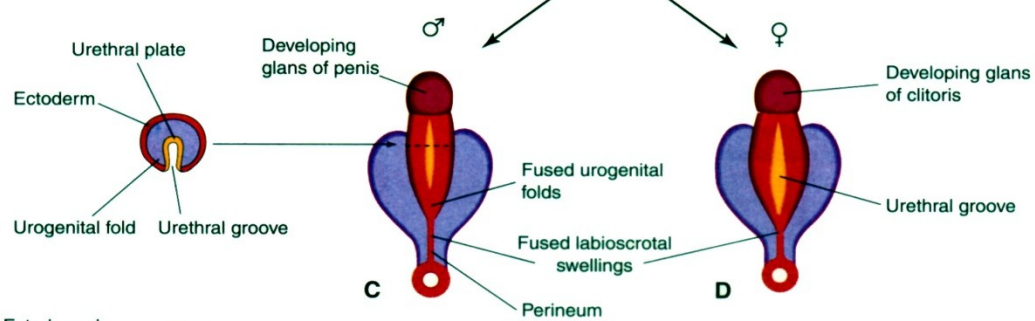
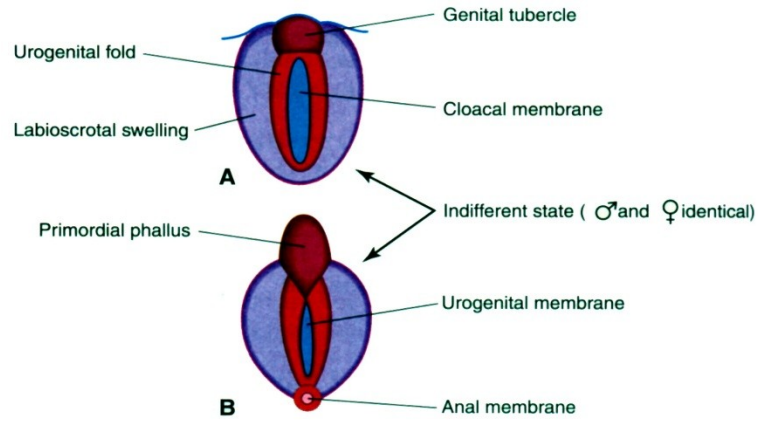
### ■ Rozdělení kloakální membrány na membrana analis a urogenitalis

### ■ Genitální valy (labioskrotální)

## □ Od 6. týdne specializace

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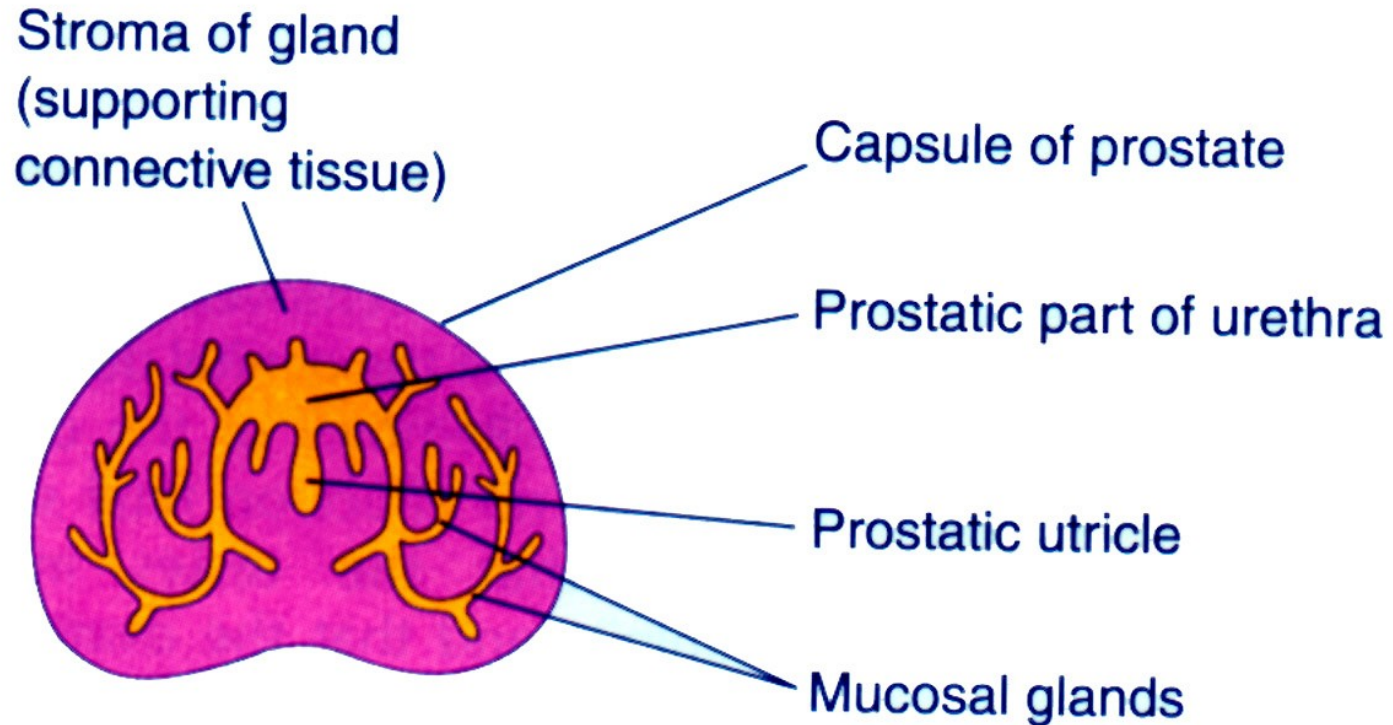
- Genital tubercle
- Urogenital folds
- Labioscrotal swellings





# Prostata

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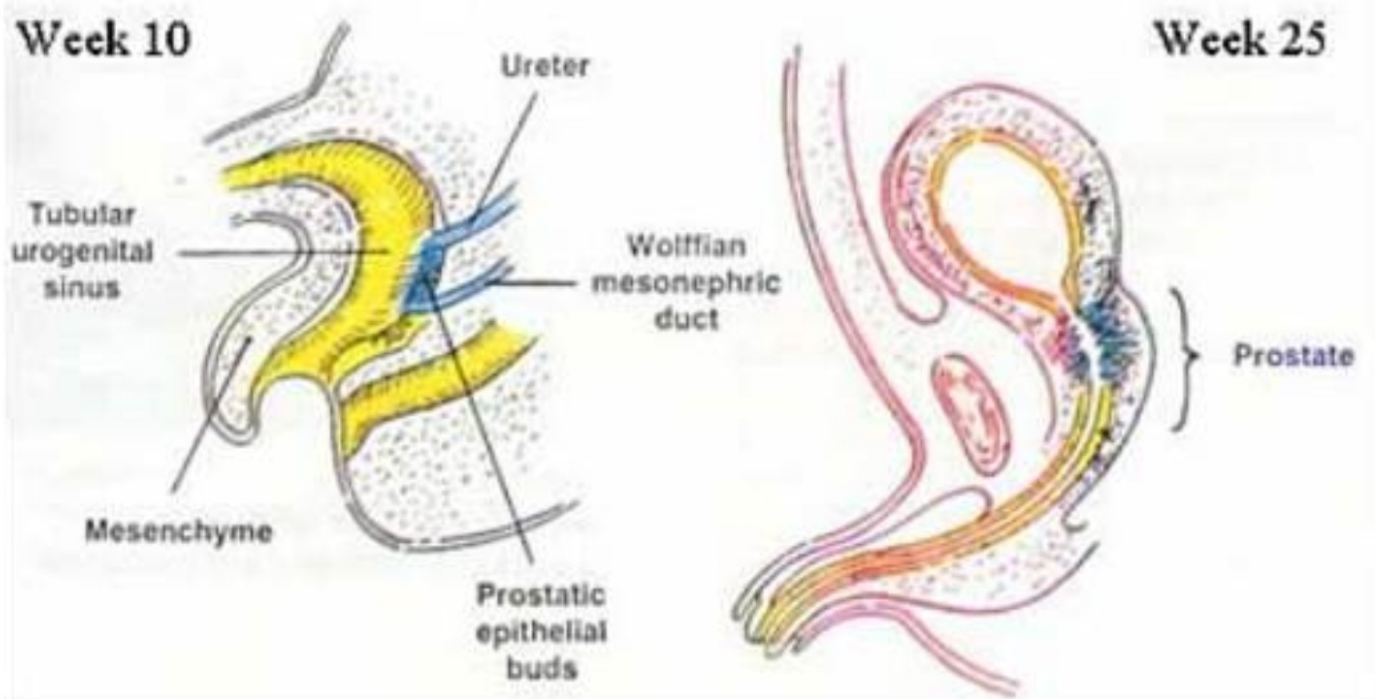
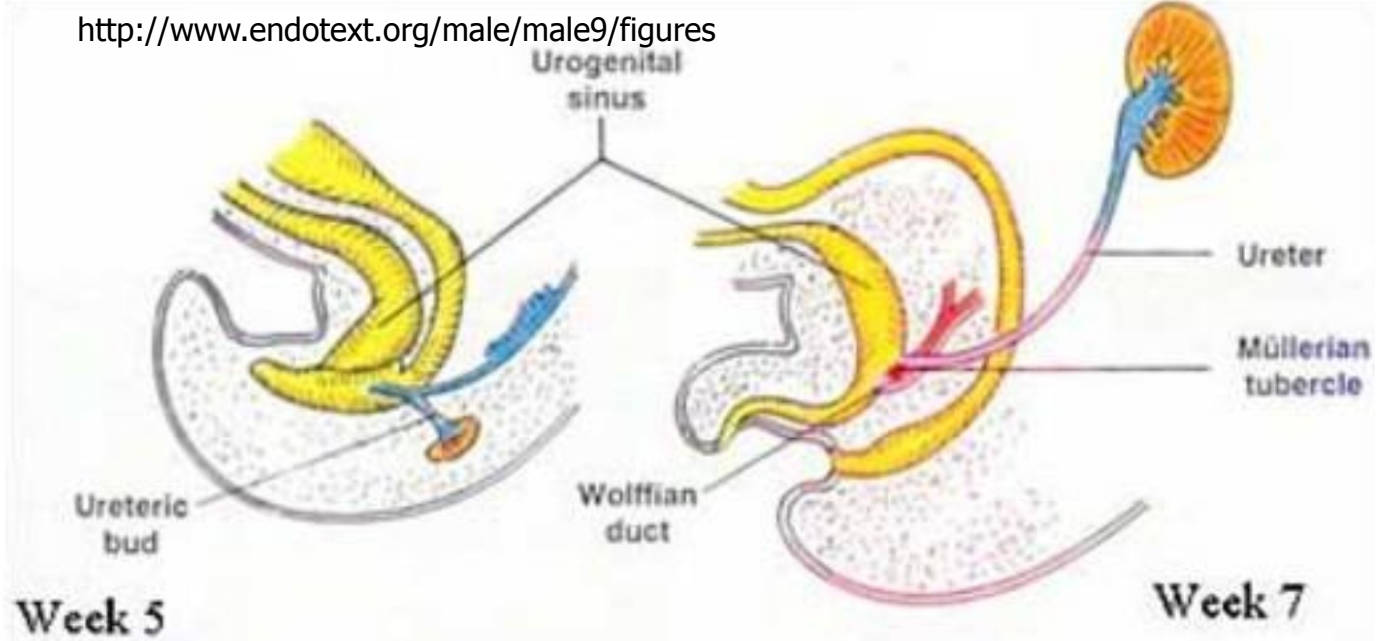
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Produkce látek tvořící většinu objemu semenné tekutiny - kyselina citrónová, fosfatáza, prostaglandin atd., neutralizace kyselých vývodů

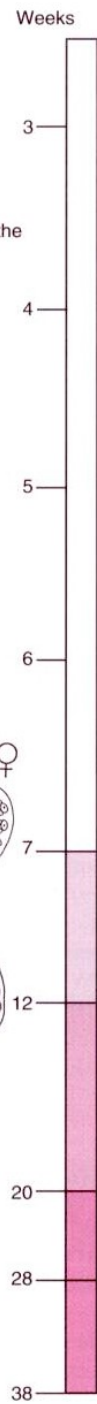
## Vývoj prostaty

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- Vývoj koncem 3. měsíce z epitelu primitivní uretry a horního konce sinus urogenitalis.
  - Proliferace epitelu – čepy vrůstající do okolního mezenchymu.
  - Luminizací se čepy mění v žlázky.
  - Stroma vzniká z okolního mezenchymu.
-



# Průběh



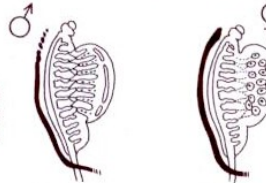
Primordial germ cells migrate from the yolk sac to the posterior body wall and later to the genital ridges



Cells from the coelomic epithelium and mesonephros form the sex cords surrounding the germ cells. The paramesonephric ducts develop next to the mesonephric ducts



The prostate, seminal vesicle, and bulbourethral glands develop in males at 10 to 13 weeks



10-12 weeks



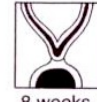
In males, the cortical sex cords degenerate and the medullary sex cords (future seminiferous tubules) connect via mesonephric tubules to the mesonephric ducts, which form the vasa deferentia

In females, the medullary sex cords and mesonephric ducts degenerate and the cortical sex cords become follicle cells

The indifferent external genitalia differentiate to form the penis and scrotum in males and the clitoris and labia in females



The paramesonephric ducts and sinovaginal bulb join to form the uterus and vagina in females

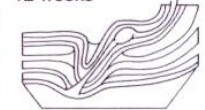


8 weeks

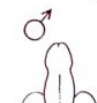
In males, shortening of each gubernaculum brings the corresponding testis to the lip of the inguinal canal by 12 weeks



12 weeks

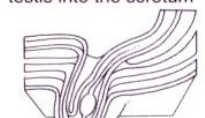


12 weeks



20 weeks

During the 7th to 9th months, further shortening of the gubernaculum draws the testis into the scrotum



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# Ontogeneze

