

EMBRYOLOGY OF THE FEMALE GENITAL ORGANS

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SEXUAL DIFFERENTIATION

- The first step in sexual differentiation is the determination of **genetic sex** (XX or XY)
- Genetic (chromosomal) sex
- Gonadal sex
- Phenotypic sex
- **Female** sexual development does not depend on the presence of ovaries (depends on the absence of **Y** chromosome)
- **Male** sexual development depend on the presence of functioning testes & responsive end organs

EXTERNAL GENITALIA

1-UNDEFERENTIATED STAGE (4-8 WK)

The neutral genitalia includes:

- genital tubercle (phalus)
- labioscrotal swellings
- urogenital folds
- urogenital sinus

2- ♂ & ♀ EXTERNAL GENITAL DEVELOPMENT (9-12 WK)

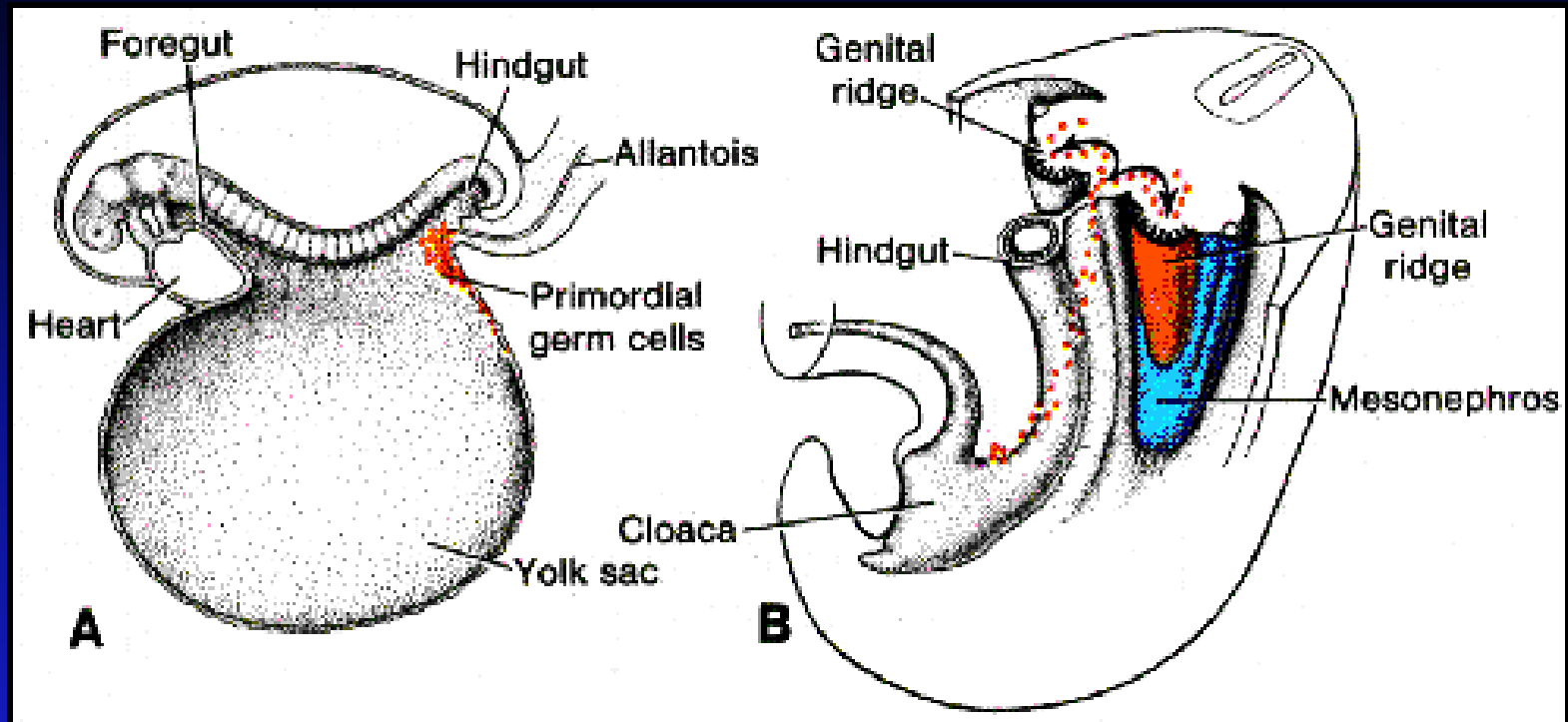
- By 12 wk gestation ♂ & ♀ genitalia can be differentiated
- In the absence of **androgens** ⇨ ♀ external genitalia
- The development of ♂ external genitalia requires the action of **androgens** (specifically **DHT**)



INTERNAL GENITAL ORGANS

1- GONADS (TESTES AND OVARIES)

- Undifferentiated gonads begin to develop on the 5th wk
- **Germ cells** originate in the yolk sac & migrate to the genital ridge
- In the absence of Y chromosome the undifferentiated gonad develop into an **ovary**
 - 45 XO embryo the ovaries develop but undergo atresia
⇒ **streak ovaries**



The gonads develop as primordial germ cells that form in the wall of the yolk sac close to the allantois **migrate** along the dorsal mesentery of the hindgut to invade the **genital ridges**.

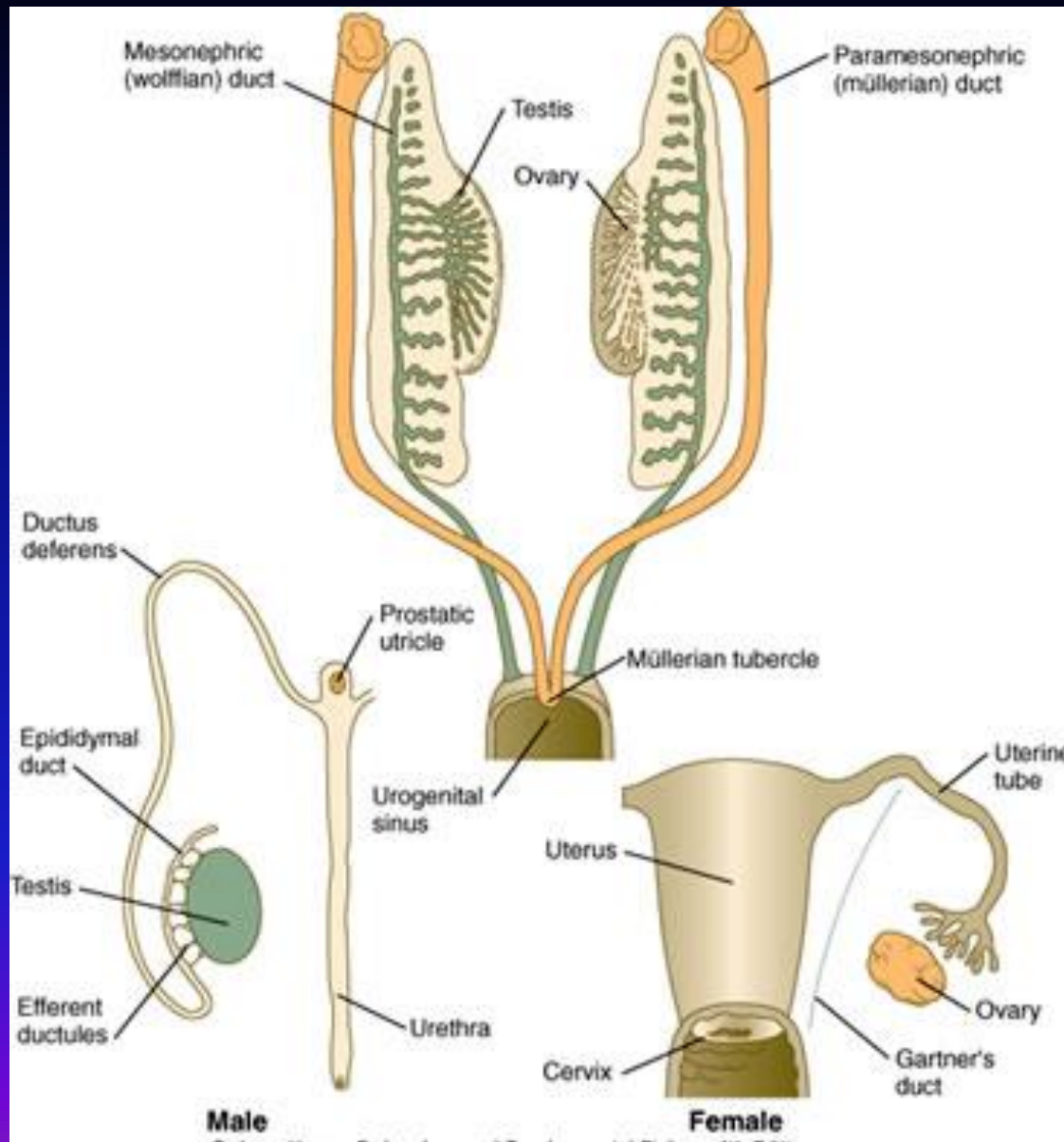
INTERNAL GENITAL ORGANS (GONADS)

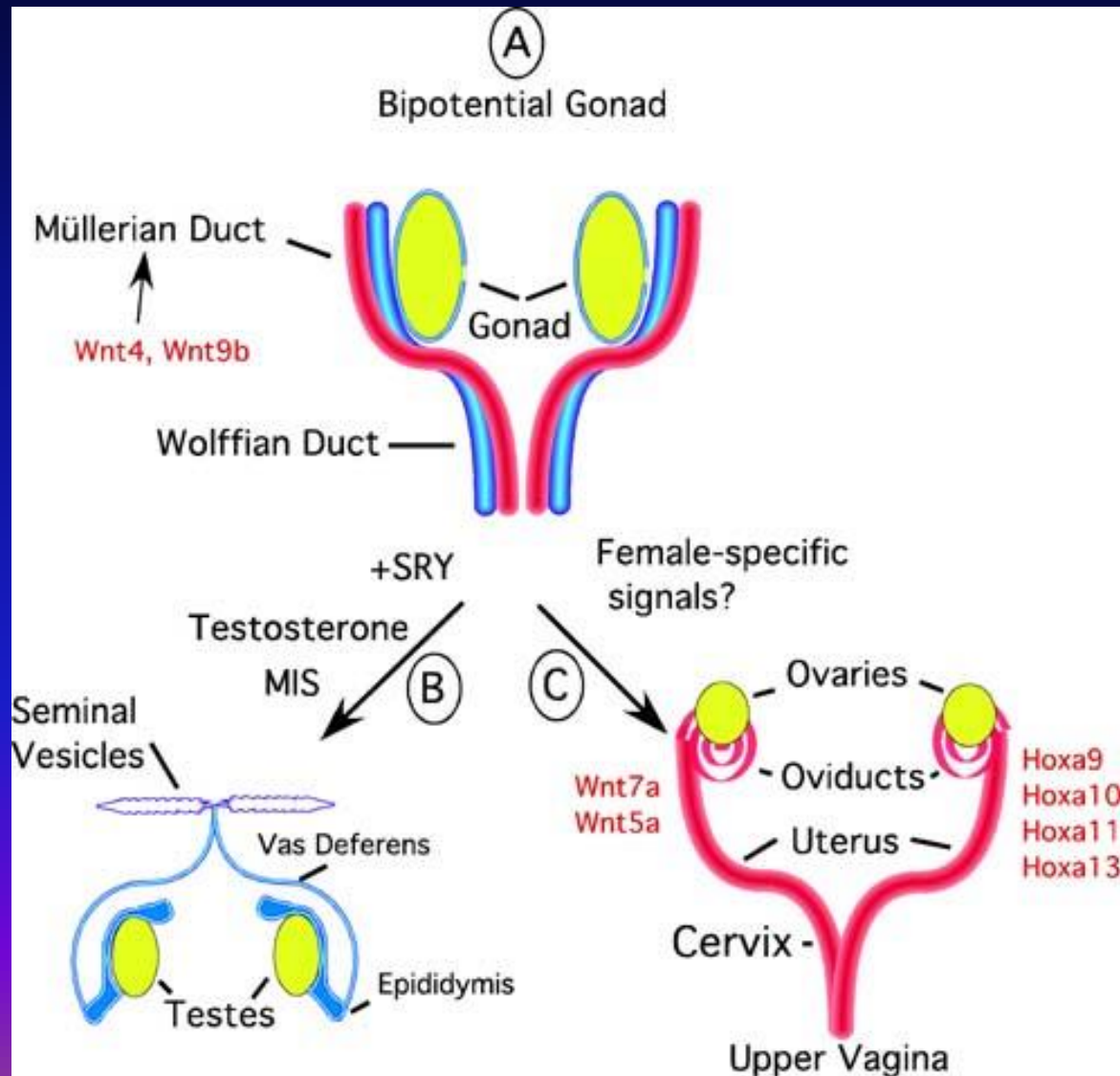
- **The ovary** develop from the cortex & the medulla regress
- **The testes** develop from the medulla & the cortex regress
- The development of the testes requires the presence of **SRY** gene (sex determining region Y) found on Y chromosome
- The ovary contains 2 million primary oocytes at birth

INTERNAL GENITAL ORGANS

2- UTERUS & FALLOPIAN TUBES

- Invagination of the coelomic epithelium on the cranio-lateral end of the mesonephric ridge ⇒
Paramesonephric ducts (Mullerian Ducts)
- Fusion of the two PMN ducts ⇒ **Fallopian tubes** (at 8-11 wk) , **uterus, cervix , upper 2/3 of vagina**
- In the male fetus the testes secrete the mullerian inhibiting factor (AMH) ⇒ **regression of the mullerian ducts**





INTERNAL GENITAL ORGANS

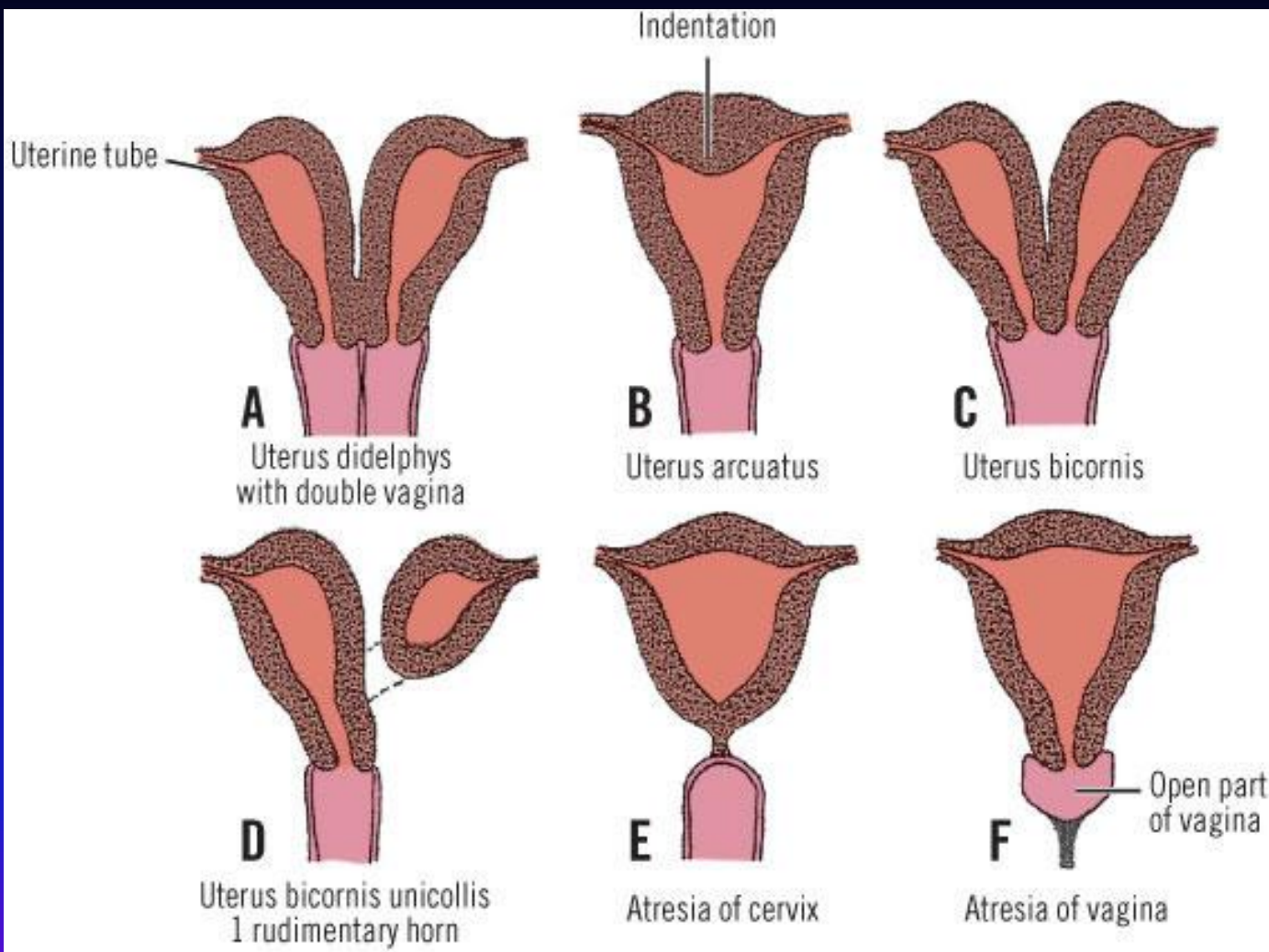
3-VAGINA

- Mullerian tubercle ⇒ upper 2/3 of vagina
- Urogenital sinus ⇒ lower 1/3

TABLE 1-2

Male and Female Derivatives of Embryonic Urogenital Structures

Embryonic Structure	Derivatives	
	Male	Female
Labioscrotal swellings	Scrotum	Labia majora
Urogenital folds	Ventral portion of penis	Labia minora
Phallus	Penis Glans, corpora cavernosa penis, and corpus spongiosum	Clitoris Glans, corpora cavernosa, bulb of the vestibule
Urogenital sinus	Urinary bladder Prostate gland Prostatic utricle Bulbourethral glands Seminal colliculus	Urinary bladder Urethral and paraurethral glands Vagina Greater vestibular glands Hymen
Paramesonephric duct	Appendix of testes	Hydatid of Morgagni Uterus and cervix Fallopian tubes
Mesonephric duct	Appendix of epididymis Ductus of epididymis Ductus deferens Ejaculatory duct and seminal vesicle	Appendix vesiculosus Duct of epoophoron Gartner's duct
Metanephric duct	Ureter, renal pelvis, calyces, and collecting system	Ureter, renal pelvis, calyces, and collecting system
Mesonephric tubules	Ductuli efferentes Paradidymis	Epoophoron Paroophoron
Undifferentiated gonad	Testis	Ovary
Cortex	Seminiferous tubules	Ovarian follicles
Medulla	— Rete testis	Medulla Rete ovarii
Gubernaculum	Gubernaculum testis	Round ligament of uterus



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