

Origin and early development of the reproductive organs, *sexual differentiation*

Early embryonic development:

- the ***Primordial germ cells*** migrate into the **Urogenital ridge** (dorsal side of the abdominal cavity)

- ***fetal*** reproductive system consists of two sexually ***non-differentiated gonads***, bipotential system or sexual indifferent stage

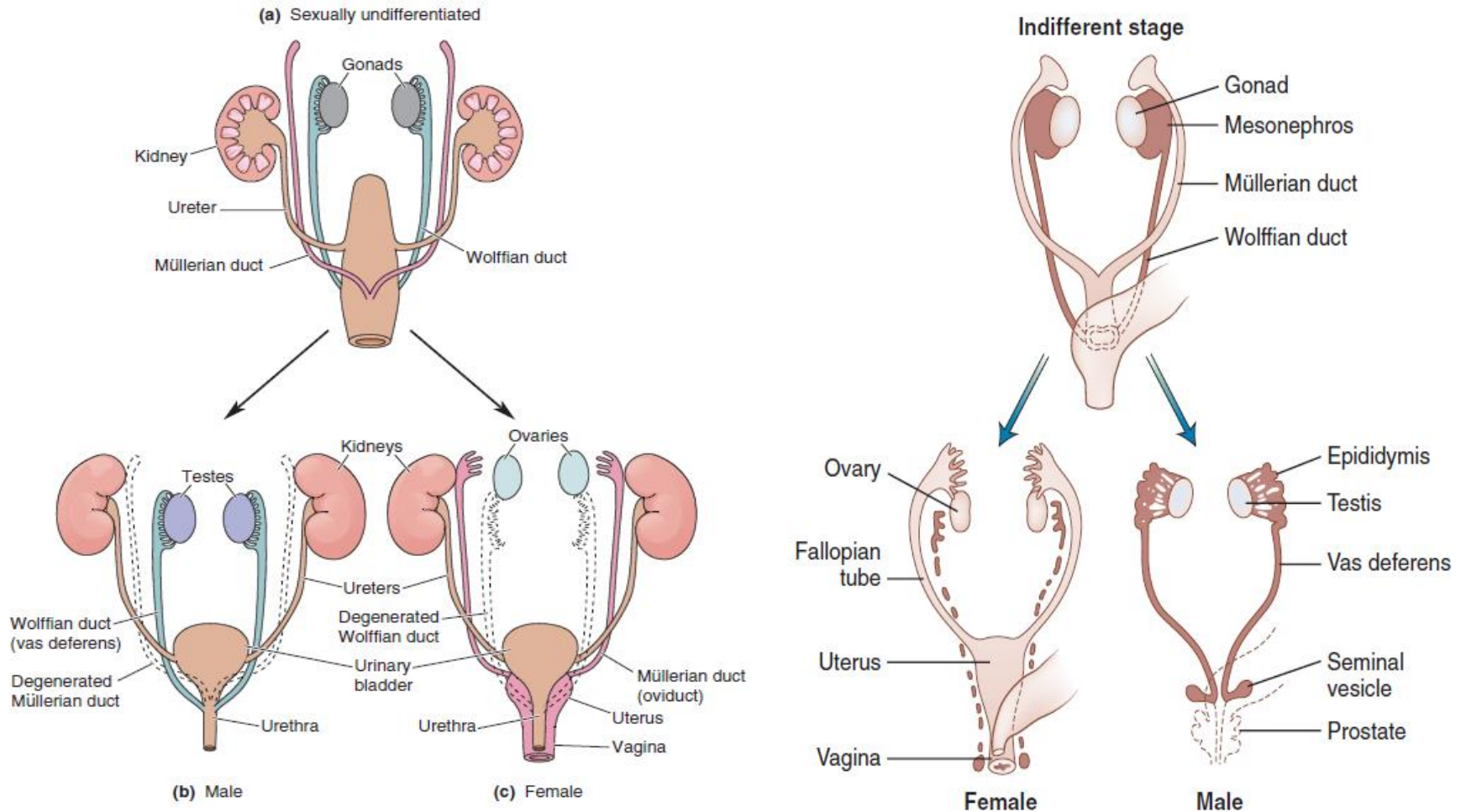
- two pairs of **ducts** (Muellerian and Wolffian ducts, urogenital sinus and a genital tubercle)
embryonic bisexuality

Origin ... (cont'd)

differentiation into a **male** and **female** system (about 2 months after fertilization)

- **Gonads** either ***ovary/testis***
- **Muellerian ducts** develops into
 - oviducts,
 - uterine horns, uterus
 - cervix and anterior vagina
- **Wolffian ducts** develops into
 - epididymis,
 - vas deferens, seminal vesicles and the ejaculatory ducts
- **Urogenital sinus** develops into the external genitals in both females and males

Sexual differentiation (cont'd)



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- **Sex** of the fetus depends on
 - inherited **genes**
 - the **formation** and **maturation** of accessory reproductive **ducts**
- **Genetic sex**
 - determined by the presence or absence of the **Y-chromosome**
 - the Y- chromosome determines the development of **testes** and **maleness** (**SRY**, **S**ex determining **R**egion of **Y** -Chromosome)

→ → **the genetic sex is independent of the ovum:**

- **Ovum** fertilized by an **X-spermatozoon**, the offspring is XX, **a female**
- **Ovum** fertilized by a **Y-spermatozoon**, the offspring is XY, **a male**

Sexual differentiation (cont'd)

- ***Gonadal sex*** - by the presence of normal **ovaries** or **testes**

Male phenotype sexual differentiation is directed by the function of the ***fetal testis***

Testis determining gene (TDG)

- *H-Y Ag* (= Histocompatibility of Y antigen) /
- *SRY gene* (= Sex Determining Region of Y Chromosome)

as the **testes** grow ***leydig cells*** produce ***testosterone***

(***Testosterone*** and ***5-dihydrotestosterone*** stimulate the growth and differentiation of the Wolffian ducts in the male)

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5/29/2025 ***the Wolffian ducts develop into the male*** 5

Sexual differentiation (cont'd)

The muellerian ducts regress by the ***anti-muellerian hormone (Muellerian-inhibiting factor, MIF)*** from the Sertoli cells

Absence of the ***testis, female differentiation*** ensues irrespective of the genetic sex (no need of extra stimulatory or inhibitory mechanism)

In the female fetus

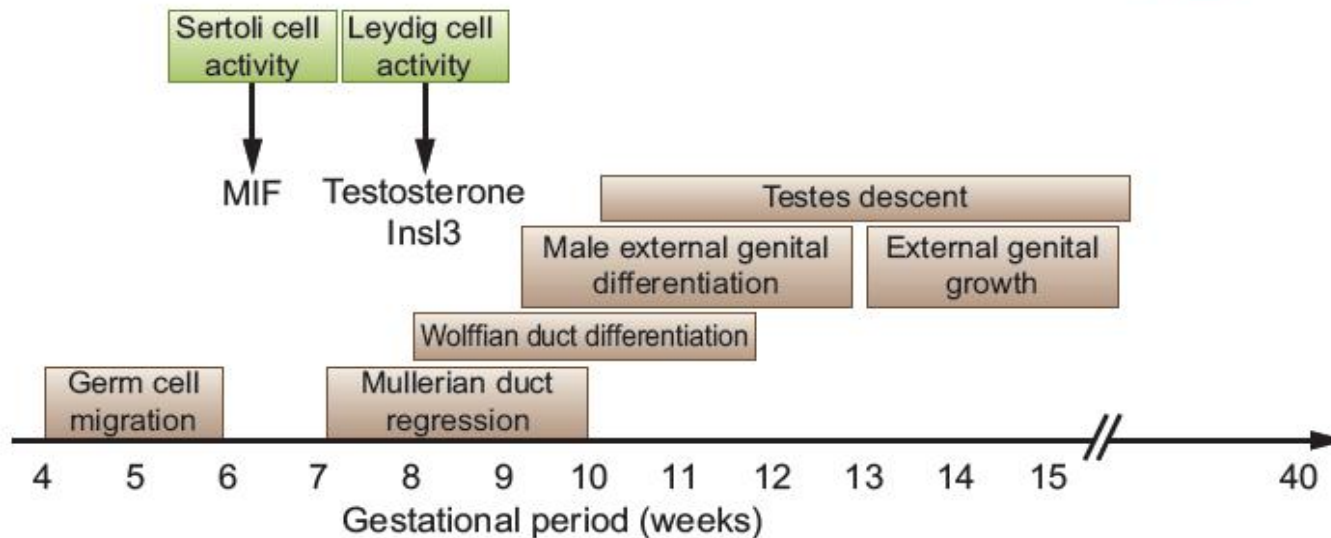
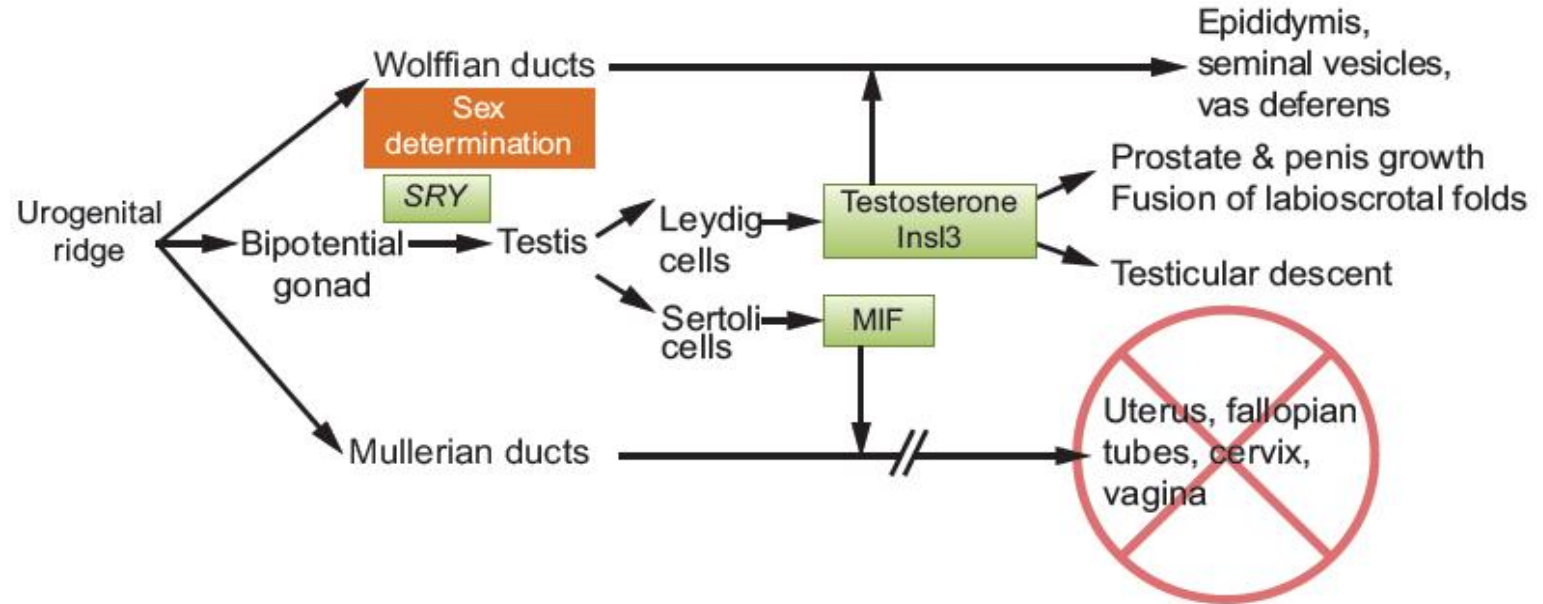
- there is a developing ovary
- no antimuellerian hormone

Sexual differentiation (cont'd)

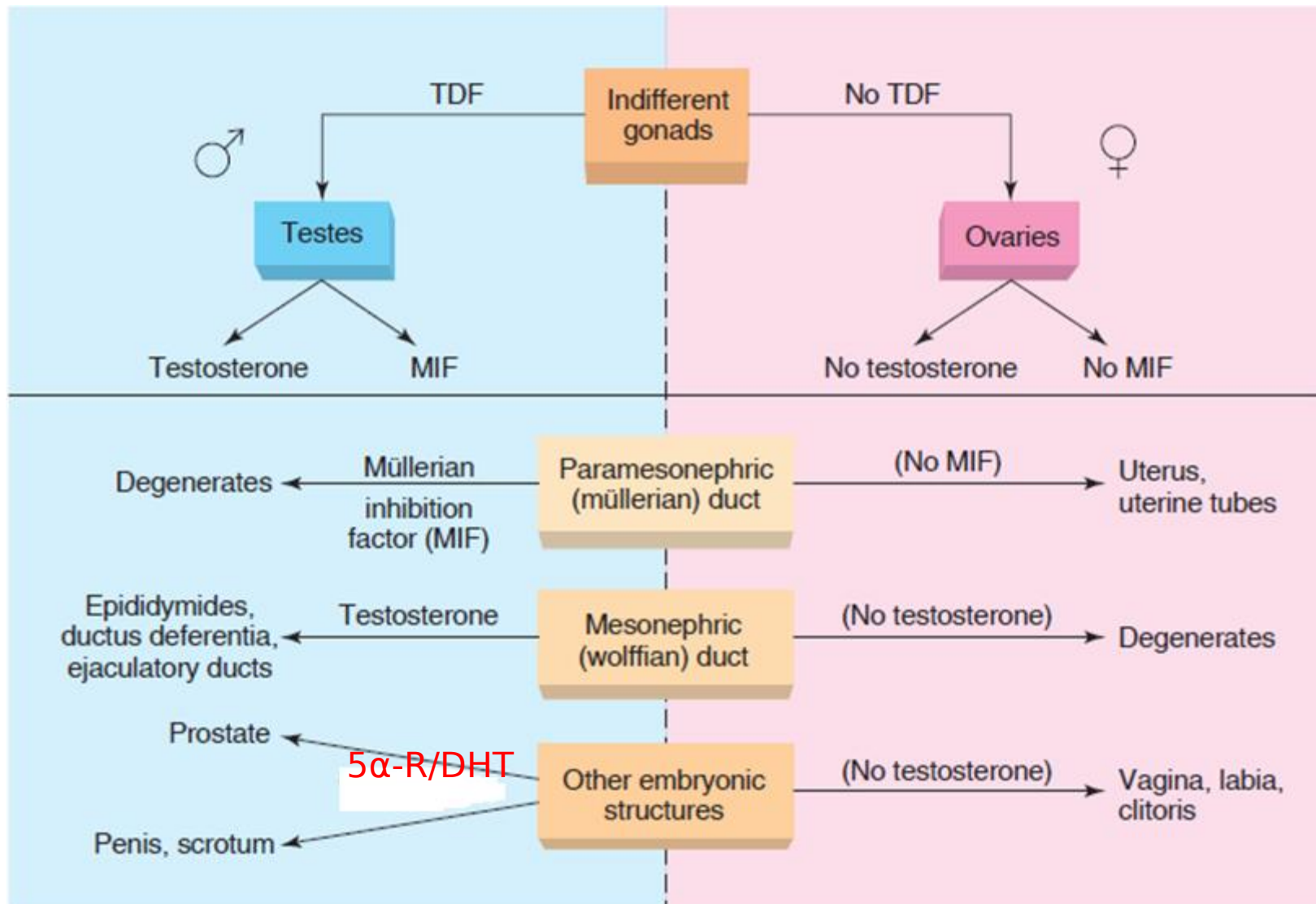
- the muellerian ducts develop into the female reproductive tract
 - the fallopian tube (oviduct)
 - the uterine horns
 - the uterus
 - the cervix and
 - the upper (cranial portion) vagina
- When a normal female fetus is exposed to ***androgens*** during the period of differentiation of the external genitalia, an ***apparent male*** can result

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Sexual Differentiation



Sexual Differentiation



Descent of the testes

- Testis formed in abdominal cavity then descend in to the scrotal sack (**Exceptions – Birds, Elephants, Some Marsupials**)
- This descent from abdominal cavity via **Inguinal Ring/Canal** in to scrotum occurs **Before or After birth**, depending on species.
- Half gestation-** Bull and Ram: **Last quarter-** Boar; **After birth-** Stallion; **After birth-** dogs
- Testicular descent is made possible by **rapid growth and subsequent regression of the gubernaculum (ligament)**
- As each testicle descends in to scrotal sac it takes with it the peritoneal lining of the abdominal cavity.