

Female Genital System

It comprises the development of:

	Gonad (Ovary).
They all first pass through an <u>Indifferent Stage</u> .	Genital Ducts (uterus, fallopian tubes & vagina)
	External genitalia (labia minora, labia majora & clitoris).

*Indifferent Gonad:

It is composed of:

1. **Mesothelium**; (mesodermal epithelium) lining the posterior abdominal wall.
2. **Mesenchyme**; (underlying embryonic connective tissue).
3. **Primordial Germ cells**; (appear early in the 4th week among the Endodermal cells in the wall of the yolk sac near origin of the allantois.).

*Genital (Gonadal) Ridge:

Appears during the 5th week as a pair of longitudinal ridges, on the medial side of the **Mesonephros**.

It is formed due to Proliferation of (Mesothelium and Condensation of underlying Mesenchyme).

Sex determination

*Chromosomal and genetic sex is established at fertilization and depends upon the Y or X chromosome of the sperm.

*Development of male phenotype requires a Y chromosome, and development of female phenotype requires two X chromosomes.

*The Y chromosome has testis determining factor,

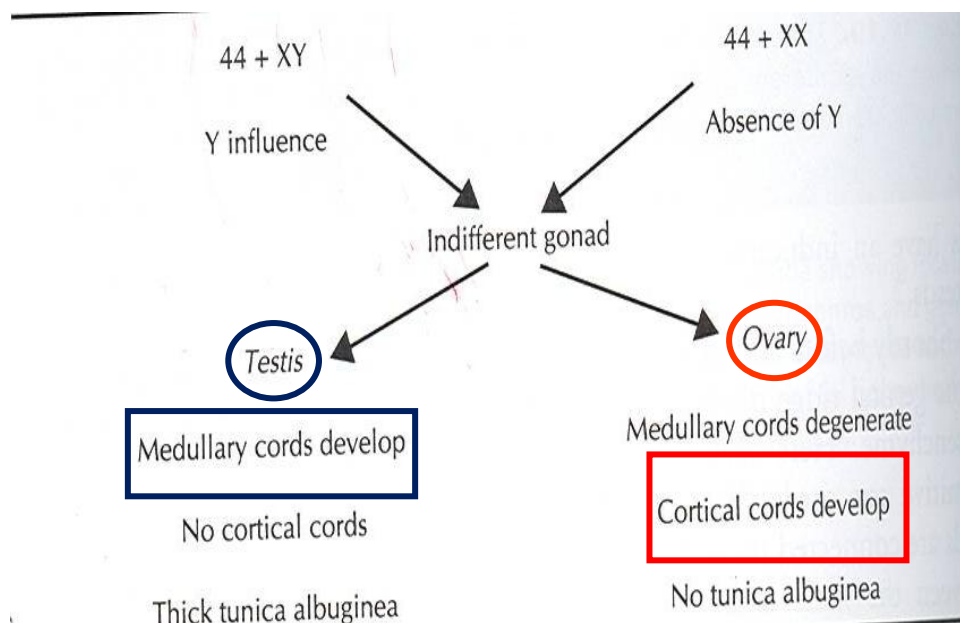
*Testosterone produced by the fetal testes determines maleness .

*Absence of Y chromosome results in development of the ovary.

*The X chromosome has genes for ovarian development

Differentiation of Gonad:

- The indifferent gonad consists of an **External cortex** and **Internal medulla**.
- In embryos with XX chromosomes, **the Cortex** differentiates into **the Ovary** and the medulla regresses.
- (In embryos with an XY chromosomes, the **Medulla** differentiates into **Testis** and the cortex regresses.)
- The gonad acquires the female morphological characteristics about the **7th week**.



Primitive (Primary) Sex Cords:

- Fingerlike epithelial cords (gonadal cords) grow **into the underlying mesenchyme**.
- In the 6th week, the Primordial germ cells **migrate to the Gonadal Ridges** and are incorporated in the primary sex cords.
- The primordial germ cells have **an Inductive Influence** on the differentiation of the gonad into ovary or testis

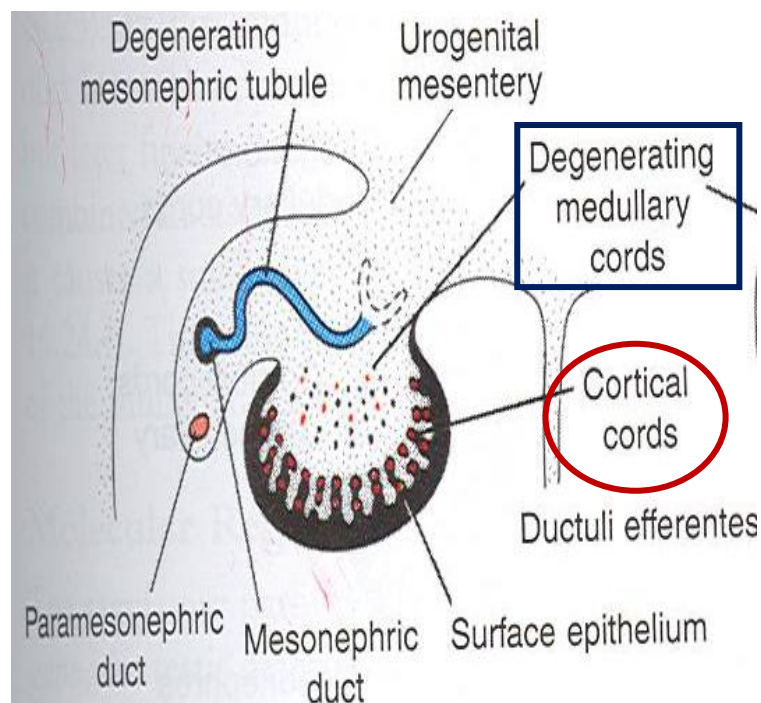
- If they fail to reach the ridges, the gonad **remains Indifferent or Absent.**

Differentiation of the Ovary:

- At the **10th week.**
- **The Primary sex cords** dissociate into irregular cell clusters (Rete ovarii), which extend into the medulla and form (Medullary Cords)
- Both the medullary cords and rete ovarii **degenerate and disappear.**

Cortical (Secondary) Cords:

- Extend **from the surface epithelium (mesothelium) into the underlying mesenchyme.**



Primary Oocytes:

- The primordial germ cells are **incorporated in the cortical cords.**
- At the **16 weeks** the cortical cords break up into isolated cell clusters, primordial follicles.

- The primordial follicles contain Oogonia; **derived from the Primitive Germ Cells**, and **surrounded by a single layer** of flattened Follicular Cells derived from the surface epithelium .
- Active Mitosis of Oogonia **produce thousands of primordial follicles**.
- **(No New Oogonia Are Formed After Birth).**
- **Many oogonia degenerat** .
- Two milion oogonia enlarge to **become Primary Oocytes Before Birth** .

Changes of the Ovary After Birth:

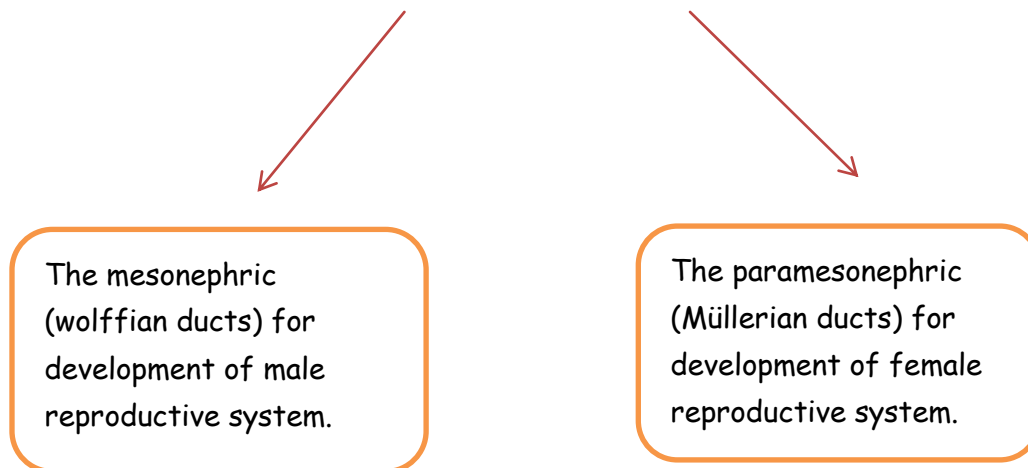
- **1. Surface Epithelium:**

Flattened into a single layer and separated from follicles in the cortex by a thin tunica albuginea.

- **2. The ovaries descend** from the posterior abdominal wall into the pelvis; just inferior to the pelvic brim.

Development of the Duct system (Indifferent Stage):

Both male and female embryos have two pair of genital ducts:



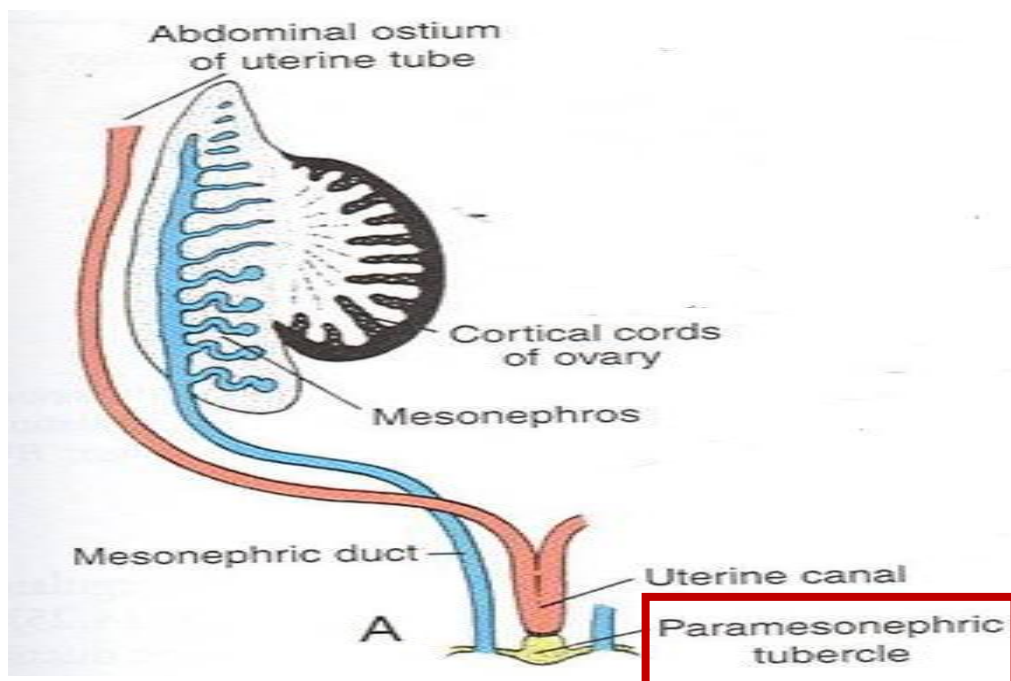
Development of the Female Duct system:

- In female embryo the mesonephric ducts regress **due to absence of the testosterone hormone**.
- The paramesonephric ducts develop due to absence of **MIS (müllerian inhibiting substance)**.

- They do not depend on ovaries or hormones.

The paramesonephric ducts:

- The paramesonephric ducts develop **lateral** to the gonads and mesonephric ducts.
- The funnel-shaped cranial end of these ducts open into **the peritoneal cavity**.
- They pass **caudally parallel** to mesonephric ducts to reach the future pelvic region.
- Cross ventral to the mesonephric ducts approaching each other in the median plane and fuse to form the **Y shaped uterovaginal primordial**.
- It projects into the **dorsal wall** of the urogenital sinus and produces the **sinus (müllerian) tubercle**.



Derivatives Of Paramesonephric Ducts:

1. Uterine Tubes:

- develop from the cranial unfused parts of the ducts.

2. Uterovaginal Primordium

- It is Y- shaped, formed from the fused caudal portions of the paramesonephric ducts.
- It Differentiates into:

Uterus

- (body and cervix).

Superior portion of the vagina.

- The endometrial stroma and myometrium are derived from the splanchnic mesoderm.

Development of Lower Portion of Vagina:

- The contact of the uterovaginal primordium with the urogenital sinus induces **formation of SinoVaginal Bulbs**.
- The bulbs proliferate and fuse **to form a solid Vaginal Plate**.
- The central cells of the vaginal plate break down **to form the lumen of the vagina**.

Differentiation of Vagina:

- The lining of the entire vagina is **derived from the Vaginal Plate** (urogenital sinus)
- The peripheral cells **form the vaginal epithelium**.
- The lumen of vagina is separated from the urogenital sinus **by the Hymen** which remains as a thin fold of mucous membrane **just within the vaginal orifice**.

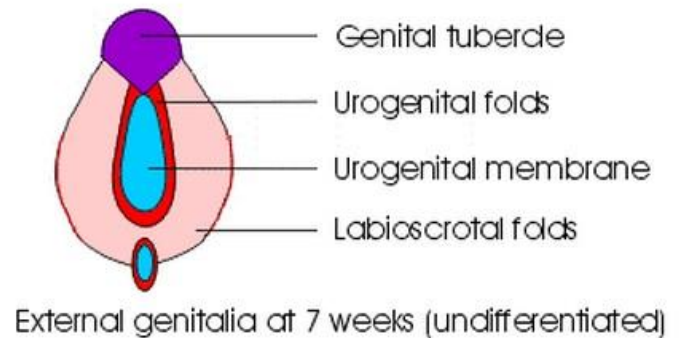
External genitalia:

They are similar in both sexes up to the 7th week (indifferent stage).

They begin to differentiate in the 9th week.

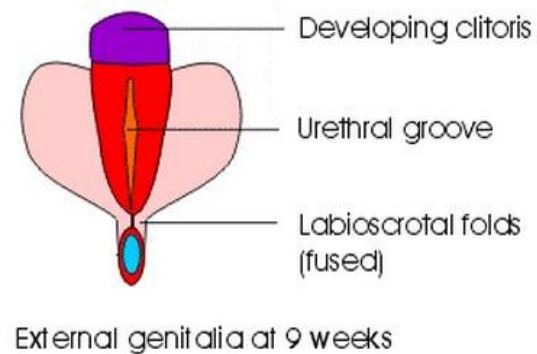
They are fully differentiated by the **12th week.**

- Mesenchyme at the Cranial end of the cloacal membrane proliferates to form **Genital Tubercle**.
- The mesenchyme proliferates on each side of the cloacal membrane to form:
 - Urogenital Folds** (Urethral Folds)
 - Labioscrotal Swellings** (Genital Swellings)
 - The Genital Tubercle proliferates to form a Primordial Phall.



The development of the female external genitalia is promoted by the presence of estrogen produced by the placenta and the fetal ovaries.

- The Genital Tubercle proliferates to form a Primordial Phall.
- The primordial phall elongates slightly to form the **Clitoris**.
- The Urethral Folds do not fuse and form the **Labia Minora**.
- The Labioscrotal Folds form the **Labia Majora**, they fuse to form the **posterior & the anterior labial commissures**.



Female Sex Glands:

- **Urethral & Paraurethral Glands** grow as buds from the urethra, they are corresponding to the **Prostate Gland** of the male.
- **Greater Vestibular Glands**: outgrowths of the urogenital sinus, they are corresponding to the **Bulbourethral Glands** of the male.

