DEVELOMET OF FEMALE GENITAL SYSTEM

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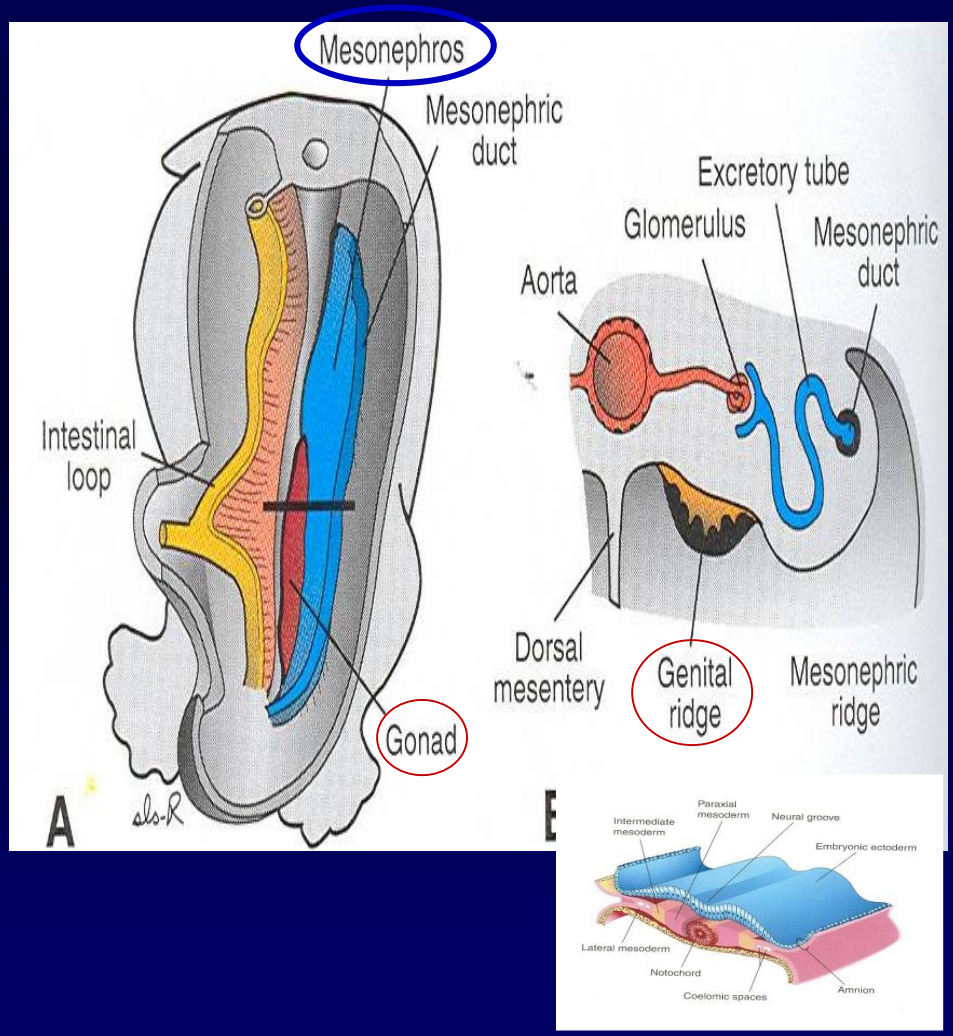
Objectives

- ***At the end of the lecture, students should be able to:***
- ***Describe the development of gonads (indifferent& different stages)***
- ***Describe the development of the female gonad (ovary).***
- ***Describe the development of the internal genital organs (uterine tubes, uterus & vagina).***
- ***Describe the development of the external genitalia.***
- ***List the main congenital anomalies.***

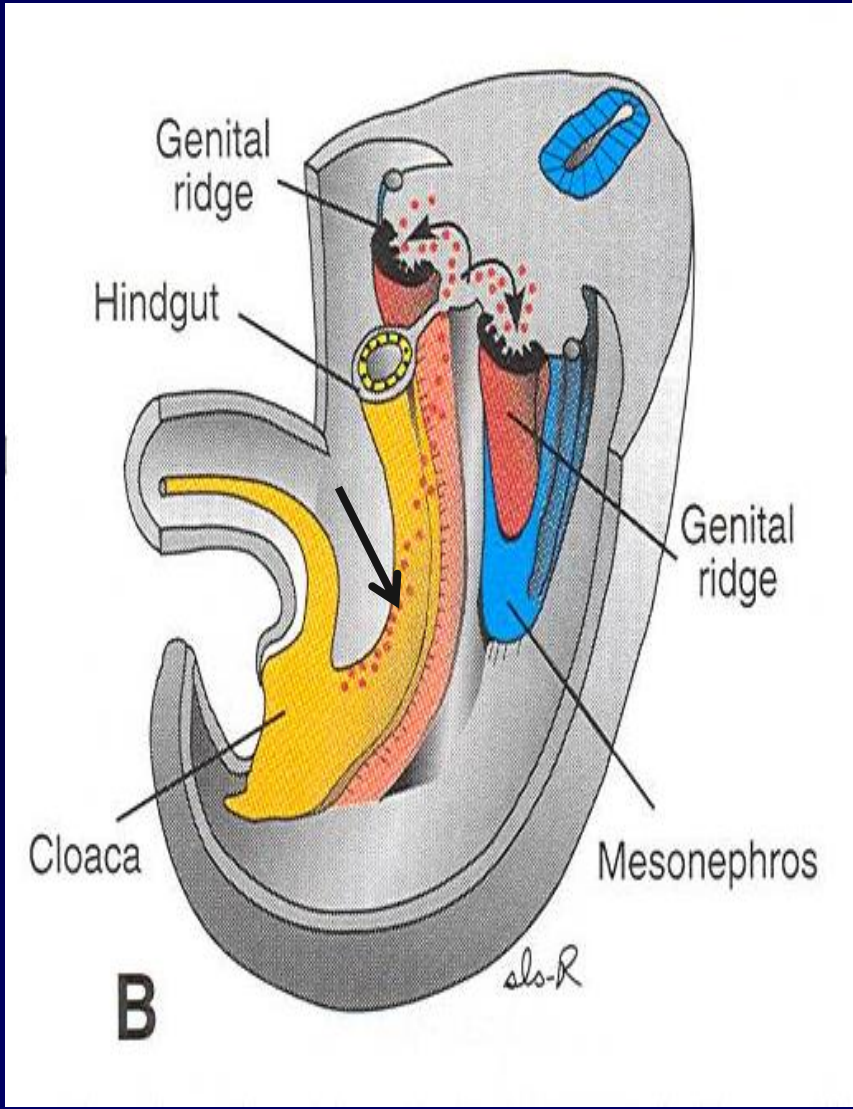
Sex Determination

- ***Chromosomal and genetic sex is established at fertilization and depends upon the presence of Y or X chromosome of the sperm.***
- ***Development of female phenotype requires two X chromosomes.***
- ***The type of sex chromosomes complex established at fertilization determine the type of gonad differentiated from the indifferent gonad. (testis determining factor),***
- ***The primary female sexual differentiation is determined by the presence of the X chromosome , and the absence of Y chromosome and does not depend on hormonal effect.***
- ***The type of gonad determines the type of sexual differentiation in the Sexual Ducts and External Genitalia.***

Genital (Gonadal) Ridge

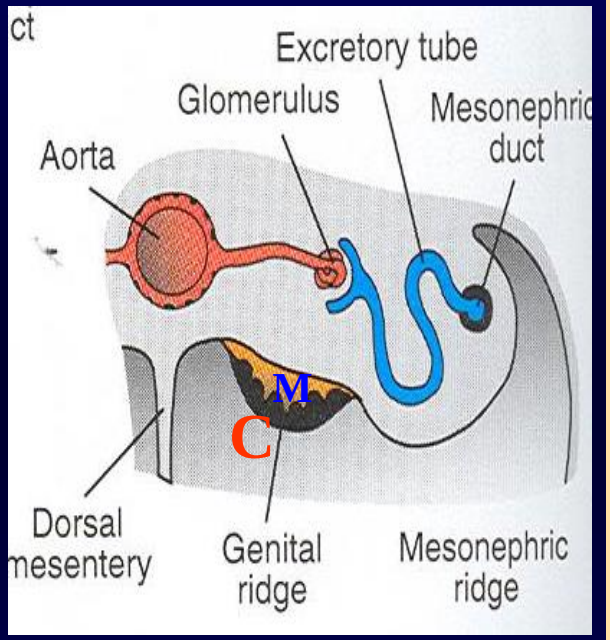


- *Appears during the 5th week as a pair of longitudinal ridges (from the intermediate mesoderm), on the medial side of the Mesonephros (nephrogenic cord).*



- ***In the 6th week, the Primordial germ cells (which appear early in the 4th week among the Endodermal cell s in the wall of the yolk sac near origin of the allantois) migrate to the Gonadal Ridges***
- **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.***

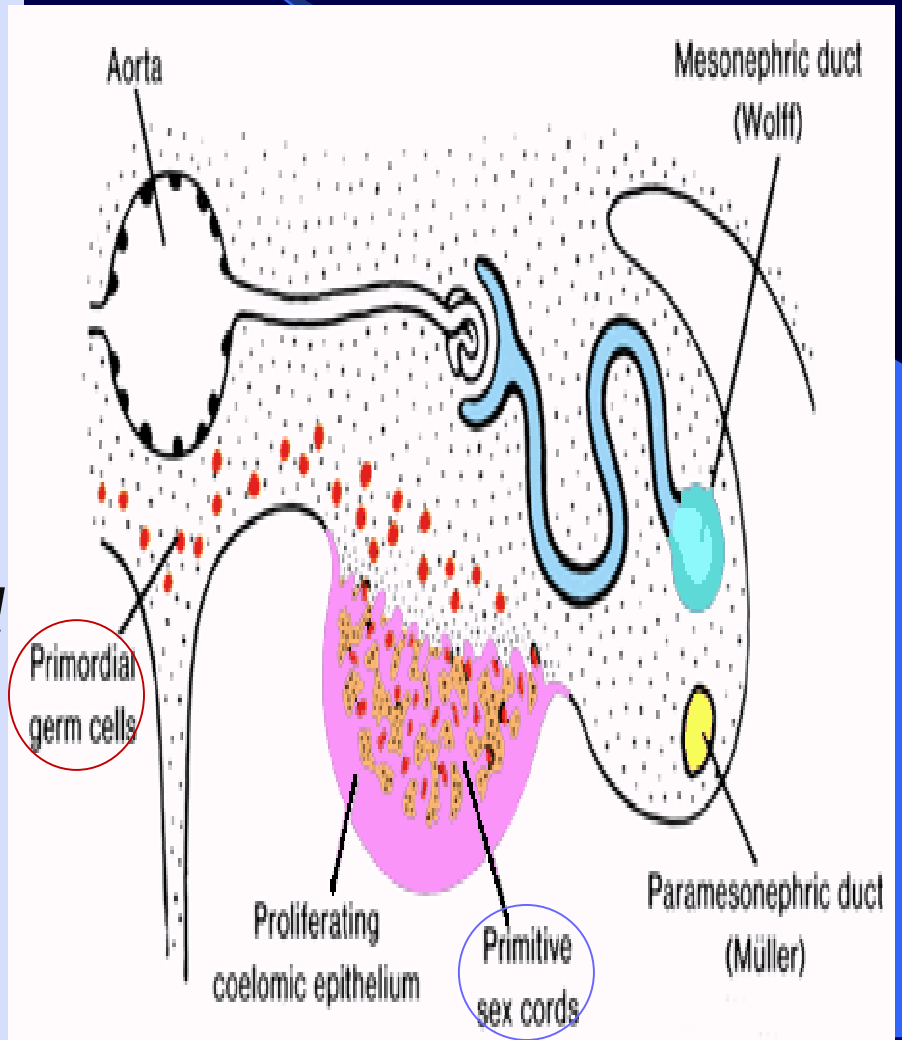
Structure of Indifferent Gonad



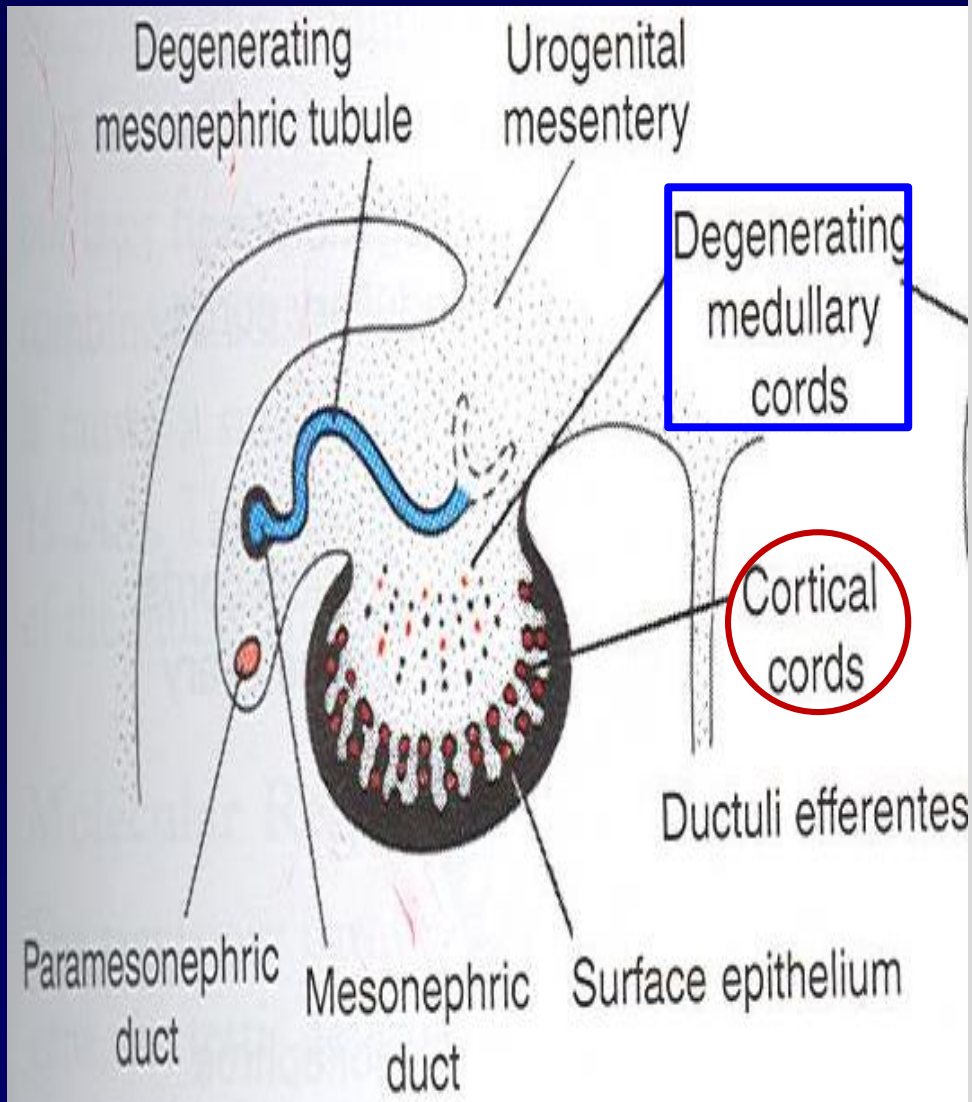
- ***The indifferent gonad consists of* an *External Cortex (C) and Internal Medulla (M).***
- ***Embryos with XX chromosomes, the Cortex differentiates into the Ovary and the medulla regresses.***
- ***(In embryos with an XY chromosomes, the Medulla differentiates into Testis and the cortex regresses.)***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

Development of the Ovary

- ***Primitive (Primary) Sex Cords:***
- ***Fingerlike epithelial cords grow from cortex of the indifferent gonad and extend into the medulla.***
- *The* ***Primary sex cords*** *dissociate into* ***(Rete ovarii),***
- ***Both the primary sex cords and rete ovarii degenerate and disappear.***

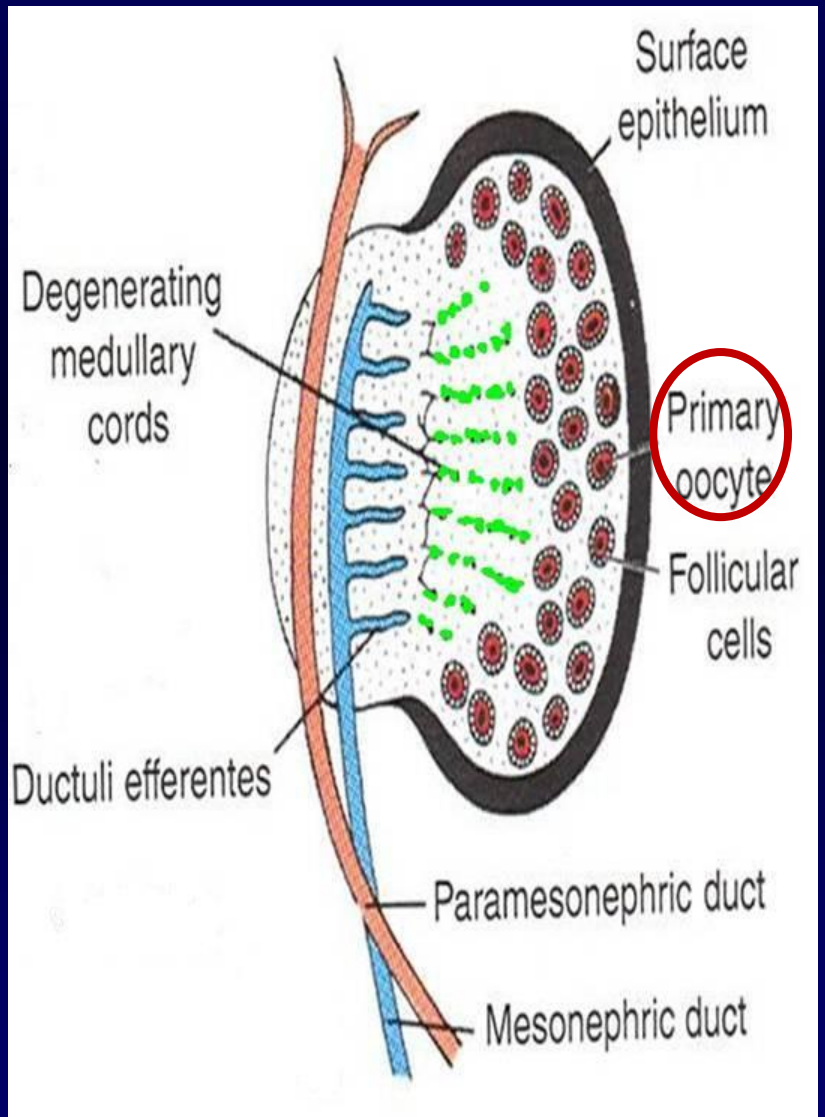


Cortical (Secondary) Sex Cords



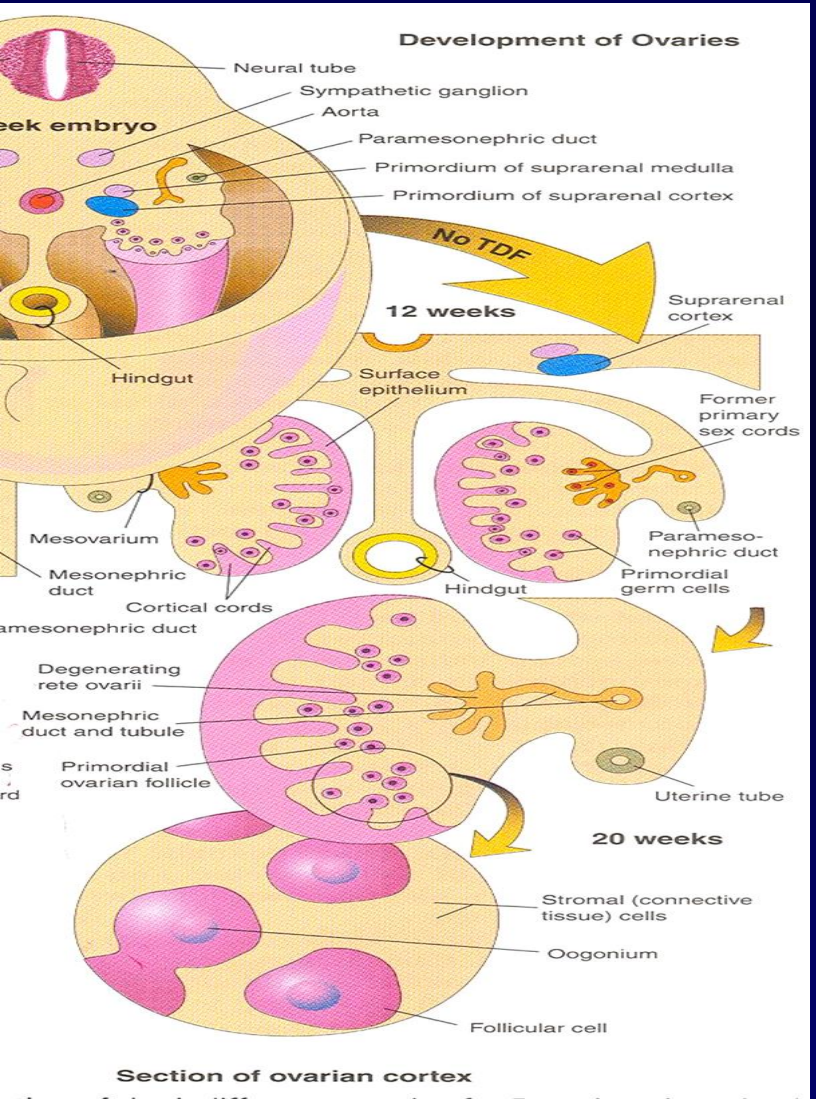
- ***They extend from the surface epithelium into the underlying mesenchyme to replace the primary cords.***
- ***The primordial germ cells are incorporated into them***
- ***The ovary is identifiable histologically at the 10th week***
- ***At the 16 weeks,***
- *the cortical cords break up into isolated cell clusters:* ***Primordial Follicles (Primary Oocytes)***

Primary Oocyte



- *Composed of :*
- ***Oogonium*** *derived from the* ***Primitive Germ Cell.***
- Surrounded by a single layer of flattened ***Follicular Cells*** *derived from the surface epithelium* ***(Sex Cord)*** .
- *Active Mitosis of Oogonia occurs during fetal period producing thousands of* ***primordial follicles***
- ***(No New Oogonia Are Formed Postnatally).***
- ***Two milion oogonia (or so) enlarge to become Primary Oocytes (Before Birth)***

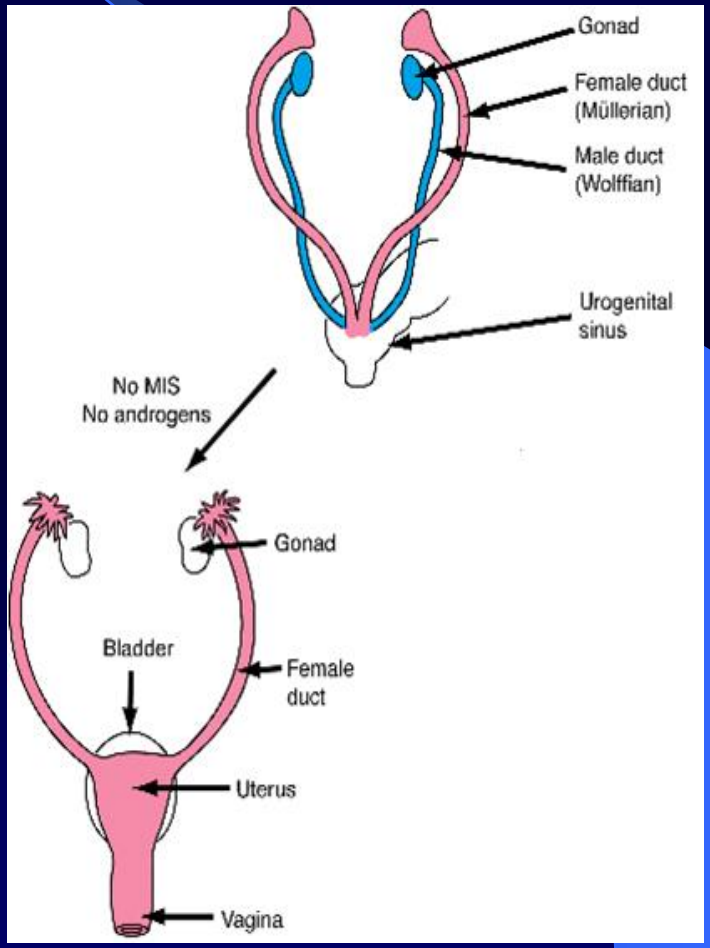
Post natal Changes of the Ovary



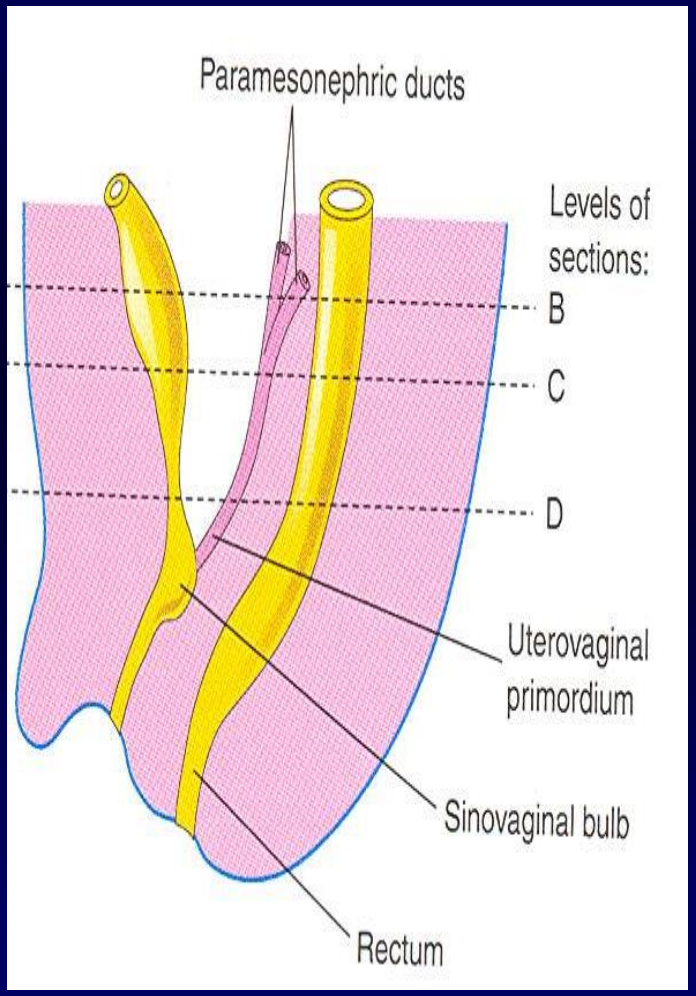
- ***1. Surface Epithelium:***
- *Flattened into a single layer and separated from follicles in the cortex by* a ***thin tunica albuginea****.*
- *2.* ***The ovaries descend*** *from the posterior abdominal wall into the* ***pelvis****; just inferior to the pelvic brim.*

Development of the 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).*

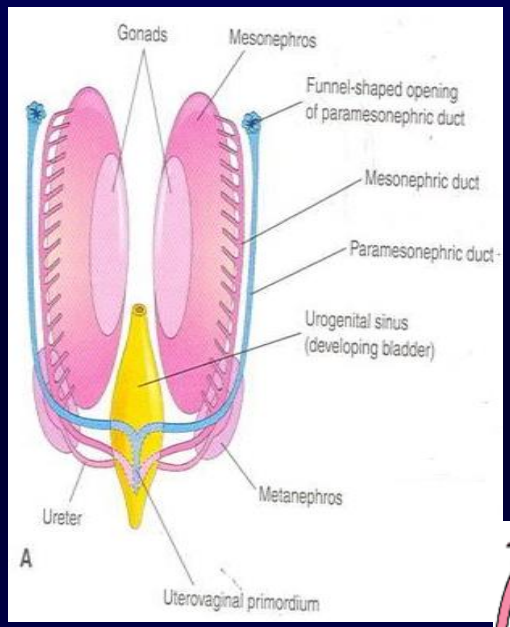


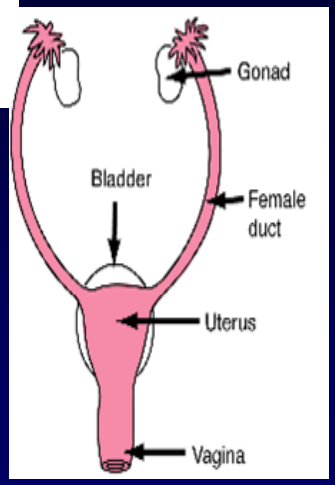
The Paramesonephric Ducts



- ***They form most of the female genital tract.***
- *They develop lateral to the gonads and mesonephric ducts.*
- *Their funnel-shaped cranial ends open into the peritoneal cavity.*
- *They pass caudally parallel to mesonephric ducts to reach the future pelvic region.*
- *They Cross ventral to the mesonephric ducts & approach each other in the median plane and fuse to form the* ***Y shaped Uterovaginal Primordial.***
- *(which opens into the dorsal wall of the urogenital sinus and produces* ***Paramesonephric(müllerian) Tubercle).***

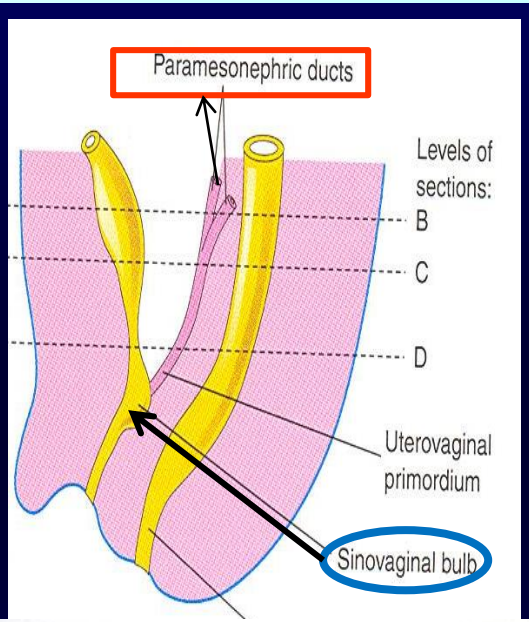
Derivatives Of Paramesonephric Ducts

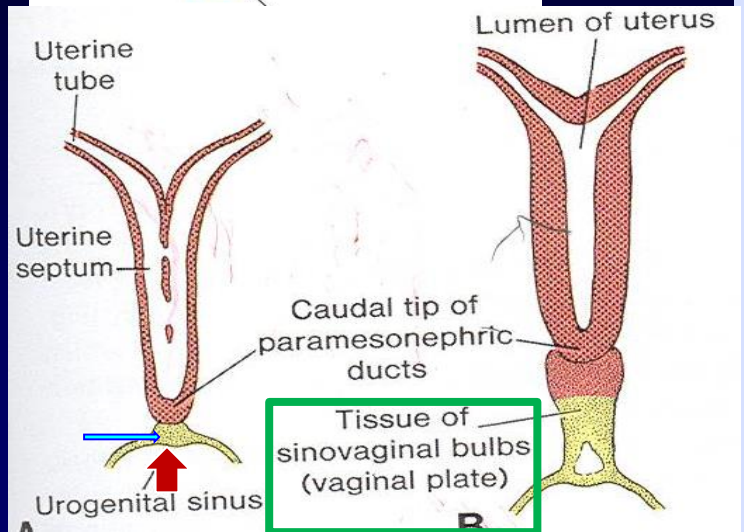




- ***1. Uterine Tubes:***
- *develop from the* ***cranial unfused parts of the ducts.***
- ***2. Uterovaginal Primordium****:* ***It differentiates into:***
  - ***Uterus*** ***(Body and Cervix)***
  - ***Superior Portion of the Vagina.***
- ***The endometrial stroma and myometrium are derived from the splanchinic mesoderm.***

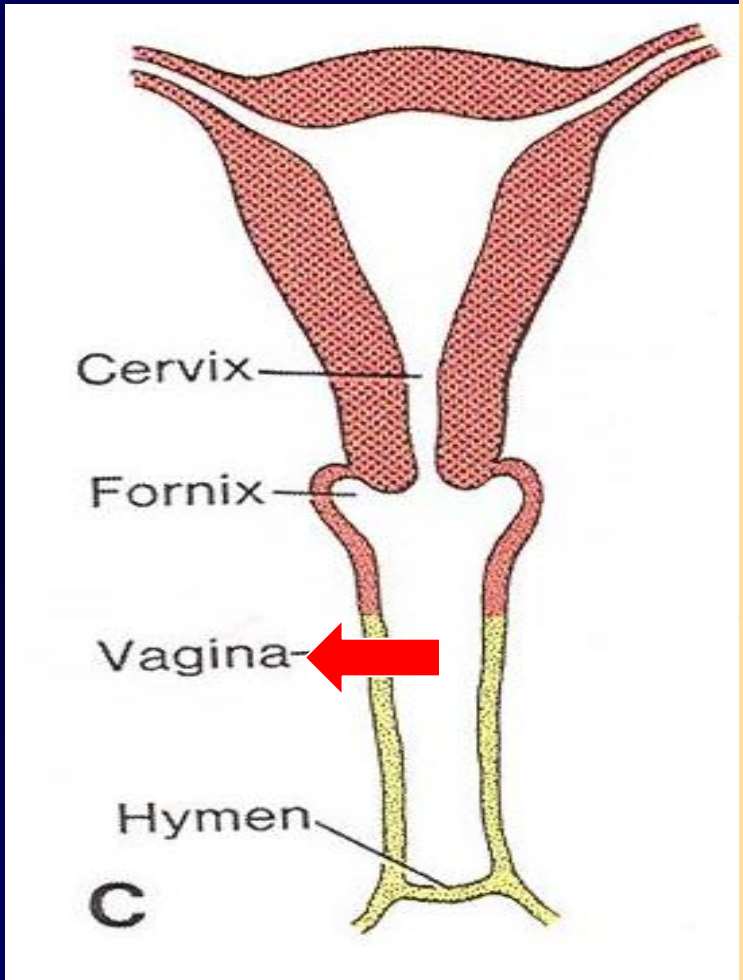
Development of Lower Portion of Vagina





- *It is derived from the **Urogenital Sinus:***
- *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 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 .*

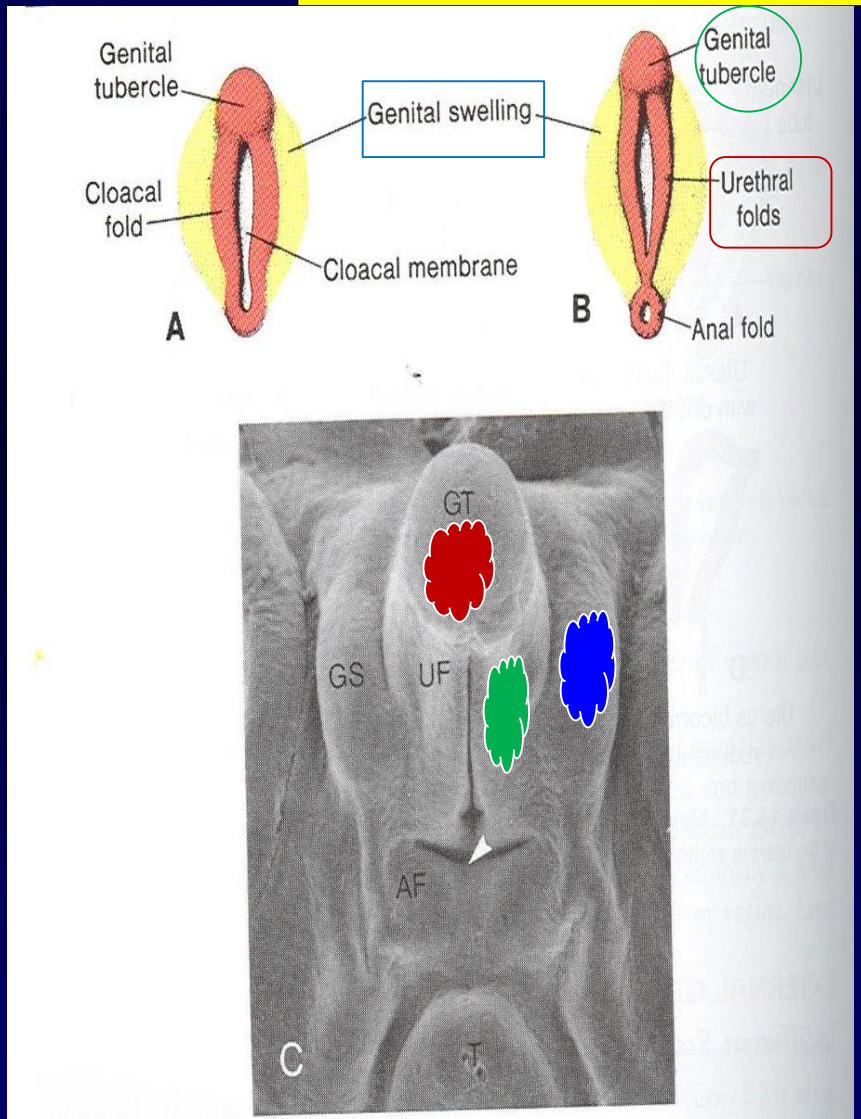
External Genitalia

Are Similar in both sexes up to the 7th week (indifferent stage).

Begin to differentiate in the 9th week

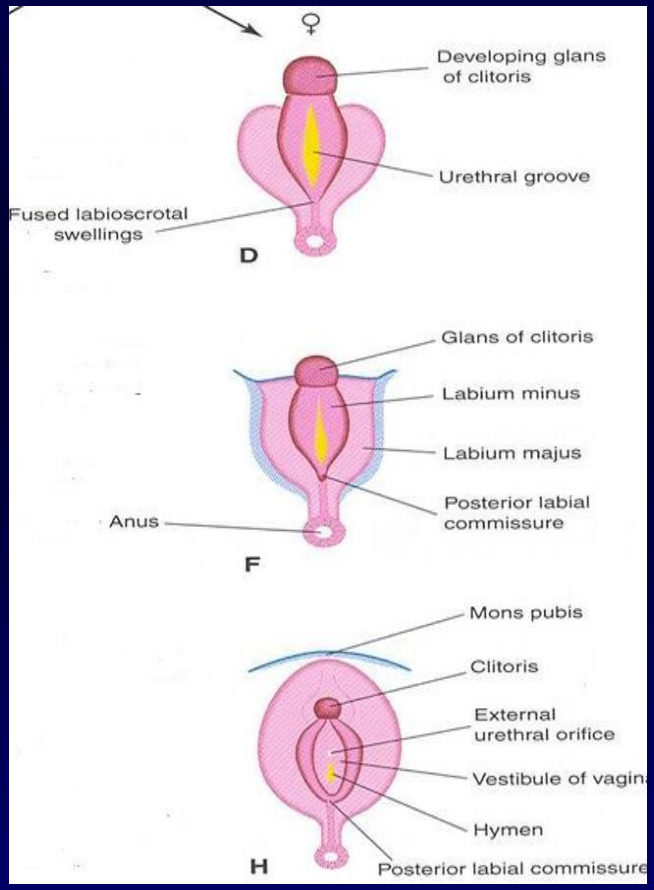
Fully differentiated by the 12th week.

Development of Female External Genitalia



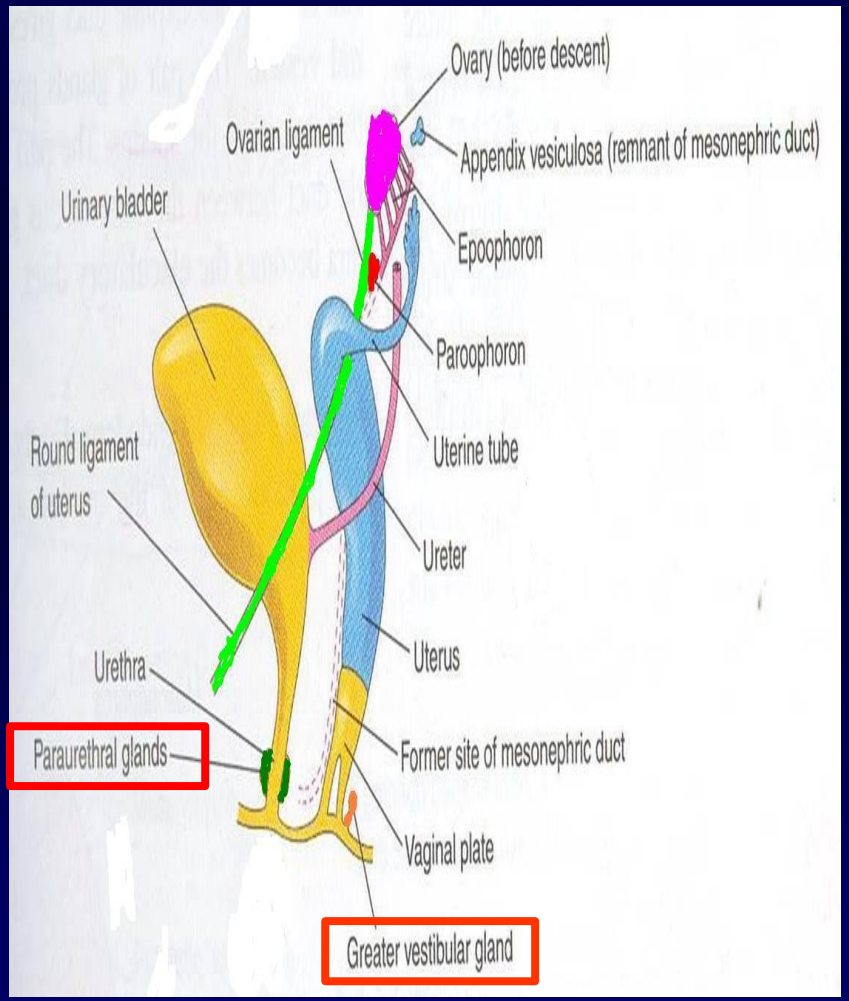
- Proliferation of Mesenchyme at the Cranial end and Sides of the **Cloacal Membrane,** forms:
- 1. **Genital Tubercle.**
- **2. Urogenital Folds (Urethral Folds) ,**
- **3. Labioscrotal Swellings (Genital Swellings)**

Feminization of External Genitalia



- ***Estrogen*** **produced by both the placenta and the fetal ovaries has a role in feminization of the external genitalia.**
- **The Genital Tubercle** proliferates to form the **Primordial Phalls**.
- The phalls 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



- ***1. Urethral & Paraurethral Glands:***
- *grow as buds from the urethra, they are corresponding to the* ***Prostate Gland*** *of the male.*
- ***2. Greater VestibularGglands (Bartholin glands):*** *outgrowths of the* ***urogenital sinus,*** *they are corresponding to the* ***Bulbourethral Glands*** *of the male.*

Summary

OVARY

Urogenital sinus

Mullerian ducts

Female external genitalia
. Lower vagina

Absence of androgen exposure

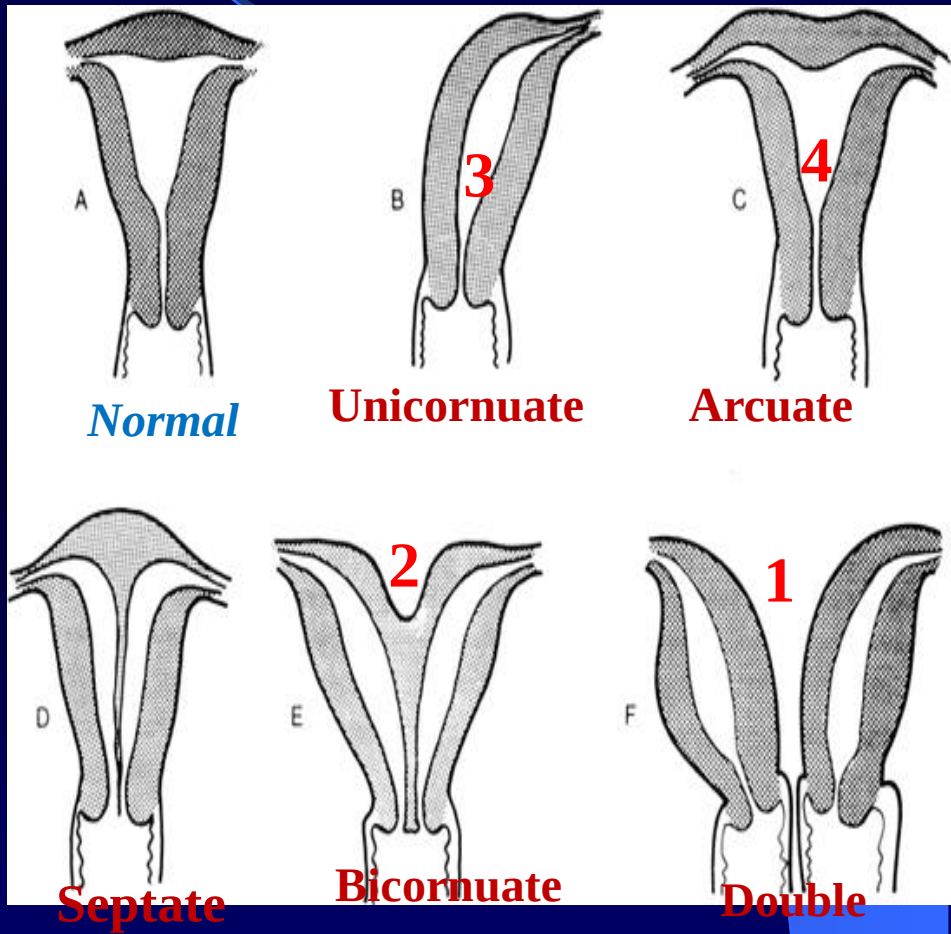
Female internal genital Organs:
. Upper Vagina
. Cervix and Uterus
. Fallopian Tubes

Congenital Anomalies

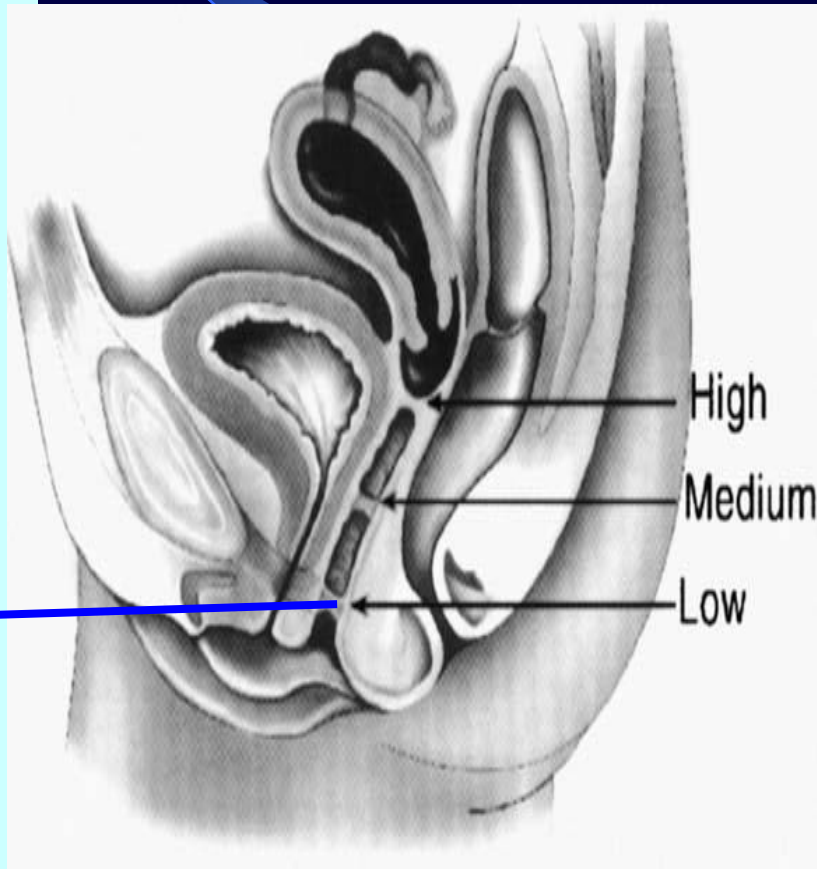
- ***Various types of anomalies can result due to:***
- ***1. Arrest of development of the uterovaginal primordium during the 8th week.***
- ***2. Incomplete development of the paramesonephric ducts.***
- ***3. Incomplete fusion of the paramesonephric ducts.***
- ***4. Failure of parts of one or both paramesonephric ducts to develop.***
- ***5. Incomplete canalization.***

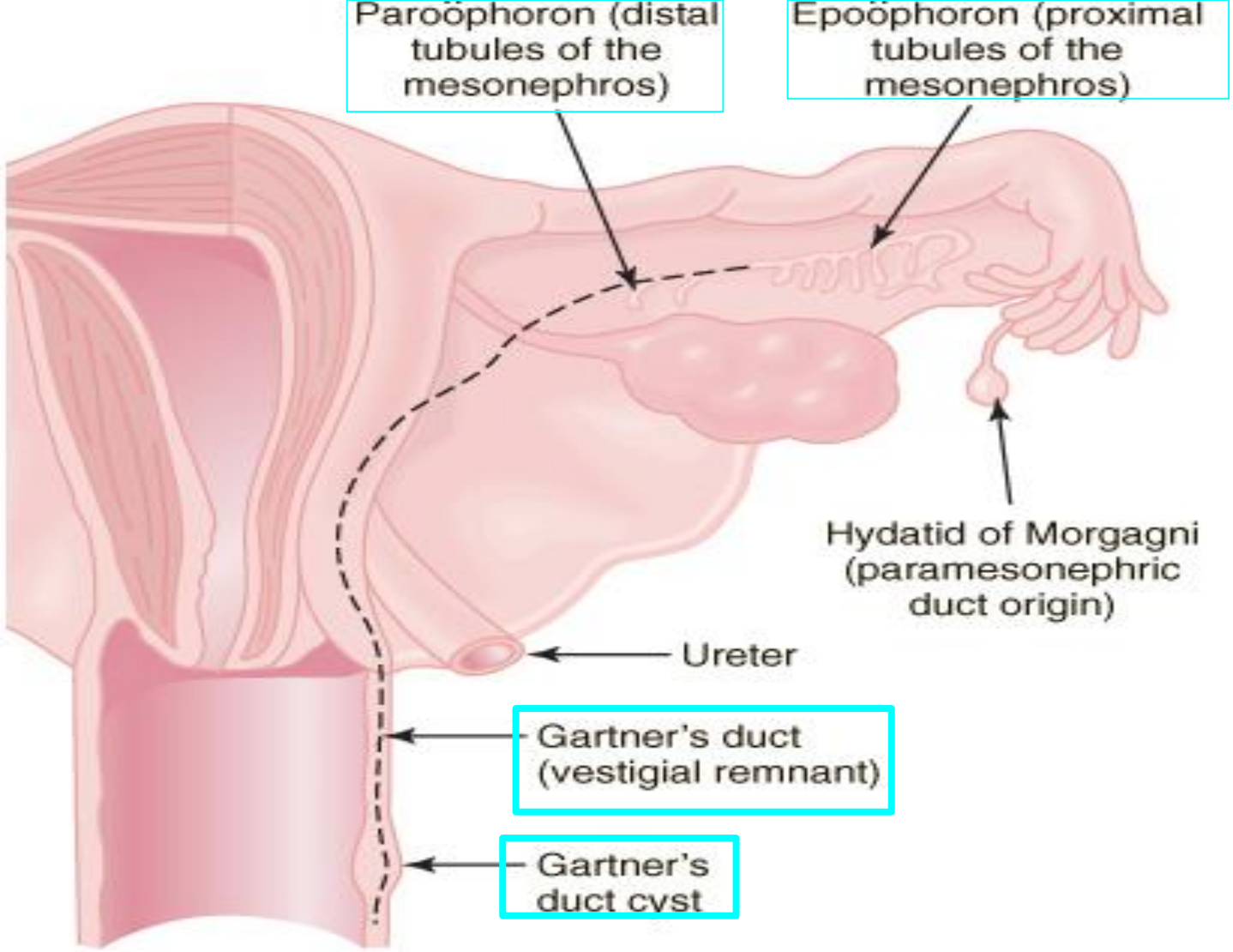
Uterine Malformations

- ***1. Double uterus (Uterus Didelphys:***
- Due to failure of fusion of inferior parts of the paramesonephric ducts.
- May be associated with a double or single vagina.
- ***2. Bicornuate uterus:***
- The duplication involves the superior segment.
- ***3.Unicornuate Uterus:***
- One paramesonephric duct fails to develop.
- ***4. Arcuate Uterus.***



- ***Cervical Atresia***:
- It may be combined with incomplete development of the upper vagina or lower uterus.
- ***Vaginal Anomalies:***
- ***Atresia*** *(*Partial or complete).
- ***Double vagina.***
- ***Transversely septate vagina:***
- Results from faulty canalization of the fused müllerian ducts.





Remnants of the mesonephric (wolffian) ducts may persist in the anterolateral wall of vagina or adjacent to the uterus within the broad ligament or mesosalpinx.

GOOD LUCK