# DEVELOMET OF FEMALE GENITAL SYSTEM

TABLE OF CONTENTS:



LECTURE OBJECTIVES :

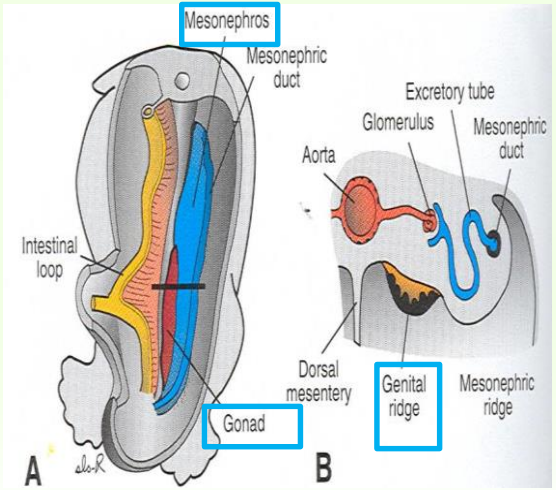
- ***Describe the development of gonads (indifferent& different stages)***
- ***Describe the development of the female gonad (ovary).***
- ***Describe the development of the internal genital organs (uterine tubes, uterus & vagina).***
- ***Describe the development of the external genitalia.***
- ***List the main congenital anomalies.***

# Sex Determination

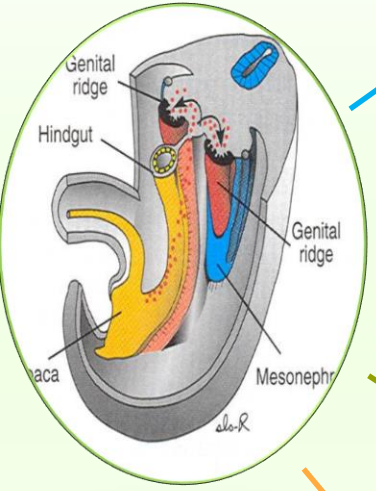
- Chromosomal and genetic sex is established at fertilization and depends upon the presence of Y or X chromosome of the sperm.
- Development of female phenotype requires two X chromosomes.
- The type of sex chromosomes complex established at fertilization determine the type of gonad differentiated from 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

| | |
|---|---|
| **Origen** | **intermediate mesoderm** |
| **Time** | Appears at **5th week** |
| **Shape** | **longitudinal ridges** |
| **Position** | on the medial side of the **Mesonephros** (nephrogenic cord). |



# *Structure of Indifferent Gonad*

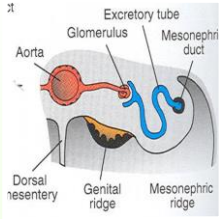



At the 4th week a special cells starts to appear among endodermal cells in the wall of the yolk sac. Are called ***Primordial germ cells***

At the 6th week Primordial germ cells **migrate** to the Gonadal Riges

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.**




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.

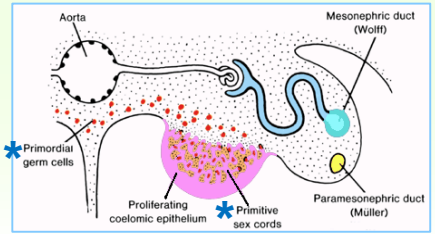
(In embryos with an XY chromosomes, the Medulla differentiates into Testis and the cortex regresses. )

The gonad acquires the Female or Male morphological characteristics at about the 7th week.

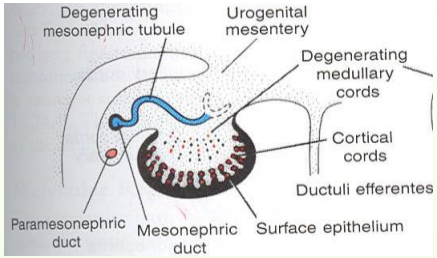
## Development of the Ovary

**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.*
- **Follicular Cells** derived from the surface epithelium **(Sex Cord)** .
  They are a single layer of flattened cells surrounding the oogonium

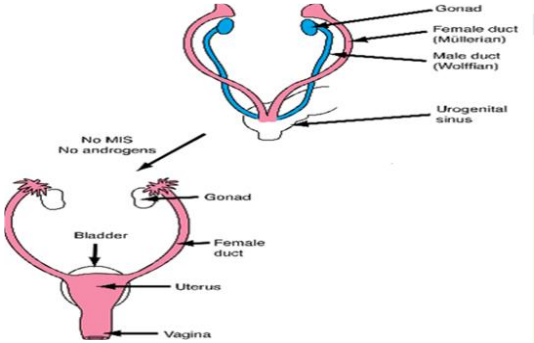
- *Active Mitosis of Oogonia occurs during fetal period producing thousands of primordial follicles*
- ***(No New Oogonia Are Formed Postnatally).***
- *Two milion oogonia (or so) enlarge to become Primary Oocytes** **(Before Birth)***

## Postnatal Changes of the Ovary

### Postnatal 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(edges) .

## Development of the Female Duct system:

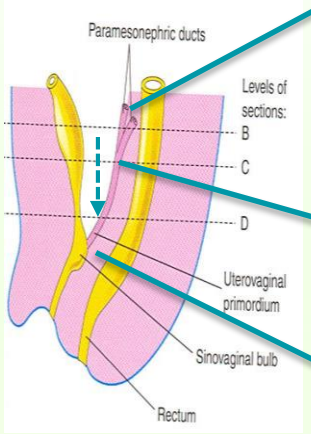



Development of the Female Duct system

***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



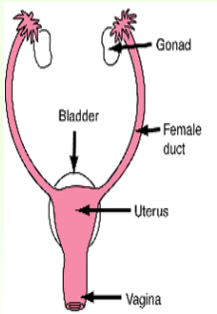

- ***They develop lateral to the gonads and mesonephric ducts.***
- ***Their funnel-shaped cranial ends open into the peritoneal cavity***
- ***They pass caudally parallel to mesonephric ducts to reach the future pelvic region.***
- ***They Cross ventral to the mesonephric ducts & approach each other 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).***

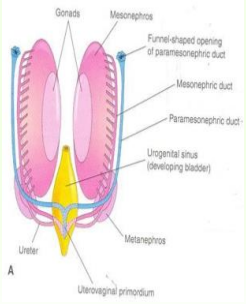
### Derivatives Of Paramesonephric Ducts

***They form most of the female genital tract.***

**the endometrial stroma and myometrium are derived from the splanchinic mesoderm.**

1. ***Uterine Tubes:*** ***develop from the cranial unfused parts of the ducts.***
2. ***Uterovaginal Primordium: It differentiates into: Uterus (Body and Cervix)***
3. ***Superior Portion of the Vagina.***



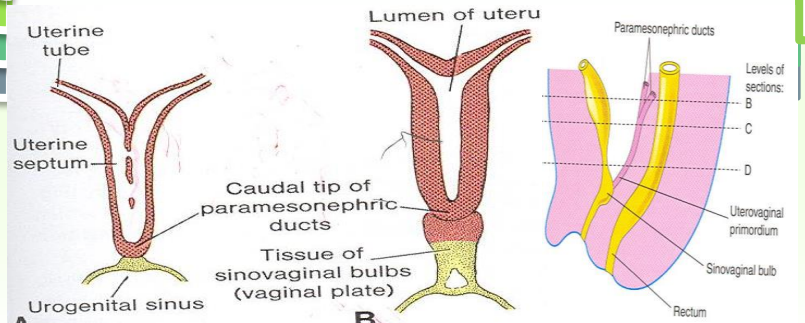
# Development of Lower Portion of Vagina

***It is derived from the <u>Urogenital Sinus</u>***

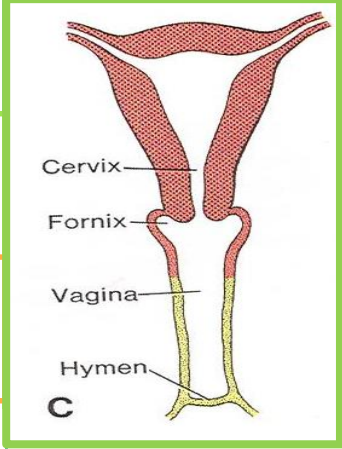
***The contact of the uterovaginal primordium with the urogenital sinus induces formation of <u>SinoVaginal Bulbs.</u>***

***The bulbs proliferate and fuse to form a solid <u>Vaginal Plate</u>.***

***The central cells of the vaginal plate break down to form the lumen of the vagina.***



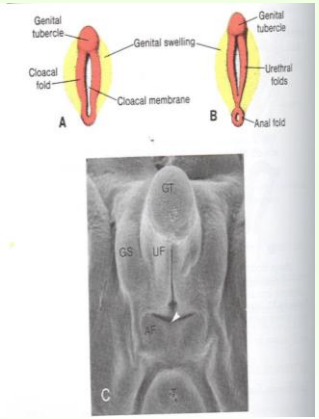

## ❑ *Differentiation of Vagina*

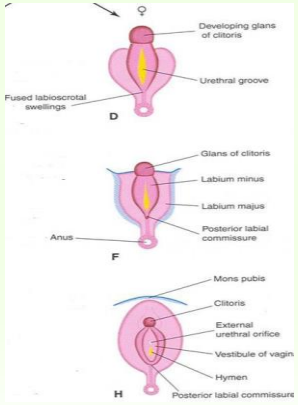



***1. The lining of the entire vagina is derived from the Vaginal Plate (urogenital sinus)***
***2. The lumen of vagina is separated from the urogenital sinus by the Hymen which remains as a thin fold of mucous membrane just within the vaginal orifice .***

# Development of Female External Genitalia

| | |
|---|---|
| 7th week | Up to this week the External genitalia are similar (indifferent stage) |
| 9th week | Begin to differentiate |
| 12th week | Fully differentiated |




**Feminization of External Genitalia**

Proliferation of Mesenchyme at the Cranial end and Sides of the **Cloacal Membrane,**

| 1. **Genital Tubercle.** | **2. Urogenital Folds** (Urethral Folds) | **3. Labioscrotal Swellings** (Genital Swellings) |
|---|---|---|

▪***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**.<br>▪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 :*

**Urethral & Paraurethral Glands**

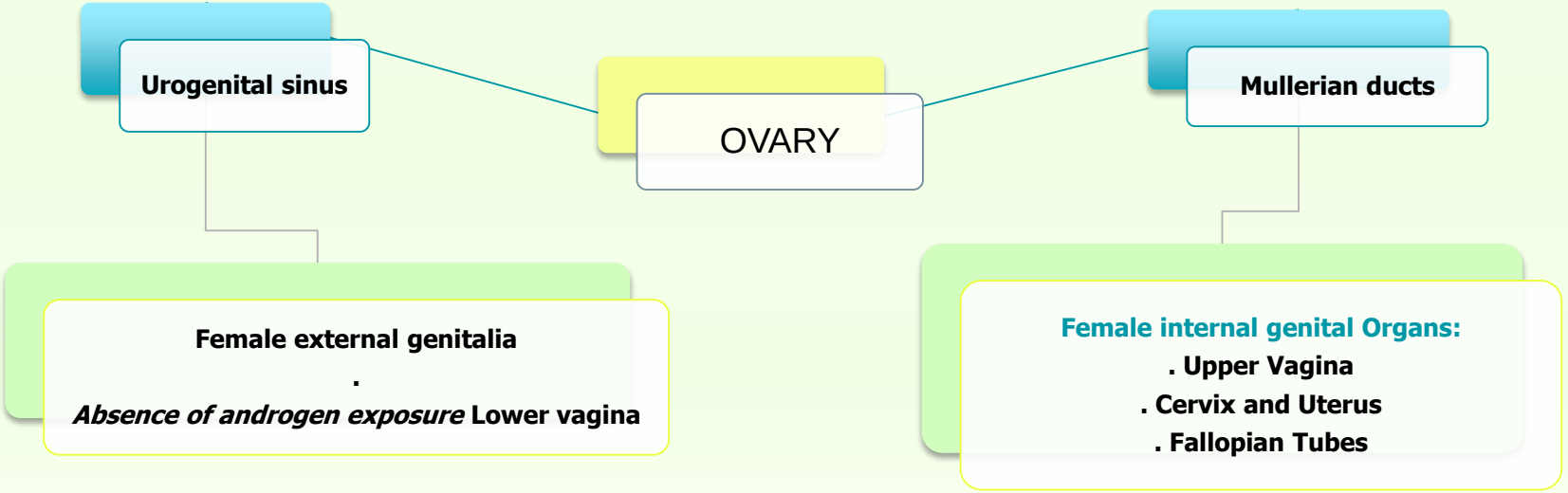
*grow as buds from the urethra*

corresponding to the **Prostate Gland** of the male

**Greater VestibularGglands (Bartholin glands)**

*outgrowths of the **urogenital sinu***

*they are corresponding to the **Bulbourethral Glands** of the male*



# Congenital Anomalies:

***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 canalizatio

## ❖ *Uterine Malformations*

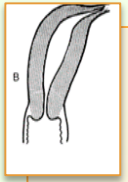
***1. Double uterus (Uterus Didelphys:***

Due to failure of fusion of inferior parts of the

Paramesonephric ducts.

***2. Bicornuate uterus:***

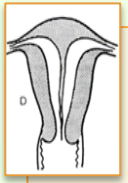
The duplication involves the superior segment.



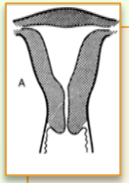
***3.Unicornuate Uterus:***

One paramesonephric duct fails to develop.

***•. Arcuate Uterus.***



**Septate**



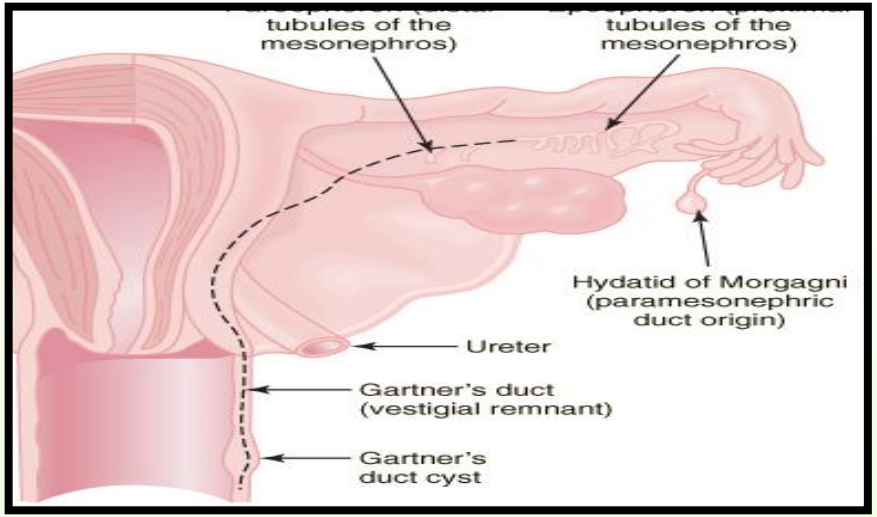
Normal

## ❖ *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

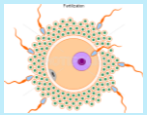




*Remnants of the mesonephric (wolffian) ducts may persist in the anterolateral wall of vagina or adjacent to the uterus within the broad ligament or mesosalpinx.*

**Doctor Jamelah:**
**This duct\cyst has no clinical importance. However the doctor has to distinguish it among other cysts and cases, and tell the patient that there is no cause to worry it is just an embryogenic remnant ☺**

# Timeline of embryogenic events

Genetic sex is determined XY



After fertilization

4th week
Differentiation of endodermal yolk sac cells

5th week
First appearance of the gonadal ridge

6th week
Migration of primordial germ cells

7th week
- Cortex regression
- Medulla develops the seminiferous tubules
- AMS secretion
- Degeneration of paramesonephric ducts

8h week
Interstitial cells(lyeding) are developed and have begun testosterone secretion

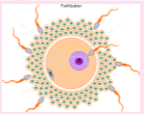
9th week
External genital begins to differentiate

12th week
Internal decent of the testis

7th month
external decent of the testes

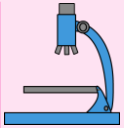
3months-1year
Complete decent of the testis

Postnatal period



Genetic sex is determined XX

7th week
- Medullary regression

10th week

The ovary become histologically identified

12th week
Full differentiation of the gonad

16th week
Breakup of the secondary (cortical ) sex cords

Decent of the ovary

1 - which one of the following dissociates into rete ovarii during ovarian development:

a - primary sex cord

b- secondary sex cord

c - primordial germ cells

A

2 - at which week the ovary became identifiable histologically ?

a - at 7 weeks

b - at 10 weeks

c -at 16 weeks

B

3 - which one of the following occurs at the 16th week:

a - primary sex cords and rete ovarii degenerate

b- gonad acquires the Female or Male morphological

c- the cortical cords break up into isolated cell clusters

C

4 - which one of the following separate surface epithelium from follicles in the cortex ?

a - thick tunica albuginea

b - thin tunica albuginea

c - both of them are correct

B

5 -which one of the following duct will regress in the absence of testosterone ?

a - paramesonephric duct

b- mesonephric duct

c - nephric duct

B

6 - phalls elongated to form which one of the following ?

a - labia minora

b- labia majora

c - clitoris

C

7 - In the ....., the Primordial germ cells migrate to the Gonadal Ridges:

A.1 month

B.1-1/2 month

C.12 week

B

8-.....are derived from the splanchinic mesoderm:

A.Uterine Tubes & Uterus only fundus

B.Uterus( fundus –body –cervix )& uterine

C.Inferior Portion of the Vagina & uterine tube

B

Oogenesis continue postnatally:

A.True

B. False

B

MCQs

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**Thank you for checking our team**
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