DEVELOPMENT OF FEMALE GENITAL SYSTEMS

Embryology 436

﴿ إِنَّا خَلَقْنَا الإنسان مِنْ نُطْفَةٍ أَمْشَاجٍ نَبْتَلِيهِ فَجَعَلْنَاهُ سَمِيعًا بَصِيرًا ﴾

تمت المراجعة
شوق الأحمري & عبدالعزيز العنقري

436
MEDICINE
KING SAUD UNIVERSITY

- Important
- Dr. notes
- Explanation

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.

مانحتاج نذكركم ان الاوقات مهمة

Sex Determination

This slide is very important

- **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 ,TDF) So, chromosome Y only has this 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**.

❖ شرح السلايد:

- During **fertilization** if the sperm carry X -> so there will be two X and no chromosome Y (no testis determining factor) -> so type of gonad is **ovary**
- Its important to differentiate that type of **gonads** depend on chromosomes BUT **female duct system** and **external genitalia** depend on HORMONES .
- **Gonad -> chromosomes** حسب وقت الفيرتلازيشن ومين الكروموسوم الي يدخل (اكس او واي) يتحدد عندي نوع الجوناد هل هو (اوفاري او تيستس) -
- **External genitalia and sexual duct -> Hormones** تتم عملية استكمال نمو الأعضاء اعتمادا على الهورمون -

❖ Development of Female Genital System:

It comprises the development of:

1-Gonad (ovary) | 2-Genital duct | 3-External genitlia

❖ شرح السلايد:

هذول الثلاثة يدخلوا في مرحلة اسمها **الاندفرنشيشن ستيج** يكبروا كلهم لمرحلة معينة بس لسا مانقدر نفرق بين هل هو انثى او ذكر في **الأسبوع السابع** .

-They all first pass through **an Indifferent Stage**.

- **The gonad** acquires the female morphological characteristics about the **7th week**.

1-Development of Gonad

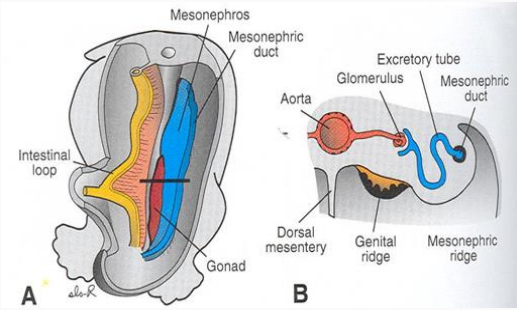
This slide is very important

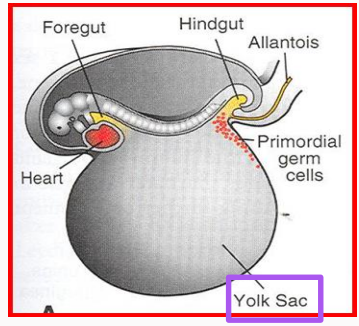
- (مهم جدا تفهموا هذي السلايد بتسهل عليكم فهم اللي جاي)

❖ **Gonad Is derived from three sources :**

Only in male's slides

1- Mesothelium	(**mesodermal** epithelium) lining **the posterior abdominal wall.**
2. Mesenchyme	(underlying **embryonic connective tissue**).
3. Primordial Germ cells	(appear among the **Endodermal** cell s in the **wall of the yolk sac**).



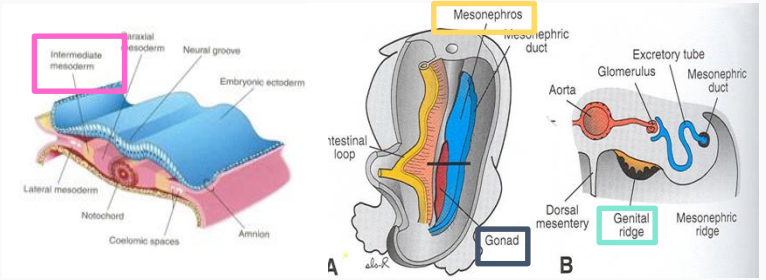


❖ **Genital (Gonadal) Ridge:** (Also called **Indifferent gonad** This stage occur in both female and male)

- **Gonadal ridge** is formed due to Proliferation of (**Mesothelium** and Condensation of underlying **Mesenchyme**).

origin	from the intermediate mesoderm
Time	Appears during **the 5th week**
Shape	**a pair of longitudinal ridges**
Position	on the **medial side** of the **Mesonephros** (nephrogenic cord)*

*الجهاز البولي والتناسلي بينهم ارتباط وثيق لانهم متكونين من نفس المكان ونفس الاوريجن (intermediate mesoderm)



❖ **شرح السلايد (ركزوا معانا) :**

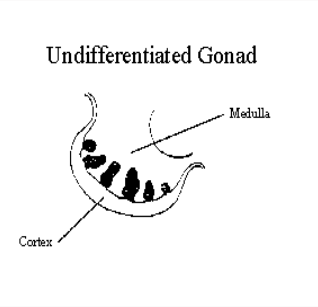
القوناد (تيستس او اوفاري) يتكون عندي من ٣ أشياء

الميزوثيليم هي الطبقة الخارجية وهي تكون **الكورتكس** للاوفاري

المازينكايم هي الطبقة الداخلية عبارة عن كونكتف تيشو شكلها زي الأصابع وهي تكون **الميدلا** للاوفاري

طيب هذول الطبقتين مع بعض يكونوا **(القونادال ريدج)** -> (ميزوثليم+مازينكيم) او (كورتكس+ ميدلا)

البريموردیال سلز تهاجر وتروح لل القونادال ريدج



Cont..

This slide is very important

- At the **4th week** a special cells (large spherical sex cells)starts to appear among endodermal cells in the wall of the **yolk sac** near origin of the **allantois**. Are called **Primordial germ cells.**

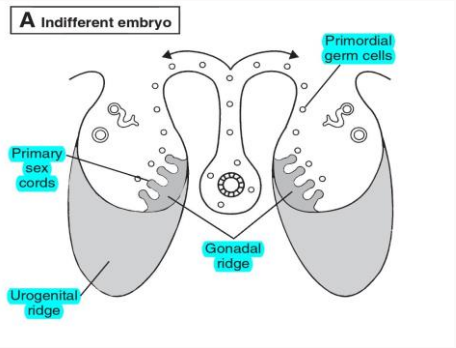
(During folding the dorsal part of the yolk sac is incorporated within the embryo.)

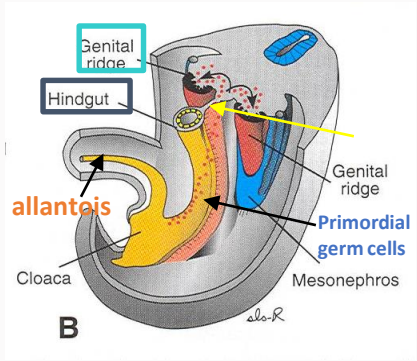
- **The Primordial germ cells** migrate along **the dorsal mesentery** to **the Gonadal Ridges**.

- At the **6th week** **Primordial germ** cells **migrate** to the Gonadal Ridges.

- The primordial germ cells have an **Inductive Influence** (تاثير مباشر) on the **differentiation of the gonad** into ovary or testis.

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





❖ **شرح السلايد:**

ابغاكم تعرفوا اول شي ان عندي شي اسمه **يوك ساك** هذا طالع من اندوديرم

المهم اثناء مايصيرفولدنق للجنين هذي **اليوك ساك** تنقسم الى ٣ اقسام :

(ميدقت ،فورقت **هندقت**)

يهمنا **الهندقت**(dorsal part of yolk sac) عنده جزء اسمه **الالنتويس** (شوفوا الصورة)

هذا **الالنتويس** تبدا تظهر فيه **بريموردیال سلز** في الأسبوع الرابع

هنا نفسر ليش هذي السلز الاوريجن حقها اندوديرم

هذي السلز في الأسبوع السادس تبدا تهاجر **للقونادال ريدج** لكن قبل كدا وهي تمشي لازم تمر في معبر اسمه **dorsal mesentry**

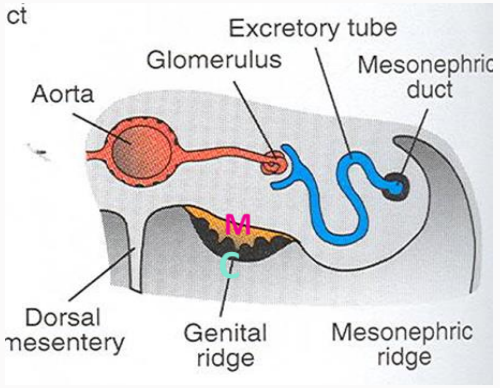
طيب نتيجة هجرتها: رح تبدا عندي عملية **الديفرنشيشن للقوناد**

- طيب لو ماصار فيه هجرة لهذي الخلايا ايش رح يصير؟

1.Indifferent gonads (not testis or ovary)
2.Absence of gonads in one side or both

Cont..

This slide is very important

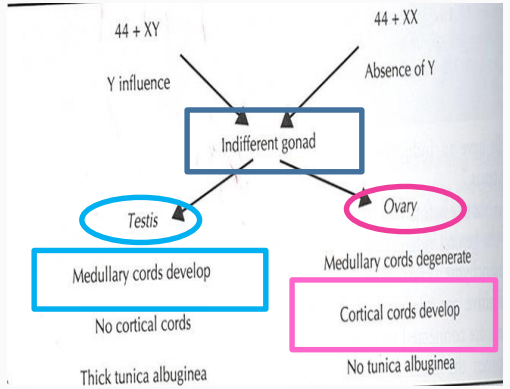


❖ **Structure of Indifferent Gonad:**

- The indifferent gonad consists of: **External Cortex** (C) and **Internal Medulla** (M).

(Embryos with XX chromosomes)
the **Cortex** differentiates into the **Ovary** and the medulla regresses. (تضمحل)

(Embryos with an XY chromosomes)
the **Medulla** differentiates into **Testis** and the cortex regresses (تضمحل)



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

عشان تحفظوها :
Male = Medulla will differentiate
Or
(COMT)
Cortex -> Ovary
Medulla -> Testis
المهم مايجتمعون مع بعض في جنس واحد إما الكورتس اللي تبقى أو الميدولا

Gonad (development of The Ovary)

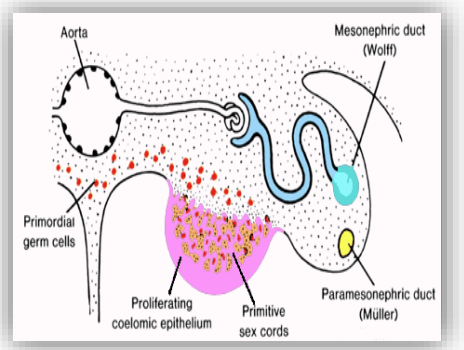
This slide is very important

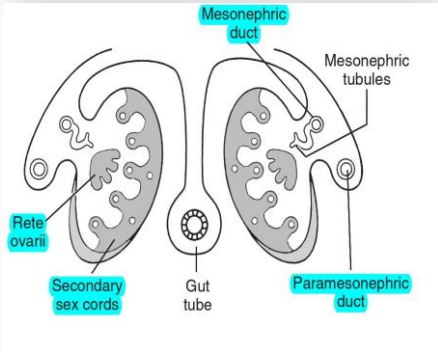
اول مرحلة من تكون الاوفري هي تكوين:

1- Primitive (primary)sex cords

At the 10th week

- **Fingerlike epithelial** cords (gonadal cords) grow from **cortex** of the indifferent gonad and extend into the **medulla**(mesenchyme) and form(Medullary Cords). زوائد نفس شكل الاصابع طالعه من الكورتكس **وفاضية** من داخل ومتجهه للميدولا	- The Primary sex cords dissociate into (Rete ovarii) كل ماتقرب من الميدلا تنفصل اكثر عن الكورتكس وتتقطع لقطع صغيرة اللي نسميها **(rete ovarii)**	- Both the primary sex cords and **rete ovarii** degenerate and disappear بالأخير ثنيناتهم بيختفون ☺





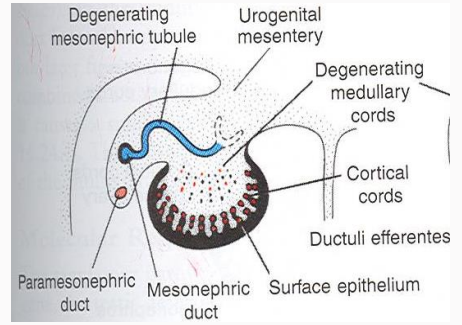
2- Cortical (Secondary) Sex Cords

- They extend from the **surface epithelium** (mesothelium) 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

هنا نفس primary sex cord رح يطلع زوائد نفس شكل الاصابع من الكورتكس بدل الباريمري كورد اللي اختفت بس ايش الفرق ؟
- هالمرة بتجي ال primordial germ cells وتدخل داخلها وهذي الخطوة مهمة عشان تميزها عن البرايمري ومايصير لها ديجنريشن
- ثاني اختلاف انها (وفية وتحب الكورتكس)رح تظل مرتبطة بالكورتكس وعشان كذا سميناها **cortical** sex cords



Primary sex cord:
فاضية من جوا مافيها سلز يصيرلها ديجينراشن

Secondary sex cord:
محشية سلز عشان كذا مايصير لها ديجنريشن

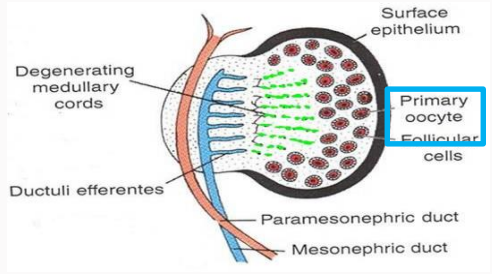
❖ Primary Oocyte:

- **At 16th week** , the cortical cords break up into isolated cell clusters: **Primordial Follicles (Primary Oocytes)**

1. Oogonium	Derived from the Primitive(primordial) Germ Cell
2.Follicular Cells	A single layer of cells derived from the surface epithelium and surrounds the primordial follicle

Active Mitosis of Oogonia occurs during fetal period producing thousands of **primordial follicle**

- (No New Oogonia Are Formed Postnatally) .
- Many oogonia degenerate .
- Two millions Oogonia (or so) enlarge to become Primary Oocytes (Before Birth).



❖ شرح السلايد: **(كل هالمراحل الي حتصير تكون قبل الولادة)**

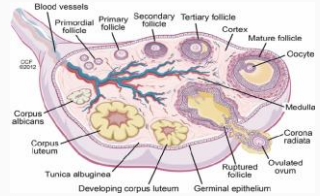
- Cortical sex cord في الاسبوع 16 رح يبدا يتقطع الى قطع سميناها primary oocyte طيب ايش مكوناتها هذي ؟
- شفتوا السكندري كورد كان مكون من surface epithelium و الخلايا اللي داخله primordial cells تمام ؟ تخيلوا انكم تقطعون هذا الكورد لقطع اكيد بتكون هالقطع نفس مكونات الكورد ، فمن داخل بتكون primordial cells اللي بنسميها oogonium ويحيط فيه follicular cells اللي تكونت من ال surface epithelium
- **طيب ايش الفرق بين primordial follicle and primary oocyte and oogonia؟**

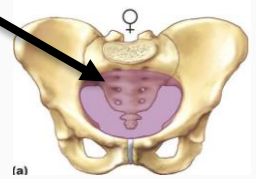
ال primitive cells تعطينا oogonia وهي يصيرلها mitosis بحيث تنقسم ويزيد عددها و تنتج لي more oogonia بحيث الانثى تنولد بما يقارب ٢ مليون
المهم oogonia لما يكبر حجمها يصير اسمها primary oocyte= primordial follicle

❖ Postnatal Changes of the Ovary: important

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(inlet).





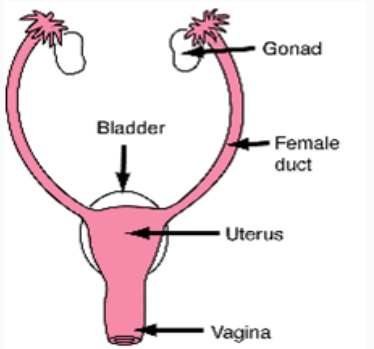
❖ شرح السلايد: (يعد الولادة)

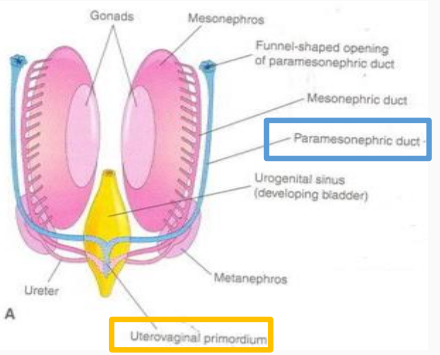
بعد الولادة ايش التغيرات الي تصير للاوفاري؟
رح يغلف الاوفاري طبقة رقيقة لونها ابيض اسمها tunica albuginea
عكس عند ال male testis تكون سميكة و بعدين الاوفاري ينزل من الابدومن لل بلفس

2- Development of the Female Duct System

لاتخافوا مرة السلايد بسيطة هي والي بعدها بتلاقوا شرحهم في سلايد رقم١١

❖ Derivatives Of Paramesonephric Ducts:





1. **Uterine Tubes:** develop from the cranial unfused parts of the ducts.

2. **Uterovaginal Primordium:**

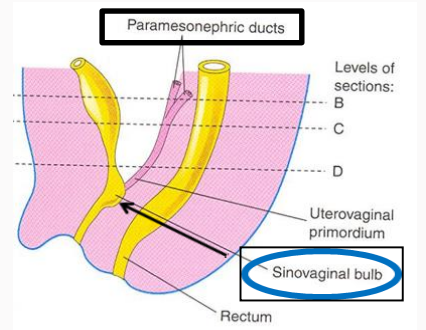
It differentiates into:

- Uterus (Body and Cervix)
- Superior Portion of the Vagina.

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

لو تذكرون lateral mesoderm حرح ينقسم ل somatic and splanchnic :
اللي رح يكون المسؤول عن اللاينينق والمسل حقت اليوتيرس Splanchinc

Development of Lower Portion of Vagina

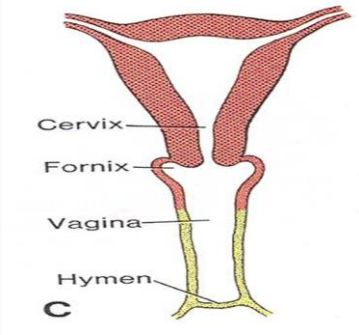


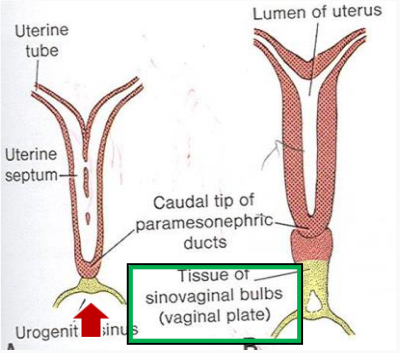
❖ It is derived from **the Urogenital Sinus**: famel genitalia وجزء بيكون urethra اسمه كذا لان جزء منه رح يكون

- 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**.

❖ Differentiation of Vagina:





- **The central cells** of the vaginal plate break down to form the lumen of the vagina.
- **The peripheral cells** form the vaginal epithelium.
- 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** (غشاء البكارة)
- which remains as a **thin fold of mucous membrane just within the vaginal orifice .**

Cont..

❖ Both male and female embryo have two pair of genital ducts:
1- **The mesonephric (wolffian's ducts)** for development of male reproductive system.
2- **The paramesonephric (Müllerian's ducts)** for development of female reproductive system.

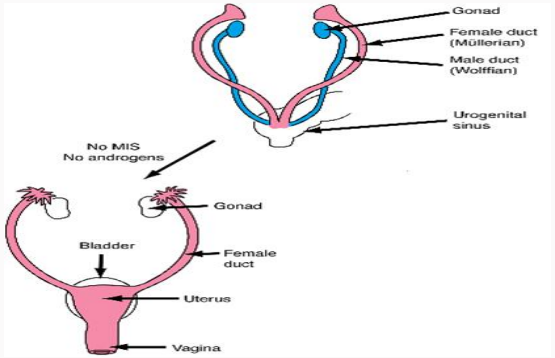
Only in male's slide

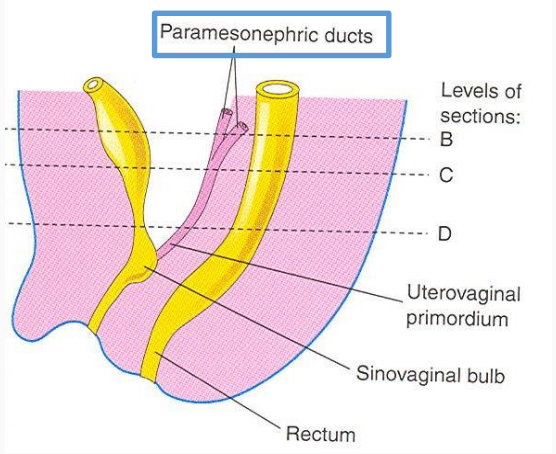
important

- **In female embryo:**

1- **The mesonephric ducts** regress(تضمحل) due to absence of the testosterone hormone.
2-**The paramesonephric ducts** develop due to absence of MIS (Müllerian Inhibiting Substance).
- They do not depend on ovaries or hormones.

نتيجة لعدم وجود testosterone and MIS رح يطلع pair of duct موازيه ل mesonephric duct اسمها mullerian or paramesonephric duct ف بما ان ظهورها يعتمد على غياب هذي الهرمونات فبالتالي مارح تطلع في الذكر لوجود هذي الهرمونات





❖ 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.

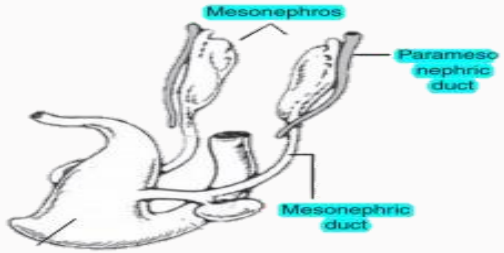
- They Cross ventral to the mesonephric ducts and approach each other in the median plane and fuse to form the Y shaped **Uterovaginal Primordial**.
(**Uterovaginal Primordial:** opens into the dorsal wall of **the urogenital sinus** and produces Paramesonephric (müllerian) Tubercle).

Explanation1

مافهمتوا اخر سلايدين ؟ حسيتوا ان الامبريو غثيث ؟ماعليكم الحل عندنا هنا الشرح لكن قبلها ضروري تشوفوا الفيديو

Very useful video

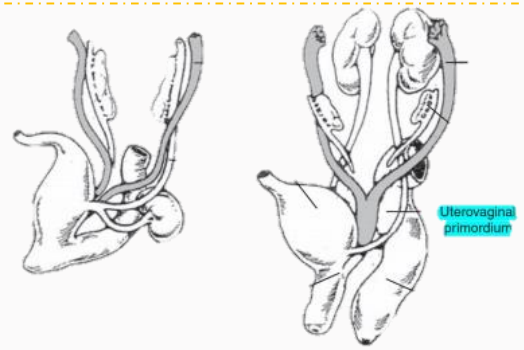
1. Paramesonephric duct will develop lateral to gonads and mesonephric duct



2. Paramesonephric duct:

- **Cranial part** of Paramesonephric duct will open into peritoneal cavity and it will form the uterine tubes.
- **Caudal part** of paramesonephric descend to pelvic رح يتلاقون from each side and they will form uterovaginal primoridium (Y shape) which then will differentiate into **uterus** and **superior vagina**.

❖ **Uterine tubes uterus and superior vagina** are mesoderm in origin.

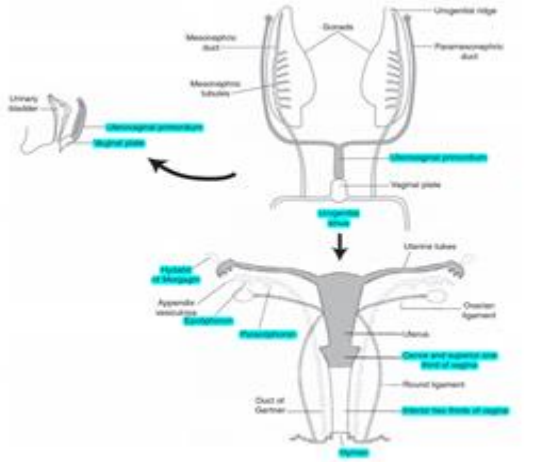


3. What about the lower vagina ?

- Uterovaginal primordium will open into the dorsal wall of the urogenital sinus and the contact between them induces the formation of a pair of sinovaginal bulbs.
- These bulbs are going to proliferate and fuse to from vaginal plate which is going to elongate and separate the upper vagina from lower vagina.
- Central portion of Vaginal plate then is going to degenerate (يعني رح يكون فاضي من داخل) to form the lumen of the vagina.

❑ A small portion will remain uncanalized called **Hymen**.

❖ **Lower vagina** endoderm in origin.



Explanation2

لسا مافهمتوا؟ هذا شرح مختصر وبشكل عام

❖ **شرح مختصر**

البارامیزونفرك دكت عبارة عن ٢ دكتس .. لهم (كرينيال ،ميدل،انفيريور بارتس)

اخر شي تعطينا شكل حرف **Y تخيلوا:**

- الكرينيال: كانها يدين - الميدل والانفيريور: كأنه جسم

- **الجزئين الكرينال** رح يكونوا منفصلين عن بعض ويفتحوا على **البروتينم كافتي** وبعدين رح يكونوا **(uterine tubes)**

- الجزئين **الميدل والانفيريور :** رح يندمجوا مع بعض(يعني كانو ٢ تيوب صاروا تيوب وحدة) وهذا التيوب نسميه (**uterovaginal primoridium**)

اللي بعدين رح يعطينا uterus and superior vagina

- اليوتيروفجاينال يروح يفتح داخل (**urogenital sinus**) لما يفتح فيه يسويلي زي نتوء او جزء بارز اسمه(**Tubercle**)

اليوتيروفجانال يتكون جنبها من الجهتين (**sinovaginal bulbs**) هذي البلب تمسك في بعض و تكون (**vaginal plate**)

هذي البليت تبدا تطول للاعلى تفصل اليوتيروفجانال عن اللور بارت

بعدين هذي البليت من **الوسط تبدا تضمحل** ويصير لها:

lower vagina <-canalization

Hymen <- uncanalized ماعدا جزء فيها

3- External Genitalia

- Are Similar in both sexes up to the **7th week (indifferent stage)**.
  (المرحلة الجينتاليا ماصار فيها تغير ف لما الام تسوي سونوقرام ماتقدر نميز انثى او ذكر)
- Begin to differentiate in the **9th week** (عملية التمايز لكن لسا الام ماتقدر تعرف نوع جنينها) **تبدأ** .
- Fully differentiated by the **12th week** (هالمرحلة تتكتمل عملية التمايز أخيراً الام تعرف نوع جنينها)

Development of Female External Genitalia:

Very useful video

Proliferation of **Mesenchyme** at **the Cranial end** and sides of **the Cloacal Membrane**, forms:

1- Genital Tubercle (swelling in the tip of the cloacal membrane)

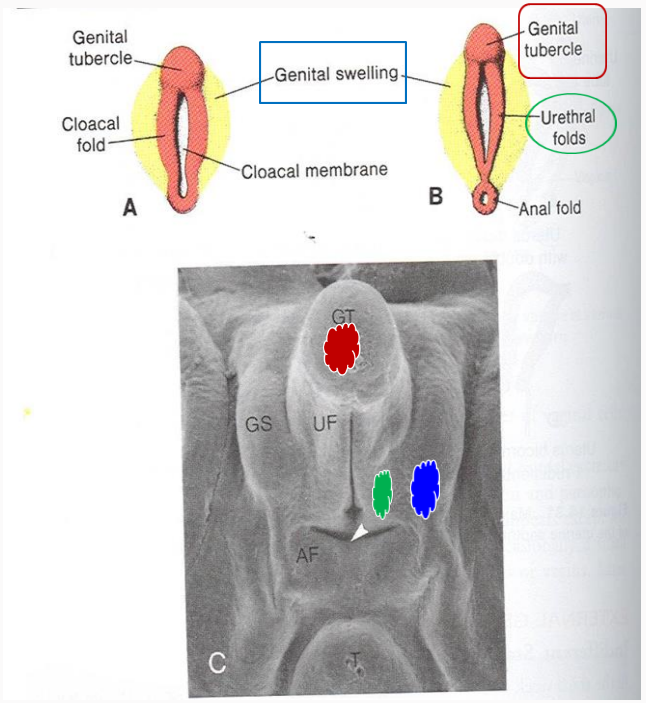
2. Urogenital Folds (Urethral Folds) internal

3. Labioscrotal Swellings (Genital Swellings) (GS) proliferate on Each Side of the cloacal membrane. external

- The **ventral part** of the **cloacal membrane**; the urogenital membrane lies in a median cleft the urogenital groove, the vestibule and bounded by the urogenital folds .

- هذي التغيرات تحصل بكلا الجنسين عشان كذا بالاسبوع السابع مانقدر نميز بينهم

Cloaca devided into two part :
Ventral part -> gives urinary bladder and urethra
Posterior part -> rectum and anal canal

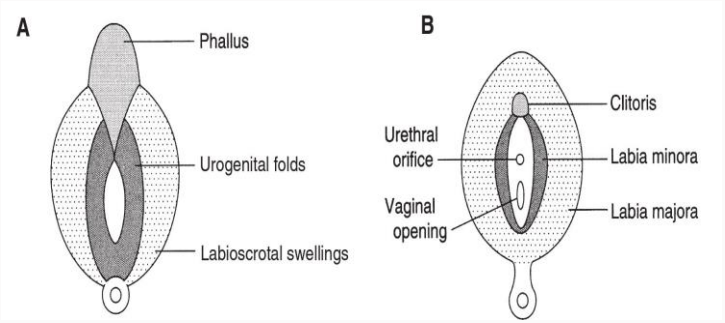


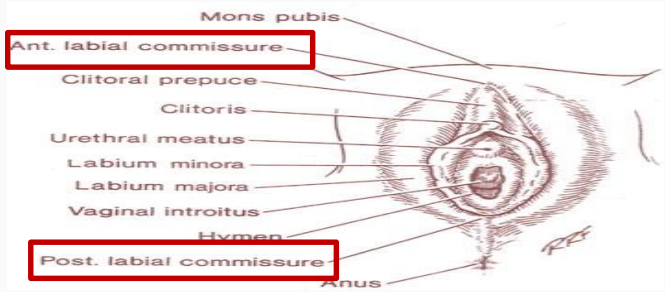
Feminization of External Genitalia (start at the 9th week) تبدا عملية التمايز

- **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**.

(primordial phalls هذي المرحلة تصير في كلا الجنسين،التبركل تكبر شوية ويصير اسمها)

- The **phalls** elongates slightly to form the **Clitoris** **(in female)**. (In males elongate and form penis)
- The **Urethral Folds** do not fuse and form the **Labia Minora**. (In males fused)
- The **Labioscrotal Folds** form the **Labia Majora** , they fuse (anteriorly & posteriorly) to form the Posterior & the Anterior **Labial Commissures**.



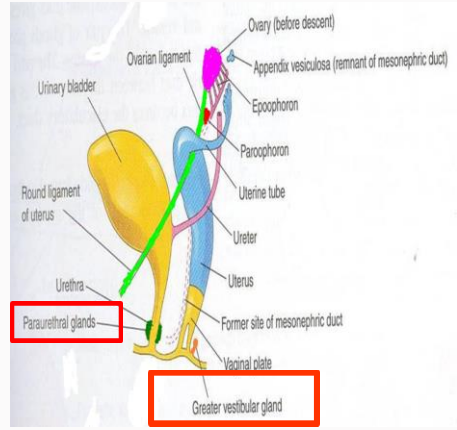


Female Sex Glands

1. Urethral and Paraurethral Glands: (These glands are only in female)
grow as buds from **the urethra**, they are corresponding to the Prostate Gland of the male.

2. Greater Vestibular glands (Bartholin glands): (this gland is only in female)

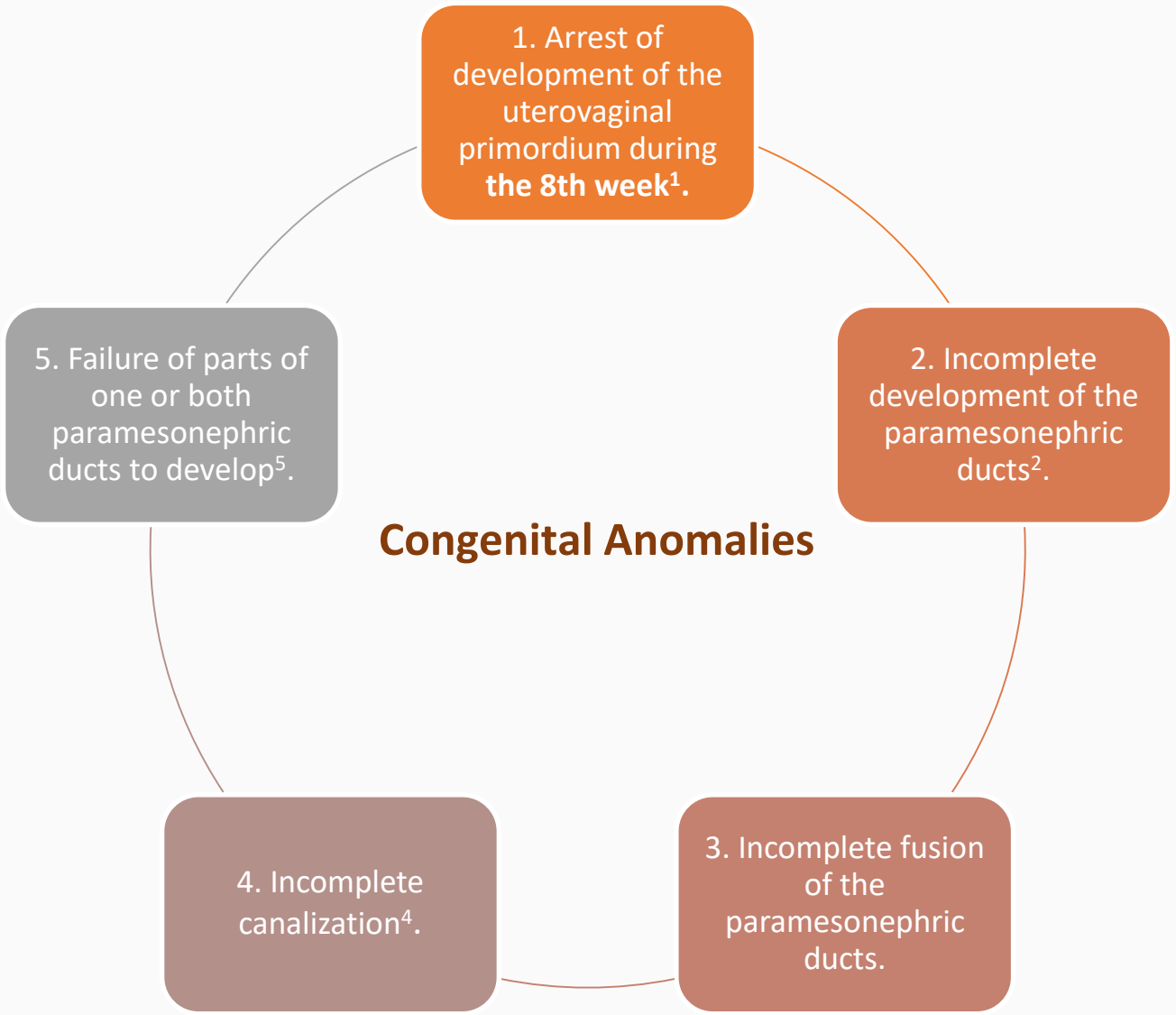
Outgrowths of the **urogenital sinus**, they are corresponding to the Bulbourethral Glands of the male.



- بإختصار هنا يقولك كل قلاند في الفيميل و من فين تطلع؟ وايش يقابل هالقلاند في الميل

Congenital Anomalies

- Various types of anomalies can result due to:



1. Fusion of the two paramesonephric duct happen in the 8th week and failure of fusion will cause anomalies in uterus cervix , or upper vagina

2 .One or both of them

4. Cavity بالتالي مارح يتكون عندي

5. cranial part مثلا لو ماتكون عندنا مارح يتكونfallopian tube

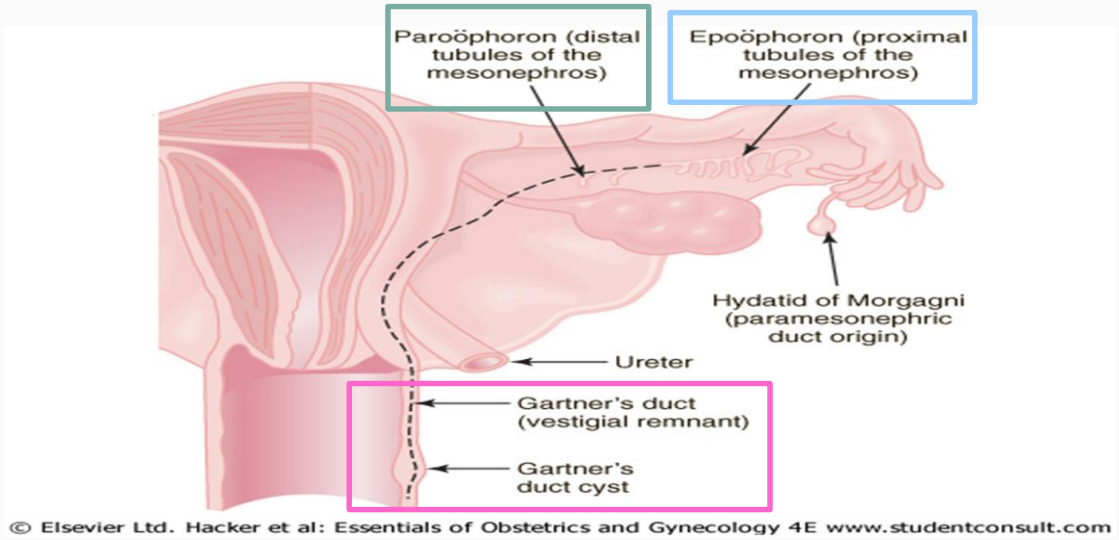
Congenital Anomalies

- 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.

❖ **شرح السلايد:** (امشوا مع الوان المربعات والصورة)

- Mesonephric duct normally in female **degenerate** , but in male persist and become **vas deferens**
-هذي الدكت يطلع منها بروكسمال وديستال تيوبيول ايش يصير اذا بقت في الأنثى ؟

If **distal persist**:
We call it Paroophoron.



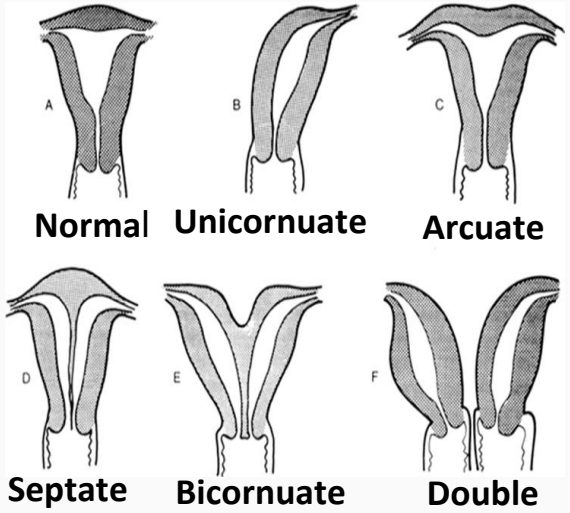
If **proximal persist**:
Appear like cyst lateral to uterus and called "epoophoron".

طيب لو الدكت بكبرها بقت؟
نسميها **gartner's duct**
واحيانا نهاية الدكت يكون فيها سيست هنا نسميها " gartner's duct cyst "
و هذول مايعتبروا ورم وانما كونجينتال انومالیز بس

Congenital Anomalies

1- Uterine Malformations

1- Double uterus (Uterus Didelphys)(F)	Due to **failure of fusion of inferior parts** of the **paramesonephric ducts**. May be associated with a double or single vagina. ٢دكتس مارح يندمجوا ويكونوا الجزي السفلي ف كل دكت رح تسوي رحم لحالها
2. Bicornuate uterus(E)	The **duplication** involves the **superior segment.** No fusion of the upper part
3.Unicornuate Uterus(B)	One paramesonephric duct fails to develop ركزوا دكت وحدة ما تكونت مو المشكلة بالفيوجن
4. Arcuate Uterus(C)	Upper segment curved like arch

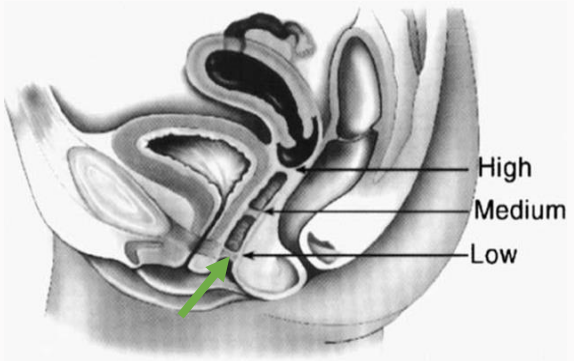


2- Cervical Atresia

- It may be **combined with incomplete** development of the upper vagina or lower uterus.

3- Vaginal Anomalies

1-Atresia (Partial or complete).	2- Double vagina No fusion of paramespnephric duct -> two vagina ممكن هذي الانوملي ترتبط مع double uterus	3- **Transversely septate vagina:** results from **faulty canalization** of the fused müllerian ducts. مارح يكون فيه complete canalization فبالتالي بيكون فيه لفواصل (septa) ورح تعيق الحمل والولادة



Summary

4th week	Appearance of the Primordial germ cells
5th week	Appearance of the Gonadal Ridge
6th week	Migration of the Primordial germ cells to the Gonadal Ridge
7th week	The gonad acquires Female or Male morphological characteristics.
	The external genitalia are similar in both sexes.
9th week	The external genitalia begin to differentiate
10th week	The ovary is identifiable histologically
12th week	The external genitalia are fully differentiated
16th week	The cortical cords break up into isolated cell clusters: Primordial Follicles (Primary Oocytes)
Before birth	About two million oogonia enlarge to become Primary Oocytes

Summary

Mullerian ducts (Paramesonephric Ducts)	Female internal genital Organs → Upper Vagina , Cervix, Uterus & Fallopian Tubes.
Urogenital sinus	Female external genitalia → Lower vagina.
Genital Tubercle	Primordial Phalls → Clitoris.
Urethral Folds	Labia Minora.
Labioscrotal Folds	Labia Majora.
SinoVaginal Bulbs	Vaginal Plate.
splanchinic mesoderm	endometrial stroma and myometrium .
intermediate mesoderm	Genital (Gonadal) Ridge.
Primitive Germ Cell	Oogonium.
surface epithelium (Sex Cord)	Follicular Cells.
Vaginal Plate	The lining of the entire vagina.

Anomalies summary	
Uterus Didelphys	Due to failure of fusion of inferior parts of the paramesonephric ducts.
Bicornuate uterus	The duplication involves the superior segment.
Unicornuate Uterus	One paramesonephric duct fails to develop.
Cervical Atresia	incomplete development of the upper vagina or lower uterus
Transversely septate vagina	Results from faulty canalization of the fused mullerian ducts

MCQ's

1- at what week of pregnancy does the gonadal ridge appear ?
a) 4th week b) 5th week c) 6th week d) 16th week

2- the primordial germ cells migrate to the gonadal ridge at :
a) 4th week b) 5th week c) 6th week d) 16th week

3- morphological characteristics of gonad are acquired at:
a) 5th week b) 6th week c) 7th week d) 10th week

4- female primary reproductive organ is histologicaly identifiable at:
a) 5th week b) 6th week c) 7th week d) 10th week

5- in any embryo degradation of mesonephric duct is due to:
a) presence of testosterone
b) absence of testosterone
c) presence of Müllerian Inhibiting Substance
d) absence of Müllerian Inhibiting Substance

6- in a female embryo failed to develop paramesonephric ducts, what went wrong ?
a) presence of testosterone
b) absence of testosterone
c) presence of Müllerian Inhibiting Substance
d) absence of Müllerian Inhibiting Substance

7- at what given week a mother can know the sex of her baby?
a) 7th week b) 8th week c) 9th week d) 12th week

8- what is the origin of ovaries ?
a) endoderm b) intermediate mesoderm c) mesoderm d) ectoderm

9- what is the origin of Fallopian tube, body of uterus, cervix and upper part of vagina ?
a) endoderm b) intermediate mesoderm c) mesoderm d) ectoderm

10- What is the origin of lower vagina ?
a) endoderm b) intermediate mesoderm c) mesoderm d) ectoderm

11- what is the origin of the muscle layer and lining of uterus ?
a) endoderm b) intermediate mesoderm c) mesoderm d) splancnic mesoderm

12- failure of fusion of inferior parts of the paramesonephric ducts lead to:
a) double uterus (Uterus Didelphys) b) bicornuate uterus
c) unicornuate uterus d) arcuate uterus

13- external genitalia begins differentiation at:
a) 7th week b) 8th week c) 9th week d) 12th week

14- faulty canalization of the fused müllerian ducts lead to:
a) cervical atresia b) vaginal atresia c) double vagina d) transversely septate vagina

1.b, 2.c, 3.c ,4.d, 5.b, 6.c, 7.d, 8.b, 9.c, 10.a, 11.d 12.a 13.c 14.d

ANY SUGGESTIONS OR ISSUES

Editing file

References

- Dr.slides (male and female).
- Embryology team 435 .

USEFUL VIDEOS

- https://www.youtube.com/watch?v=MureNA-RSZM
- https://www.youtube.com/watch?v=EO6kRLtTZW0
- https://www.youtube.com/watch?v=JPkljbZioIQ

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