أهلا وسهلا

الأستاذ الدكتور يوسف حسين

رئيس قسم التشريح والأنسجة والأجنة

كلية الطب - جامعة مؤتة – الأردن

دكتوراة من جامعة كولونيا المانيا

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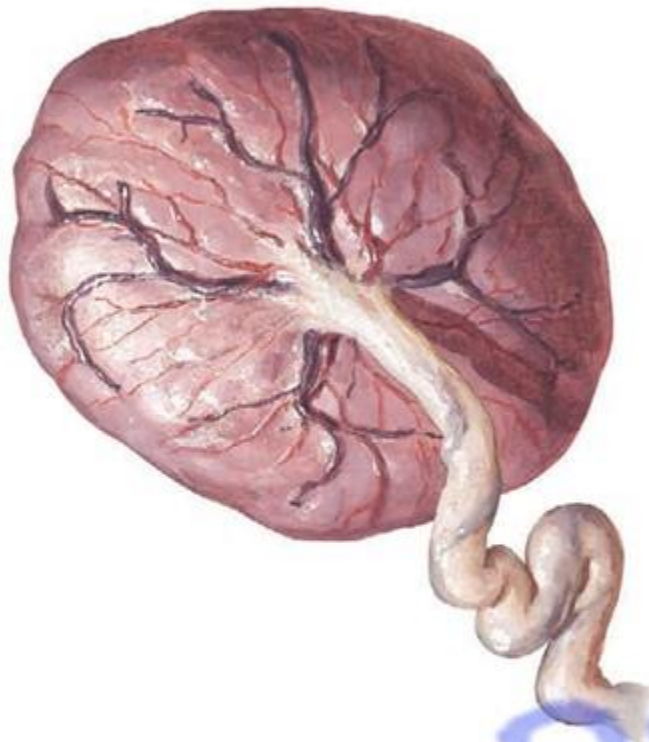


Development of Placenta

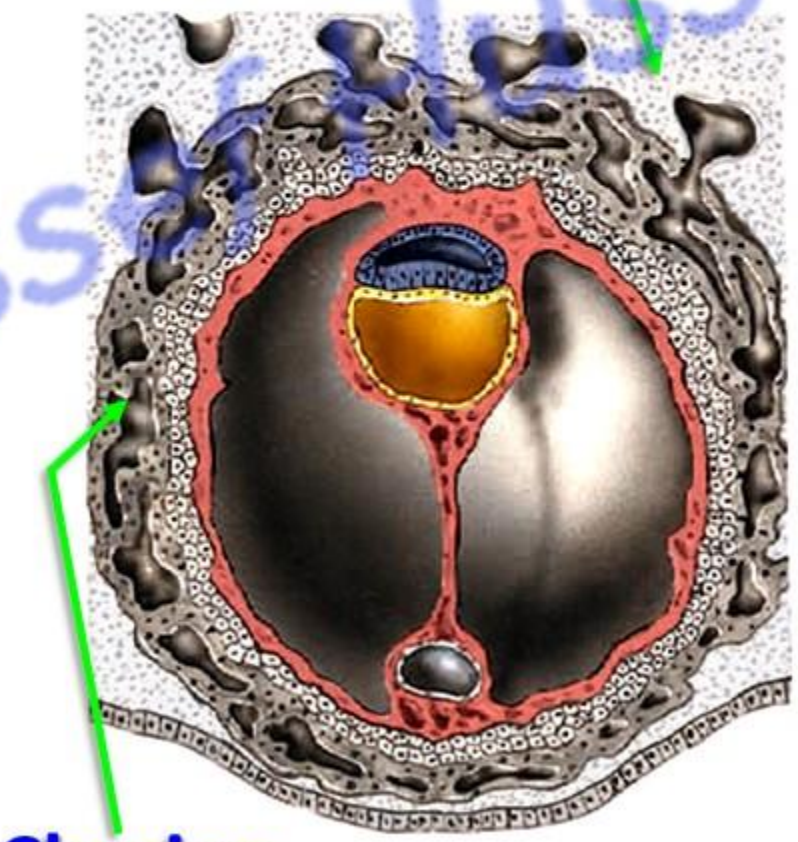
Parts of Placenta

The placenta consists of two components: maternal and fetal.

A- The **fetal** part develops from **chorion frondosum**

B- The **maternal** part develops from the **decidua basalis** (**endometrium** of the uterus after fertilization and implantation)

The **placenta** is the only organ in the body that develops from two different individuals, fetus (chorion) and mother (endometrium)

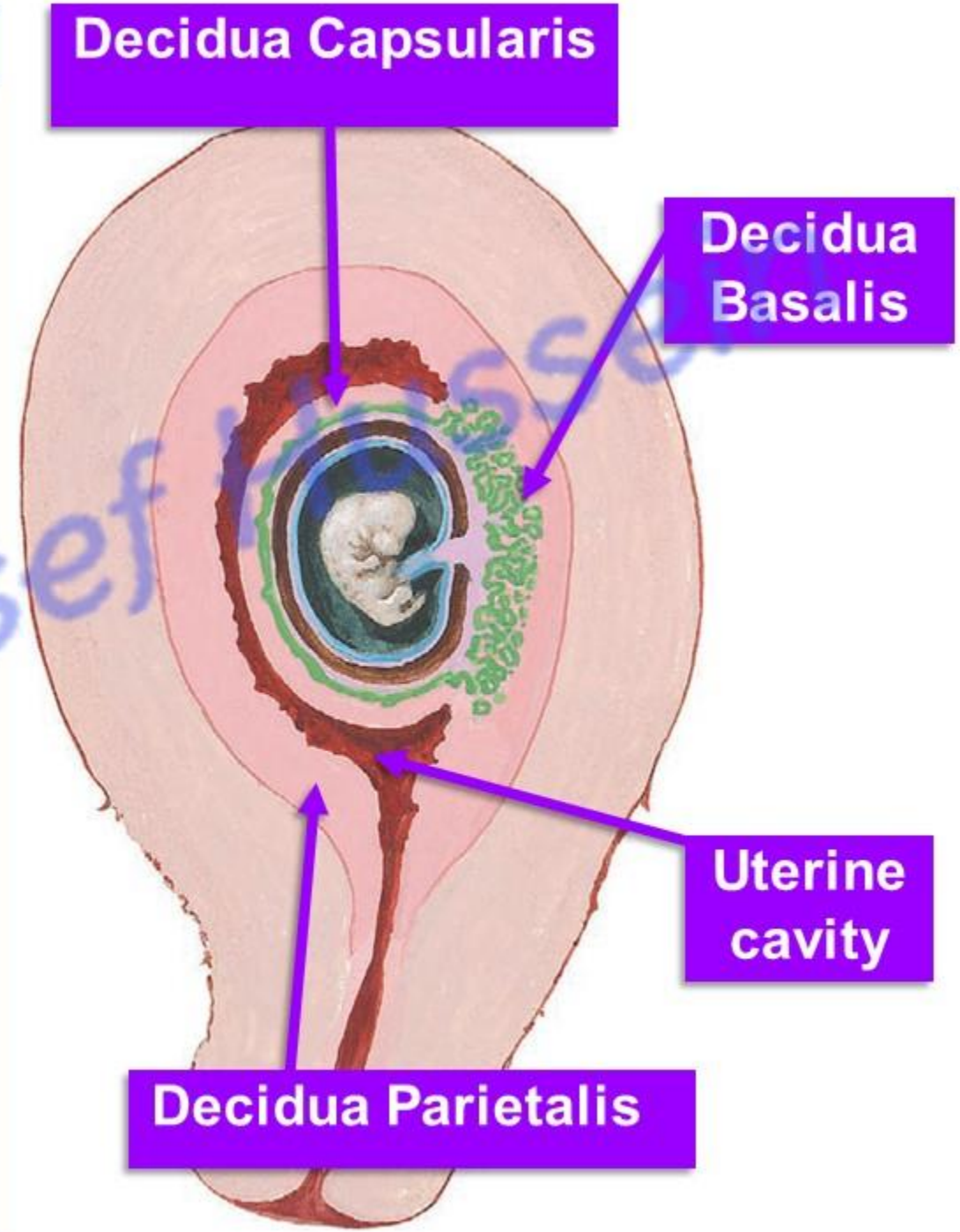


- **Development of decidua (Maternal part)**

- a- The endometrium becomes thicker and more vascular.
- b- Its glands become highly tortuous and filled with secretions.
- c- It contains decidual cells characteristic of pregnancy.

- **Parts of decidua**

- **Decidua basalis**: deep to the embryo (between blastocyst and myometrium). It forms the maternal part of placenta.
- **Decidua capsularis**: covers the blastocyst, later on disappear.
- **Decidua parietalis**: the rest of endometrium that lines uterine cavity, later on disappear.



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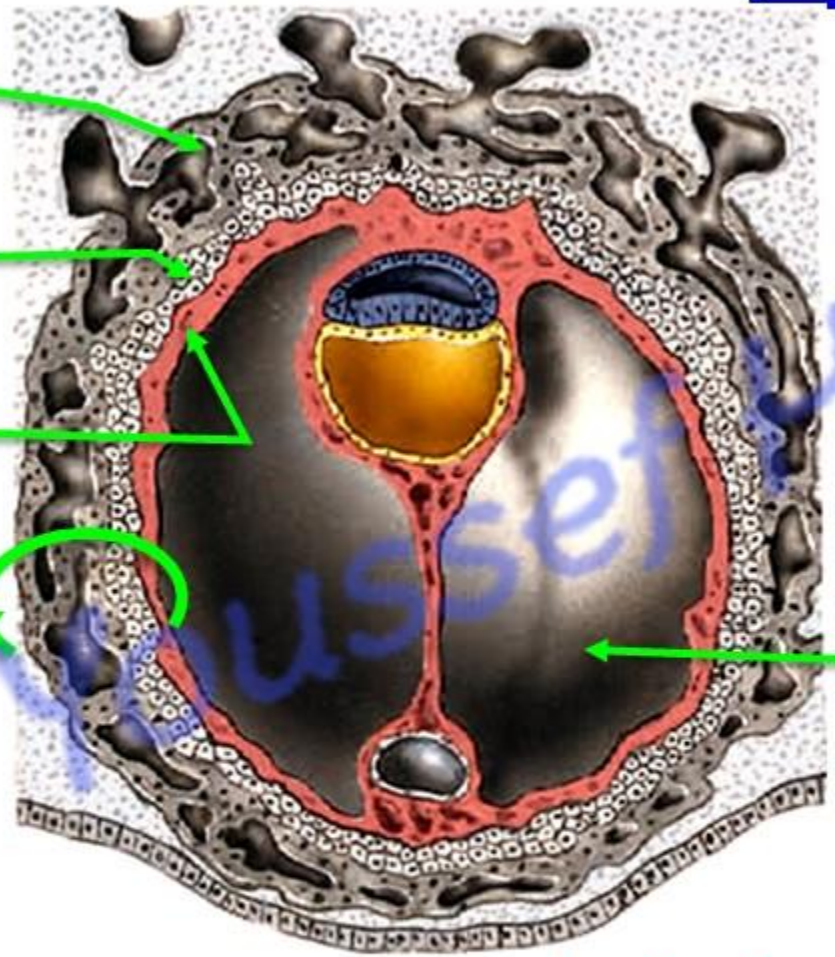
Development of Chorionic Villi

Chorionic Vesicle



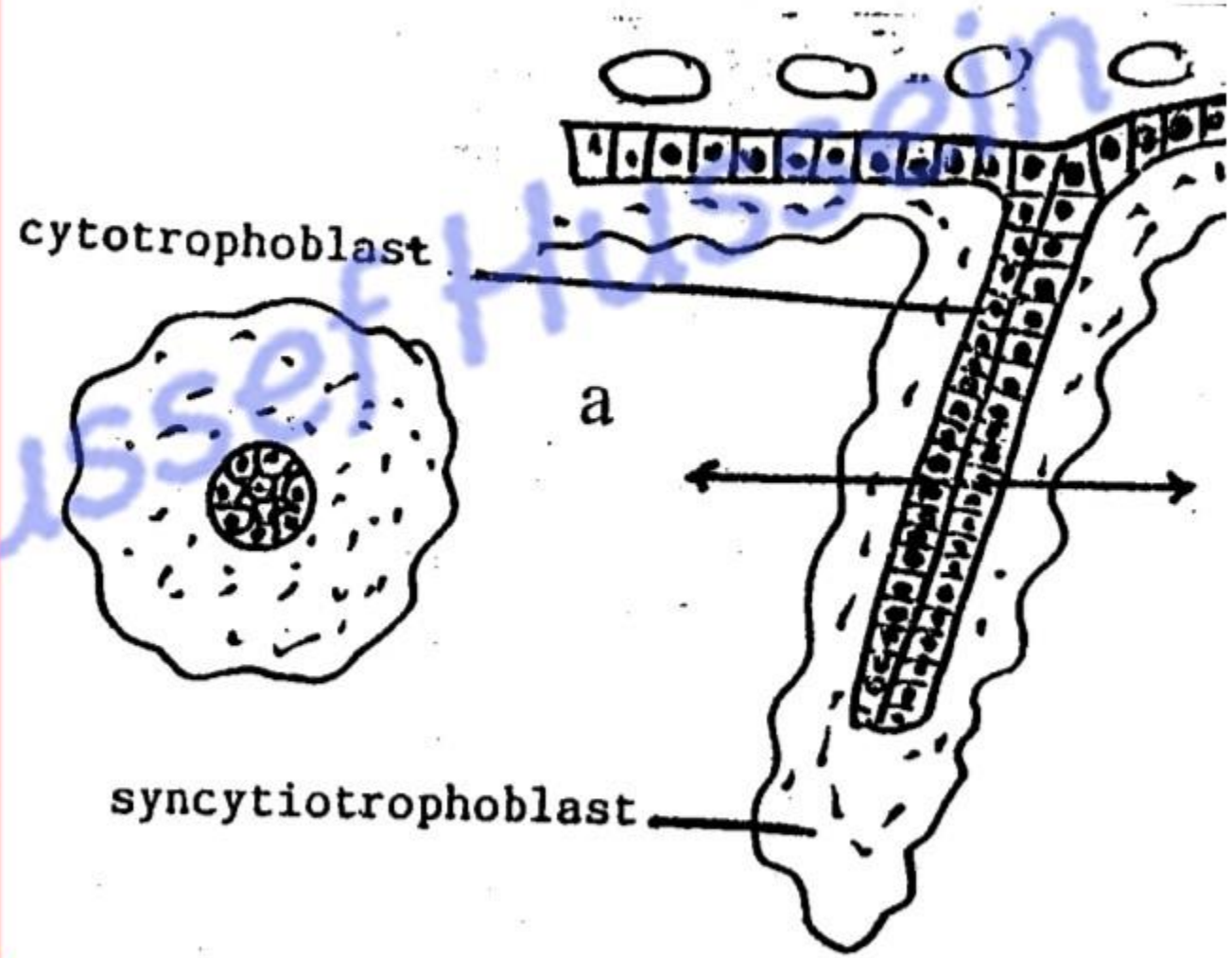
- By the end of 2nd week, The blastocyst is called chorionic vesicle having large cavity called chorionic cavity
- The Chorion (wall) is formed by three layers: 1) Syncytiotrophoblast.

2) Cytotrophoblast. 3) Somatic layer of extraembryonic mesoderm.

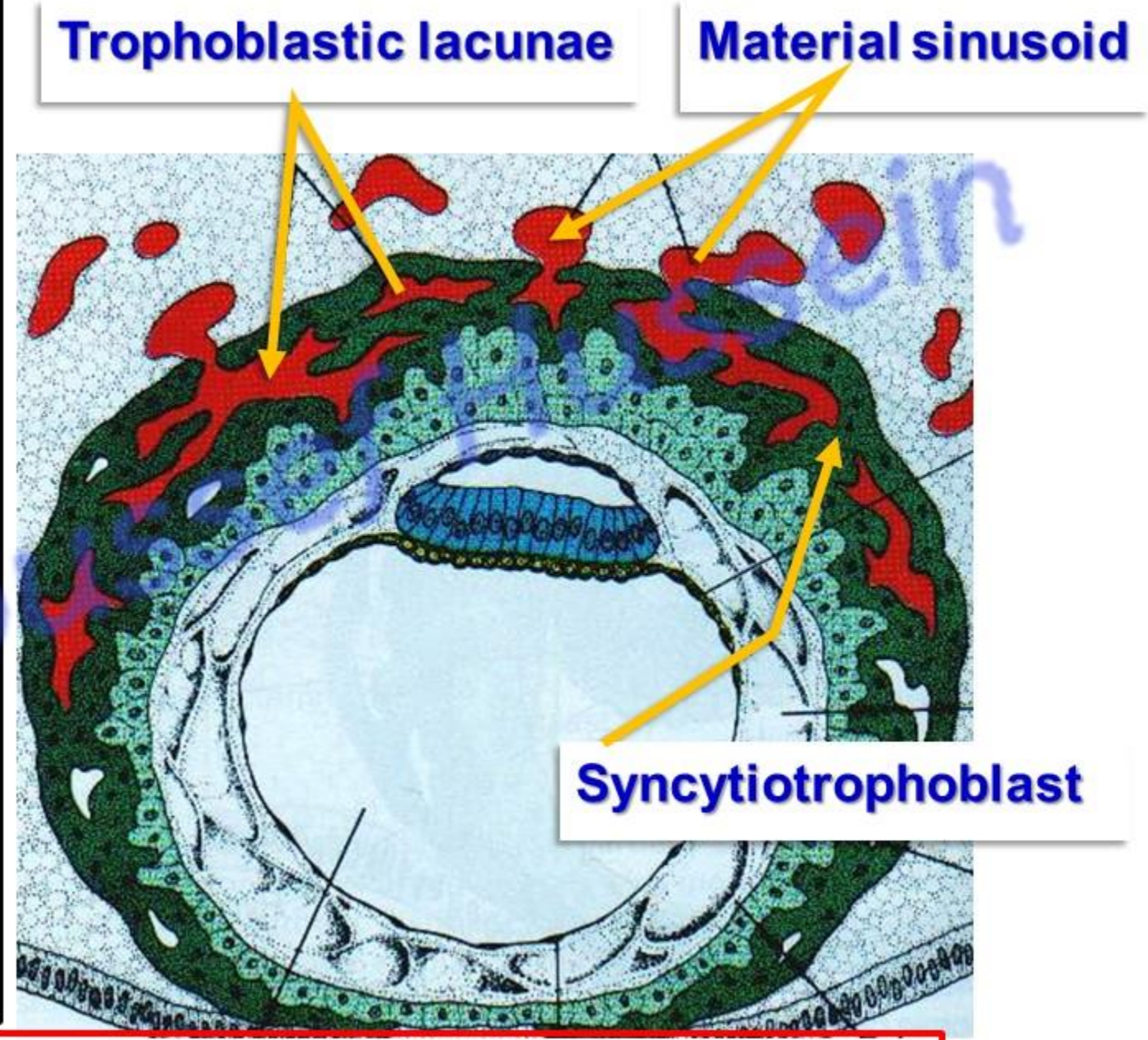
- **Primary chorionic villi :**

- The **syncytiotrophoblasts** form finger-like projections.
- The **cytotrophoblasts** migrate into center of the projections.
- The **villi** are separated from each other by spaces called **lacunae** filled with maternal blood due to erosion of the uterine vessels by syncytiotrophoblast.

Primary chorionic villi



- **Trophoblastic lacunae** appeared in syncytiotrophoblast at embryonic pole of the disc
- The syncytiotrophoblast cells **penetrate** (phagocytosis) deeper into maternal endometrium and **invade its capillaries**
- The lacunae become **filled with maternal blood**
- So, maternal blood begins to flow through **lacunar system** of trophoblast and this is called **uteroplacental circulation.**



Secondary chorionic villi

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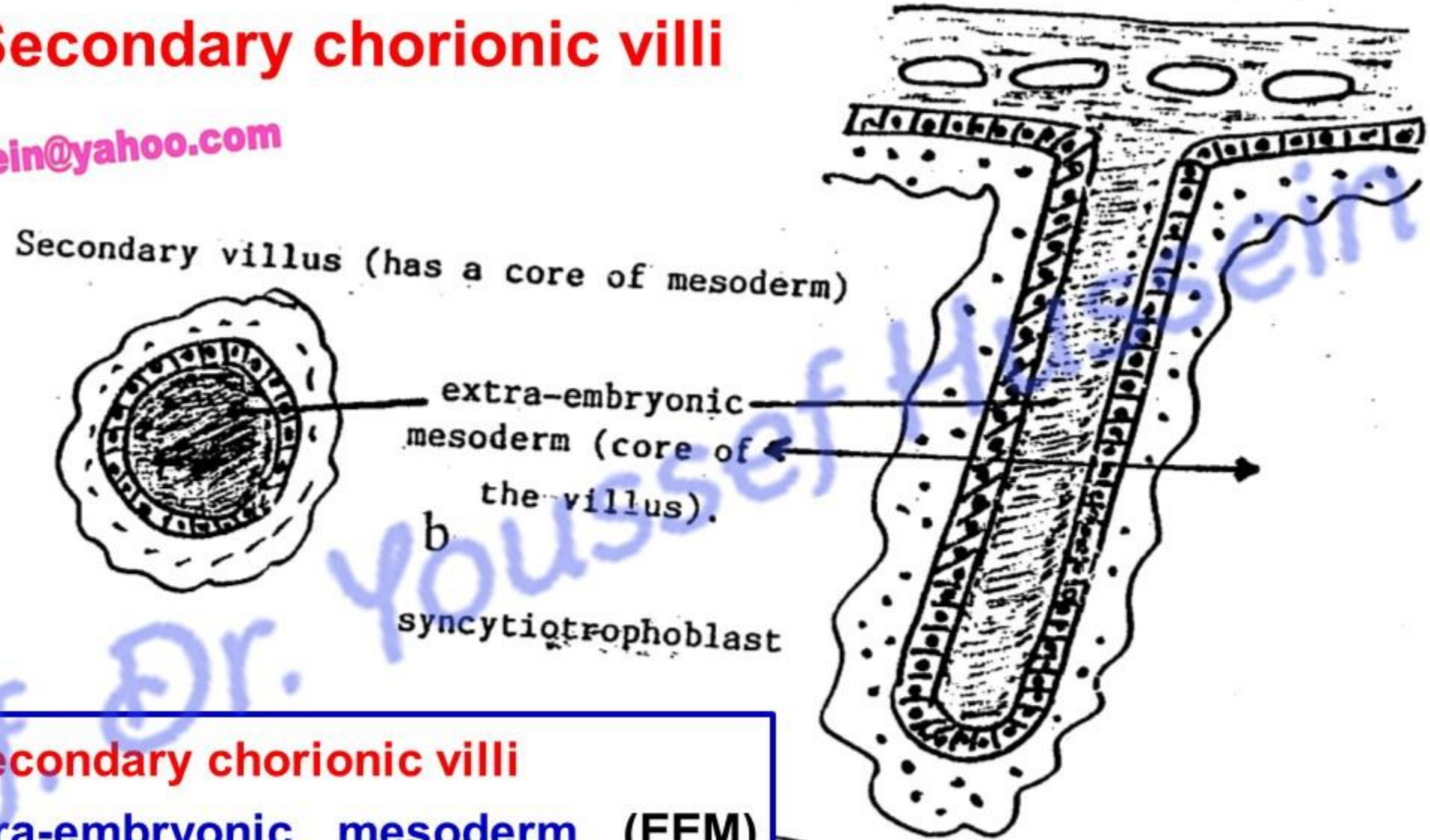
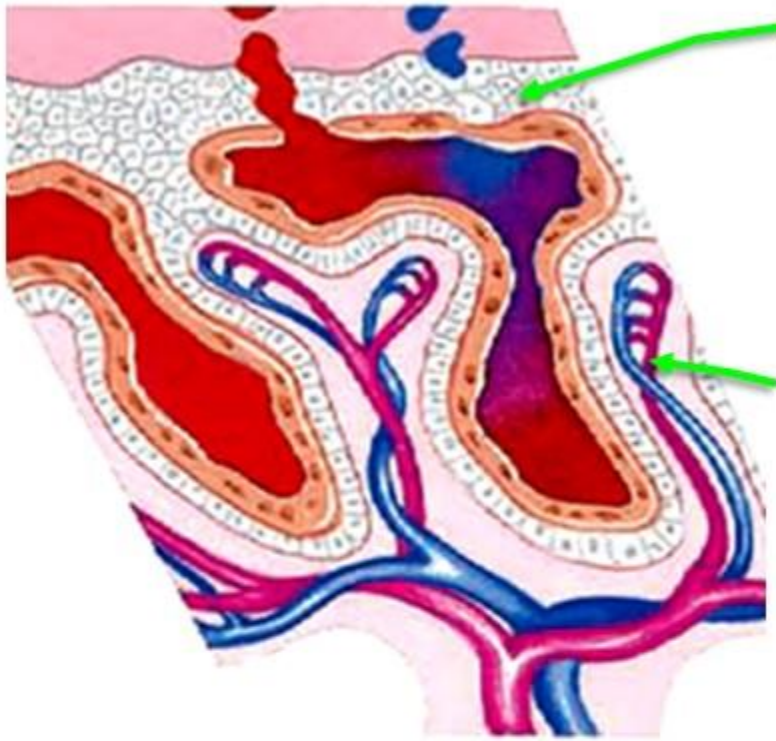


- **Secondary chorionic villi**

- The extra-embryonic mesoderm (EEM) proliferates and migrates into the center of the cytotrophoblastic cells.

Tertiary chorionic villi



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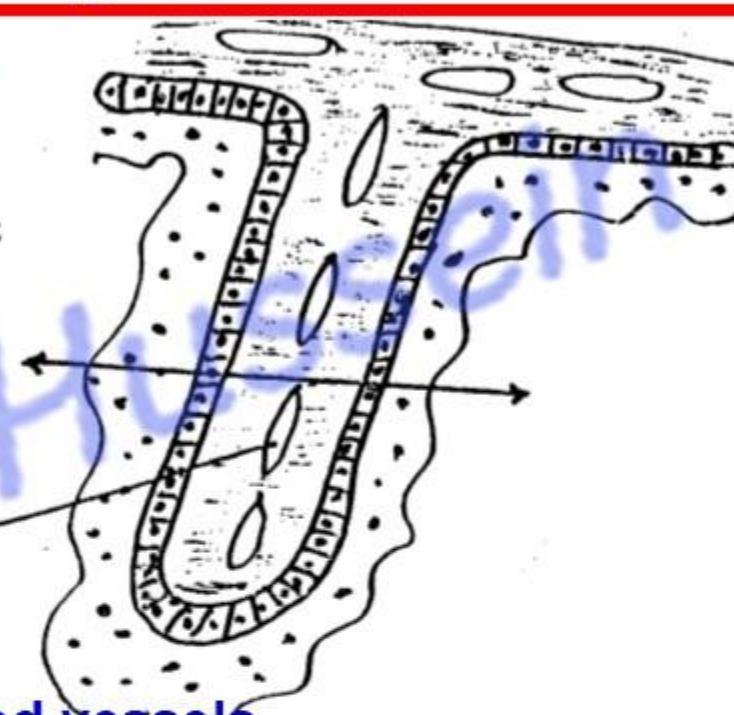

- **Tertiary chorionic villi**

- The cells of the **extra-embryonic mesoderm** give rise to fetal **blood vessels.**

  N.B: The cytotrophoblast cells of the apical region pierce the syncytiotrophoblast cells to meet and fuse with the adjacent one forming **cytotrophoblastic shell** to prevent further erosion of the endometrium by the syncytiotrophoblast and fixes all the villi in the decidua (**Anchoring villi**) .

Fate of the chorionic villi

- The villi related to decidua basalis called **chorion frondosum** and forms fetal part of the placenta
- The villi related to the decidua capsularis called **chorion laevae** and later on degenerated.

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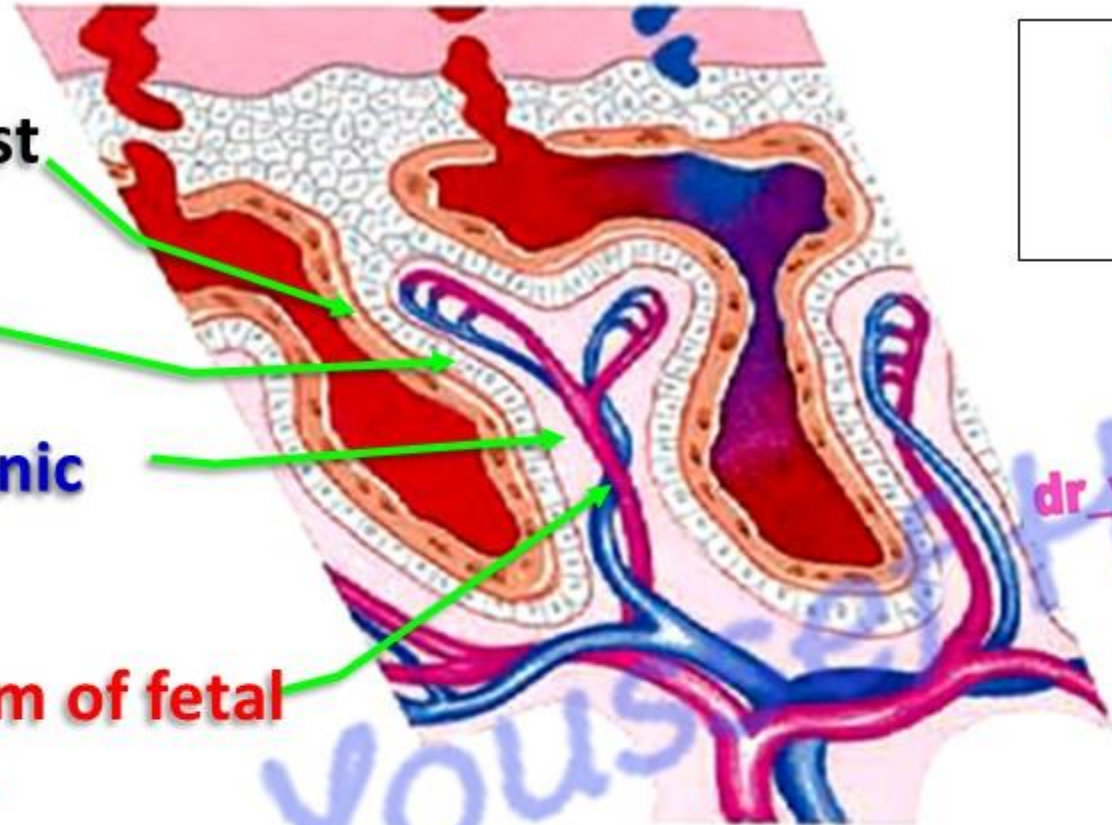
Placental barrier

Placental barrier (Membrane)



1- Syncytiotrophoblast

2- Cytotrophoblast

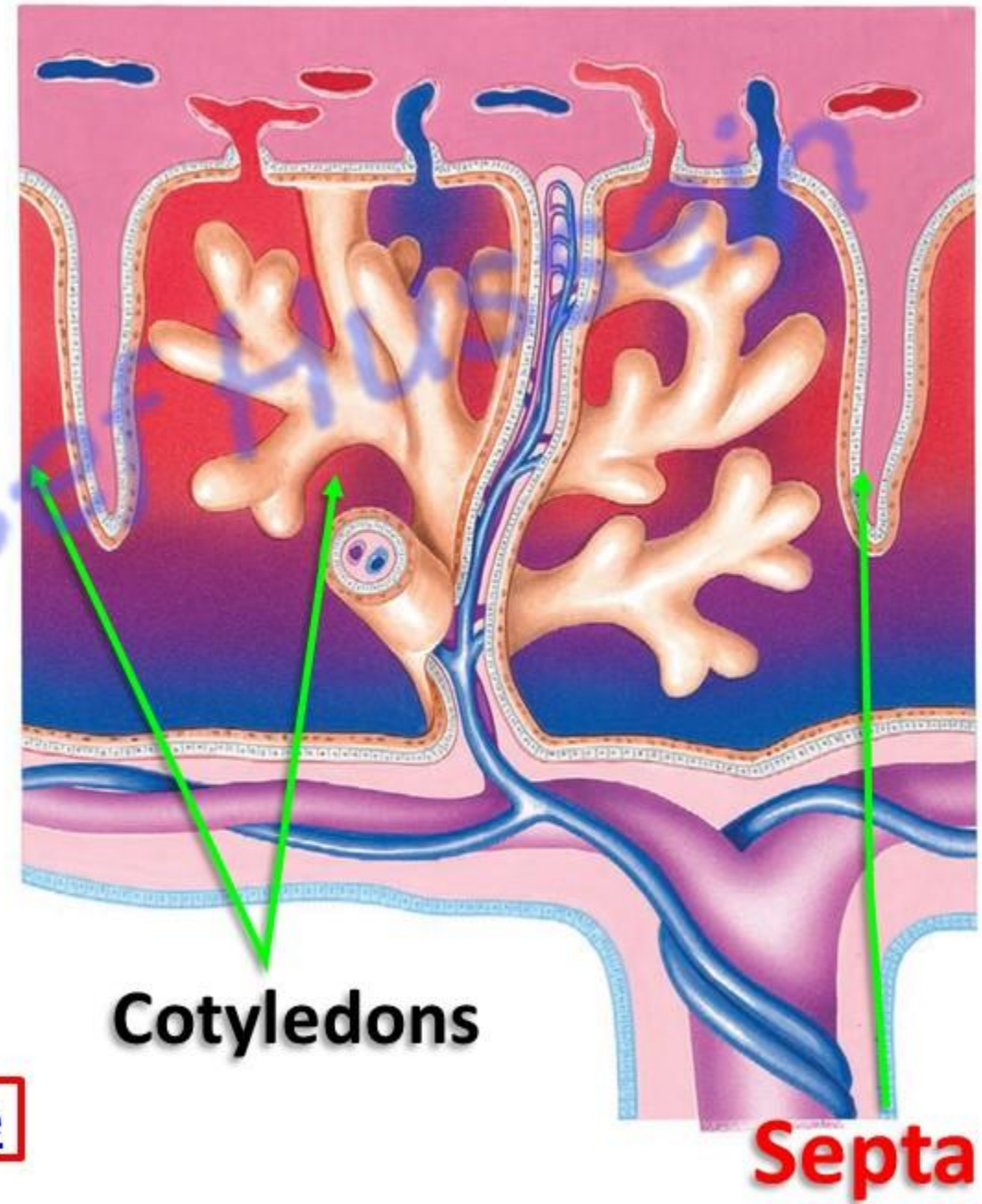
3- Extraembryonic mesoderm

4- Endothelium of fetal blood vessels

- In early pregnancy, the placental membrane is made up of four layers, its thickness is about 25 micron
- After the 3rd month, the nutritional demands increase so the placental membrane becomes thin to increase the efficiency of transport of nutrients, its thickness is about 1-2 micron. It is made of two layers syncytiotrophoblast and endothelium of the fetal blood vessels

** **Development of decidual septa:**

- The **decidua basalis** forms many **septa** that protrude into the **intervillous spaces** aiming to increase the surface area of the decidua.
- These septa divide the placenta into 15-20 lobes called **cotyledons** الفلقات.

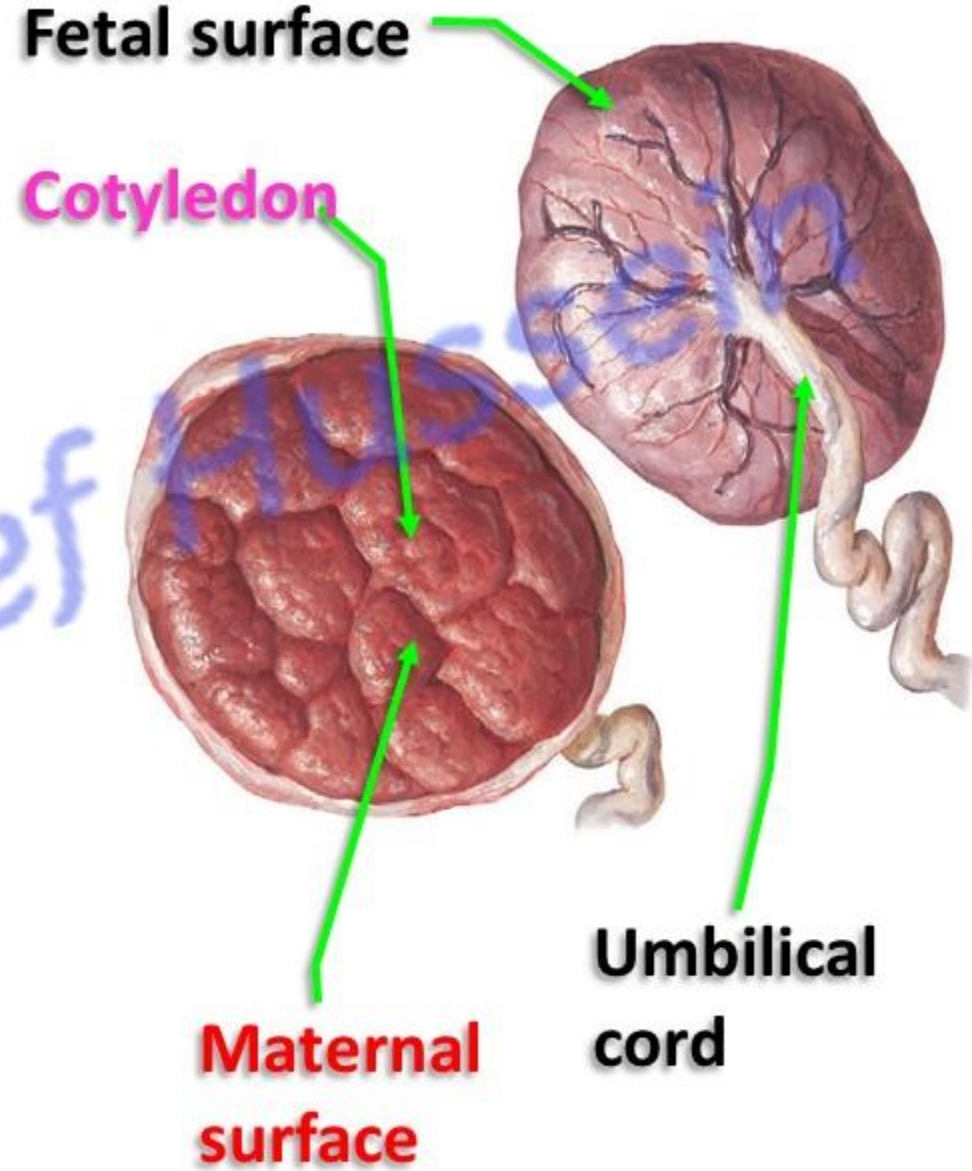


Morphology (Gross features)

- **Shape**; disc shaped.
- **Diameter**; about 15-20 cm.
- **Weight**: about 500 gm at birth.
- **Thickness**; its center about 3 cm and its margins about 1 cm
- **Surfaces**

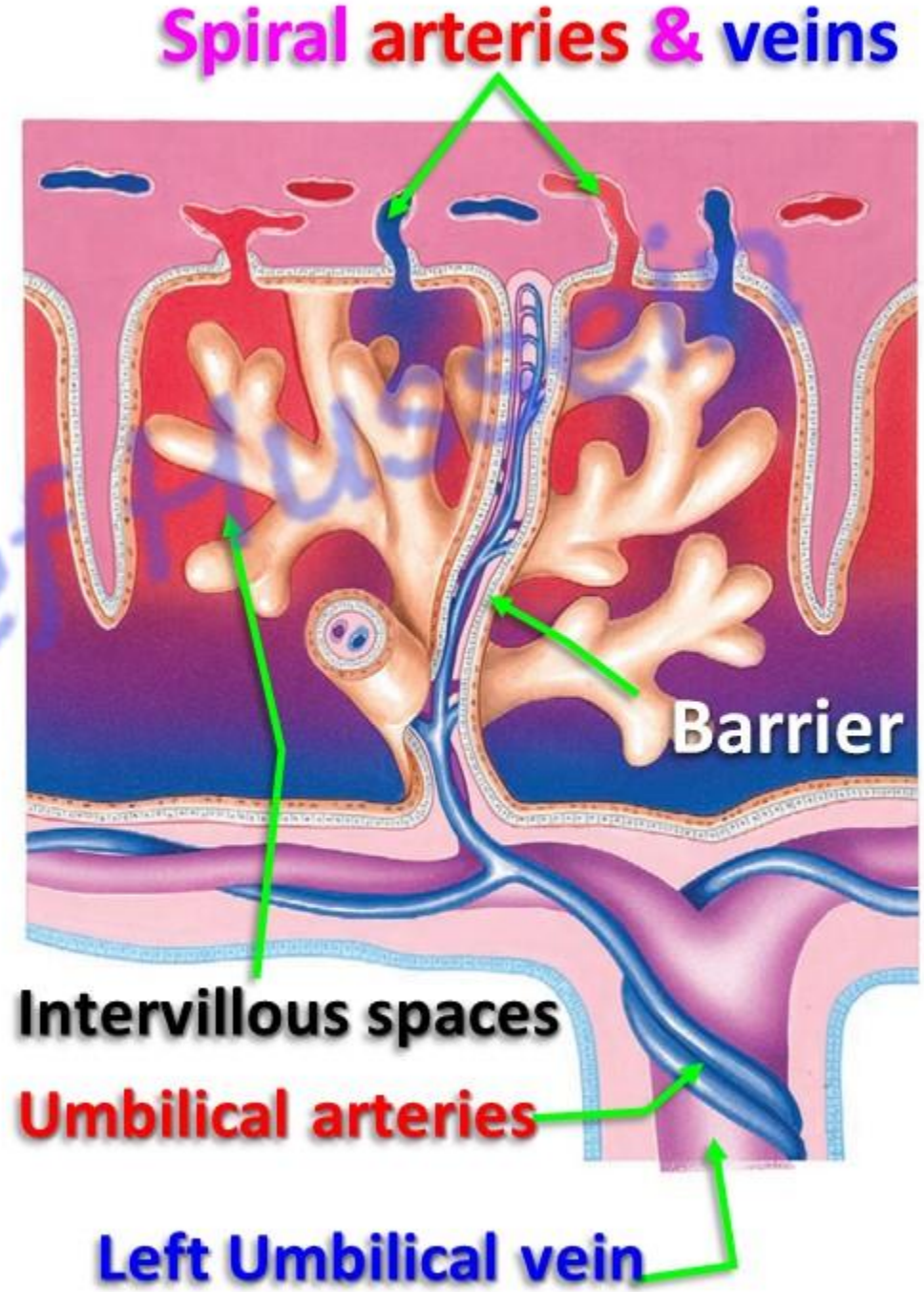
A- maternal: Rough. It is segmented into 15-20 lobes (cotyledons). الفلقات

B- Fetal: Smooth and covered by amniotic membrane. The umbilical cord attached to the center of the fetal surface.



- **Placental circulation:**

- The fetal non oxygenated blood reaches to the placenta by **2 umbilical arteries** → where gas exchange occurs with the maternal blood in the **intervillous spaces through spiral arteries and veins of the** decidua basalis.
- Exchange between the 2 blood streams occurred across the **placental barrier**.
- The oxygenated blood returns to the fetus by **left umbilical vein**.



Functions of placenta

• Functions of the placenta

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(I) Gases Exchange (respiration)

- The fetus takes **oxygen** from the maternal blood cross the placental barrier.
- The **carbon dioxide** passes to the maternal blood cross the placental barrier.

(II) Nutrition: The fetus takes **nutrients and electrolytes** from maternal blood cross the placental barrier *(*such as carbohydrate, fat, protein, amino acid, vitamins, minerals)

(III) Excretion: Waste products resulted from the metabolism like urea and uric acid pass from the fetal blood to the maternal blood cross the placental barrier.

(IV) Protection:

a- It allows the passage of antibodies (**IgG**) from the maternal blood to the fetal blood (**passive immunity**).

b- It prevents the passage of **most of the microorganisms and drugs** from the maternal blood to the fetal blood.

- However, some organisms like ***poliomyelitis, AIDS, syphilis and measles***, also few drugs cross the barrier produce congenital anomalies of the fetus.

(V) Endocrine function:

a- Human chorionic gonadotrophic hormone (HCGH)

1- it is used as an **early indicator of pregnancy**.

2- It is important for maintaining growth of the **corpus luteum** to secret progesterone till the 4th month of the pregnancy.

3- It helps development and descends of the **gonads** (testis or ovary).

b- Human Chorionic thyrotrophin hormone

c- Human Chorionic corticotrophin hormone

d- Human Chorionic somatomammotropin hormone: regulates carbohydrate, lipid and protein metabolism of the mother to produce glucose, fatty acid and protein for nutrition of the fetus. Increase of this hormone leads to diabetic pregnancy

(V) Endocrine function:

e- Estrogen and progesterone hormones:

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1- Help maintenance of the pregnancy by:

a- Support of the endometrium.

b- Maintains dilations of the spiral arteries of the endometrium.

2- Inhibit release of FSH and LH (inhibition of ovulation during pregnancy).

3- They stimulate the development of the breast.

4- At the end of the pregnancy,

a- Estrogen hormone **relaxes the pelvic ligaments** and increases smooth muscle contractility of the uterus.

b- Estrogen hormone makes **uterus more sensitive to oxytocin** hormone.

c- Drops off the progesterone hormone stimulates the beginning of the uterine contractions.

https://www.youtube.com/channel/UCVSNqbibj9UWYaJdd_cn0PQ

Thank you

Questions

https://www.youtube.com/@ProfDrYoussefHusseinAnatomy/playlists