Placenta

EMBRYOLOGY EDIT

The Placenta: Its Development and Function

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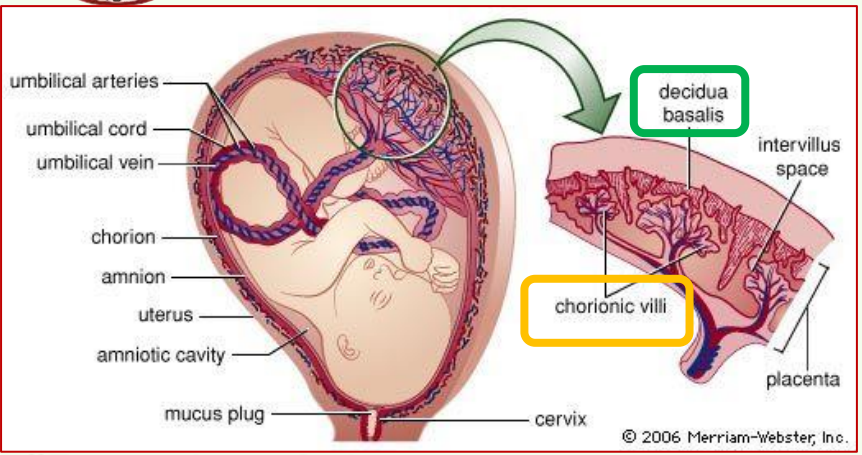


#Formation of placenta

When it is formed?

Formed by the beginning of the **4th month**.

What is it?

It is a Fetomaternal structure

(Part from the fetus and part from the mother)

What is the function of it?

It is the primary site for exchange of gases and nutrients between the mother and the fetus.

Placenta

- **Fetal part:**
  - **Villous Chorion.**
  - It is the bushy area at the embryonic pole.
  - Its villi are more in number, enlarged and branch profusely.
- **Maternal Part:**
  - **Decidua Basalis** (part of the decidua deep to the conceptus).

Decidua (Gravid Endometrium) : It is the functional layer of the endometrium during pregnancy which is shed after parturition.

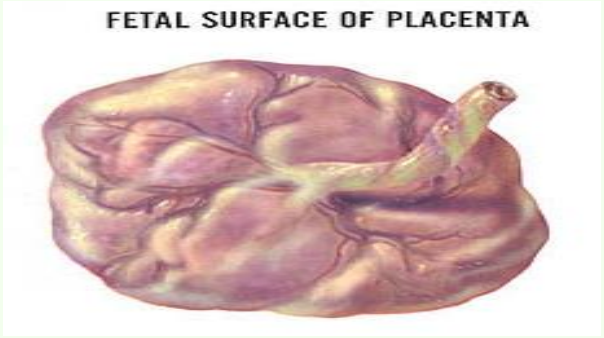
#Full term placenta

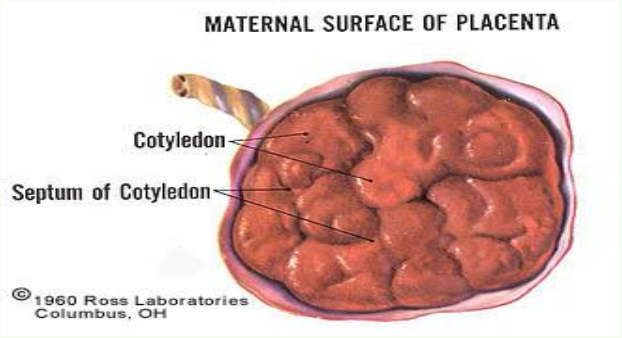
- ✓ Discoid in shape.
- ✓ Weighs: (500 – 600)g.

Has two surfaces:

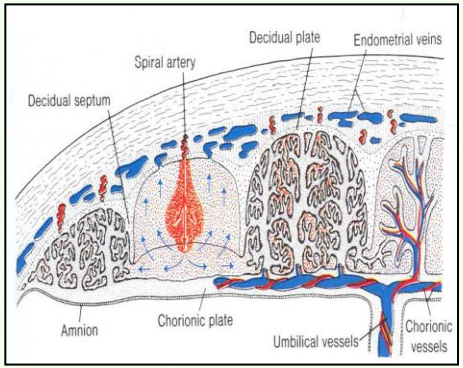
1. Fetal
2. Maternal

Fetal surface	Maternal surface
• Smooth because it is covered with the amnion. • The umbilical cord is attached to its center. • The chorionic vessels are radiating from the umbilical cord.	• Rough. • Formed of (15 –20) irregular convex areas (Cotyledons): -which are separated by grooves (placental septa). -Each cotyledon is covered by a thin layer of decidua basalis.





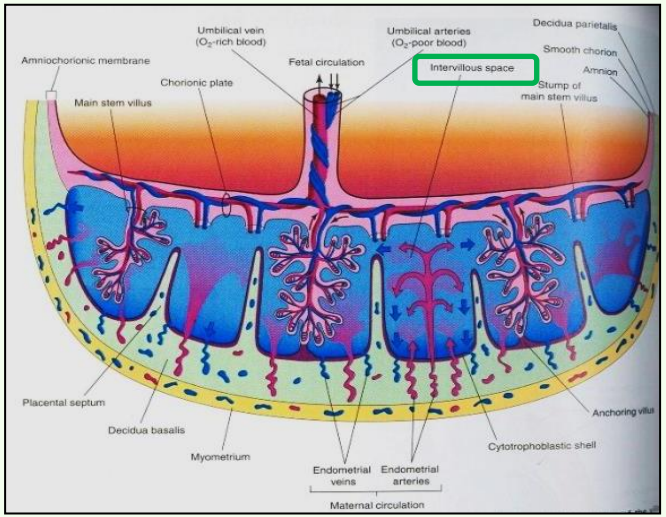
#Structure of a Cotyledon



- It consists of two or more Stem Villi with their many branch villi.
- It receives (80-100) maternal spiral arteries that enter the **#intervillous spaces** at regular intervals.

#Intervillous spaces

- ✓ Large blood filled spaces which are freely communicating
- ✓ They receive spiral arteries from the lacunae in the syncytiotrophoblast.
- ✓ The spaces are drained through endometrial veins.



#Fetal Placental circulation / Maternal Placental Circulation

Fetal Placental Circulation

Two Umbilical Arteries:

Carry poorly oxygenated blood from the fetus to the placenta.

within the branch chorionic villi, they form:

Arterio-capillary venous network:

-It brings the fetal blood extremely close to the maternal blood.

-The well oxygenated fetal blood in the capillaries passes into veins accompanying the chorionic arteries.

-At the umbilical cord, they form the **One Umbilical Vein**.

Maternal Placental Circulation

- 80–100 **spiral endometrial arteries** discharge into the intervillous spaces.

-The blood is propelled in jet like fountains by the maternal blood pressure.

-The pressure of this entering blood is higher than that in the intervillous space.

-It forms a roof of the space.

-As the pressure dissipates, the blood flows slowly around the branch villi.

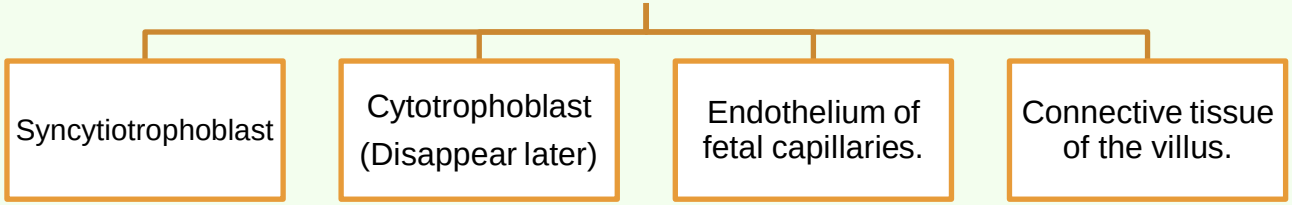
- Exchange of metabolites and gases with the fetal blood.

- As the pressure decreases, the blood flows back from the chorionic plate and enter the endometrial veins to the maternal circulation.

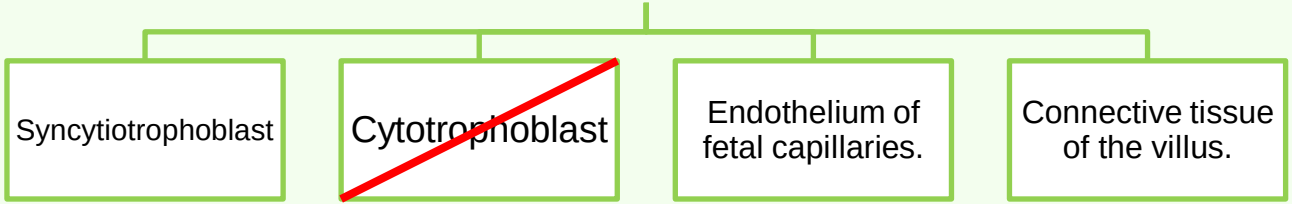
#Placental membrane

- It is a composite thin membrane of **extra fetal tissues** which separates the fetal and maternal bloods.

Up to **(20) weeks**, it is composed of (4) layers:



At **full term** It becomes thinner and composed of (3) layers only:



At some sites, the syncytio comes in direct contact with the endothelium of the capillaries and forms **Vasculosyncytial** placental membrane.

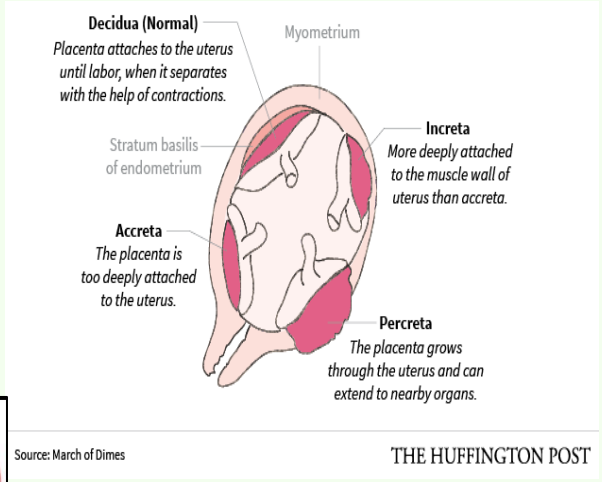
#Function of the Placenta

- ✓ Fetal drug addiction can be due to some drugs as Heroin.
- ✓ All sedatives and analgesics can affect the fetus to some degree.
- ✓ Drugs used for management of labor can cause respiratory distress to the newborn.

Metabolic	Transportation	Endocrine Synthesis
*Synthesis of: **Glycogen, Cholesterol and Fatty Acids.** *They supply the fetus with nutrients and energy	**(A) Gases:** *Exchange of O2, CO2 and CO through simple diffusion. *The fetus extracts (20 –30) ml of O2/minute from the maternal blood. **B) Nutrients and Electrolytes:** Water, Amino acids, Carbohydrates, Vitamins and Free Fatty Acids are rapidly transferred to the fetus. **C. Maternal Antibodies:** Maternal immunoglobulin G gives the fetus passive immunity to some infectious diseases (measles, small box) and not to others (chicken box). **(D) Drugs and Drug metabolites*:** *They cross the placenta by simple diffusion. *They can affect the fetus directly or indirectly by interfering with placental metabolism **(E) Hormones:** *Protein hormones do not reach the embryo in sufficient amounts. *some of these hormones: (Thyroxine & Testosterone which may cause masculinization of a female fetus) can cross the placental membrane **F) Waste products:** Urea and uric acid pass through the placental membrane by simple diffusion.	**(1) Progesterone :** Maintains pregnancy if the corpus luteum is not functioning well. **(2) Estrogen** Stimulates uterine growth and development of the mammary glands. **3) hCS or Hpl:** *A growth hormone that gives the fetus the priority on maternal blood glucose. *It promotes breast development for milk production. **(4) hCG:** Maintains the corpus luteum and used as **indicator of pregnancy.**

Table from embryology team 433

#Anomalies of Placenta

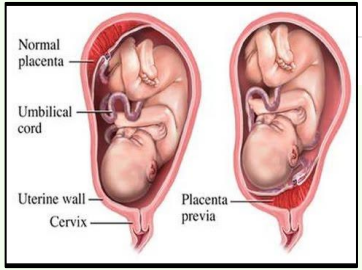


1. Placenta Accreta:

Abnormal absence of chorionic villi with partial or complete absence of the decidua basalis.

2. Placenta Percreta:

- Chorionic villi penetrate the myometrium to the perimetrium.
- The most common presenting sign of these two anomalies is trimester bleeding.



3. Placenta Previa:

- The blastocyst is implanted close to or overlying the internal uterine os.
- It is associated with late pregnancy bleeding.
- Delivery is through Cesarean section.

#Fate of the placenta

The strong uterine contractions that continue after birth compress uterine blood vessels to limit bleeding & cause the placenta to detach from the uterine wall **(within 15 minutes after birth of the infant).**

What is it ?

- Fetomaternal structure
- Begins forming at 4th Month
- full term (500-600)g.

Function

- Exchange of O2, CO2

Transfer of

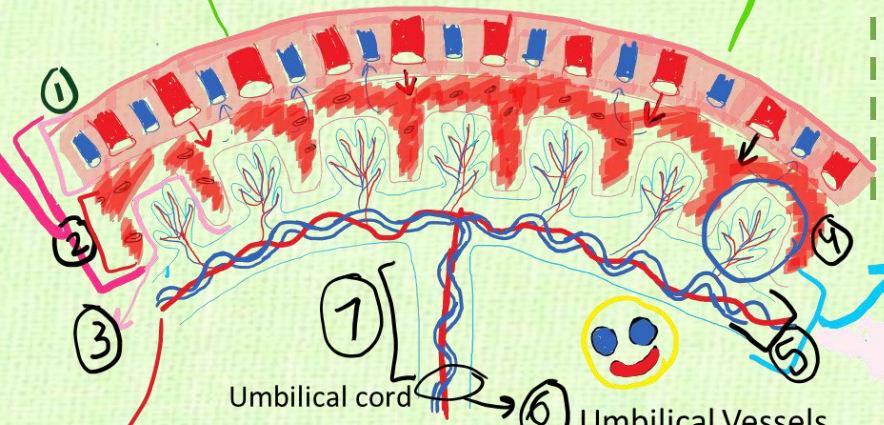
- Nutrients and Electrolytes
- Maternal Antibodies
- Drugs and its Metabolits
- Hormones
- Waste produces

Maternal part

Formed from:

Decidua Basalis

1. Endometrium
   80 –100 spiral endometrial arteries
2. Intravillius space
   large blood filled spaces that is filled and drained by endometrial vessels
3. Stem villius of **Cotyledon**
   15 –20 ones separated by a placental septa
   Resive 80 –100 spiral endometrial arteries



Umbilical cord

6. Umbilical Vessels
   2 veins + one artery

5. Chorionic plate

Fetal part

Formed from:

Villous Chorion

4. chorionic villi
   Is the extension branchs of umbilical vessels

Placental abnormalities

1- Placenta Accreta

2- Placenta Percreta

3- Placenta Previa

Layers of villi

0-20wks (4 layers)	Full term pregnancy	
• Syncytiotrophoblas. • Cytotrophoblast. • Connective tissue Endothelium of fetal capillaries.	• Syncytiotrohoblast. • Connective tissue. • Endothelium of the capillaries.	**Other sites** • Syncytiotrohoblast • Endothelium of the capillaries. **Called: Vasculosyncytial**

Fate: detach from the uterine wall (within 15 minutes after birth

MCQs

1.The placenta will detach from the uterine wall within____after birth of the infant:

a. 15min.
b. 15 hours.
c. 24 hours.
d. 1 week.

2. Criteria of Maternal Surface are:

a. Rough.
b. The umbilical cord.
c. Decidua basalis.
d. A & C.

3. The placenta is formed at:

a. 1sh Week
b. 4th Week
c. 4th month
d. 5th month.

5. Which of the following is true regarding (Placenta previa):

a. No associated bleeding
b. Abnormal absence of chorionic villi
c. Delivery is through Cesarean section
d. A & B.

6. Which of the following layers disappear at full term placenta:

a. Endothelium of fetal capillaries.
b. Connective tissue of the villus.
c. Syncytiotrophoblast
d. Cytotrophoblast

1. A
2. D
3. C
4. C
5. D

Done by:

Embryology team 434

Thank you for checking our team
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