PLACENTA

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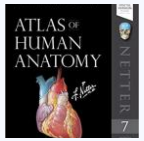
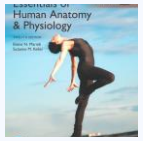
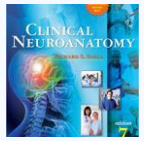
RESOURCES



Atlas of Human Anatomy
by Frank Netter



Essential of Human Anatomy & Physiology
by Elaine Marieb and Suzanne Keller



Clinical Anatomy
BY Richard Snell

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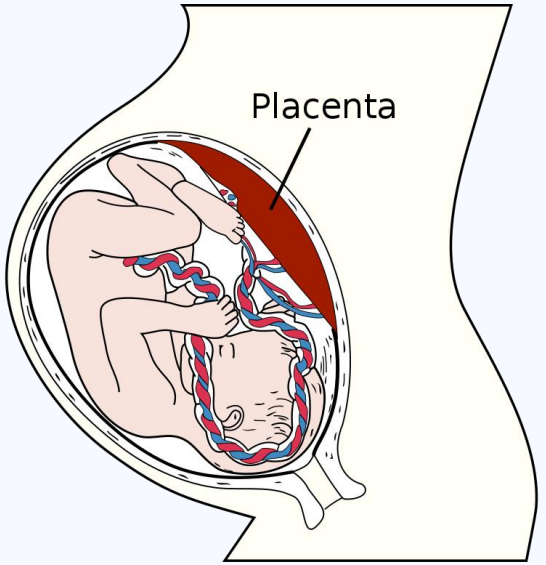
INTRODUCTION

- It is a fetomaternal structure.
- Formed by the beginning of the 4th month.
- It is the primary site for exchange of gases and nutrients between mother and fetus.



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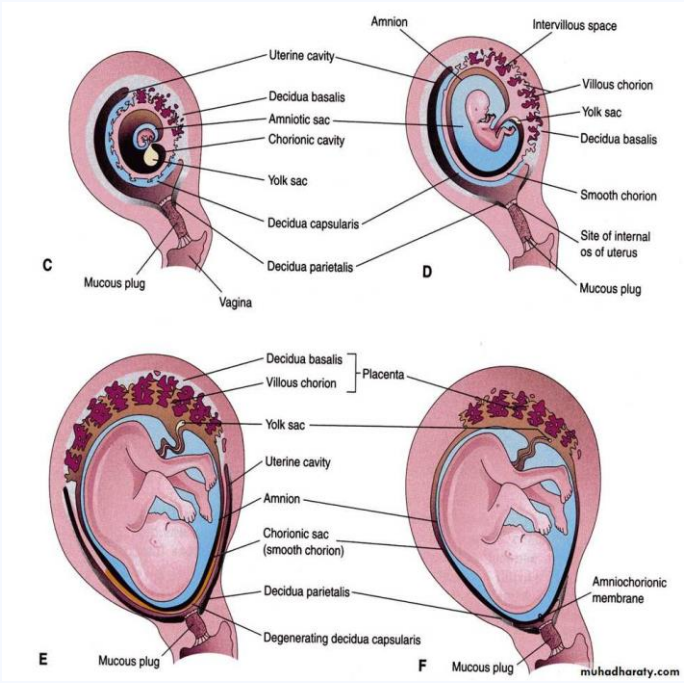
FULL TERM PLACENTA

- Discoid in shape.
- Weighs (500 – 600)g.
- Diameter 15-25 cm.
- Thickness 2-3 cm.
- Umbilical cord is attached to the center.
- It has two surfaces:
  - Fetal
  - Maternal

FORMATION

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



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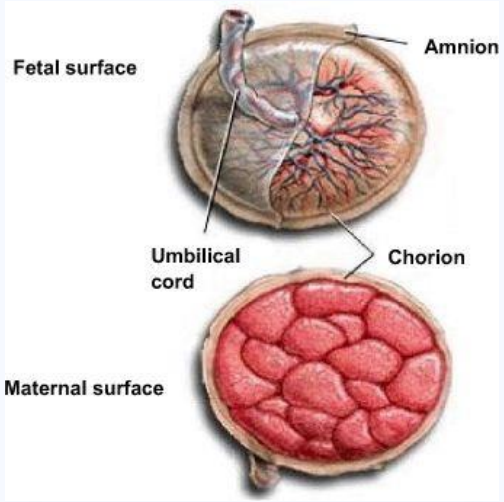
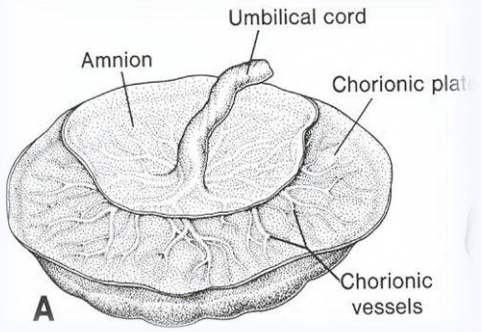
SURFACES

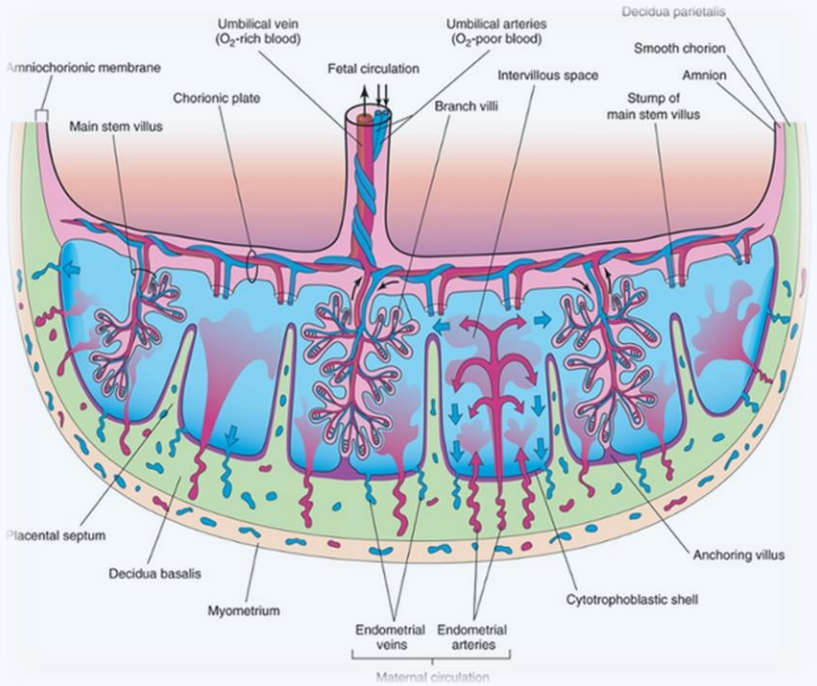
- **FETAL SURFACE**
  - Smooth because it is covered with the amnion.
  - The umbilical cord is attached to its center.
  - The chorionic vessels are radiating from the umbilical cord.
- **MATERNAL SURFACE**
  - Rough.
  - Formed of (15 –20) irregular convex areas (Cotyledons) which are separated by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





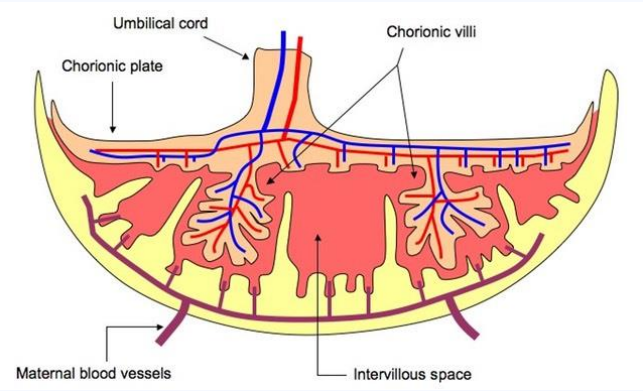
STRUCTURE OF COTYLEDON

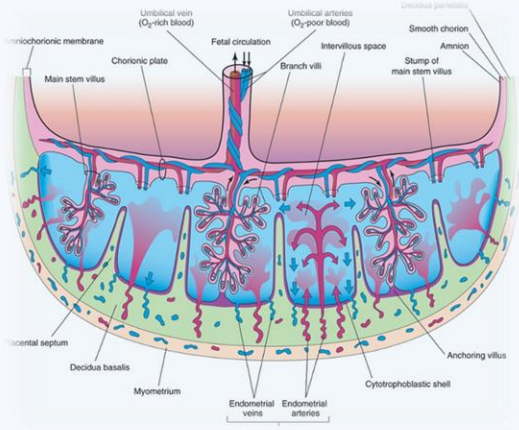
- It consists of two or more stem villi with their many branch villi.
- It receives (80-100) maternal spiral arteries that enter the intervillous spaces at regular intervals.



INTERVILLOUS SPACE

- 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.
- Both arteries and veins pass through pores in the cytotrophoblastic shell.





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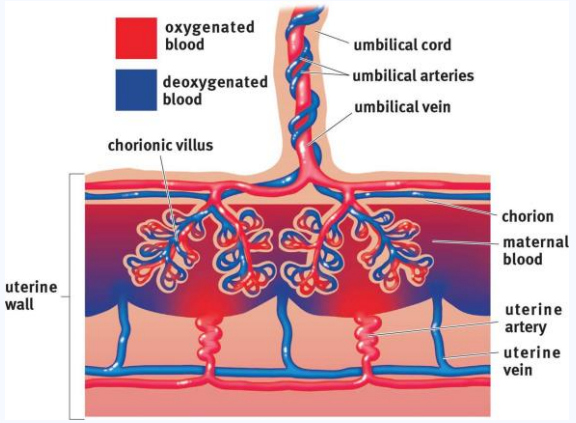
FETAL PLACENTAL CIRCULTION

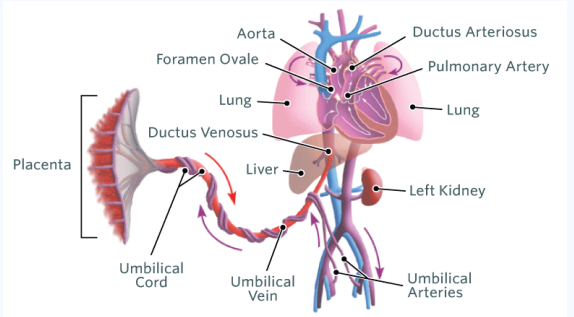
- Two Umbilical Arteries:
  - Carry poorly oxygenated blood from the fetus to the placenta.
  - Within the branch chorionic villi, they form:

  ❑ **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.**





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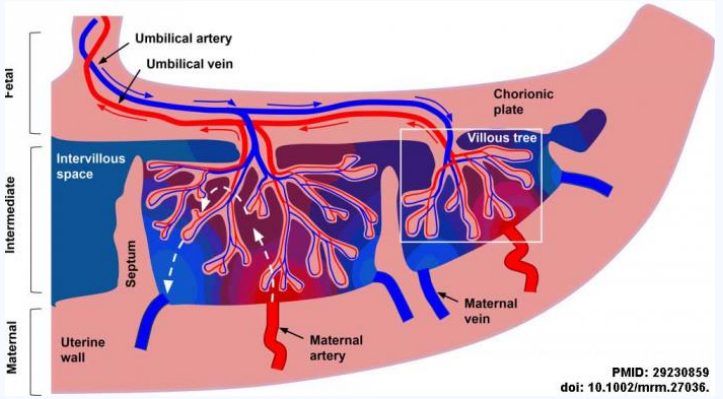
MATERNAL PLACENTAL CIRCULTION

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



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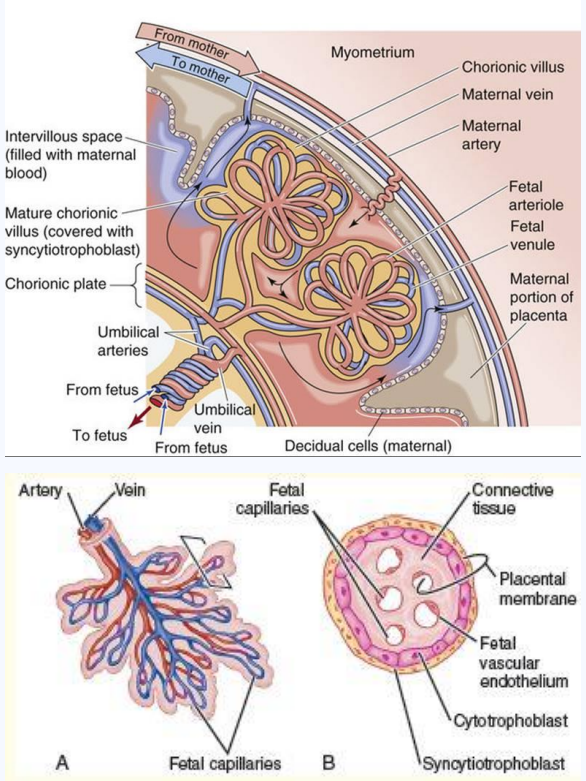
PLACENTAL MEMBRANE

- It is a composition of thin membrane of extra fetal tissues which separates the fetal and maternal bloods.
- Up to (20) weeks, it is composed of four layers:
  - Syncytiotrophoblast.
  - Cytotrophoblast.
  - Connective tissue of the villus.
  - Endothelium of fetal capillaries.
- At full term it becomes thinner and composed of three layers only:
  - Syncytiotrohoblast.
  - Connective tissue.
  - Endothelium of the capillaries.
- At some sites, the syncytio comes in direct contact with the endothelium of the capillaries and forms vasculosyncytial placental membrane.



FUNCTIONS

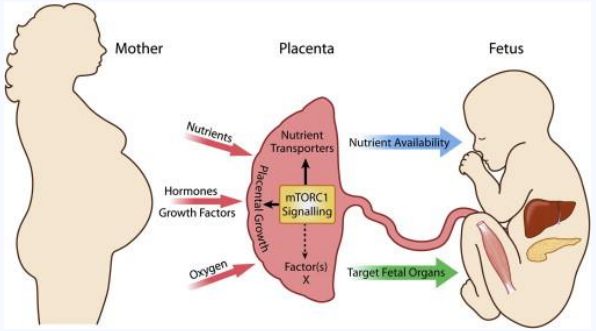
- **Metabolic**
  - Synthesis of Glycogen, Cholesterol and Fatty Acids.
  - They supply the fetus with nutrients and energy.

- **Transportation**

  - Gases:
    - Exchange of O2, CO2 and CO is through simple diffusion.
    - The fetus extracts (20 –30) ml of O2/minute from the maternal blood.

  - Nutrients and Electrolytes:
    - Water, Amino acids, Carbohydrates, Vitamins and Free Fatty Acids are rapidly transferred to the fetus.

  - Maternal Antibodies:
    - Maternal immunoglobulin G gives the fetus passive immunity to some infectious diseases (measles, small box) and not to others (chicken box).



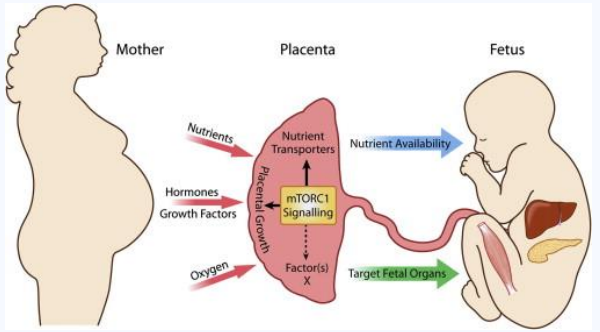
FUNCTIONS

- **Transportation (Cont.)**

  - Drugs and Drug metabolites:
    - They cross the placenta by simple diffusion.
    - They can affect the fetus directly or indirectly by interfering with placental metabolism.

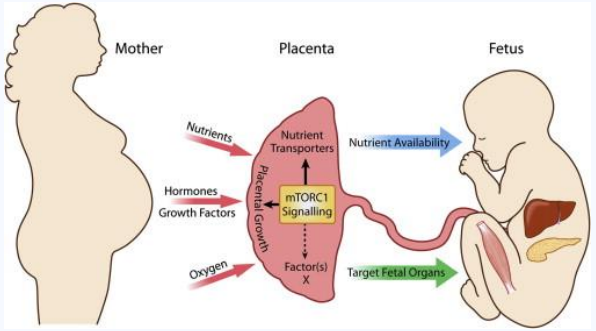
  - Hormones
    - Protein hormones do not reach the embryo in sufficient amounts.
    - Some of these hormones (Thyroxine & Testosterone which may cause masculinization of a female fetus) can cross the placental membrane.

  - Waste products:
    - Urea and uric acid pass through the placental membrane by simple diffusion.



FUNCTIONS

- **Endocrine Synthesis**
  - Progesterone:
    - Maintains pregnancy if the corpus luteum is not functioning well.
  - Estrogen:
    - Stimulates uterine growth and development of the mammary glands.
  - hCS or Hpl:
    - Human placental lactogen (human chorionic somatomammotropin) a growth hormone that gives the fetus the priority on maternal blood glucose.
    - It promotes breast development for milk production.
  - hCG:
    - Human chorionic gonadotropin maintains the corpus luteum and used as indicator of pregnancy.

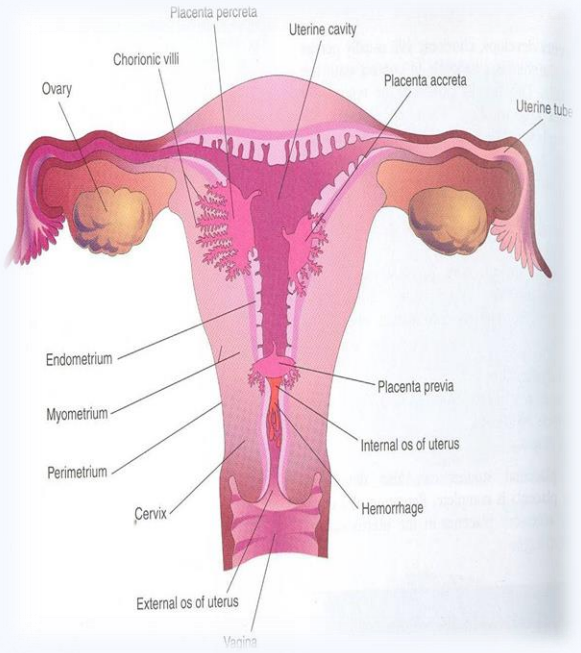


DRUG ADDICTION

- 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.

ANOMALIES OF PLACENTA

- Placenta Accreta:
  - Abnormal absence of chorionic villi with partial or complete absence of the decidua basalis.
- Placenta Percreta:
  - Chorionic villi penetrate the myometrium to the perimetrium.
  - The most common presenting sign of these two anomalies is trimester bleeding.
- 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.



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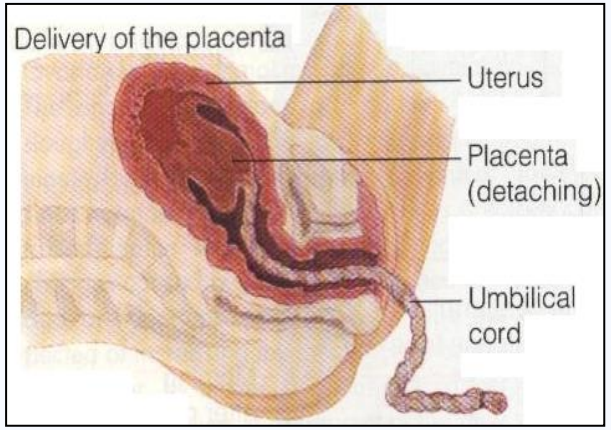
FATE OF PLACENTA

- 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).



QUESTIONS?

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