

## FORMATION OF HUMAN PLACENTA AND FUNCTIONS

Human being is viviparous animal so the developing embryo must be nourished with adequate amount of nutrient during development. This is possible due to the development of a tissue bridge between the foetus and the mother. This tissue bridge is the placenta.

Before understand the structure and formation of placenta one should have a knowledge about the extra-embryonic membranes (Fig-1). These membranes are – Yolk sac, Allantois, Amnion and Chorion.

**Yolk sac-** It accommodates the yolk or the reserve food material of the developing embryo and supply nutrient during the development. In mammal this is very much reduced.

**Allantois-** It is a bag like structure develops from the extra –embryonic splanchnopleure. It stores the excretory material produces during embryonic development. It is also rudimentary in mammal and in some it takes part in placenta formation.

**Amnion-** This membrane completely surrounds the embryo except the place of origin of yolk sac. This membranous bag remains full with a fluid called amniotic fluid. This fluid prevent the embryo from external choke. In human it takes part in placenta formation.

**Chorion-** It is the outer most covering originated from embryonic somatopleure and provides the overall protection to the developing embryo. It takes part in the placenta formation in all mammals.

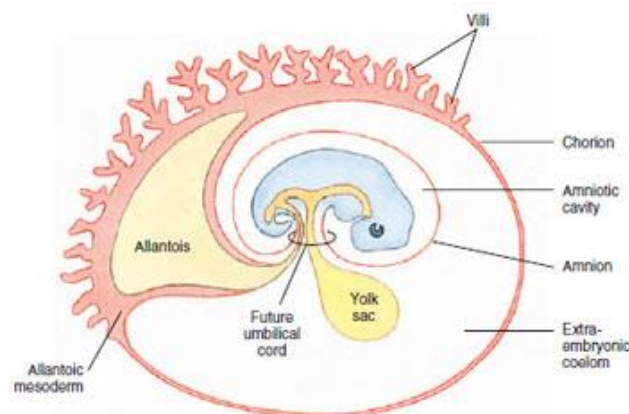


Fig. 1- Extra- embryonic membranes in Mammal with chorionic villi

**Formation of Human placenta-** After implantation the embryo gets attached to the endometrial tissue of the uterus. The maternal tissue form the **deciduas basalis** , which is a vascularised, eroded and compact layer. The foetal tissue also form a layer, the **chorionic frondosum** with villi.. The chorionic trophoblast by virtue of its semipermeable nature control the distribution of substances between the maternal and foetal tissue. The placenta is made up of villi of two layers of tissues – the chorionic membrane of foetus and the deciduas basalis of maternal tissue , separated by a blood sinus- the intervillous space- occupied by

large number of finger like structures arises from the chorionic membrane, called chorionic villi.

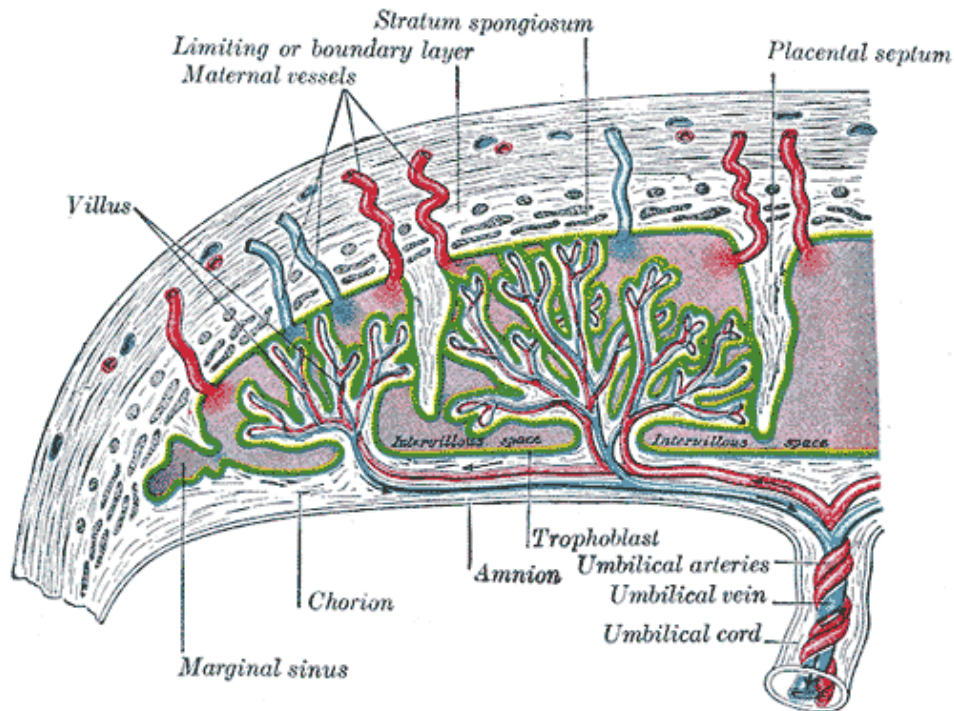


Fig.2 - Mammalian placental layers

The chorionic trophoblast is supported by blood vessels, arises from umbilical cord. The developing amnion at the end of second month comes in contact with the chorion at every point of the villi and thus attached with the foetal membrane of placenta and retain during the pregnancy. Soon the villi turn more complex, forming anchoring villi and mixed with the eroded surface of deciduas basalis. The inter villous space enlarges by forming blood sinuses bounded by chorionic villi. The intervillous space lined by trophobalst later on replaced by fibrinoid material.

From the maternal tissue side deciduas basalis composed of two layers of endometrial tissue- one is compact towards trophoblast and the other is loose spongy towards uterine wall. The compact layer incorporated with placenta to form basal plate. The basal plate incorporated with number of uterine arteries which are highly branched.

Depending on the mode of origin the human placenta is Allantoic placenta ,ie. along with chorion, the allantoic membrane also take part in the placental villi formation. Further it is a deciduate placenta, where the union between chorion and uterine mucosa or the endometrium is much more intimate.

- Egg laying animals are called **Oviparous** and the animals those give birth of young ones are called **Viviparous**.
- Animals having amniotic membrane in embryonic stage are called **Amniotes** (Reptiles, birds and mammals).
- **So, you think yourself –is it true that all mammals are Viviparous?**

### **Functions of Placenta-**

Placenta perform several functions, which can be briefly describe as-

1. **Supply of nutrient-** mammalian egg is microlecithal or alecithal, almost no yolk is present. So, placenta provides the required nutrition directly from the mother.
2. **Gaseous exchange-** The gaseous exchange, ie. supply of oxygen to the embryo and elimination of carbon dioxide occur via placenta.
3. **Elimination of metabolites-** excretory products produced in the developing embryo is eliminated via placenta.
4. **Secretion of hormone-** Placenta secret some hormones which are very important for the maintenance of pregnancy. They are human chorionic gonadotrophin (HCG), progesterone and estrogens.
5. **Act as barrier-** Placenta plays an another very important function that it does not allow the passes of some pathogen and other antigens to go through the placenta to foetus.