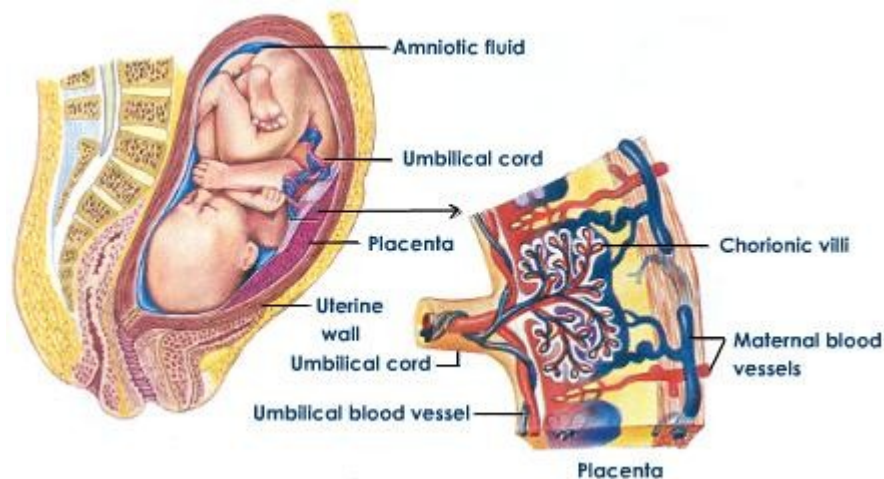


Placenta

Placenta is the mechanical and physiological connection between foetal and maternal tissues for the nutrition, respiration and excretion of the foetus.

The surface of the blastocyst gives rise to finger - like outgrowths called chorionic villi which penetrate into depressions on the wall of the uterus called crypts.

The intimate connection between the foetal membranes and the uterine wall is known as placenta. The part of the placenta contributed by the foetal (chorion) membranes of the foetus is called the foetal placenta and that contributed by the uterine wall of the mother (deciduabasalis) is called the maternal placenta. The degree of intimacy between the foetal placenta and maternal placenta is so strong, that, eventually the blood vessels of the chorionic villi are literally bathed in the mother's blood. This type of placenta is known as haemochorial placenta.



Foetal Membranes and Placenta

In the placenta, the foetal blood comes into close contact with the

maternal blood, resulting in exchange of materials. Food and oxygen pass from the maternal blood into the foetal blood and the wastes from the foetus pass into the maternal blood.

There is no mixing up of maternal and foetal blood. The umbilical cord connects the foetus to the placenta.

Functions of Placenta

- Nutrition

Placenta helps to transport nutrients from maternal blood into foetus

- Respiration

It helps in getting oxygen from the maternal blood into the foetus and CO₂ from foetus blood into the maternal blood.

- Excretion

Nitrogenous waste products produced in the embryo diffuse through the placenta into the maternal blood stream.

- Immunity

Antibodies developed in the mother against certain diseases like measles, small pox, diphtheria pass from mother into the foetal blood through the placenta.

- Transport of pathogens

Pathogenic organisms like viruses diffuses through the placenta. Viruses causing syphilis, measles, rubella, small pox may infect the foetus, if the mother gets the disease during pregnancy. Some of these diseases may even cause congenital deformities.

- Transport of drugs

Some of the drugs taken by the mother during pregnancy cross the placental barrier and may even cause developmental deformities.

E.g., The drug thalidomide used to avoid nausea and morning sickness during early pregnancy by some women resulted in the child born to such mothers to have deformities in the limb development and heart. The children had flipper like limbs, a condition called as phocomelia.

Children born to drug addicts, are born with addiction and withdrawal symptoms.

- Storage

Placenta stores some fats, glycogen and iron.

- Secretion of hormones

Placenta secretes many hormones like 1- estrogen, 2- progesterone, 3- human chorionic gonadotropin (hcg) 4- chorionic somatomammotropin (hcs) 5- placental corticotrophin-releasing hormone (placenta CRH) , thus functioning as an endocrine gland.

Endocrine Functions

One of the critical functions of the placenta is to produce the steroid hormone progesterone. As its name implies, it is the hormone that allows the continuation of pregnancy. In humans, this hormone is initially made by the corpus luteum (of the ruptured ovarian follicle), but after the 4th month of pregnancy, it is mostly the progesterone made from the trophoblast that allows the maintenance of pregnancy. Progesterone prevents the uterine muscles from contracting and aids in the differentiation of the mammary glands that will produce the milk necessary for the infant.

During the initial stages of pregnancy, the corpus luteum is instructed to produce progesterone (and estrogen) by human chorionic gonadotropin (hCG) which is similar to LH in its effect ;secreted by the syncytiotrophoblast portion of the placenta. This is the compound that is measured in pregnancy tests and is an excellent way to monitor early pregnancy.(detected as early as 6 d after conception in blood and 14d in urine)

| Chorionic somatomammotropin(hcs) is similar to growth h and prolactin h ; made by the syncytiotrophoblast (and the cytotrophoblast). It acts to enhance fetal growth and at the same time, prepares the mammary gland for milk production.

Placenta CRH-is belived to be essential for timing of onset of labour(parturition)

Materno-Fetal Exchange of Nutrients and Gasses

The oxygen/carbon dioxide exchange in the placenta is mediated by hemoglobin. Fetal hemoglobin binds to oxygen more avidly than adult hemoglobin, so there is a net transfer of oxygen from the mother to the fetus. Carbon dioxide from the fetus will take up the site in the hemoglobin of the maternal blood, and it will be exhaled in the lungs.

Simple diffusion down concentration gradients is responsible for the transport of non-polar molecules and fat-dissolvable substances such as fats and alcohol. Water, a strongly polarized molecule, cannot transverse the cell membrane. It crosses the placenta through specialized pores called the aquaporines that are formed by specialized proteins in the plasma membrane.

Active transport is critically important in getting nutrients into the fetus. Glucose is the major source of energy to the fetus. It is transported across the placenta by facilitated diffusion via [hexose transporters](#). Although the fetus receives large quantities of glucose, much of it is oxidized within the placenta to lactic acid, which is used for fetal energy production.

Since the concentrations of some amino acids are higher in the fetal blood than in the maternal circulation, these amino acids need to be transported into the fetus by active transport mechanisms. At least 10 sodium-dependent amino acid transporters have been found in human placenta. There is also substantial metabolism of some amino

acids as they cross the placenta.'

