Hello and welcome to this session. I am Sheena Paul, teaching at Government College of Arts, Science and Commerce, Quepem. The name of this module is Functions of Placenta, which is a part of Unit 4: Late Embryonic Development of the Developmental Biology paper of semester six in the subject of Zoology.
The outline of this module includes the functions of placenta, the nutritive function respiratory function excretory function, enzymatic function, endocrine function, storage function, barrier function and the negative functions played by the placenta.
At the end of this module, students would be able to enlist the various functions performed by the placenta and describe these functions of the placenta in detail.

In the previous two modules we talked about what is placenta and what are the different types of placentae based on various factors of classification. Today we will be talking about the functions of the placenta.
Placentation is actually a mechanism by which the foetal and maternal circulations are brought in very close contact to carry out various functions such as respiration, excretion and nutrition of the foetus. However, there is no direct mixing of the maternal and the foetal blood. The exchange of substances between the maternal bloodstream and the foetal bloodstream occurs through the placenta, which acts as a semipermeable membrane. This exchange of substances is brought about by simple diffusion, active transport, pinocytosis, etc.
Let us go on to the first and one of the most important functions played by the placenta. In case of mammals, the eggs. or the ova are supplied with very little amount of yolk, which is completely insufficient to meet the energy requirements of the developing ova. Therefore, the foetus depends on the nutrients which is made available to it from the maternal bloodstream. Now, different types of nutrients are absorbed from the maternal bloodstream into or diffused from the maternal bloodstream into the foetal bloodstream by many different methods. For example, glucose, water and water-soluble vitamins, electrolytes, hormones. are obtained or a passed from the maternal bloodstream, into the foetal blood stream by the process of diffusion whereas amino acids and minerals entered the foetal bloodstream by active transport. Lipids, triglycerides, fatty acids, and cholesterol are either built up within the placenta itself and then transferred into the foetal bloodstream or they're absorbed by direct transfer from the maternal blood into the foetal blood. Macromolecules such as antibodies, vitamin B12, are taken by the placenta by receptor mediated endocytosis.
The next function that is performed by the placenta is exchange of gases. Oxygen from the maternal blood diffuses into the foetal blood stream. Similarly, carbon dioxide from the foetal bloodstream passes into the maternal bloodstream by the process of diffusion, which is then expelled out through the mother’s lungs.
The next function performed by the placenta is removal of nitrogenous waste from the foetal bloodstream. The waste products, such as urea, uric acid creatinine which are formed within the foetal body as a part of metabolic activities are excreted into the maternal bloodstream by the process of simple diffusion. These nitrogenous wastes are then carried out to the kidneys of the mother from where it is eliminated, along with her own nitrogenous waste products.

The placenta also performs enzymatic function. Numerous enzymes which are needed for the protection and normal development of the foetus, such as diamine oxidase and oxytocinase are produced by the placenta and then transferred into the bloodstream of the foetus.

Placenta also has an endocrine function. It secretes a variety of hormones in case of rats, it secretes progesterone, which is necessary for the pregnancy to continue to term and rat chorionic mammoluteotrophin, which is responsible for the maintenance of corpus luteum. In case of human beings, a variety of hormones, which are proteinaceous in nature, such as human chorionic, gonadotrophin, human placental lactogen and human chorionic thyrotrophin as well as steroid hormones in the form of oestrogen and progesterone are secreted by the placenta.

Placenta also serves as a storage organ. It helps in the storage of a variety of materials such as fats, glycogen, and iron, which would be made available into the foetal blood stream as and when required.

The placenta also plays a barrier function. The antibodies against certain diseases, such as diphtheria, smallpox, scarlet fever, which are present in the maternal bloodstream are passed from the maternal blood pool into the foetal blood pool, which gives the foetus passive immunity.

Now all these that we listed above were the positive functions that were played by the placenta. But in addition to this, the placenta also can perform certain negative roles. For example, certain pathogenic organisms can diffuse through the placenta from the mother's bloodstream into the foetal blood stream. Viruses such as rubella, which causes Rubella. Chicken box, Measles, Mumps, Polio and a host of other diseases can be transmitted to the foetus if the mother is infected during her pregnancy period. These viruses would then cause harm to the developing foetus.

Similarly, in addition to viruses, even any drugs that are taken by the mother during the pregnancy can cross the placental barrier and cause harmful effects on the growing foetus. For example, in case of human beings, a drug which was called as thalidomide was taken by pregnant women and this drug would prevent the nausea feeling that is common during the early pregnancy months. But this drug while it removed the nausea feeling was later found to be a teratogen. It crossed the placental barrier and entered into the foetal bloodstream and caused serious deformities in the foetus. It messed up the formation of the long bones of the body. There was non perforation of arms and the heart was formed in a defective manner. The children born of these ladies who had taken this drug instead of arms and legs had small flipper like appendages. this disease is called as phocomelia, and these babies were called as thalidomide babies.

Drugs such as quinine, aspirin, ionizing radiations of X rays, alcohol and smoking also are found to be teratogens which can be transmitted from the mother's bloodstream to that of the foetus through the placenta.

So, these are the negative roles that is played by the placenta.

These are the references that I have used in the making of this module. Thank you.