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Placental metabolism and disease

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Editorial

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Introduction

The placenta is recognised as an organ that plays a vital role as a metabolic and a physical barrier in the foetoplacental unit. Several metabolic substrates and other molecules cross the placenta from the mother to the foetus and vice versa. This physiological phenomenon is considered as a mechanism of communication between the mother and the foetus. The exchange of metabolic signals between the mother and the foetus is mutually beneficial and secures the development and growth of the foetus as well as the wellbeing of the mother during and after pregnancy. The primary cell types in the placenta are trophoblasts (which form the syncytiotrophoblasts) as well as the vascular endothelium and smooth muscle (forming the placental macrovascular and microvascular net). The architecture of these cells in the placenta imposes structural and metabolic barriers for the transfer of metabolic substrates (e.g. oxygen, D-glucose, amino acids and vitamins), hormones (e.g. thyroid hormones), toxins (e.g. carbon dioxide) and waste material. It is also an organ that transfers immunity and releases hormones (e.g. oestrogen, progesterone, placental lactogen and placental variant growth hormone (GH-V)) [1] and extracellular vesicles including nanovesicles (i.e. exosomes) into the foetal [2] and maternal [3] circulation.

Pregnancy is a physiological phenomenon that could initiate in healthy women, thus leading to a healthy pregnancy and a healthy newborn and mother. However, women who