

Phospholipid Transfer Protein in the Fetal and Maternal Circulation

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Phospholipid transfer protein (PLTP) plays an important role in plasma lipoprotein metabolism, in particular in the modulation of high density lipoproteins (HDL) and reverse cholesterol transport. This secretory glycoprotein facilitates tissue transfer and exchange of phospholipids, unesterified cholesterol, alpha tocopherol, and other amphipatic molecules between lipoprotein particles. PLTP is expressed in a variety of cell types and tissues including the placenta and has been shown to be regulated by farnesoid (FXR) and liver X (LXR) nuclear receptors as well as by interactions with different subclasses of lipoproteins in plasma. Despite its positive effects on HDL metabolism, PLTP activity and mass have been reported to be elevated in type 2 diabetes and in insulin-resistance, and this elevation is frequently associated with hypertriglyceridemia and obesity.

Reports on very high PLTP mRNA expression levels and a much higher activity in the human placental trophoblastic BEWO cell line than in other cell types imply an important role of PLTP in the placenta. This together with the important role of HDL and LXR regulation in maternal-fetal cholesterol transfer across placental endothelial cells, prompted us to investigate the function of PLTP at the fetoplacental endothelial barrier. PLTP expression in isolated arterial and venous fetal term placental endothelial cells (HPEC) was analyzed on protein and mRNA level. PLTP activity in supernatants of cultured HPEC was determined and possible changes of the activity under simulated diabetic conditions or treatment with the LXR agonist 24(S)-hydroxycholesterol were investigated. Furthermore, we measured PLTP activity in fetal and maternal sera from gestational diabetic pregnancies and normal controls. Fetal sera showed a significantly lower PLTP activity as compared to maternal sera, while no difference was observed between gestational diabetic and normal sera. Further investigation into this topic may clarify the role of PLTP in the placenta and thus its importance in the fetal and maternal circulation in health and disease.

