Title: Aspects of placental growth hormone physiology

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The ph.d.-study was conducted at the Gynaecological/Obstetrical Research Laboratory, in cooperation with the Medical Research Laboratories, Aarhus University Hospital. The aim of the study was to scrutinise basal aspects of placental growth hormone (PGH) physiology with special attention to diabetic pregnancies. The ph.d.-dissertation is based on laboratory and clinical studies and gives an up-to-date review on the physiology of human placental growth hormone (PGH) in normal and pathological pregnancies.

PGH is synthesised in the placental syncytiotrophoblast. The PGH bears very high similarities to pituitary growth hormone (GH) and human placental lactogen, and many aspects of the potential effects of PGH has been deduced from its similarity to GH. PGH is found only in the maternal circulation, it is present in detectable concentrations from early first trimester and maximum concentrations are reached in the last weeks of pregnancy. It appears that PGH regulates the serum levels of insulin-like growth factors (IGFs), and PGH levels also correlate with the birth weight of the newborns. Conversely, the maternal body mass index is inversely correlated to PGH levels during pregnancy. Both *in vitro* and *in vivo* low glucose levels are a stimulus for PGH secretion. A role for glycerol was suggested in *in vitro* studies, further linking PGH to maternal energy metabolism. Therefore, PGH may be involved in regulating the amount of nutrients available for placental extraction in the maternal circulation. These mechanisms may be shunted by, when there is an abundance of caloric compounds in the maternal blood, as e.g. in obesity.

Growth hormone binding protein (GHBP) has the same affinity for GH and PGH and serves as the transport protein in maternal blood. However, GHBP is known to influence GH measurements, and a similar effect was observed in PGH assays. In contrast to GH assays, prolongation of incubation times did not correct the GHBP impact.

Increased GH levels as in acromegaly are accompanied by insulin resistance and diabetogenic effects of PGH in pregnancy have therefore been postulated. Animal experiments have been suggestive of such effects, whereas studies in humans have been unable to find consistent evidence for diabetogenic effects of PGH. In type 1 diabetes mellitus, PGH behaved as in normal pregnancies, and positive associations between IGFs and birth weights were found. Insulin requirements, though, did not correlate to PGH levels, indicating that PGH was not a major contributor to the development of the insulin resistance of pregnancy in type 1 diabetes.

The perspectives of the present thesis will be to open up for research on PGH in relation to the maternofoetal energy metabolism. Especially, the impact on adipose tissue metabolism deserves attention in future studies.