Differential regulation of genes for fetoplacental lipid pathways in pregnancy with gestational and type 1 diabetes mellitus.


Radaelli T, Lepercq J, Varastehpour A, Basu S, Catalano PM, Hauquel-De Mouzon S.

Department of Reproductive Biology, MetroHealth Medical Center, Case Western Reserve University, Cleveland, OH 44109, USA.

**Abstract**

**OBJECTIVE:** Changes in metabolic homeostasis in pregnant diabetic women are potential determinants of increased adiposity of the fetus. The aim of this study was to characterize diabetes mellitus-induced changes in genes for fetoplacental energy metabolism in relation to fetal adiposity.

**STUDY DESIGN:** Placentas of women with type 1 diabetes mellitus, gestational diabetes mellitus (GDM), or no complications were analyzed by microarray profiling. The pattern of gene expression was assessed in primary placental cell cultures.

**RESULTS:** Diabetes mellitus was associated with 49 alterations in gene expression at key steps in placental energy metabolism, with 67% of the alterations related to lipid pathways and 9% of the alterations related to glucose pathways. Preferential activation of lipid genes was observed in pregnancy with GDM. Type 1 diabetes mellitus induced fewer lipid modifications but an enhancement of glycosylation and acylation pathways. Oleate enhanced expression of genes for fatty acid esterification and the formation of lipid droplets 3 times as much as glucose in cultured placental cells.

**CONCLUSION:** These results point to fatty acids as preferential lipogenic substrates for placental cells and suggest that genes for fetoplacental lipid metabolism are enhanced selectively in GDM. The recruited genes may be instrumental in increasing transplacental lipid fluxes and the delivery of lipid substrates for fetal use.