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Title: New model of human placental co-culture to evaluate the effects of food contaminants on placental barrier

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The placenta, located at the interface between the maternal and the fetal sides, plays a crucial role in nutrient exchanges, endocrine function and immunity. This organ is sensitive to maternal environment (nutrition, metabolism, pollutants...), which can disrupt placental functions leading to disturbance of fetal development, fetal growth and long-term effects on offspring phenotype. To limit the use of animal experiments to study the effects of food contaminants or other molecules on the placental function, it seems crucial to develop cellular models to evaluate their transfer and their effects on placental endocrine function.

Our aim was to develop a method of co-culture using human term placenta, to be close to *in vivo* placental barrier, including mesenchyme and trophoblastic cells, in a transwell[®] system.

The method to isolate and purify mesenchyme cells from human placenta was developed using enzymatic digestion associated to percoll gradient. Cells were characterized by immunocytochemistry and cell concentration was adjusted according to cell viability using LDH measurement in the media. Layer permeability was assessed by a quantification of fluorescent sodium fluorescein molecule (Na-Flu) in both transwell[®] compartments. Trophoblastic cells were isolated from the human placenta as described Kliman et al. 1986 and the timing of trophoblastic cells adding to mesenchyme cells on the transwell[®] was determined. LDH and Na-Flu concentrations were measured associated to the production of the human Chorionic Gonadotropin, an hormone which reflects the functionality of trophoblastic cells.

Establishment of this co-culture system allows us to investigate the effects of food additives containing nanoparticles on placental barrier. Work is ongoing to explore the placental transfer and endocrine function using gold-nanoparticles at different sizes and doses.

Kliman HJ, Nestler JE, Sermasi E, Sanger JM, Strauss JF 3rd. Purification, characterization, and in vitro differentiation of cytotrophoblasts from human term placentae. *Endocrinology*. 1986 Apr;118(4):1567-82.