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Is the human placental barrier protective towards environmental exposures?
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Fetal exposures to environmental and medicinal products may impact the growth of the fetus (e.g. cigarette smoke) and development of organs (e.g., methylmercury and thalidomide). Perfusion studies of the human term placenta enable investigation of placental transport of chemical substances between the mother and fetus. Dual perfusion of a single cotyledon in the human placenta can contribute to a better understanding of the placental barrier, transport rate and transport mechanisms of different substances and the placental metabolism of these substances. Examples of substances with passive transport are antipyrene, benzoic acid and caffeine, while glyphosate, selected phthalate monoesters and benz(a)pyrene pass to a lesser extent. The human placental structure is unique compared to most other species, and a human placenta perfusion system has recently been established in Copenhagen to represent a supplement and alternative to animal testing, thus bypassing the animal to human extrapolation.

Placentas are readily obtainable from most births upon informed consent from the mothers and are considered a promising tissue alternative/supplement to animal experiments. The system also allows for the analysis of levels of compounds in umbilical cord blood, maternal and paternal blood providing useful samples for biomonitoring studies of families. The placental perfusion will be further developed and validated in integrated projects of ReProTect and Newgeneris and provide data on transport of substances which will be fed into the ReProTect workpackage exploiting data for QSAR considerations.