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Human placental passage of phthalate monoesters

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The transplacental passage of monomethylphthalate (mMP) and mono (2-ethylhexyl) phthalate (mEHP) was studied using an ex-vivo placental perfusion model with simultaneous perfusion of fetal and maternal circulation in a single cotyledon. Umbilical cord blood and placental tissue collected both before and after perfusion were also analyzed. Placentas were obtained immediately after elective Caesarean section and dually perfused in a recirculation system. mMP or mEHP was added to maternal perfusion medium to obtain concentrations at 10 µg/L and 25µg/L, respectively. The placental transfer
was followed analyzing samples from fetal and maternal perfusion media by LC-MS-MS.

Four perfusions with mMP indicated a slow transplacental transfer with a feto-maternal ratio (FM ratio) of 0.30 ± 0.03 after 150 minutes of perfusion. Four perfusions with mEHP indicated a very slow or non-existing placental transfer. mEHP was only detected in fetal perfusion media from two perfusions giving rise to FM ratios of 0.088 and 0.20 after 150 minutes of perfusion. Detectable levels of mMP, mEHP, monoethylphthalate (mEP), and monobutylphthalate were found in tissue. Higher tissue levels of mMP after perfusions with mMP compared to perfusions with mEHP suggest an accumulation of mMP during perfusion. No tendency for accumulation of mEHP was observed during perfusions with mEHP compared to perfusions with mMP. Detectable levels of mEHP and mEP were found in umbilical cord plasma samples. mMP and possibly other short-chained phthalate monoesters in maternal blood can cross the placenta by slow transfer, while the results indicate no placental transfer of mEHP. Further studies are recommended.