In vivo investigation of the placental transfer of $^{13}$C-labeled fatty acids in humans
(In vivo-Untersuchung des plazentalen Transfers von $^{13}$C-markierten Fett säuren beim Menschen)

Cord blood shows higher percentages of long-chain polyunsaturated fatty acids than maternal blood, which agrees with the assumed importance of long-chain polyunsaturated fatty acids for pre- and postnatal infantile development. As the mechanism for the enrichment of these fatty acids on the fetal side of the placenta are not fully understood yet, we compared placental transfer of different fatty acids in humans in vivo using stable isotopes.

**Subjects and Methods:** Four pregnant women undergoing cesarean section received four hours before delivery an oral dose of uniformly labelled $^{13}$C-palmitic acid (PA), $^{13}$C-oleic acid (OA), $^{13}$C-linoleic acid (LA) and $^{13}$C-docosahexaenoic acid (DHA). Maternal blood was collected at -4 (basal), -3, -2, -1, 0 and +1 hour relative to the time of the cesarean section. At the time of birth, venous cord blood and placental tissue were collected. From tissue and plasma samples lipids were extracted and phospholipids, triglycerides and non esterified fatty acids (NEFA) were isolated. Fatty acid composition was determined by gas-liquid chromatography and isotopic enrichment by gas chromatography-combustion-isotope ratio mass spectrometry.

**Results:** $^{13}$C-enrichment in NEFA of cord plasma tended to be higher than in NEFA of placenta with statistically significant differences for the nonesterified OA and DHA (PA: $0.024±0.011$ APE vs. $0.001±0.001$ APE; OA: $0.042±0.008$ APE vs. $0.005±0.003$ APE; LA: $0.038±0.010$ APE vs. $0.008±0.002$ APE; DHA: $0.059±0.009$ APE vs. $0.010±0.003$ APE). The ratio of tracer fatty acid concentrations of placenta to maternal plasma was significantly higher for $^{13}$C-DHA than for the other fatty acids ($^{13}$C-PA: 7.1±1%; $^{13}$C-OA: 3.8±0.4%; $^{13}$C-LA: 9.2±1.3%; $^{13}$C-DHA: 25.9±3.4%).

**Conclusion:** These results suggest that only a part of the placental NEFA participated in fatty acid transfer and that the placenta showed a preferential accretion of DHA relative to the other fatty acids.