

## Long-chain saturated and monounsaturated fatty acids are correlated to early development in premature infants

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Nervonic acid (24:1 $\omega$ 9 NA) and lignoceric acid (24:0 LiA) increase markedly in white matter during late gestation. Oleic acid (18:1 $\omega$ 9 OA) is also a component of myelin in adults. White matter lesions associate with cognitive disturbances and cerebral palsy.

Fatty acid profile in cord blood, breast milk at 1 w and in plasma phospholipids at 1 w, 40 and 44w gestational age were analysed with GC in 51 premature infants (gestational age 24-36 w) and infants' development at 1 month (44w) with Brazelton Neonatal Behavioral Assessment Scale (BNBAS) and Bayley's Scales for Infant Development (BSID II) at 3, 6, 10 and 18 m corrected age. Multiple regression analyses included neonatal data of mothers and infants and correlations previously reported between development and omega-6 and omega-3 FA.

NA, LiA and OA decreased in infants' plasma from 1 w to 1 m corrected age, as did ratios of NA to the other FA. NA correlated to OA ( $r=0.43$ ,  $p=0.006$ ) and LiA ( $r=0.74$ ,  $p<0.0001$ ) at 1 w but at 1 m negatively to OA ( $r=-0.49$ ,  $p=0.001$ ). NA correlated to LiA/SA ratio at 1-40 w ( $\beta 0.66-0.69$ ) explaining 43-48% of NA concentration variability. At 1 m 34% of the variability of NA related to LIA/SA ratio ( $\beta 0.53$ ), including negative influence of OA/SA ratio ( $\beta -0.52$ ).

Alertness (BNBAS) correlated to OA ( $\beta 0.32$ ,  $p=0.019$ ), gestational age ( $\beta 0.27$ ,  $p=0.043$ ) and omega-6/omega-3 ratio in breast milk ( $\beta -0.30$ ,  $p=0.026$ ),  $R^2 0.34$ . Animate visual orientation correlated to LiA in plasma ( $r=0.50$ ,  $p=0.001$ ) and that and auditory orientation related also to LiA, OA and sex representing 40% of the NA variability. Infant development assessed with BSID II showed positive correlations at 6, 10 and 18 m with NA, NA/OA and NA/LiA but negative to OA. In multiple regression analyses several positive correlations were found to NA/OA and NA/LiA ( $\beta 0.31-0.41$ ,  $p=0.003-0.037$ ).

Concluding, the long-chain unsaturated and saturated fatty acids had an influence on the ability to attend in social interaction at 1 m and in assessments of mental and psychomotor development between 3 and 18 m.