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POLYMORPHISM IN THE FATTY ACID DESATURASE GENES AND DIET ARE IMPORTANT DETERMINANTS OF INFANT N-3 FATTY ACID STATUS.

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Background and objectives: Tissue docosahexaenoic acid (DHA) accretion in early infancy has been shown to be supported by the DHA-content of breast-milk and thus may decrease once complementary feeding takes over. Endogenous synthesis of DHA from alpha-linolenic acid has been shown to be very low and polymorphism in the genes that encodes the fatty acid desaturases (FADS) has little effect on DHA-status in adults. It is however unclear to what extent endogenous DHA-synthesis contributes to infant DHA-status.

Aim: To investigate the role of diet and FADS polymorphism on DHA-status at 9 months and 3 years.

Methods: This cross-sectional study with Danish infants use data from two prospective studies (EFiON and the SKOT cohort). We measured erythrocyte (RBC) DHA-status at 9 months (n=409) and 3 years (n=176) and genotyped 4 FADS tagSNPs, rs3834458, rs1535, rs174575 and rs174448 (n=401).

Information about breastfeeding was obtained by questionnaires and fish intake was assessed by 7-day pre-coded food diaries.

Results: FADS-genotype, breastfeeding, and fish intake were found to explain 25% of the variation in infant RBC DHA-status (mean±SD: 6.6±1.9% of the fatty acids (FA%)). Breastfeeding was the most important contributor and still being breast-fed at 9 months was associated with 0.8 FA% higher DHA vs. no longer breast-fed (p<0.001). Two of the examined FADS-SNPs were highly correlated (rs1535 and rs3834458; r=0.98). Homozygous carriers of the minor allele of rs1535 had an increase in RBC DHA of 1.6 FA% relative to those with wild type, whereas minor allele carriers of rs174448 and rs174575 had a decrease of 0.9 (p=0.017) and 1.9 FA% (p=0.001), respectively. Each 10-gram increment in fish intake was associated with an increase in DHA-status of 0.3 FA%. At 3 years, fish intake was the only significant determinant of DHA-status (0.2 FA%/10g).

Conclusions: FADS-genotype and diet are both important determinants of DHA-status in late infancy.

Key words: FADS-genotype, docosahexaenoic acid, fish intake, child nutrition, breastfeeding