

Role of FADS1 and FADS2 polymorphisms in polyunsaturated fatty acid metabolism.

Claudia Glaser a, Joachim Heinrich b, Berthold Koletzko a.

a Division of Metabolic Diseases and Nutritional Medicine, Dr von Hauner Children's Hospital, Ludwig-Maximilians-University of Munich, DE-80337 Munich, Germany b Institute of Epidemiology, Helmholtz Zentrum München, German Research Center for Environmental Health, DE-85764 Neuherberg, Germany.

In press: *Metabolism Clinical and Experimental* xx (2010) xxx-xxx. Available online at www.sciencedirect.com

Tissue availability of polyunsaturated fatty acids (PUFAs) depends on dietary intake and metabolic turnover and has a major impact on human health. Strong associations between variants in the human genes fatty acid desaturase 1 (FADS1, encoding Δ -5 desaturase) and fatty acid desaturase 2 (FADS2, encoding Δ -6 desaturase) and blood levels of PUFAs and long-chain PUFAs (LC-PUFAs) have been reported. The most significant associations and the highest proportion of genetically explained variability (28%) were found for arachidonic acid (20:4n-6), the main precursor of eicosanoids. Subjects carrying the minor alleles of several single nucleotide polymorphisms had a lower prevalence of allergic rhinitis and atopic eczema. Therefore, blood levels of PUFAs and LC-PUFAs are influenced not only by diet, but to a large extent also by genetic variants common in a European population. These findings have been replicated in independent populations. Depending on genetic variants, requirements of dietary PUFA or LC-PUFA intakes to achieve comparable biological effects may differ. We recommend including analyses of FADS1 and FADS2 polymorphism in future cohort and intervention studies addressing biological effects of PUFAs and LC-PUFAs.