

High Levels of Long-Chain Polyunsaturated Fatty Acids in Cord Serum Are Associated With Increased Risk of Allergy Development

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Background: Long chain polyunsaturated fatty acids (PUFAs) reduce T cell activation and dampen inflammation and might counteract the neonatal immune activation needed to induce normal tolerance development. We investigated whether levels of PUFAs in cord serum are associated with allergy development up to age 13 years.

Methods: We randomly selected cases with atopic eczema (n=40) or respiratory allergy (n=48) as well as non-allergic non-sensitized controls (n=48) from a population-based birth cohort based on their diagnosis at 13 years of age (n=794). Cord and maternal sera obtained at delivery were retrospectively analyzed for proportions of phospholipid fatty acids.

Results: Cord serum proportions of 6/8 PUFAs were higher in subjects who had respiratory allergy at 13 years of age than in non-allergic controls; the same was true of 5/8 PUFAs in subjects with eczema. The risk of respiratory allergy was directly proportional to the proportion of n-3 PUFA, n-6 PUFA, and total PUFA in cord serum (each $P_{\text{trend}} < 0.001$). Subject who by the age of 13 years had either atopic eczema or respiratory allergy had significantly lower proportions of 18:1n-9 in their cord serum phospholipids than non-allergic controls ($P < 0.001$). Kaplan-Meier estimates of allergy development demonstrated that total PUFA proportion in cord serum was significantly associated with respiratory allergy ($P = 0.02$) and sensitization ($P = 0.01$), after control for gender and parental allergy.

Conclusion: Exposure to PUFAs during immune development in early infancy may be a risk factor for allergy development. Our results put into question current recommendations for PUFA intake in pregnant women and children.