ASSOCIATION OF PRENATAL EXPOSURE TO METHYLMERCURY AND n-3 FATTY ACIDS WITH NEUROBEHAVIORAL TEST PERFORMANCE AT AGES 7 AND 10 YEARS

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Background and aims: Methylmercury, a worldwide contaminant found in fish and seafood, can have serious adverse effects on the developing nervous system. However, essential nutrients such as the long-chain n-3 polyunsaturated fatty acids, including docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) in fish provide beneficial effects on brain development. Underestimation of the effects of both mercury toxicity and fish benefits may occur from the lack of mutual adjustment. We examined these effects in regard to neurodevelopment in176 children in a Faroese singleton birth cohort.
Methods: We determined the cord blood mercury concentration and the relative concentrations of cord serum phospholipid fatty acids. Maternal hair mercury at parturition was also measured. Neuropsychological performance in verbal, motor, attention, spatial, and memory functions was assessed at 7 and 10 years of age. The sum of DHA and EPA represented the total n-3 fatty acid concentration (correlation=0.98, $p<0.001$) and was included as the nutrient adjustment. Multiple regression and structural equation models (SEMs) were carried out to determine the confounder-adjusted effect of methylmercury exposure.
Results: Indicators of prenatal methylmercury exposure were significantly associated with naming, verbal learning, and spatial performance. The association strengthened after adjustment by fatty acids. Taking into account correlations among related measures to derive latent exposure and response variables in SEMs, we found significant associations of mercury exposure with deficits in verbal and memory performance at 7 years and 10 years of age, and also in spatial function at 10 years.
Conclusions: Prenatal exposure to methylmercury was associated with deficits at school age in domains known to be sensitive to this neurotoxicant. This effect was strengthened after nutrient adjustment. These findings suggest that essential fatty acid information needs to be included or modeled in analyses of similar studies to avoid underestimation of the methylmercury effects.