

Standard statistical method for risk analysis using hair minerals measured by PIXE

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Abstract

In 2005, we started a cohort study following 834 mother-infant pairs who were participating in both the national one-month and ten-month health checkups in Fukuoka City. The objective was to determine the association between atopic dermatitis (AD) and 32 identified hair minerals measured by proton induced X-ray emission (PIXE) method. Mineral amounts together with individual AD family history were incorporated into a logistic model to predict the risk of infant AD. In 2011, six years after initial research, we sampled 209 then 6 year-old children from the original cohort to statistically analyze intra-individual variations and to confirm associations between hair minerals and AD. As a result we have succeeded in decomposing hair mineral variations into inter-individual and intra-individual variations for minerals obtained using PIXE. For large volume minerals, further decomposition of intra-individual variations into variations due to locations and physical fitting errors was performed. In this paper, we summarized our recent results. Our suggestion for risk analysis using hair minerals is that always take two hair mineral measurements, confirm the normality of the difference, then use the average of them.