

Daily changes of elemental concentration in a human body over a long period obtained by quantitative analyses of beard and hair samples

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Abstract

Beard samples were taken from a person in the morning and at night over successive 218 days, and 543 samples were analyzed in total by means of a standard-free method developed by us and reported in the previous paper. Concentration changes with passage of time in a day were also studied. As a result, both short-term and long-term changes have been observed reflecting the changes of elemental concentration in a human body, and their correlation with the food intakes is investigated. It is found that concentrations of sodium, potassium and chlorine show the same trend both in short- and long-term changes, which indicates that they mostly exist in the chemical forms of NaCl and KCl in a human body. Difference of elemental concentration between the beard samples collected in the morning and at night is also discussed. It is found that the standard-free method for beard samples is quite useful for investigating daily changes of elemental concentration in a body.

In order to estimate daily changes of elemental concentration in a body for women and children, a new method which allows us to perform quantitative analysis of small hair samples cut into 1 mm pieces has been developed and applied to long hair samples taken from three persons. It is found that it enables us to estimate both long- and short-term changes in elemental concentration in a body in the same manner as in the case of beard analysis. These methods are expected to give us information about the pathways of human exposure to toxic elements.

Keywords : PIXE, Beard, Long Hair, Quantitative analysis, Changes in concentration, Standard-free method, Human body, Toxic element