

Studies on daily changes of elemental concentration in the body by means of quantitative analysis of beard samples on the basis of the standard-free method

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Abstract

We developed and reported a standard-free method for beard (including mustache and whiskers) samples that enables us to quantitatively analyze powdered beard samples of extremely small quantity. In order to investigate intake of essential elements and also exposure to toxic elements, daily changes of elemental concentration in the body give us essential information. Firstly, we have measured dependence of elemental concentration in beard, mustache and whiskers on the collecting regions in the face. Then, daily changes of elemental concentration in the body, which reflect daily ingestion of foods and waters, have been estimated by means of quantitative analyses of beard samples. These beard samples were taken from three persons everyday over successive 7, 13 and 33 days, respectively. As a result, some elements such as nickel and mercury show long term changes and a few toxic elements such as arsenic and lead exhibit changes with a period of a few days. We have also measured daily changes of elemental concentration in urine and beard taken from the same person at the same time every half day over 10 days, and clear correlation of daily changes of the arsenic concentration between urine and beard samples was observed. It is found that the standard-free method is quite effective for beard samples of very small quantities, and that beard analyses are quite suited to studies on daily changes of elemental concentration in the human body in comparison with the other samples.

Keywords : PIXE, beard, standard-free, daily changes, toxic element, small quantity, powdered-internal-standard