

# **Characterization of zinc of an elderly population in the São Paulo Metropolitan region, SP, Brazil by neutron activation analysis of head hair and blood serum.**

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Zinc is an essential trace element for health and has a wide range of functions. It plays an important role in growth and cell division where it is required for protein and DNA synthesis, in insulin activity, in the metabolism of the ovaries and in liver functions. As a vital component of several enzymes, zinc is involved in the metabolism of proteins, carbohydrates, lipids and energy. Research is being carried out to discover the role of zinc in preventing the chronic and degenerative diseases associated with ageing. The objective of this study was to investigate the zinc status of a healthy elderly population residing in the São Paulo Metropolitan region, São Paulo, Brazil. Blood and head hair samples were collected from 47 healthy subjects, aged 60 to 87 years, included in a program "Successful Ageing" from the Hospital das Clínicas, São Paulo University Medical School. All participants signed an informed consent approved by the Ethics Committees. Hair strands were cut close to the scalp of the occipital region and in the laboratory hair filaments were cut in lengths smaller than 2 mm and then washed using non-ionic detergent Triton X100, acetone and purified water. The washed hair was dried at room temperature inside a class 100 laminar flow hood. The whole blood collected in heparin free tube without additive was centrifuged and the obtained serum was freeze-dried prior the analysis. Haemolyzed samples were excluded for the analyses. The serum and hair samples were analyzed by instrumental neutron activation analysis method. Samples and Zn standard were irradiated at the IEA-R1 nuclear research reactor for 16 h under a thermal neutron flux of  $5 \times 10^{12} \text{ n cm}^{-2} \text{ s}^{-1}$ . After about a week of decay time the induced gamma activity of Zn-65 was measured using an HGe detector coupled to a gamma-ray spectrometer. Zinc concentrations were calculated by comparative method. To validate the analytical methodology the certified reference materials (CRMs) NIST 1566b Oyster Tissue and NIST 1577b Bovine Liver from the National Institute Standards and Technology and IAEA-086 Human Hair and IAEA-A-13 Animal Blood from the International Atomic Energy Agency were analyzed. Results obtained for CRMs analyses showed good precision and accuracy with relative standard deviations and relative errors lower than 5.6 and 4.1%, respectively. Zinc mean concentration of  $125 \pm 37 \mu\text{g/g}$  was obtained in hair analyses. This mean value is within the normal range values utilized by clinical laboratories however 17% of the selected population presented lower concentrations for Zn than the limit values established for hair analysis control. For blood serum, a mean concentration of  $96 \pm 14 \mu\text{g/dL}$  was obtained and this value falls also within the reported normal ranges used in clinical laboratories. Two participants (4.2% of the population) however, presented serum Zn concentrations out of the limit values. These findings suggest that the zinc status for some individuals of this elderly population may be less than ideal.