14th Rio Symposium on Atomic Spectrometry
Vitória, Espírito Santo, Brasil, 02 a 07 de abril de 2017

IRON DETERMINATION IN WHOLE BLOOD SAMPLES OF DYSTROPHIC MICE STRAINS USING X-RAY FLUORESCENCE SPECTROMETRY

Dalton Nogueira da Silva Giovanni[a], Sabrina Metairon[a] Cibele Bugno Zamboni[a], Miriam Fussae Suzuki[a], Carlos Roberto Bueno Junior[b], Marcia de Almeida Rizzutto[c]

[a]Instituto de Pesquisas Energéticas e Nucleares – IPEN
Av. Prof. Lineu Prestes, 2242 – Cidade Universitária - 05508-000, São Paulo, SP, Brazil
[b]Escola de Educação Física e Esporte de Ribeirão Preto, EEFERP
Av. Bandeirantes 3900, 14040-907 Ribeirão Preto, SP, Brasil, Ribeirão Preto, SP, Brazil
[c] Universidade de São Paulo, IFUSP
Rua: do Matão, Travessa R 187, 05508-090, São Paulo, SP, Brasil

The use of alternative analytical techniques to investigate specific electrolytes in body fluids has increased in past years with the goal of adding advantages and simplifications, compared to the procedures used in conventional clinical practice. Specifically, in this study, a portable X-ray spectrometer (PXRFS) from Amptek (model X-123 SDD) with Ag X-ray mini-tube has been employed for the whole blood iron measurements in mice species with Muscular Dystrophy (Dmd^{mdx}/J, SJL/J and A/J). The term whole blood refers to solid (cells) and liquid (plasma) components in blood. Usually the conventional procedures for clinical tests are performed in serum using samples of 0.5 to 1.0 mL. However, when the biological material is scarce (case of small size animal model, i.e. mice), the possibility to use whole blood became a fascinating alternative for clinical practice: the Energy Dispersive X-Ray Fluorescence (EDFRX) analyses, using PXRFS, can be done using 50 µL (the total body blood in mice is around 1.0 mL). In this study, we investigated whole blood samples of dystrophic mice strains, a genetic disease that cannot be reversed. In this investigation, twenty samples were investigated. The blood samples were obtained from Jackson Laboratory (Maine, USA) and further inbred at IPEN. The whole blood was collected by the retro–orbital venous plexus and immediately transferred to filter paper (Whatman n°41), prior to its coagulation. No anticoagulants or reagents have been used to prevent interference on the results. This procedure simplify the preparation and conservation of biological samples: it is not a destructive procedure and the sample does not need refrigeration. The collection was performing according to the rules approved by Animal Research Ethics Committee (087/99). A comparative study between EDXFX and INAA (Instrumental Neutron Activation Analysis) data was also carried out and the results are in good agreement. This alternative procedure was capable, in a few minutes, to determine whole blood Fe concentrations higher than 6.5 mgL^{-1}, without chemical digestion using direct and non-destructive analysis. The study of Fe behavior in whole blood samples of mice with muscular dystrophy contributes to its diagnosis.

Acknowledgements: We would like to acknowledge for financial support from Fundação de Amparo a Pesquisa do Estado de São Paulo (FAPESP) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)