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RELATION OF SELENIUM CONCENTRATION BETWEEN PAIRED CEREBROSPINAL FLUID AND SERUM SAMPLES AND FIRST SELENIUM SPECIATION RESULTS

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The beneficial health effects of Se demanded the development of rapid and accurate methods for analysis. For total Se analysis a flow injection method with ICP-DRC-MS as a selenium-selective detector was optimized and validated. The method characterization parameters were: LOD: 26 ng/L, LOQ: 86 ng/L, linearity: 0.05 — >10 µg/L, $r^2 = 0.9999$, serial or day-to-day precision at 2 µg/L: 4.48% or 5.6%. Accuracy was determined by a) recovery experiments (spiked CSF); b) comparison of FI-ICP-MS measurement with graphite furnace atomic absorption (GFAAS) measurements of diluted serum samples; c) Se determination in urine and serum control materials. Recovery (a) was 101.4%, measurement comparison with GFAAS (b) showed 98.8%, and accuracy was 96.8% or 105.6% for the serum or urine control material. Analysis time per sample was short and typically below 2 minutes for the complete quadruplicate Se-determination. This method was used to determine Se in 35 paired serum and CSF samples, resulting in a serum-Se concentration range of 42 —130 µg/L and in a CSF-Se concentration range of 1.63—6.66 µg/L. The median for Se in 35 individual CSF samples was 3.2 µg/L, the mean (± SD) was 3.67 (1.35) µg/L, whils for individual serum samples the median was 81 µg L and the mean (± SD) was 85 (26) µg/L. Relating the paired Se concentrations of CSF and serum samples it turned out that Se-CSF (behind blood brai barrier (BBB)) is independent on Se-serum concentration (before BBB). The transport of Se across BB depends on a strictly controlled transporter and no on diffusion along a concentration gradient. Preliminary studies on Se-speciation in CSF and serum used hyphenated techniques: SEC coupled to ICP-DRC-MS and IEC-ICP-DRC-MS. This technical setup provided good characterization and even identification of Se-species. Predominantly Se-proteins but nearly no LMM-Se-compounds were found in CSF. Some of these proteins were identified and were related to proteic Se-species in serum.

ELEMENTAL COMPOSITION OF MEDICINAL PLANT DRUGS SOLD OVER-THE-COUNTER IN SAO PAULO CITY, BRAZIL

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Medicinal plants have been used to treat diseases for thousands of years. In Brazil, the use of medicinal plants is very popular due to the assumption that herbs which are of natural origin are safe and without side effects and they are sold over-the-counter. Medicines derived from medicinal plants are, in general, cheaper than those from synthetic products and used for self-medication. Consequently, it becomes important to ensure the quality of the plant material and detect presence of contaminants. Trace elements present in these plants can also constitute part of active constituents. In this study neutron activation analysis (NAA) was applied to evaluate the element composition of drugs from the plants (Ginseng, Ginkgo biloba, Centella asiatica, Mulberry and Aloe vera) from different origins. Samples bought in natural product drugstores and pharmacies in capsule or tablet forms were ground to a homogeneous powder. Aliquots of these samples were irradiated along with synthetic element standards in the IEA-R1 nuclear research reactor. Short and long irradiations were carried out for determination of As, Br, Ca, Co, Cr, Cs, Fe, K, Mn, Na, Rb, Sc, Se, Zn and lanthanides. The induced gamma activities were measured using an HPGe detector coupled to a gamma ray spectrometer and the element concentrations were calculated by the comparative method. Comparisons made between the results indicated difference in their element contents depending on the origin of the sample, as well as, the age of the leaves. Correlations between the effect of the medicinal plants and their element content were found for Ca, K and Zn. Toxic elements such as Hg, Cd, Cu, Sb were not detected. Arsenic was detected in some samples but at very low concentrations at the ng/g levels. Biological certified reference materials were also analyzed for quality control of the analytical results.