

M228 DETERMINATION OF URANIUM IN HUMAN HEAD HAIR OF A BRAZILIAN

POPULATIONL GROUP BY EPITHERMAL NEUTRON ACTIVATION ANALYSIS. A. U.

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Hair analysis is extensively used in forensic science, assessment of occupational or environmental exposure and in some cases for clinical and nutritional studies. Hair analysis has a series of advantages in relation to other biomarkers, like blood and urine, since it is very easy to collect, very stable at room temperature and it represents not only instantaneous concentrations but it can reveal the exposure along a given period of time. The assessment of environmental or occupational exposure to uranium is generally done by means of analysis of urine, although some papers have described attempts to use also hair as a biomonitor. In the present work, epithermal neutron activation analysis has been used to establish base-line concentrations for a Brazilian population group living in São Paulo and not exposed to uranium, either environmentally or occupationally. The hair samples were collected from the occipital part of the head, were cut in segments smaller than 2 mm and then subjected to washing with a Triton X100 solution, followed by MilliQ water and acetone. After drying at room temperature, about 250 mg of hair samples were irradiated in Cd capsules, together with synthetic standards of uranium, for 16 hours, at the IEA-R1 nuclear research reactor, under a thermal neutron flux of $5.1012 \text{ n cm}^{-2} \text{ s}^{-1}$. The samples and standards were measured after 3 days of decay time in a hyperpure Ge detector and the radioisotope used to calculate uranium concentrations was ^{239}Np . For quality control, the reference materials Pine Needles NIST 1575 and USGS geological material BCR-1 were used. The concentrations obtained for the control population studied up to now varied from about 3 to 50 $\mu\text{g kg}^{-1}$. Future work will include more analysis of individuals of Brazilian control population, as well as comparison with results from other countries and analysis of populations living in an area of high natural content of monazitic sand, in Brazil.

M229 INAA OF SOME INDIAN MEDICINAL HERBS. A.N. Garg1, A. Kumar1, A.G.C. Nair2 and A.V.R. Reddy2

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Traditional Indian medicine system called Ayurveda is several thousand years old. It is primarily based on the principle of strengthening the body immune system and thus enhancing vigour, memory and vitality. Many herbs and herbal preparations have been widely used for curing various chronic and other diseases. Instrumental neutron activation analysis (INAA) has been employed for the multielemental determination of some medicinal herbs such as *Cassia rhombifolia* (Amaltas-fruits), *Psoralea corylifolia* (Bauchi-seeds), *Andrographis paniculata* (Kalmegh-leaves), *Holarrhena antidysenterica* (Kutaj-bark), *Azadirachta indica* (bitter Neem-leaves), *Symplocos racemosa* (Lodhra-bark), *Murraya koenigii* (curry leaves) and *Nardostachys jatamansi* (Jatamasi-roots). Also several reference materials (RM) including depleted RM Pine Needles (new, 1575a) were analyzed for quality control and data validation and used as comparators. Concentrations of 7 minor (Na, K, Al, Ca, Cl, Mg and P) and 10 trace (Cr, Mn, Fe, Co, Cu, Zn, Br, Ba, Ti and V) elements were determined by short (5 min) and long (7 h) irradiation at thermal neutron flux of $\sim 10^{11} \text{ n cm}^{-2} \text{ s}^{-1}$ in APSARA reactor of BARC, Mumbai, India. Short-lived nuclides were measured at BARC laboratories whereas long irradiation samples were brought to Roorkee and activities were counted at several intervals up to 8 weeks using an HPGe detector, 8K MCA system and GENIE-21 (Canberra, USA). Phosphorous was determined by counting - activity of ^{32}P using an end window G. M counter and Al filter (27 $\mu\text{g cm}^{-2}$). Several of the herbs are enriched in Ca, Mg, P, Fe, Mn, Zn, which play a vital role in biochemical and enzymatic processes. Jatamasi, often used as antibacterial, antipyretic and as heart tonic is enriched in Fe ($1.21 \pm 0.20 \text{ mg/g}$), Na ($1.40 \pm 0.10 \text{ mg/g}$), Mn ($4.74 \pm 5.9 \text{ g/g}$) and Zn ($60.0 \pm 6.3 \text{ g/g}$). Similarly kutaj is highly enriched in Ca ($5.30 \pm 0.07 \text{ mg/g}$) and Mg ($2.12 \pm 0.31 \text{ mg/g}$). An attempt has been made to correlate elemental contents with the therapeutic importance of herbs.

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