PROGRESS IN CLINICAL DIAGNOSIS USING NEUTRONS AND X-RAYS

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Understanding potential trajectories in health is crucial for guiding long-term policy in the health area. This study provides alternative approaches to clinical practices (dosage of ions and metal) using neutrons and X-rays. In recent years, Neutron Activation Analysis (NAA) and X-ray Fluorescence (XRF) techniques have been applied to this clinical end at IPEN/SP- Brazil, in collaboration with research centers. These analytical techniques have been applied to investigate specific ions and metal in biological samples, in-vitro (serum, blood, urine, saliva) and in-vivo (nails and hair), for monitoring and diagnosis of prevalent diseases in Brazil. The NAA measurements were performed using the IEA-R1 nuclear reactor at IPEN (CNEN/SP-Brazil) and XRF data were obtained using a compact X-ray spectrometer (X-123 SDD, Amptek®) with Ag, Au, and Rh targets. There are several motivations and positive expectations for the use of these alternatives for diagnosis, but the great advantage is the feasibility of using the X-ray experimental set-up facility, outside the nuclear reactor premises, which allows its use in underserved regions without a clinical laboratory. In addition, we provide a robust platform of reference values in biological samples (serum, blood, urine, saliva) that can be explored or implemented by other analytical techniques. We intend to stimulate the biochemical analysis of body fluids as well as in-vivo samples (nails and hair) using a compact and portable X-ray spectrometer setup.