

Boron determination and imaging

S. Altieri

Department of Physics University of Pavia and INFN, Pavia, Italy

The effectiveness of BNCT treatment depends on the amount of radiation dose due to $^{10}\text{B}(\text{n},\alpha)^7\text{Li}$ reactions in tumor and healthy tissues; however, the local and real time distribution of this quantity during the neutron irradiation is a big challenge, not solved yet by BNCT community. Until now many techniques have been developed for off-line boron concentration measurement and/or imaging. Different methods can be grouped in two main categories: *in vivo* and *in vitro*, depending if they are applied directly on the patient or on a small sample. The first method is based on the ^{18}F -BPA PET technique or on the SPECT of 478 keV gamma emitted in the $^{10}\text{B}(\text{n},\alpha)^7\text{Li}$ reaction; in the second one Boron concentration is measured in a blood sample by ICP (AES – OES) (already used in patient treatment), or in other kind of a tissue samples, with Neutron Auto-Radiography, Prompt Gamma Neutron Activation Analysis (PGNAA), Charged particles spectrometry, Secondary Ion Mass Spectrometry (SIMS), Laser-SNMS, EELS etc. It is fundamental to underline that for dosimetry it is necessary to know the concentration of boron, so it is also necessary to measure the mass of the tissue at the same time. In the presentation will be made the state of the art of the various techniques used in BNCT.