

Comparisons of Dosimetry for Boron Neutron Capture Therapy

Boron Neutron Capture Therapy is in Phase I/II clinical trials at Brookhaven National Laboratory and at the Massachusetts Institute of Technology. Several patients with glioblastoma multiforme have been diagnosed with Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET) and have received primary care at The University of Tennessee Medical Center at Knoxville (UTMCK).

Doses received by the UTMCK patients from B-10 reaction products were calculated by a Monte Carlo neutron particle transport code (BNCT_rpte) where the tumor location and beam positioning specifications were based on MRI scans. Boron concentrations are estimated based on histological information and on the tumor location as determined from the MRI information. These doses were adjusted using a boron agent F-18/BPA in PET scans registered with the MRI data used to specify the input to BNCT_rpte. In particular, the calculated doses were scaled based on the relative intensity of the PET images. It is apparent that PET scans define tumor location better than MRI images, and the adjusted doses frequently differ significantly from the calculated doses on the tumor boundaries. This information is correlated with post treatment PET scans and with tumor regrowth.