

Changes in Proton Radiosurgery Dosimetry at the Harvard Cyclotron Laboratory

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The need for consistency in multi-institutional clinical trials has motivated this study of proton therapy dosimetry. Since 1961, Massachusetts General Hospital (MGH) has treated approximately 3400 patients with brain tumors (arteriovenous malformations, pituitary tumors, metastases) using the 160 MeV proton beam at the Harvard Cyclotron Laboratory (HCL). The absolute dosimeter used in the HCL beam is a diode, which has submillimeter spatial resolution and is calibrated against a Faraday cup. The Faraday cup methodology has been re-examined in light of discrepancies (~8%) revealed in a dosimetry intercomparison (Vatnisky, et al. 1996). A second intercomparison found that the difference between the highest and lowest absorbed dose determinations from 11 participating proton centers decreased to ~3% when the ICRU proton dosimetry protocol was implemented. (Vatnisky, et al. in press). In this work, we report on our implementation of the ICRU dosimetry methodology for our radiosurgery beams, including calibration of the diode against ionization chambers that are calibrated based on ^{60}Co (NIST-traceable) and the ICRU dosimetry protocol.