AbstractID: 11410 Title: Antiproton Therapy: A simplified method to characterize and compare dose from peripheral radiation fields

Purpose: Recent work has shown the potential benefits of antiprotons for radiotherapy. Because of the large amount of energy released by the annihilation of antiprotons, it is of interest to understand the dosimetric properties of the peripheral field. The purpose of this research is to develop a standard method to estimate, characterize, and compare the secondary dose in the peripheral radiation field of particle beams, allowing for the assessment of relative safety and treatment suitability for a given patient. **Method and Materials:** The FLUKA 2008.3 Monte Carlo package was used. A simplified set of target and secondary tissue phantoms (1 cm diameter spheres) were placed in a volume of water, with secondary phantoms placed every 10 cm out to 100 cm along the beam axis and perpendicular to the beam axis at the depth of the target. The target phantom was irradiated by a pencil beam of particles (antiprotons, protons, etc.). Absorbed dose was evaluated in the target phantom and ambient dose equivalent (H*(10)) was evaluated in the secondary phantoms using factors from ICRP 74 and Pelliccioni to convert from fluence. This data was then used to determine the ratio of H*(10) to target absorbed dose. Additionally, the relative contributions by different particles to the H*(10) were measured as well as various particle fluence spectra. **Results:** 2-40 million primary beam particles yielded satisfactory statistics to estimate the peripheral field dose values for beams of antiprotons and protons. **Conclusion:** As awareness of second cancer risk grows, a standard scheme for estimating secondary dose from particle therapy will be all the more important. Our scheme allows for detailed characterization of the peripheral field and dose estimation can be made for non-target organs by weighting dose with tissue factors.