AbstractID: 9610 Title: Reducing stray radiation dose for a pediatric patient receiving craniospinal irradiation with protons

Purpose: Proton therapy is an emerging treatment modality for pediatric cancer patients because of its advantageous depth-dose relationship. Although proton dose distributions conform to the target volume, stray neutrons deliver low doses to healthy tissues throughout the body. These exposures may increase the risk of radiation carcinogenesis, particularly for pediatric patients. The aim of this study was to quantify stray radiation dose for a pediatric patient receiving proton craniospinal irradiation and to evaluate methods of reducing stray radiation dose to the patient. **Method and Materials:** Equivalent dose to each organ and effective dose from stray radiation was estimated for a 30.6 Gy craniospinal treatment using Monte Carlo simulations of a passively-scattered proton nozzle and a human phantom. The treatment plan and phantom were based on CT images of a 10-year-old boy treated for medulloblastoma. Comparisons were made between the existing nozzle, an idealized nozzle with no stray radiation, and the existing nozzle with modest modifications to suppress stray radiation. The existing nozzle was modified by increasing the distance from the patient to the primary external neutron source and enhancing the local shielding. **Results:** Effective dose from stray radiation was 396 mSv and 74 mSv for the existing and idealized nozzles, respectively, while modest modifications to the nozzle reduced effective dose emanating from the nozzle by 43%. **Conclusion:** These results add to the body of evidence supporting the suitability of passively-scattered proton beams for the treatment of pediatric cancer and confirm that the effective dose from stray radiation was not excessive and can be substantially reduced by modest enhancements to the nozzle. **Conflict of Interest (only if applicable):** We would like to disclose that a similar presentation will be given to a largely different audience at the International Conference on Radiation Shielding in April 2008.