

AbstractID: 11327 Title: Comparison of out-of-field doses in pediatric patients from craniospinal irradiations using photon, electron and proton spinal fields

**Purpose:** Compare the out-of-field secondary doses to critical organs in pediatric patients resulting from three different craniospinal irradiation (CSI) treatments.

**Methods and Materials:** A pediatric anthropomorphic Rando phantom was CT scanned for planning purposes following MDACC protocols. Based on the images three different treatment plans employing photon, electron and proton spinal fields, were designed. A common dose prescription for pediatric patients with CNS disease of 36 Gy to the cerebrospinal axis was used for all three plans. The photon and electron spinal fields plans were each delivered three times and the doses at several critical organ sites were measured with TLD. The proton delivery was simulated with MCNPX to calculate the out-of-field secondary neutron contribution to the doses at the same critical organ sites. Measured doses for all three treatments were compared.

**Results:** In the majority of the investigated critical organ sites, the doses from the photon spinal fields were higher than from the electron spinal fields. Many of the critical organ doses beyond the spinal target were greater for the photon delivery than for the electron delivery by several orders of magnitude. The entrance doses, as well as the doses lateral to and outside of the target, were up to a factor of two greater for the electron delivery. The expectation for the proton delivery is that the out-of-field doses from the secondary neutrons will be less than the conventional electron and photon treatments.

**Conclusions:** An improved clinical treatment decision for pediatric patients can be made using the comparisons between the out-of-field doses for three different treatment methods.

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