

AbstractID: 11041 Title: Comparison of RapidArc and IMRT for Pediatric Patients

Purpose: To compare RapidArc and IMRT plans in the treatment of pediatric patients and determine unique benefits of each technique.

Method and Materials: RapidArc/IMRT plans for six patients with various primaries were generated using AAA dose calculation available in Eclipse 8.6. The sites included: thorax sarcoma, germ cell tumor of the ventricles, T-spine/C-spine ependymomas, and rhabdomyosarcomas of the hip and nasal sinus. Critical structures within the region of treatment were contoured and taken into consideration during planning. The plans were evaluated by the total number of MU, the dose volume histograms (DVH) for the target and critical structures, and the dose homogeneity within the PTV.

Results: All of the RapidArc plans showed more heterogeneous dose distributions within the PTV. For five patients, MU was lower with RapidArc; however, the percent difference ranged from 8% to 61%. For three of these lower MU cases, the percent difference was larger than 46%, but the DVH were similar for both IMRT and RapidArc. For one case with only slightly lower MU, the PTV was close to skin surface, and PTV coverage was more than 10% higher with RapidArc than IMRT. The C-spine ependymoma patient showed IMRT had 16% less MU than RapidArc; however, critical structures sparing was mixed between the two planning techniques.

Conclusions: RapidArc provides two advantages for children: lower MU, meaning less scatter dose to out of field critical structures where the risk of secondary cancers is of concern, and significantly shorter beam time (2 min) which is a great benefit for children who require anesthesia. IMRT is advantageous if the dose heterogeneity is a concern for the child. For example, heterogeneous dose across a growing bone or growth plate will result in growth asymmetry, which could cause significant deformity.