

AbstractID: 13338 Title: Comparison of RapidArc and IMRT peripheral doses for pediatric patients based on measured and TPS doses

**Purpose:** To evaluate RapidArc and IMRT pediatric plans in peripheral regions based on measured and TPS doses. **Method and Materials:** IMRT and RapidArc plans for six pediatric patients were created and delivered to a solid water phantom containing a 2D ion chamber array – MatriXX. A correction technique was developed to correct for MatriXX dose errors in the peripheral regions. Thus corrected MatriXX doses were evaluated against TPS plans. **Results:** (1) MatriXX, with corrections, shows good agreement with a reference Exradin A12 ion chamber and EBT film, allowing for accurate measurements of low doses; (2) In the peripheral regions without direct beams, TPS was found to underestimate the dose by as much as 7cGy (prescription 200cGy); (3) The mean TPS dose error was smaller for RapidArc in five of the six cases and comparable in the other; (4) The error shows clear dependence on the equivalent square jaw size due to MLC scatter; (5) The distance to agreement (DTA) was smaller for RapidArc in all six cases (1 – 100cGy); (6) The impact of TPS dose error on  $V_{xGy}$  was evaluated along y-axis in low-dose regions. Disagreement between MatriXX and TPS was found to be insignificant (<1cm) for  $x > 5Gy$ , independent of RapidArc or IMRT. For jaw size >15cm, as large as 6 and 4.2cm were observed in  $V_{1Gy}$  and  $V_{2Gy}$ , respectively, for IMRT. The corresponding values were 2.6 and 0.6 cm for RapidArc. The disagreement in  $V_{xGy}$  was smaller for RapidArc in all six cases. **Conclusion:** In terms of TPS error in peripheral dose, its impact on  $V_{xGy}$  or DTA, RapidArc was found to be better than IMRT from our study of six pediatric patients. Our method can be useful in determining the best plan based on accurate assessment of the TPS doses in the peripheral regions through measurements.