

AbstractID: 13364 Title: Comprehensive RapidArc™ treatment planning and Quality Assurance for Head and Neck Cancers

**Purpose:** To assess the dosimetric quality of a two-arc RapidArc™ plans for the treatment of head and neck cancers and present corresponding quality assurance (QA) results.

**Method and Materials:** Fifty three patients (male=32,female=21, <age> = 61.9 years (range: 25-87 years) treated for nasopharynx, oropharynx, base of tongue and laryngeal cancers were included in this study. Treatment doses ranged from 12Gy to 70.4Gy with many cases requiring irradiation of the cervical nodes as well as the primary site. RapidArc™ plans were generated using Varian Eclipse™ 8.6 and consisted primarily of two 358-degree arcs delivered counterclockwise and clockwise, respectively with a  $\pm 5$ -degree couch rotation for one of the arcs. Based on the treatment site and target location, there were instances where a 358-degree arc and a partial arc with 90-degree couch rotation were used. QA plans were generated and delivered to a solid-water phantom with a Mapcheck™ detector array centrally mounted between the solid-water slabs.

**Results:** The RapidArc™ treatment plans were evaluated based on RTOG conformity index (CI), RTOG homogeneity index (HI), monitor units (MUs) and beam-on time. The primary targets (PTVs) had mean $\pm$ SD CI and HI values of  $0.93\pm 0.04$  and  $1.10\pm 0.03$ , respectively. The average number of MUs was 565 (range: 350 – 2144) and beam-on times ranged from 3 to 5 min. The average %PASS for the plan QA was 99.3% (range: 97.9% -100%) using the 3% /3mm plan evaluation criteria in Mapcheck™.

**Conclusion:** This dosimetric analysis indicates that a two-arc RapidArc™ plan provides highly conformal dose distributions to head and neck treatments. QA results have shown that dose calculation and measurement are in good agreement for these plans. Short beam-on times and few MUs have reduced the overall treatment time (setup + beam-on times) by ~40% per patient making RapidArc™ a more efficient delivery technique than multifield IMRT.