

AbstractID: 11511 Title: Comparison between fixed gantry angle intensity modulated radiotherapy and intensity modulated arc therapy for head-and-neck cancers

**Purpose:** To compare the dose distributions resulting from fixed gantry angle IMRT and IMAT (dynamic arc) optimization for head-and-neck tumors (HN).

**Materials and Methods:** Four (HN) cases were retrospectively investigated. Pinnacle<sup>3</sup> (v. 8.1x) was used to generate treatment plans for an IMAT and a 9-field IMRT delivery techniques. The targets were the planning target volume (PTV) and the lymph nodes (LN). The organs at risk (OARs) were the spinal cord (cord), the cricopharyngeus, the esophagus and the parotid glands (parotids). The IMAT and IMRT plan cross-comparison was based on dose indices used as objectives in the optimization process. The evaluated dose indices were  $D_{95}$  for PTV and LN and  $D_1$  for the cord and average doses for the parotids, the cricopharyngeus and the esophagus. The standard deviations of the dose (expressed as a fraction of the prescription dose) over the PTV and the LN were also tallied. The highest priority in the optimization was given to target coverage.

**Results:** The dose indices for the PTV and the LN differed by less than 1% and 3% respectively. A reduction in OAR dose was possible in the IMRT plans while maintaining the dose standard-deviation below 3% (used as a dose uniformity criterion) for all targets. The IMAT plans resulted in higher dose indices/average doses to the OARs by as much as 50%. The IMAT dose standard deviation in all patients for the LN and in one patient for the PTV was greater than 3%.

**Conclusions:** A better balance between dose uniformity and dose coverage was found in the IMRT plans. In addition the IMRT plans yielded lower doses to the OARs. We hypothesize that allowing for variable gantry speed in the IMAT optimization will result in IMAT plans which are at least as good as the fixed gantry angle IMRT plans.