AbstractID: 7811 Title: Evaluation of dose calculation algorithms for dynamic arc treatments of head and neck tumors.

Fractionated Stereotactic Radiation Therapy (FSRT) is in our department delivered by means of the Novalis® System using the dynamic arc treatment modality. When FSRT is applied for head and neck tumors the issue of tissue inhomogeneities needs to be addressed. The degree to which the Pencil Beam (PB) dose calculation algorithm predicts the disturbance due to inhomogeneities of the dose distribution accurately is the purpose of the study. A treatment plan of an oropharynx lesion on a humanoid phantom was evaluated. The plan was calculated with three different calculation algorithms: the Clarkson and the PB algorithm (both available on the BrainScan® planning system), and the Collapsed Cone Convolution Superposition (CC) algorithm (used by the Pinnacle® planning system). The three resulting plans are compared using isodose distributions and CDVHs, and are compared to absolute and relative dosimetric measurements with TLD and radiographic film respectively. All calculated dose distributions show a good agreement with the measured distribution except in and at the border of the air cavity. All three algorithms overestimate the dose in the target at the boundary with the low-density tissue, with 12%, 10% and 7% for the Clarkson, PB and CC algorithm respectively. The correspondence between the calculated dose distributions is reflected in the CDVHs. The PB algorithm calculates treatment plans for the dynamic arc treatment modality adequately for FSRT of head and neck tumors, but care needs to be taken in clinical cases where it is critical to irradiate the air-tissue boundary to a sufficient dose.