AbstractID: 13911 Title: Accumulating delivered doses based on daily CT in Head and Neck cancer radiotherapy

Purpose: To accumulate actually delivered dose based on daily CTs to evaluate patient repositioning techniques and adaptive strategies for head and neck cancer radiotherapy.

Methods: Daily CTs acquired for 28 Head and Neck cancer patients using a CT-on-Rails (CTVision, Siemens) were analyzed. These patients were treated with IMRT plans, designed with a 5 mm CTV to PTV margin with prescription in the range of 60-70Gy. Daily plans were reconstructed using a planning system (XiO, CMS) based on daily CTs with iso-center shifted according to three clinically used alignment techniques: skin markers (BB), soft-tissue and bone. The daily dose distributions were then deformed using an in-house deformable registration tool and mapped on to the planning CTs. The cumulative delivered dose distributions with three alignment techniques were compared with planning doses.

Results: Although patient repositioning shifts are different between three alignment methods, the accumulated doses for GTV and PTV are comparable. The differences in PTV mean doses between the delivered (accumulative) and the planned values are within 2% for all three alignment methods. However, the accumulated mean doses for parotid glands and salivary glands are different by as much as 20% from their planned values. The soft-tissue alignment leads to smaller differences.

Conclusion: The actual delivered doses for head and neck radiotherapy are calculated by deforming daily CTs to the planning CT for three clinically used patient alignment techniques. While the delivered accumulative doses in targets are similar to the planned doses, the delivered doses to critical structures are different and these differences depend on the alignment method.