AbstractID: 13226 Title: Dosimetric Benefits of the imaging dose incorporation (IDI) method for megavoltage cone beam CT (MVCBCT) in head and neck patients.

Purpose: To determine the range of expected increases in spared parotid and integral dose in head and neck cancer patients as a function of daily MVCBCT imaging dose managed with the IDI method. The IDI method includes imaging dose in the treatment planning optimization process, enabling the explicit management of dose received by organs at risk (OAR) from imaging beams.

Materials and Methods: For 10 head and neck cancer patients, IDI and non-IDI treatment plans were created for MVCBCT imaging doses ranging from 10-40 cGy per fraction. Unrealistically high imaging doses were considered in order to produce generalized results. For the IDI plans, cold spots in the target volumes were avoided by constraining the dose volume histograms to remain above or equal to those corresponding to 0 cGy imaging dose. Brainstem and spinal cord overdose was avoided with IDI by constraining the maximum doses to 45 Gy or less.

Results: The IDI method reduced the increase in spared parotid dose above the zero imaging dose case by 40% or more relative to the non-IDI case ($p < 0.041$). The IDI method reduced the increase in integral dose above the zero imaging dose case by 50% or more relative to the non-IDI case ($p < 0.03$). For the non-IDI cases the brain stem and spinal cord maximum doses increased above the 45 Gy tolerance for 95% of the cases in which imaging dose was above 20 cGy per fraction or greater.

Conclusions: Even for unrealistically high daily MVCBCT imaging doses for head and neck cancer patients, the IDI method successfully constrains brainstem and spinal cord maximum doses to 45 Gy or less. IDI vs. non-IDI increases in integral dose and spared parotid dose fall within predictable intervals that are dependent upon imaging dose.