

AbstractID: 12642 Title: Effect of CT Contrast Materials on Dose Calculations in Tomotherapy Planning System

**Purpose:** When head and neck cancer patients take a CT scan, contrast agents (CA) are usually applied to enhance the visibility of the cardiovascular system, which helps physicians to delineate the fine structures in this confined region. Depending on the type of CA, among other factors, the physical density of certain organs would increase by up to 12-13%. To better represent the real density of human tissue for the treatment planning process, another set of CT scan is always acquired right before the CA is administered. Then the two sets of images are fused for contouring purpose. This study takes a closer look at the effect of the CA on dose calculations in the Tomotherapy planning system. **Method and Materials:** Nine patients with various types of head and neck cancer were randomly selected. Besides the regular PTV and ORA contours, the most obvious contrast enhanced vessels were also carefully drawn, of which the overlap priorities were set to be the highest in the ORA list. First a treatment plan was done based on the CT images with CA. The optimization parameters were saved and applied to the second plan, in which the same set of images was used with the density of contrast region overwritten to 1.0. Then the optimization process of both plans ran for a same number of iterations. Finally the change of average doses of PTV, cord, mandible and contrast filled areas were compared between the two plans. **Results:** The doses of various structures calculated from CA enhanced CT are not significantly different ( $< 1.5\%$ ) from the doses based on the non-contrast CT. **Conclusion:** CT scan without CA is not absolutely necessary for Tomotherapy treatment planning purpose. By only scanning patients with CA, it would increase the overall efficiency of the patient care and clinical practice.