

AbstractID: 12687 Title: Inclusion of kV CBCT dose in the patient treatment plans and evaluation of dose to normal tissue and critical organs

Purpose: Daily kilovoltage cone beam CT (kV CBCT) patient localization adds to the dose to organs at risk and normal tissues near the planning target volume (PTV). This dose, which is highly dependent on the techniques used for imaging, is routinely ignored at the time of treatment planning and delivery. Adding this dose to the treatment plan will give a more accurate indication of the dose to normal tissues and critical organs.

Method and Materials: The kV CBCT beam from the Elekta XVI system has been modeled in Pinnacle treatment planning system and the accuracy of the model has been verified by phantom measurements. A number of head and neck IMRT treatment plans have been selected and the dose from the daily CBCT procedure has been added to the treatment plans. The effect of this dose on the DVH of all organs has been studied.

Results: The modeling provides an agreement of 3% or better between measured and computed profiles within the field. Utilizing the standard preset of the Elekta XVI system for head and neck CBCT, the dose from each scan is added to the treatment plan. The computed dose agrees with that reported in the literature for the head and neck presets¹. The magnitude of this dose, however, depends on the technique used. Therefore, the dose as a result of using a different technique has also been calculated.

Conclusion: This work demonstrates the feasibility of adding the dose from kV CBCT to the patient treatment plans. Similar work in the past has been done using the MV CBCT² but this is the first time the kV dose is added to plans. Accounting for this dose at the time of treatment planning will help to optimize the plan accordingly, avoiding possible overdose of critical organs.