AbstractID: 13813 Title: Accuracy of superficial dose calculation for breast cancer treatments on Tomotherapy

Purpose: To evaluate the effect of breathing motion and setup error on the accuracy of treatment planning surface dose calculation for breast cancer treatments on helical Tomotherapy. **Method and Materials:** In-vivo dosimetry with MOSFET detectors was performed on a cohort of patients treated for breast cancer on helical Tomotherapy. The detectors were placed under the 0.5-cm tissue-equivalent bolus used for patient treatments. The pre-treatment MVCT images were used to localize the MOSFET detectors. Tomotherapy's Planned Adaptive software was used to compare the measurements against both the planned surface doses at the locations of the dosimeters as well as the recalculated doses based on the MVCT scan. This allowed for evaluation of the combined impact of breathing and setup error on the surface dose contribution, and the quantification of dosimetric accuracy of the Tomotherapy treatment planning system for breast cancer patients. **Results:** The differences between dose values at the locations of the dosimeters from the plan and those calculated from the MVCT image were on average within 1% of each other. The average dosimetric differences between measured and calculated doses were 7.8 and 8 percent for the planned and adaptive calculated doses, respectively. Overall, the treatment planning system overestimated the dose at the skin/bolus interface. **Conclusion:** The treatment planning system was previously shown to overestimate dose at a 5-mm depth by about 4%. The possible setup error is taken into account by the adaptive software since it recalculates the dose distribution based on the MVCT image associated with the treatment for which the measurement was made. Since the setup error was shown to be within 1%, it is therefore estimated that the dosimetric consequence of breathing motion may be as high as 3%. **Conflict of Interest (only if applicable):** This work was partially supported by a grant from Tomotherapy, Inc.