AbstractID: 5790 Title: Quantifying Skin Effects after Accelerated Partial Breast Irradiation Using Digital Infrared Imaging (DII): Preliminary Feasibility Data

Purpose: Accelerated partial-breast irradiation (APBI) is an emerging radiation technique that challenges standard whole breast irradiation. The larger fraction sizes used in these hypofractionated schedules may increase the risk of late normal tissue effects. Identification of the causes of variability in radiation sensitivity and normal tissue reactions could have important implications for breast cancer therapy. For this, a quantitative method of estimating early and late skin effects is needed. DII is recording instantaneous skin temperatures that are directly correlated with the skin blood flow, a parameter known to be an indicator of skin reaction.

Material and Methods: An infrared digital camera IRSnapShot® was used to image breast cancer patients treated with APBI to a total dose of 3850 cGy over 10 fractions. The plans consisted of multiple external non-coplanar photons +/- electron beams. The patients were imaged in a controlled temperature room before and after each fraction. They were also be imaged at regular intervals during their follow-up. Two sets of orthogonal DII images were taken. The images were then transferred into Matlab where a GUI is being developed for image registration, thresholding and data analysis.

Results: Five patients were imaged as described, three treated with photons only, and two with a combination of photons and electrons. The increase in maximum skin temperature from the baseline (pre treatment) to treatment completion is on average 2 to 4 degrees and depends on the techniques used, higher for plans including electrons, as expected due to their way of depositing dose.

Conclusions: DII generated skin temperature information is a promising quantitative tool to estimate early and late effects in irradiated breast cancer patients. Our goal is to generate an “Index of Radiosensitivity” based on the early pattern of change in skin temperature that will allow individualization of radiotherapeutic prescription.