AbstractID: 6871 Title: Predicting Late Skin Effects Using Digital Infrared Imaging for Breast Cancer Patients Treated with Radiation

Purpose: Establish a methodology based on digital infrared imaging (DII) to predict skin reaction after breast irradiation using the Skin Radiosensitivity Index (SRI) derived from early skin temperature changes.
Method and Materials: Five breast cancer patients treated with accelerated partial breast irradiation to a total dose of 3850cGy over 10 fractions were imaged using a digital infrared camera, including DII images obtained before and after radiation treatment, and a baseline image. Images obtained at scheduled follow-ups were also included in the analysis of the late skin effect. DII derived temperatures were averaged over regions of interest (ROIs) in the irradiated and normal breast, the latter used as control. The SRI was calculated based on the early pattern of change in skin temperature relative to the normal breast. SRI = $\Delta T/N_{avg,\ Base} = (T_{avg,\ FX1} - N_{avg,\ Base})/ N_{avg,\ Base}$ where $T_{avg,\ FX1}$ is the average temperature in the ROI of the irradiated breast after the 1st fraction (i.e. after 385 cGy), and $N_{avg,\ Base}$ is the average temperature in the normal breast ROI at baseline.
Results: In all patients, higher temperature was observed in the irradiated breast than in the normal breast. However, only patients with higher temperature differences at follow up between the normal and irradiated breast reported skin problems early after treatment. For these patients, ΔTs were greater than 3^oC and corresponded to SRI values greater than 0.1, values that might be considered as threshold for mild skin reaction. None of the five patients imaged had severe skin reaction. A threshold SRI value to determine severe skin reaction was therefore not established.
Conclusion: Although the small number of patients in this study make the results anecdotal, the evidence supports the potential use of DII derived SRI in predicting late skin effects in patients treated with radiation.