Purpose: To characterize performance and accuracy of 3-camera Align RT system (London, UK) in application to DIBH technique.

Methods: Align RT system consisting of 3 cameras was installed in a linac room and used for the current study. Ten breast cancer patients were enrolled in an IRB-approved prospective protocol to evaluate the accuracy of Align RT for determining the position of the patient with respect to the treatment isocenter. 3D shifts as detected by Align RT were recorded weekly, on the same day conventional port films were also obtained. Shifts based on port films were compared with those determined by Align RT. The accuracy of Align RT system was determined for different regions of interest (ROI), including the entire chest surface, the ipsilateral breast and the sternum.

Results: 25 separate recordings were available for analysis. For the first 3 patients, Align RT images were not always available due to failure of synchronization of images from multiple cameras; this was corrected by a subsequent software upgrade. The average (SD) differences in shifts from Align RT and port-films were 1.5mm (4mm), 2mm (5mm) and 0.1mm (3mm) in lateral, longitudinal and vertical directions, with maximum deviations of 10, 12 and 6 mm respectively. There was no dependence of the accuracy of vertical shift definition on ROI.

Conclusions: Despite initial difficulty with calibration, Align RT proved accurate and reproducible. When compared with conventional port-films, Align RT was accurate within standard deviation of 3mm in the vertical plane, which may be the most relevant direction for DIBH. These results are independent of ROI. This accuracy, combined with the ease of use and lack of radiation exposure, makes Align RT a promising tool for DIBH.