Purpose: To assess the positioning accuracy of ExacTrac image guidance system for spine SBRT patients and to quantify the residual errors of ExacTrac calibration in daily QA using an in-house phantom.

Methods:  Twelve patients treated with spine SBRT in Siemens Artiste linac using ExacTrac system thus far are included in this study to assess the localization accuracy. The sequence of localization is as following. 1) Patient is aligned to the treatment isocenter using infrared markers. 2) Stereoscopic X-ray images are taken for all fractions before and after treatment to calculate the setup errors and intrafraction motion. 3) In addition, X-ray images are acquired whenever the markers showed a deviation of more than 2 mm in any direction. In order to quantitatively verify ExacTrac calibration, an in-house phantom with high density inserts was developed and was used daily before treatments to acquire residual errors of the system.

Results: The initial and final setup errors were calculated using A/P, R/L and S/I shifts of X-ray localization before and after treatment. The average and standard deviation of initial and final setup errors were $1.00 \pm 0.6$ mm and $1.6 \pm 0.9$ mm respectively. Intrafraction motion was found to be $1.2 \pm 0.8$ mm. It was noted that the final setup error followed initial setup error in that it can be reduced if the initial setup error was kept well below the setup tolerance (2 mm). We observed no significant correlation between deviations shown by infrared markers and subsequent positional shifts of X-ray images. The average residual error from phantom measurements after daily ExacTrac calibration was $0.2 \pm 0.11$ mm.

Conclusions: ExacTrac image guidance system is very useful for accurate target localization of spine SBRT patients. The daily QA checks using our in-house phantom after ExacTrac calibration provides quantitative assessment of positional uncertainties.