Purpose: We investigate the feasibility of using AlignRT for pelvic radiation image guidance. The uniqueness of our study is that all patients have multiple CT-on-rails (CTOR) scans to compare corresponding AlignRT images to.

Methods: Ten patients receiving pelvic radiation were enrolled in this study. Two simulation CT scans were performed in supine and prone positions for each patient. Body surface contours were generated in treatment planning system and exported to AlignRT to serve as reference images. The patient was aligned to treatment isocenter with room lasers, and then scanned with both CTOR and AlignRT in both supine and prone positions. Image guidance shifts were calculated for both modalities by comparison to the simulation CT and the differences between them were analyzed. These procedures were performed for each patient once per week for five weeks. The average and maximum difference of displacement between AlignRT and CTOR were calculated for each patient.

Results: For supine position, there are 4 patients who had the average difference of displacement between AlignRT and CTOR along any direction (vertical, longitudinal, and lateral) greater than 0.5cm, and 1 patient greater than 1cm. For prone position, there are 7 patients who had the average difference greater than 0.5cm, and 3 patients greater than 1cm. For supine position, there are 4 patients who had the maximum difference greater than 1cm. For prone position, there are 9 patients who had the maximum difference greater than 1 cm. The difference of displacement between AlignRT and CTOR is greater for prone position than for supine position.

Conclusions: AlignRT does not appear to be an advisable image guidance approach for pelvic radiation therapy for patients with either supine or prone position. There appears to be a potential for large alignment discrepancies (up to 2.25 cm) between AlignRT and CTOR.