

AbstractID: 3791 Title: Evaluation of an Infrared Camera and X-Ray System for Gated Radiation Therapy

Purpose: To determine the clinical feasibility of a gated treatment delivery system from BrainLab™.

Method and Materials: The Exactrac from BrainLab™ is a localization system that uses both infrared cameras and x-rays. In gated mode, target location is determined by implanted fiducials. Breathing patterns are determined by infrared reflectors attached to the patient's surface. The User selects an x-ray trigger point and radiotherapy beam-on window relative to the breathing cycle. Multiple trigger levels may be selected to simulate a fluoroscopic mode to measure organ motion. Prior to clinical use feasibility tests including localization accuracy, gating window accuracy, and beam-on accuracy were performed. Patients with small lung lesions were selected for treatment and implanted with a 20 by 0.7 mm gold fiducial. Treatment planning CT scans were taken at expiration breath hold with internal and external fiducials present.

Results: Localization accuracy was within 3mm when using 20% of the breathing cycle for beam on. To date, five patients with lung lesions were treated. Treatment times were approximately twenty minutes (standard dose fractionations). Implanted fiducials were well localizable in all patients. Target motion was on the order of 5mm average. Repeat CT scans showed implants did not migrate. The primary limitations with the system were related to breathing signal due to placement of external fiducials.

Conclusion: Gating treatment technique from Exactrac™ has been used to treat lung lesions. This initial evaluation of the system verified the accuracy of the localization system under Gated mode. Implanted fiducials are localizable in patients, and gating is possible. The benefit of this system is the potential to decrease treatment margins and improve targeting. Continued evaluation of this system would help to define patient specific dose margins and beam-on windows for treatment.