

The output, energy, and the alignment of imaging plane to the treatment plane have been evaluated for the first clinical HI-ART² Helical tomotherapy system. Fixed-gantry/fixed-couch and rotational-gantry/fixed-couch measurements were made on a daily basis over a period of 20 weeks to investigate system stability. Static gantry measurements were taken at 10-cm depth in a rectangular stack of Virtual Water at an SSD distance of 90-cm and a field size of 5x40-cm. Rotational gantry measurements were taken in a cylindrical phantom Virtual Water phantom for a field size of 5x40-cm. The alignment of the imaging plane to the treatment plane was analyzed using the MedTec IMRT phantom. The phantom was placed in the transverse orientation with embedded pins extended to mark Kodak EDR film with fiducials. The treatment isocenter position was calculated from three areas of high dose exposed on the film. The imaging isocenter was determined from four pinpricks on the film. The HI-ART² system has maintained its calibration to within ± 2 percent and energy to within ± 1.5 percent over the initial 20 week period. Furthermore, the agreement between imaging plane to the treatment plane is less than 1-mm. At the end of the first calendar year of operation, 50 patients have been treated on for over 800 fractions. The HI-ART² Helical Tomotherapy system has provided a stable platform for intensity modulated radiation therapy treatment of these patients with minimal output and energy fluctuations.

Research supported by TomoTherapy, Inc.