

AbstractID: 5109 Title: Mechanical, radiation and imaging isocenter quantification on four Varian On-Board Imager Clinacs

**Purpose:** Varian has recently introduced the On-Board Imager (OBI) based image guided radiation therapy (IGRT). The OBI system comprises of a kV x-ray source and an amorphous silicon detector mounted on robotic arms perpendicular to the gantry. Our aim was to quantify and verify the coincidence of the mechanical, radiation and imaging isocenters for four OBI Clinacs (including one Trilogy linac) we recently purchased at our institution.

**Method and Materials:** The mechanical isocenter (gantry, collimator and couch) was determined using the Radac 2100 device (Medtec). Once the exact mechanical isocenter of the linac was confirmed, the lasers were aligned precisely through the isocenter. The radiation isocenter was then measured using the classical star-shot technique as well as using the Winston Lutz technique. The Varian supplied isocenter cube device (with a ball in the center) was then positioned on the exact couch at the mechanical and radiation isocenter coincidence point. kV images were then taken at the four cardinal gantry angles 0, 90, 180 and 270 degrees to determine the imaging isocenter.

**Results:** The coincidence between the mechanical, radiation and imaging isocenter are within 1 mm for all four Clinac's. The gantry and collimator mechanical isocenter was typically much less than 1 mm radius for the linacs ( $< 0.5$  mm for the Trilogy). The radiation isocenter was also less than 1 mm radius for all the linacs. The imaging isocenter was less than 0.8 mm for all linacs.

**Conclusion:** The added weight of the robotic arms, x-ray source and detector does not seem to have a negative effect on the mechanical and radiation isocenter of the Clinac's. The coincidence between the mechanical, radiation and imaging isocenter give confidence to shifts made using OBI based IGRT.