

## **Evaluation of the Mechanical Stability for the On-Board Imager**

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**Purpose :** To evaluate the mechanical stability of the On-Board Imager with a simplified automatic method. **Methods and Materials :** We set up a simple iso-center verification protocol for the On-Board Imager(OBI, Varian Medical Systems, USA) using a home-made iso-center verification tool(IVT) and software. After alignment of the IVT with the Linac iso-center using cross-hair line of the light field and electric portal images, high resolution(2048x1536) kV x-ray radiographs for every 10 degree gantry angle were obtained. Iso-center migration at each image were analyzed automatically and final look-up table of the iso-center deviation for 2 axes as a function of gantry angle were generated. Proposed procedure was implemented as a monthly quality assurance task for 6 months. **Results :** The maximum discrepancy between the actual and a calculated iso-center was less than 0.5 mm, thus it was acceptable for clinical use. To the vertical direction it showed more regular and sinoidal pattern than that of horizontal direction. Long-term stability test showed a good agreement with a discrepancy of 0.2 mm. **Conclusions :** With the proposed procedure we could accurately and easily verify the mechanical stability and migration of the iso-center for the OBI. The OBI showed a good mechanical stability and the position of the iso-center for arbitrary gantry angle was predictable. Reproducibility and predictability are essential for the iso-center correction of the cone-beam computerized tomography.

**Keywords :** On-Board Imager, Iso-Center, Cone-Beam CT