

**AbstractID: 4466 Title: A filmless verification of the radiation isocenter for a micromultileaf-based radiosurgery system**

**Purpose:** To assess the feasibility of a commercial electronic portal image device (EPID) along with an in-house developed software, in order to verify the alignment of the radiation isocenter.

**Method and Materials:** The system used for the radiosurgery delivery consists of a Varian Clinac 2100C/D (Varian Inc, Palo Alto, CA) modified by an attachable micromultileaf collimator (m3, BrainLAB AG, Heimstetten, Germany) and equipped with a Varian Mark II EPID.

A 5mm diameter tungsten ball centered in the room laser isocenter is shot and imaged with the EPID for several gantry, collimator and couch angles combinations by a 30x30mm field size shaped with m3.

The software Rodeo1.1 (written using Fortran) detects the centers of the radiation field and the ball shadow in every 2D image taken. From several projections, the 3D position of the radiation isocenter can be obtained and compared with the laser isocenter. The distance between them is a measure of the alignment error which includes also the effects due to possible displacement of the portal itself that could depend on the gantry value. The accuracy of the procedure described was investigated by applying known shifts to the ball and recording the displacements detected by the mentioned software.

For comparison purpose with the standard procedure which uses film and analysis by visual inspection, several pointer images were acquired and the reproducibility of two methods was stated.

**Results:** The verification system composed of the EPID and Rodeo 1.1 shows an accuracy better than 0.2mm. Differences inter-observer up to 0.3mm were found when we compared the results of the film test against a perfect reproducibility with the EPID-based method.

**Conclusions:** The EPID and Rodeo 1.1 set is a reliable tool for isocenter verification, with not observer dependence and time saving in relation to the film procedure.