

## EXPERIMENTAL COMPARISON BETWEEN RADIOCHROMIC FILM AND SUN NUCLEAR EDGE DIODE DETECTOR DURING COMMISSIONING OF SMALL FIELD SIZE RADIOSURGERY CONES

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**Introduction:** In radiosurgery treatments (SRS), one of the devices that can be used are cones. Such devices have low radiation transmission (0.1%) and penumbra (<2mm), which reflect in better planning quality in some situations.

The radiation fields used in these treatments are extremely small, with a diameter varying between 4 mm and 17.5 mm, therefore detectors with good resolution and low directional and energy dependence are required.

The objective of the present work is to compare the measurements of the dose in depth (PDD), the off-axis ratio (OAR) and the output factor (OF) using Edge diode and radiochromic films and analyzing the agreement between the two detectors during this measures.

**Material and method:** The measurements were performed on Truebeam STX linear accelerator at the energies of 6FFF and 10FFF for seven cone sizes (4; 5; 7.5; 10; 12.5; 15 and 17.5 mm). The data collection with the film was carried out in a solid water plate. The measurements using the edge detector were performed in water in a 3D automated phantom.

PDD measurements were performed with the Edge detector and compared to the manufacturer's Golden data (TPS). The detector was positioned with its axis parallel to the central beam, with acquisition in step-by-step mode using 0.5 mm pitch. The profiles were measured in three distances (80, 90 and 100 cm) keeping the depth fixed at 5 cm, under the same scanning conditions as the PDD.

The output factors were measured in the source skin distance (SSD) of 95 cm and depth 5 cm, three measurements for each cone related to the field 10 x 10 cm (reference). During all measurements with a cone, it was decided to keep the field at 5 x 5 cm.

The measurements with the film were carried out on the same film cut equally, which before the cut and the irradiation served as a background. 1000 MUs were de-

livered in each exposure and after 11 hours the irradiation was scanned on the Epson 11000XL Scanner and analyzed on the Omnipro Accept IMRT.

**Results:** In the gamma index analysis of the profiles, the minimum percentage reached was 98.3% of the points in the criterion 1% and 0.5 mm. The maximum percentage difference in the output factor was 2.79% for a cone 4 mm and 10FFF. In the gamma index analysis of the PDDs, the minimum percentage reached was 97% of the points in the criterion 1% and 1mm.

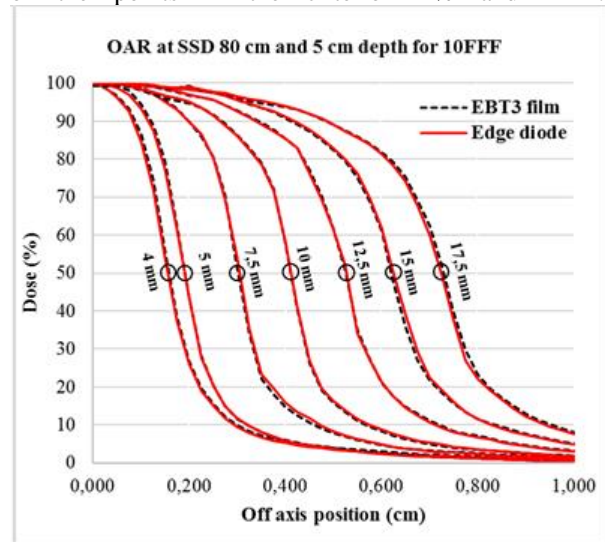


Figure 1: OAR at SSD 80 cm and depth 5 cm for all cones sizes and 10FFF.

**Conclusions** The results allow us to conclude that the edge diode detector can be replace the film for the commissioning of radiosurgery cones with a high level of agreement.