

AbstractID: 3888 Title: Measurement of the radial dose and the dose anisotropy functions for the new ¹⁹²Ir Varian source

Purpose:

To measure the radial dose function and the dose anisotropy functions, used in the AAPM Task Group 43 dose calculation formalism, of the new ¹⁹²Ir Varian Source model VS-2000 utilized in high dose rate brachytherapy.

Method and Materials:

The measurements were carried out with TLD dosimeters and radiochromic dye films in a 30 x 30 x 30 cm³ acrylic phantom with the ¹⁹²Ir source positioned at the center. The new VariSource has an active length of 0.5 cm, and an active diameter of 0.34 mm. Measurements were made for distances between 2 and 7 cm from the source center using TLD-100 (LiF:Mg,Ti) chips (3.1 x 3.1 x 0.89 mm³) whereas for distances smaller than 2 cm Gafchromic HD-810 film were used. TLD irradiations for each distance from the source center were made separately at approximately 2 Gy. TLD's were read using a Harshaw 3500 reader. Because of the high gradient dose near the source, HD-810 films were exposed at three different doses and then digitized in RGB color scale obtaining three images based on the RGB channels. HD-810 films were calibrated in a ⁶⁰Co beam.

Results:

Dosimetric characteristics of the new Varian ¹⁹²Ir source have been measured in an acrylic phantom using LiF TLD chips and HD-810 radiochromic film. These measurements were performed following the AAPM TG-43 task group recommendation. The radial dose and the dose anisotropy functions were measured in the range of 0.25 cm to 1.5 cm using HD-810 radiochromic film and for distances between 2.0 cm and 7 cm using LiF TLD-100 chips. The anisotropy function was measured from 5° to 180° relative to the source axis.

Conclusion:

Dosimetry data were presented for the new Varian ¹⁹²Ir HDR source following the AAPM TG-43 dosimetric formalism, for input and verification purposes in treatment planning systems.