

## THE DOSIMETRY CHARACTERISTICS OF LEIPZIG APPLICATORS

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**Purpose:** Leipzig applicators are one kind of accessories of Nucletron <sup>192</sup>Ir High-Dose-Rate remote afterloading system. According to the orientation of the source axis in the applicator, it can be divided into two kinds: horizontal and vertical ones. There are three kinds of diameter for each type of applicator: 1, 2 and 3 cm. Five characteristics of the applicator will be measured for clinical application. They are geometric structure, relative output, percent depth dose, isodose curve distributions and real sagittal plane radiation leakage test.

**Materials and Methods:** High accuracy calipers was used to measure the geometric structure of the applicator. The relative outputs were measured with N.E. 0.03 c.c. parallel-plate ionization chamber connected to Ionex Dosemaster 2590 in RMI solid phantom with 3 mm build-up layer. The outputs were normalized to the dose in full phantom that was measured at the same source-to-chamber distance. The percentage depth dose and isodose curve distributions were measured with Scanditronix RFA-300 water phantom connected to p-type electron beam semiconductor chamber. The measurement was performed in water along the side Mylar window. The real sagittal plane radiation leakage of the applicator was measured with Kodak V-film that was cut according to the shape of the applicator.

**Results:** The relative outputs of the horizontal type were increased 10%, while the vertical ones were decreased 9%. The effective source-to-surface distance of the horizontal type is equal to 1.93 cm and 1.74 cm for the vertical ones. The isodose curves are attenuated in the central axis of vertical type applicators due to the attenuation from catheter and source tip. The hot spots of the horizontal type applicators are located at the top of the applicator and at the sides for the vertical ones. The leakage is 30% for the horizontal types and 20% for the vertical types.

**Conclusion:** Leipzig applicators can be used to treat some small volume cancer such as skin cancer, oral cancer and for other dose boost treatment. The dose can be estimated with ESSD to approximately 20% depth accurately. The hot spots of the applicators allow the user to avoid unnecessary exposure.

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