

## **Dosimetric considerations of Using Cylinders and HDR in the Irradiation of Vaginal Cuff**

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High dose rate remote afterloader with cylindrical applicators has been used to irradiate the vaginal cuff. Although the stepping source feature of HDR offers the potential for optimization of dose, in actuality delivering a uniform dose distribution around the hemispherical dome and sides of the cylindrical may prove to be difficult. This is due to the constraints from the number of available dwell positions and dose anisotropy of the source resulting from fabrication.

This study examined various arrangements of dwell positions activation and dwell times to generate a uniform dose distribution at 0.5 cm from the cylinder surfaces. Vaginal cylinders with diameters from 2.0 cm to 3.5 cm were considered. The dwell times at evenly spaced dwell positions were determined to deliver 500 cGy to a distance 0.5 cm from the cylinder surface.

Results showed that a uniform dose around the dome of a cylinder is difficult to obtain with the existing limited dwell positions. In addition a more uniform dose distribution can be attained if certain dwell positions remain inactivated. The impact of these parameters as well as the dwell time as a function of distance from the end of the dome will be reviewed using physics of radiation sources.