High dose rate (HDR) ¹⁹²Ir sources in remote afterloaders can be used for endovascular brachytherapy applications, such as restenosis prevention. The determination of accurate dose distribution at proximate distances (i.e., 0.1-1.0 cm) from an HDR ¹⁹²Ir source is crucial for the success of treatments because the target cells for endovascular brachytherapy are typically located within a few millimeter from the source. However, information about the dose distribution at such distances is scarce because of its limited impact on conventional brachytherapy and the difficulty of accurate measurements. In this study, the radial dose distribution between 0.1 and 1.0 cm from an HDR ¹⁹²Ir source (Nucletron Corporation, Columbia, Maryland) was calculated by Monte Carlo calculations using the MCNP 4A code in a coupled photon-electron transport mode. Results show that the dose rate decreases by a factor of approximately 60 as the radial distance increases from 0.1 to 1.0 cm. Calculated values are presented in 1 mm intervals and compared with a few data points available from published Monte Carlo results obtained from the MCPT code that performs photon transport only. This comparison allows the effect of including electron transport on the calculational accuracy to be discussed. Recommendations on an adequate dose calculation grid size and interpolation scheme will be presented for dose calculations in endovascular brachytherpy using HDR ¹⁹²Ir sources.

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