Dosimetry of iridium-192 and cesium-137 seed sources

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The use of $\sp{192}$Ir in brachytherapy implants both alone and in conjunction with other modalities for the treatment of various types of cancer has greatly increased in recent years. This increased usage has led to a greater need for detailed information concerning the dose distribution surrounding commerically available $\sp{192}$Ir seed sources. This is especially truce since improvements in computer technology along with their increased availability and utilization have enabled more precise calculation of dose distributions.

The radiation does distribution in water was measured using LiF thermoluminescent dosimeters for an $\sp{192}$Ir seed source with platinum encapsulation, for an $\sp{192}$Ir seed source with stainless steel encapsulation and for a $\sp{137}$Cs seed source intended as a substitute for $\sp{192}$Ir.

The Electron-Gamma-Shower (EGS) computer code, which is a package for doing Monte Carlo simulation of the transport of photons and electrons in any medium or geometry specified by the user, also was used to study the dose distribution around these seed sources. In addition, the exposure rate constant, exposure rate at 1 meter, transmission through the source capsule, f-factor, and energy distribution exiting the source capsule were evaluated by Monte Carlo simulation of these three sources.

Good agreement was seen between the measured data and the Monte Carlo generated data. In addition to producing valuable dosimetric data, this study has demonstrated that Monte Carlo modeling of $\sp{192}$Ir and $\sp{137}$Cs seed sources using the EGS Monte Carlo code can provide an accurate means of evaluating these data.