

In ¹⁰³Pd seed prostate implants, a dose of 125 Gy is prescribed to cover the target volume. However, in many cases, accurate identification of target volume is difficult and the amount of margin needed to cover a clinical target volume to achieve adequate tumor control is at question. On the other hand, since dose distribution produced by a ¹⁰³Pd seed is anisotropic, inadequate margin may lead to cold spots inside tumor, especially in the peripheral portions of tumor. Furthermore, edema usually occurs in prostate after the implantation and may manifest the cold spots caused by inadequate margin and dose anisotropy. In this work, we examine the influence of inherent dose anisotropy of seeds on the tumor cell survival fractions for an edematous prostate implant. A biomathematical model was used to calculate the tumor cell survival fractions inside an edematous prostate taking into account the temporal resolution of post-surgical edema. The model 200 and DraxImage BrachySeedTM-Model Pd-1 ¹⁰³Pd seeds were used and the calculations were based on an actual pre-implant plan. The anisotropy factors at 1 cm for the two seeds are 0.86 and 1.06 respectively. It was found that as margin decreased the effect of dose anisotropy on tumor cell survival became more pronounced. Thus, the more isotropic ¹⁰³Pd source is more forgiving of the errors in the placement of seeds in the margins of the implants.