

One of the objectives of image based three dimensional treatment planning of permanent implant of I-125 or Pd-103 seeds in the prostate is to have optimal coverage of the target volume (TV) after the actual implant is performed. Pre-implant treatment plans are usually designed with the prescribed dose covering a planning volume that is larger than the TV to allow for the seed placement uncertainties during the implant. One can quantify the extent of additional treatment volume by calculating the ratio of the volume of tissue that receives the prescribed dose to that of the target. This tissue target volume ratio (TTVR) can be used to compare competing plans. The correlation between TTVR in the pre-implant plans with the post-implant dose coverage of the TV and source strength is being studied for a number of prostate implants. The extent of dose inhomogeneity is also quantified by calculating the ratio of the harmonic mean dose¹ to the intended homogeneous dose to the TV. The correlation of this dose inhomogeneity index (DII) with the biological effective dose is also being investigated to assess its usefulness as a tool for designing optimal treatment plans. A quality index (QI) is also being examined to quantitatively evaluate the deviation of the post-implant dose coverage of the TV from the planned prescribed dose. The usefulness of TTVR, DII, and QI for planning and evaluation of permanent seed implants will be presented.

1. Y. Yu, Med. Phys. **23**, 905 (1996).