

The Relationship between Volume and Dose Conformity Quantifiers in Prostate Brachytherapy

Conformity quantifiers are used in permanent prostate brachytherapy as a measure of implant quality. They can be organized into two distinct groups, volume conformity quantifiers and dose conformity quantifiers. Both types are used to describe the sufficiency of the dose delivered to the clinical target volume, usually the prostate gland. Volume quantifiers delineate the volume of the target (or percentage of the target) that received a specified dose (or percent of the reference dose) or greater. Thus V_{100} refers to the percentage of the target which received 100% of the reference dose or greater. The dose conformity quantifiers on the other hand refer to the dose at which the specified percentage of the target volume received that dose or greater. D_{90} therefore refers to the dose at which 90% of the target received that dose or greater. Although both conformity quantifier types are used in the literature, the sole publication that relates implant quality to outcome uses only the dose conformity quantifier, suggesting a D_{90} of at least 140 Gy for iodine monotherapy.

In analyzing the results of post implant dosimetry from 150 patients, we have determined the relationship between the volume and dose conformity quantifiers in the clinical environment. Our results illustrate the relationship's dependence upon isotope, implant design, and reference dose. Based upon this analysis, achieving a V_{100} of 87% may be assumed to be equivalent to achieving a D_{90} of 140 for iodine monotherapy.