Purpose: To create a clinical basis and to describe a process that would lead to a better understanding of possible practical implementations of the treatment site concept in the strength-base medical event definition. To explore various metrics and similarity measures defining the geometry of implants.

Methods: Pre- and post-implants were analyzed for 100 cases. Contour structures and seed data were extracted from Variseed (Varian Medical Systems, Inc., Palo Alto, CA). In house written Matlab software was developed to construct structures that would encompass 100% and 95% of seeds, identify seed distributions with greater than 20% of total number of seeds residing outside of zones at distances up-to 5mm beyond the prostate contour, determine inter-distances between seeds, and calculate the center of mass for prostate contours as well as seed distributions. Similarity between pre- and post-implant plans was evaluated by skewness and kurtosis of the inter-seed distance distributions. All implants studied were considered ‘good’ or better by current D90 criteria.

Results: In our dataset there were no cases in which more than 20% of the seeds were implanted outside a zone expanded 4mm from prostate. A 3mm expansion would have produced 5 events, while a 2mm expansion would have produced 11 events. Skewness of inter-seed distances was on average 0.06 for pre-plans and 0.14 for post-plans. This demonstrates a displacement of inter-seed distances toward larger values. Post to pre-plan ratios of minimum box volume encompassing 95% of seeds increased from 1.3 to 1.72 as zones were expanded from 0 to 4mm. Kurtosis analysis revealed a significant increase in post-plans, but outlier-prone distributions did not correlate with the cases having more than 20% of seeds in distant zones.

Conclusions: We are proposing measures based on clinical data that can assist in defining ‘treatment site’ as well as help practitioners better understand the relation between pre- and post-implants.