New nonogram for peripheral loading of prostate brachytherapy using iodine-125 seeds.

In recent years, brachytherapy has become one of the important primary treatment modalities for early stage prostate cancer patients using iodine radioactive seeds. To determine the total activity required for the implant of uniform seed distributions, the traditional approach has been based on the use of a nomogram. Various nomograms have been developed and used by many other centers. However, for preferential seed loading around the periphery of the prostate gland, a new sphero-cylincrial dose model has been developed. In this presentation, for given sizes of the gland, a special peripheral loading of the seeds is configured. The accumulated isodose surface encompassing the target volume is calculated according to TG-43. As a result, the total activities of the iodine-125 seeds and the geometrical average dimensions calculated from the various target volumes are plotted on a log-log scale. The equation of a nomogram, namely $A=2.00d^{2.12}$, is an especially formulated power function for peripheral loading. Furthermore, by using this specific nomogram approach, forty (4) implanted patients with iodine seeds were analyzed for their post-implant dosimetry based on CT images. The results including dose coverage, dose homogeneity, dose to the urethra and the overall urinary complications are presented for evaluation.