AbstractID: 1628 Title: A clinical application for converting Iodine 125 nomogram values from one source to another for real-time prostate brachytherapy.

Over the years, nomogram models have been developed and used to predict the activity necessary to treat a given minimum peripheral dose for prostate brachytherapy. Activity predicting nomograms are specific to a brachytherapy source model and their TG43 dosimetric properties. Further variations in nomograms are derived from differences in source loading, activity per seed, and number of seeds used in order to determine the surface distribution of the integral dose. With the increase in the different types and vendors of Iodine 125 seeds, and the shift to performing real-time brachytherapy, nomograms have regained popularity in order to estimate the number and activity of each source prescribed for the surgical procedure. Since individualized nomograms for all Iodine 125 sources have not been developed, there is a need for the ability to convert the values from a specific nomogram to another Iodine 125 source. This paper will first evaluate and compare the TG43 source characteristics for the current nine Iodine 125 source manufacturers. Secondly, by utilizing these characteristics with a modified uniform loading pattern for a specific plan, an evaluation will be made of the V100, V150, average urethral and rectal doses. Finally, it will be demonstrated that by using a simple conversion factor (source specific), one can convert from a published nomogram activity to any other Iodine 125 seed type, while keeping the same number of seeds, location and needles used, and achieve the same clinical results within $\pm$ 2%.