Purpose: Nomograms can be used as quality-assurance instruments for performing secondary independent checks of total implanted activity per prostate volume when computer based treatment planning has been performed. The goal of this study was to generate a Pd-103 (Model 200) activity to prostate volume nomogram based on a stranded-seed modified uniform loading implant technique.

Methods: In a Phase II protocol, seventy-five consecutive patients who had recently undergone prostate brachytherapy were selected for this study. The patients were treated using a modified uniform loading stranded-seed technique. Plans determining the number of seeds and needle loading were generated using the Variseed treatment-planning system. Approximately 30% of the seeds were implanted within the PTV in the periprostatic tissue. The prescribed dose was 125 Gy for all patients. Patients were implanted with Pd-103 (Model 200) seeds with an activity of either 2.451 U/seed (1.9 mCi/seed) or 1.548 U/seed (1.2 mCi/seed).

Results: Over all the implants, the mean prostate volume was 34.1 ± 9.2 cc, the mean number of implanted sources was 89 ± 17 seeds with an average total activity of 165.8 ± 30.7 mCi. For the range of prostate volumes implanted in this study, the activity in mCi could be determined using a best fit power law equation of 15.962 (prostate volume)^0.6652 with a correlation coefficient of 0.95. The mean planned and post implant (Day 30) prostate V100 values were 100% and 97% respectively.

Conclusions: We have characterized the amount of activity per volume necessary to achieve consistent high quality implants using Pd-103 stranded-seeds with a modified uniform loaded technique. The nomogram acts as a secondary dosimetry check to verify the accuracy of the treatment planning system determined dose calculations. The nomogram is also an extremely efficient and effective tool in the prostate implant quality assurance process.