All currently used methods for the treatment of prostate cancer treat the entire gland because of the inability to identify regions of cancer within the prostate. Recently, Feleppa et al. have developed a ultrasonic spectrum analysis technique to distinguish prostate cancer. In this study, we performed a dosimetric analysis of selective dose escalation to the peripheral zone and the regions suspicious for cancer as identified by this technique. The impact of dose escalation on dose to the urethra, neurovascular bundles, and dose coverage to the prostate were evaluated.

Spectrum analyses were performed for 5 prostate implant patients. Tissue-type images were obtained, and suspicious regions identified. Treatment plans were generated by the VariSeed™ optimization program and then modified slightly as needed. We covered the entire prostate with the prescribed dose, 85% of the prostate with 125%, 60% with 150% and 30% with 200% while limiting the dose to the neurovascular bundles and urethra to less than 100% and 150%, respectively. For dose escalation plans, a dose 150% was prescribed to the peripheral zone, and 200% to the suspicious regions, with $^{103}\text{Pd}$ seeds activities in the range of 1.8 mCi to 2.4 mCi.

For regular plans, prostate coverage, urethra and neurovascular bundle sparing were achieved with all activities. For dose escalation plans, urethra sparing and dose coverage for prostate gland, peripheral zone, and suspicious regions were achieved for all activities. However, neurovascular bundles V100 increase from less than 5% for regular plans up to 45% for dose escalation plans.