AbstractID: 3439 Title: Treatment planning approach for elongated linear sources for prostate implants

Purpose:

Recently pseudo and true elongated linear brachytherapy sources have become available for prostate implants. These sources were designed to eliminate the problems associated with loose seed type implants such as seed migration and embolization. However, majority of the commercially available prostate treatment planning systems are not capable to perform dose calculations with the elongated linear source types. In this project an intermediate solution for prostate treatment planning with elongated linear sources has been introduced using commercially available treatment planning systems.

Methods and Materials
Two new models have been introduced for calculating dose distribution around linear sources greater than 1.0 cm in length. Dose distributions around elongated linear source were obtained either by super position of 0.5 cm or 1.0 cm long source segments using line (LSS) or point (PSS) source approximation in treatment planning systems. These models have been validated by calculating dose distribution around RadioCoil^{TM} sources using Prowess^{TM} and VariSeed^{TM} treatment planning systems and comparing the results with Monte Carlo Simulated data. Clinical application of these models for a multi source implant has been validated by treatment planning for a sample prostate patient.

Results:
Results of LSS and PSS models are found to be in good agreement with of Monte Carlo simulated data (within 4%) for the points within the active length of the source. Discrepancy is noted for the points out side the active length of the source and is under investigations. Moreover, ABS recommended parameters obtained with these models for a sample prostate patient are in good agreement to that of "seed" type implant using Pd^{103} Model 200.

Conclusion: These results show that the new models can easily be adapted for dose calculations with commercially available treatment planning systems for elongated linear sources. These models provide an intermediate solution for the treatment planning with elongated sources.