

AbstractID: 10313 Title: Dosimetric feasibility of using low energy sources in multi-lumen device for partial breast brachytherapy

Purpose: To evaluate the dosimetric feasibility of using low energy sources (Cs-131, I-125, Pd-103) in the multi-lumen device for partial breast brachytherapy. The sources are placed into the device for multiple days until the desired dose is achieved, then withdrawn with the device. This outpatient procedure only requires two visits, one for source placement and another for device withdrawal.

Method: A 10-1 SAVI device was fully expanded, CT-scanned and imported into VariSeed. Cavity, PTV (cavity + 1cm margin) and PTV_eval (PTV – cavity) were created. The same type and activity of seeds were added into the multi-lumen device to cover the PTV_eval and seed activity was adjusted to achieve a nominal dose (50Gy in one half-life of source). Different seed types and distributions were tested. Oncentra Brachy and IPSA optimization was used to generate a HDR plan for comparison. Dosimetric parameters (D_{90} , V_{100} , V_{150} , and V_{200} of PTV_eval) and skin dose were compared.

Results: D_{90} , V_{100} , V_{150} , and V_{200} of PTV_eval of HDR plan are 107%, 97%, 52cc, and 24cc. The most comparable LDR plan is from a non-uniform distributed 90 3.2U Cs-131 source, which gives 102%, 92%, 52cc, and 26cc. Skin dose is lower than the HDR plan by ~10% of the prescription dose from 0.5 ~ 5 cm away from the PTV edge. With the comparable coverage, I-125 gives slightly higher V_{150} and V_{200} (56cc and 30cc, respectively), while Pd-103 gives much higher V_{150} and V_{200} (66cc and 46cc respectively).

Conclusion: Cs-131 is the best choice among the 3 commercially available low energy sources. It can provide adequate target coverage and similar dose homogeneity compared to HDR dosimetry in reasonable days (10 days). The faster dose fall-off of the low energy sources give it advantage of less dose to the surrounding healthy tissues including skin, heart, and lung.