

AbstractID: 8657 Title: Comparison of Rush University In-house Dose Optimizer and Nucletron IPSA

Purpose:

We quantitatively compared the Rush University In-house Optimizer (RUIDO) with the Inverse Planning with Simulated Annealing (IPSA) used in Nucletron Plato Treatment Planning System.

Method and Materials:

RUIDO uses Adaptive Simulated Annealing (ASA) optimization algorithm, which is capable of optimizing a plan based on either physical dose, EUD, or TCP/NTCP. In this study, only physical dose optimization is compared. Three Syed implant HDR cases were planned using both RUIDO and IPSA. For each case, the number and positions of the catheters remain the same, and dwell time for each source position is optimized. Based on the Dose-Volume-Histogram (DVH) from both optimized plans, detailed comparison of coverage (CI), homogeneity (HI), and overdose (OI), etc. were performed. The source strengths in RUIDO plans were scaled to provide similar CI as the corresponding IPSA plan during plan comparison.

Results:

For all three cases, the normalized RUIDO plans show similar CI (within 0.1%) as the IPSA plans. In two cases, RUIDO plans appear better with higher HI (9% and 16%) and lower OI (16% and 45%). In the third case, two plans were tied, as RUIDO plan shows preferable HI (13% higher) but less preferable OI (12% lower). In addition, for all three cases, mean dose in both plans agree within 7%. It takes 10-15 seconds for IPSA to optimize the plan once. However, it might take several more trials for the user to obtain the optimal set of parameters depending on the user's experience. RUIDO plan, on the other hand, can generate the optimized plan within minutes (1-16 minutes), but it only takes one trial to do this hence needs possible shorter overall planning time.

Conclusion:

RUIDO is able to provide equivalent plan with possible shorter overall planning time compared with IPSA and is less user-dependent.

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