AbstractID: 12694 Title: Determination of Dose Objective Parameters and Dose Evaluation during Inverse Planned HDR Brachytherapy based on a Global DVH-Based Statistical Comparison

Purpose: Since brachytherapy dose distribution contains steep dose gradients, plan evaluation over the whole DVH (rather than a few dose points) may be beneficial. We developed a rapid dose evaluation procedure to determine the optimization parameters, facilitate the planning process, and complete the dose distribution evaluation simultaneously for all regions of interest.

Materials and Methods: After each dose calculation for a prostate implant, the DVH are automatically compared to the clinically validated reference data for prostate, urethra, rectum, bladder and bulb. The reference data was generated for each DVH from 50 HDR patients planned with IPSA, separated by volumes into three groups. Upper and lower 95% and 99% confidence intervals and the mean were computed for each structure from 10% to 200% of the prescribed dose. The data were entered into the OncentraBrachy planning system.

Results: The observation of the color-coded deviations provide an immediate visual cue indicating which organ(s) and what DVH dose intervals are above or below the preset reference range and require attention, and therefore the optimization parameters to be adjusted, such as the minimum or maximum dose objective values. The process is completed when all dose intervals for all structures are within the normal range in relation to the reference data. This approach is now clinically implemented.

Conclusion: The similarity of the DVH, over a wide range of prostate volumes and shapes, illustrates the consistency of the dose distributions when IPSA is used. A global DVH-based statistical procedure has been developed to quickly determine whether, and for which structure, a dose modification is needed during the dose optimization planning process. In addition to rapidly identifying which optimization parameters need adjustment, the comparison with clinically validated r eference values provides an automatic, immediate, and global quantitative quality assurance.

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