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Evaluation of BEBIG HDR+[®] dose optimization methods: A case study of HDR brachytherapy cervical plans

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Introduction:

High dose rate brachytherapy (HDR) has taken an important place in the treatment of cervical cancer. Treatment planning system is required to calculate dwell time and position. Many methods are used to optimize those parameters such as manual method and automatic method.

The aim of this work is to compare graphical (GRO) and inverse planning by simulated annealing (IPSA) optimization methods offered by BEBIG HDR+[®] for cervical plans considering dosimetry and planning time.

Methodology:

Ten retrospective cervical brachytherapy patients were chosen for this study. Manual GRO and IPSA plans were generated for each patient. Plans were compared using dose-volume histograms (DVH) and dose coverage metrics including; conformal index (COIN), and homogeneity index (HI). Approximate planning time was also recorded.

Results:

There was significant difference between GRO and IPSA in terms of mean COIN of 1.34 and 1.18 ($p=0.04$) and no significant difference in terms of mean HI of 0.32 and 0.44 ($p=0.09$) respectively. Mean GRO planning times were greater than 20 min while average IPSA planning times were less than 10 min.

Conclusion:

For the same dosimetrical plan, IPSA offers a reduced planning time compared to GRO.

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