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A Planning Study Comparison: Stereotactic Ablative Body Radiotherapy (SABR) versus Stereotactic Ablative Body Proton Therapy (SABPT) for High Risk Prostate Cancer

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Abstract

Objectives: 1- To assess the technical feasibility of SABR and SABPT in high risk prostate cancer.

2- To assess the tumour control probability (TCP) and rectal normal tissue complication probability (NTCP) between the plans.

Methods: All patients underwent serum PSA levels, a TRUS biopsy, whole body bone scan and a multi-parametric MRI of the prostate, and a planning CT scan. The T2-weighted, ADC map, and T1 with dynamic contrast mpMRI sequences were used to identify the dominant intra-prostatic lesions (DIL). The prescribed doses were 35 Gy in 5 fractions to the prostate and seminal vesicles; and 50Gy in 5 fractions to the DIL. SABR plans using a Volumetric Modulated Arc Therapy (VMAT) technique were compared with SABPT plans using an Intensity Modulated Proton Therapy (IMPT). All RT plans were created on the Phillips Pinnacle with Proton Planning treatment planning system. Tumour control probabilities (TCPs) and rectal equivalent uniform doses (EUDs) were compared between the plans using RADBIOMOD.

Results: All plans reached prescription doses and adhered to the normal tissue constraints. The mean TCPs for SABR and SABPT were 95% and 97%, respectively. The mean rectal EUDs for SABR and SABPT were 10.3 Gy and 8.4 Gy, respectively.

Conclusions: This planning study has suggested that a dose escalation for high risk prostate cancer is feasible, either by using SABR or SABPT. The TCPs were similar, whilst the rectal EUD was slightly lower with SABPT.

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