

Published Research -SQCCCRC

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- 1- Fleury E, Trnková P, van Rij C, Rodrigues M, Klaver Y, Spruijt K, Naus N, Zolnay A, Pignol JP, Kiliç E, Hoogeman MS. Improving Organs-at-Risk Sparing for Choroidal Melanoma Patients: A CT-based Two-Beam Strategy in Ocular Proton Therapy with a Dedicated Eyeline. *Radiother Oncol.* 2022;171:173-181. doi: 10.1016/j.radonc.2022.04.021.

Purpose: To investigate the potential clinical benefit of a two-beam arrangement technique using three-dimensional (3D) imaging of uveal melanoma (UM) patients treated with proton therapy and a dedicated eyeline. Material/Methods: Retrospective CT-based treatment plans of 39 UM patients performed using a single beam (SB) were compared to plans with two beams (TB) optimized for better trade-offs in organs-at-risk sparing. The RBE-weighted prescribed dose was 60 Gy ($D_{RBE, GTV} = 60$ Gy) in four fractions, assuming an RBE of 1.1. Dosimetric findings were analyzed for three patient groups based on tumor-optic nerve distance and UM staging (group GrA: ≤ 3 mm, T1 T2 UM; GrB: ≤ 3 mm, T3 UM; GrC: > 3 mm, T1 T2 T3 UM). Finally, two schedules were compared on biologically effective dose (BED): both beams being delivered either the same day (TB), or on alternate days (TBalter). Results: All strategies resulted in dosimetrically acceptable plans. A dose reduction to the anterior structures was achieved in 23/39 cases with the two-beam plans. $D_{25\%}$ was significantly lowered compared to SB plans by 12.4 and 15.4 Gy RBE-weighted median dose in GrA and GrB, respectively. $D_{2\%}$ was reduced by 18.6 and 6.0 Gy RBE-weighted median dose in GrA and GrB, respectively. A cost to the optic nerve was observed with a median difference up to 3.8 Gy RBE-weighted dose in GrB. BED differences were statistically significant for all considered parameters in favor of two beams delivered the same day. Conclusion: A two-beam strategy appears beneficial for posterior tumors abutting the optic nerve. This strategy might have a positive impact on the risk of ocular complications.

