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## Introduction

In radiosurgery for single brain metastases (BM), the advantage of using non-coplanar fields in terms of dose falloff and conformity to the peak volume (PV) has been reported. However, the need to rotate the treatment table and the difficulty in obtaining positioning images in certain table positions can lead to inaccuracies during treatment. This paper proposes dosimetric comparison coplanar and non-coplanar, using volumetric intensity-modulated arc therapy (VMAT).

## Method

Twelve patients with a single BM ( $PTV_{3.3} \pm 2.0$  cc) were selected. The prescribed dose was 20Gy/1fr, two treatment plans were optimized using coplanar VMAT and non-coplanar on the Eclipse TPS (Varian). All plans were normalized 95% of the PTV received 100% of the prescribed dose. The resulting plans were evaluated considering: conformity index (CI) (RTOG and Paddick), gradient index (GI), high doses ( $\geq 105\%$ ) outside the PTV, homogeneity index, PTV coverage, and homogeneity of coverage. The number of radiation units (MUs) and total irradiation time were also evaluated for each modality. Doses received by the healthy brain were compared.

## Conclusions

This study confirms the possibility of slightly improving dose homogeneity and limiting low doses by using non-coplanar arcs. However, in terms of protecting healthy brain tissue, coplanar VMAT was superior in all patients, making this technique a viable treatment option. This analysis is particularly important when considering radiosurgery with equipment that does not allow for table rotation, as in tomotherapy.

## Results

Both plans met the internationally recommended medical and physical acceptance criteria. CI (RTOG) values of 0.98 and 1.05 were obtained, CI values 0.87. Homogeneity indices were slightly better with non-coplanar VMAT. Units of treatment (UM) and irradiation times were reduced by 27.1% and 18.7%, respectively, with non-coplanar VMAT, but the time required for table rotations or additional images was not taken into account. V12Gy and V10Gy of healthy brain were 23.6% and 9.0% lower with coplanar VMAT.

