

## Dosimetric study of automatic brain metastases planning

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## Abstract

**Objectives:** To investigate plan quality indices for two different techniques available for Automatic Brain Metastases Planning (ABMP): BrainLAB Elements (BEL) with dynamic conformal arcs (DCA) and Varian HyperArc (VHA) with volumetric modulated arcs (VMAT). Both treatment planning systems allow the automatic planning workflow for multiple targets using one single isocentre with multiple coplanar and non-coplanar arcs. **Methods:** New plans were generated with Eclipse v15.5 for 10 clinical cases of multiple small brain metastases (with 2 to 4 targets), which had been originally planned with Elements version 1.5 using dynamic conformal arcs (DCA). HyperArc uses a VMAT optimised technique with up to 5 arcs. Each plan was optimised to match the same prescription dose and D99% for each target as in BEL. Treatment plan dose distributions were evaluated using "Paddick" conformity index (PCI) and Gradient Index (GI). The V12Gy for the brain minus GTV was also analysed. **Results:** All new HyperArc plans met our standards for clinical acceptability, including minimum target coverage and maximum dose limits to critical organs at risk. In the original BEL plans using DCA, the quality indices were PCI = 0.61 +/- 0.11 and GI = 3.46 +/- 1.2. There was higher conformity in the simulated HyperArc VMAT plans, with the mean PCI = 0.79 +/- 0.14, but lower dose gradients, with the mean GI = 3.57 +/- 1.2. **Conclusion:** Using automated planning features, both treatment planning systems consistently achieved conformal plans with high dose gradients for multiple targets. HyperArc (VMAT) plans had better conformity indices and also offer the possibility to reduce the treatment time with delivery process automation. BrainLab Elements (DCA) plans achieved better gradient indexes for small target volumes only.

### Open Access

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