

The QFix EncompassTM stereotactic radiosurgery (SRS) immobilization system consists of a thermoplastic mask that attaches to the couch insert to immobilize patients treated with intracranial SRS. This study evaluates the dosimetric impact and verifies a vendor provided treatment planning system (TPS) model in the Eclipse TPS. A thermoplastic mask was constructed for a Lucy 3D phantom, and was scanned with and without the EncompassTM system. Attenuation measurements were performed in the Lucy phantom with and without the insert using a pinpoint ion chamber for energies of 6xFFF, 10xFFF and 6X, with three field sizes (2 × 2, 4 × 4, and 6 × 6 cm²). The measurements were compared to two sets of calculations. The first set utilized the vendor provided Encompass TPS model (EncompassTPS), which consists of two structures: the Encompass and Encompass base structure. Three HU values for the Encompass (200, 300, 400) and Encompass Base (-600, -500, -400) structures were evaluated. The second set of calculations consists of the Encompass insert included in the external body contour (EncompassEXT) for dose calculation. The average measured percent attenuation in the posterior region of the insert ranged from 3.4%-3.8% for the 6xFFF beam, 2.9%-3.4% for the 10xFFF, and 3.3%-3.6% for the 6X beam. The maximum attenuation occurred at the region where the mask attaches to the insert, where attenuation up to 17% was measured for a 6xFFF beam. The difference between measured and calculated attenuation with either the EncompassEXT or EncompassTPS approach was within 0.5%. HU values in the EncompassTPS model that provided the best agreement with measurement was 400 for the Encompass structure and -400 for the Encompass base structure. Significant attenuation was observed at the area where the mask attaches to the insert. Larger differences can be observed when using few static beams compared to rotational treatment techniques ¹⁾.

¹⁾

Snyder KC, Xhaferllari I, Huang Y, Siddiqui MS, Chetty IJ, Wen N. Evaluation and verification of the QFix EncompassTM couch insert for intracranial stereotactic radiosurgery. J Appl Clin Med Phys. 2018 Jul;19(4):222-229. doi: 10.1002/acm2.12387. Epub 2018 Jun 15. PMID: 29905000; PMCID: PMC6036407.

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