

## Documents

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**Dosimetric evaluation of brain radiotherapy using custom-made Rhizophora head phantom – comparison between Monte Carlo GATE and treatment planning system MONACO**

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**Abstract**

Background: A custom-built head phantom has the potential as a dosimetric phantom in brain radiotherapy. Materials and Methods: Computed tomography (CT) was used to scan the phantom with CT data imported to treatment planning system (TPS) for dose computation. The dose prescription was pre-determined to deliver 300 cGy per fraction to the isocenter of the beam. 6 MV photon with parallel-opposed technique was used in this work. Absorbed dose computed in planning target volume (PTV) and organ at risks (OARs) were computed, and comparison was made with Monte Carlo (MC) Geant4 Application for Tomographic Emission (GATE). Results: The result demonstrates a close proximity of computed dose for TPS and GATE with a 1.6 % discrepancy for the PTV, with less than 1 % statistical uncertainty for GATE. The dose measured by TPS for most of the target of interest was in close proximity with the dose measured in MC. Conclusion: This study revealed the potential of MC GATE simulation in the dosimetric evaluation and verification of the treatment planning. © 2025 Novin Medical Radiation Institute. All rights reserved.

**Author Keywords**

brain radiotherapy; Dosimetry; GATE; Monte Carlo simulation; treatment-planning system

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