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Redefining the therapeutic landscape of glioblastomas and brain metastasis through cesium brachytherapy and low-kV intra-operative radiation therapy (IORT)

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Abstract

Background: The role of brachytherapy in neuro-oncology has evolved through periods of enthusiasm and skepticism.

Objective: We examined the historical landscape of brachytherapy, tracing influential studies, clinical adoption patterns, technological advancements, and ongoing trials that reflect its resurgence in neuro-oncology.

Methods: We conducted a scoping literature review of brachytherapy.

Results: Because of their favorable safety profiles, cesium-131brachytherapy and low-kV intra-operative radiation therapy (IORT) have emerged as a preferred platform for intracranial brachytherapy. In glioblastoma and brain metastasis (BM) patients, published literature indicates that cesium-131 brachytherapy and low-kV IORT do not increase the risk of surgical morbidity or procedural complications. Radiation necrosis remains rare in most glioblastoma and brain metastasis cases. Consistent across the available literature, cesium-131 brachytherapy and low-kV IORT are associated with excellent local control, including large lesions with a maximal diameter of > 3.5 cm. Ongoing clinical trials aim to compare the effectiveness of these adjunctive radiation platforms to the current standard of care, while also exploring their potential for integration into multimodal treatment strategies.

Conclusion: As prospective clinical trials mature, cesium-131 brachytherapy and IORT are poised to redefine the therapeutic landscape for glioblastoma and brain metastasis management.

Keywords: Brachytherapy; Brain metastasis (BM); Cesium; Glioblastoma; Intra-operative radiation therapy (IORT).