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# Advancements and challenges: immunotherapy therapy in high-grade glioma - a meta-analysis of randomized clinical trials

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## Abstract

**Background:** High-grade gliomas (HGG) are the most aggressive primary brain tumors with poor prognoses despite conventional treatments. Immunotherapy has emerged as a promising avenue due to its potential to elicit a targeted immune response against tumor cells.

**Objective:** This meta-analysis aimed to evaluate the efficacy and safety of various immunotherapeutic strategies, including immune checkpoint inhibitors (ICI), virotherapy, and dendritic cell vaccines (DCV) in treating HGG.

**Methods:** Following the PRISMA framework, we searched PubMed, Cochrane, and Embase for studies reporting outcomes of HGG patients treated with immunotherapy. Key metrics included overall survival, progression-free survival, and treatment-related adverse events.

**Results:** We reviewed 47 studies, analyzing data from 3674 HGG patients treated with immunotherapy. The mean overall survival for patients treated with ICI was 11.05 months, with virotherapy at 11.79 months and notably longer for DCV at 24.11 months. The mean progression-free survival (PFS) for ICIs was 3.65 months. Virotherapy demonstrated a PFS favoring the control group, indicating minimal impact, while DCV showed substantial PFS improvement with a median of 0.43 times lower hazard compared to controls (95% CI: 29-64%). Adverse events were primarily Grade 1 or 2 for ICI, included a Grade 5 event for virotherapy, and were predominantly Grade 1 or 2 for DCV, indicating a favorable safety profile.

**Conclusion:** Immunotherapy holds potential as an effective treatment for HGG, especially DCV. However, results vary significantly with the type of therapy and individual patient profiles. Further randomized controlled trials are necessary to establish robust clinical guidelines and optimize treatment protocols.

**Keywords:** Dendritic cell vaccine; High-grade glioma; Immune checkpoint inhibitors; Immunotherapy; Virotherapy.