# Advances in gene therapy for high-grade glioma: a review of the clinical evidence

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## Abstract

**Introduction:** High-grade glioma (HGG) is one of the most deadly and difficult cancers to treat. Despite intense research efforts, there has not been a significant breakthrough in treatment outcomes since the early 2000's. Anti-glioma gene therapy has demonstrated promise in preclinical studies and is under investigation in numerous clinical trials.

**Areas covered:** This manuscript reviews the current landscape of clinical trials exploring gene therapy treatment of HGG. Using information from clinicaltrials.gov, all trials initiated within the past 5 years (2018-2023) as well as other important trials were cataloged and reviewed. This review discusses trial details, innovative methodologies, and concurrent pharmacological interventions. The review also delves into the subtypes of gene therapy used, trends over time, and future directions.

**Expert opinion:** Trials are in the early stages (phase I or II), and there are reports of clinical efficacy in published results. Synergistic effects utilizing immunotherapy within or alongside gene therapy are emerging as a promising avenue for future breakthroughs. Considerable heterogeneity exists across trials concerning administration route, vector selection, drug combinations, and intervention timing. Earlier intervention in newly diagnosed HGG and avoidance of corticosteroids may improve efficacy in future trials. The results from ongoing trials demonstrate promising potential for molding the future landscape of HGG care.

**Keywords:** Gene therapy; clinical trials; glioblastoma; high grade glioma; malignant glioma; virotherapy.

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