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Applications and current challenges of chimeric antigen receptor T cells in treating high-grade gliomas in adult and pediatric populations

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Abstract

High-grade gliomas (HGGs) continue to be some of the most devastating diseases in the USA. Despite extensive efforts, the survival of HGG patients has remained relatively stagnant. Chimeric antigen receptor (CAR) T-cell immunotherapy has recently been studied in the context of improving these tumors' clinical outcomes. HGG murine models treated with CAR T cells targeting tumor antigens have shown reduced tumor burden and longer overall survival than models without treatment. Subsequent clinical trials investigating the efficacy of CAR T cells have further shown that this therapy could be safe and might reduce tumor burden. However, there are still many challenges that need to be addressed to optimize the safety and efficacy of CAR T-cell therapy in treating HGG patients.

Keywords: CAR T cells; adult; high-grade gliomas; immunotherapy; pediatric.

Plain language summary

This publication describes the current application of chimeric antigen T-cell (CAR T-cell) therapy in treating high-grade gliomas (HGGs). Treatment of various HGG models with CAR T cells has shown that this therapy is often able to shrink HGG tumors and prolong the survival of these models. Subsequent clinical trials have shown that CAR T-cell therapy can reduce tumor size in some HGG patients. Patients in these clinical trials have tolerated the treatment well, though more robust studies are needed to confirm this treatment's safety. Additionally, other challenges, such as getting CAR T cells into the brain and to the tumor, need to be addressed to improve the effectiveness of this therapy for HGG patients.

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