

Chimeric Antigen Receptor-T Cell Therapy for Pediatric and Young Adult Primary Central Nervous System Tumors: A Systematic Review of Early-Phase Clinical Trials with a Focus on Diffuse Midline Glioma

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Supplementary Table 1: Search terms

Database	Search terms	Results
PUBMED/MEDLINE	("Chimeric Antigen Receptor T-Cell"[Mesh] OR "chimeric antigen receptor"[tiab] OR "chimeric antigen receptor t cell"[tiab] OR "CAR T"[tiab] OR "CAR-T"[tiab] OR "CAR T-cell"[tiab] OR "CAR-T cell"[tiab] OR "adoptive cell therap*" [tiab]) AND (pediatr*[tiab] OR paediatr*[tiab] OR child*[tiab] OR adolescen*[tiab] OR teen*[tiab] OR "young adult"[tiab] OR AYA[tiab] OR infant*[tiab]) AND ("Brain Neoplasms"[Mesh] OR "Central Nervous System Neoplasms"[Mesh] OR brain tumor*[tiab] OR brain tumour*[tiab] OR CNS tumor*[tiab] OR CNS tumour*[tiab] OR glioma*[tiab] OR glioblastoma*[tiab] OR "diffuse midline glioma"[tiab] OR DMG[tiab] OR DIPG[tiab] OR "diffuse intrinsic pontine glioma"[tiab] OR medulloblastoma*[tiab] OR ependymoma*[tiab] OR ATRT[tiab] OR "atypical teratoid rhabdoid"[tiab] OR PNET[tiab]) AND humans[MeSH Terms]	101
EMBASE	('car t':ti,ab,kw OR 'car-t':ti,ab,kw OR 'chimeric antigen receptor':ti,ab,kw OR 'chimeric antigen receptor t cell':ti,ab,kw OR 'adoptive cell therap*':ti,ab,kw) AND (brain:ti,ab,kw OR cns:ti,ab,kw OR glioma*:ti,ab,kw OR glioblastoma*:ti,ab,kw OR dipg:ti,ab,kw OR dmg:ti,ab,kw OR medulloblastoma*:ti,ab,kw OR ependymoma*:ti,ab,kw OR atrt:ti,ab,kw) AND (pediatr*:ti,ab,kw OR paediatr*:ti,ab,kw OR child*:ti,ab,kw OR adolescen*:ti,ab,kw OR 'young adult':ti,ab,kw OR aya:ti,ab,kw) NOT ('animal'/exp NOT 'human'/exp)	601
Scopus	TITLE-ABS-KEY("chimeric antigen receptor" OR "chimeric antigen receptor t cell*" OR "CAR T" OR "CAR-T" OR "CAR T-cell*" OR "CAR-T cell*" OR "adoptive cell therap*") AND TITLE-ABS-KEY(pediatr* OR paediatr* OR child* OR adolescen* OR teen* OR "young adult" OR AYA OR infant*) AND TITLE-ABS-KEY("brain tumor*" OR "brain tumour*" OR "CNS tumor*" OR "CNS tumour*" OR glioma* OR glioblastoma* OR "diffuse midline glioma" OR DMG OR DIPG OR "diffuse intrinsic pontine glioma" OR medulloblastoma* OR ependymoma* OR ATRT OR "atypical teratoid rhabdoid" OR PNET) AND NOT TITLE-ABS-KEY(animal*)	225

Supplementary Table 2. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
• Prospective or retrospective early-phase (phase I / first-in-human) clinical trials or expanded cohorts • Chimeric antigen receptor (CAR) T-cell therapy, delivered intravenously and/or locoregionally (e.g., intracerebroventricular, intratumoral) • Pediatric and/or adolescent/young adult patients, or mixed-age cohorts with extractable pediatric/AYA CNS tumor data • Primary CNS tumors, including DMG/DIPG, high-grade glioma, glioblastoma, ependymoma, medulloblastoma, ATRT, or other primary brain/spinal tumors • At least one of the following: safety/toxicity, clinical or radiographic response (PR/SD/PD), biologic or immune correlates, or survival outcomes • Full-text, peer-reviewed articles with sufficient data for extraction	• In vitro or animal-only studies • Studies evaluating immunotherapies or cellular therapies without CAR modification • Studies limited to brain metastases or non-CNS primary malignancies • Reviews, editorials, commentaries, protocols without outcomes, or conference abstracts lacking extractable data • Overlapping patient populations without novel outcome data (most complete/latest report retained) • Outcomes not extractable for primary CNS tumor cohorts