Efficacy and Safety of CAR T-Cell Therapy in Primary Central Nervous System Lymphoma: A Systematic Review and Meta-Analysis

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INTRODUCTION.

PCNSL is a rare, aggressive B-cell lymphoma. Half of patients relapse within two years. 15–20% are refractory to first-line therapy. [1] Median survival after relapse is 4–12 months. [2,4] CNS disease was excluded from every pivotal CAR-T trial, on fear of neurotoxicity. [3] Most reviews mix primary and secondary CNS lymphoma, so disease-specific estimates are missing.

AIM.

Pool all published outcomes of CAR-T therapy in PCNSL. Endpoints: overall, complete and partial response; overall and progression-free survival at 6 and 12 months; cytokine release syndrome, ICANS and treatment-related mortality.

METHODS.

Design: systematic review and meta-analysis. **Search:** PubMed, Scopus, Web of Science, inception to February 2026. **Eligible:** studies reporting clinical outcomes of CAR-T in PCNSL. **Yield:** 23 reports. 15 studies pooled (n = 194). 8 reports described qualitatively (n = 9). **Model:** random effects, with I^2 for heterogeneity.

CONCLUSIONS.

CAR-T showed activity in PCNSL. Two in three patients respond to treatment, and most responses are complete. Toxicity is manageable. Severe CRS and severe ICANS stay near systemic-lymphoma levels. Durability is the gap. Survival falls between 6 and 12 months. Disease-specific prospective trials are needed.

RESULTS

68%
OVERALL RESPONSE
95% CI 59–76 · I^2 17%

57%
COMPLETE RESPONSE
95% CI 49–65 · I^2 4%

60%
OVERALL SURVIVAL, 12 MO
79% at 6 months

42%
PFS, 12 MONTHS
52% at 6 months

RESPONSE

Overall response	**68% (59–76)**
Complete response	**57% (49–65)**
Partial response	**16% (11–22)**

SAFETY

CRS, any grade	**72%**
CRS, grade ≥3	**12%**
ICANS, any grade	**46%**
ICANS, grade ≥3	**16%**
Treatment-related death	**5% (2–15)**

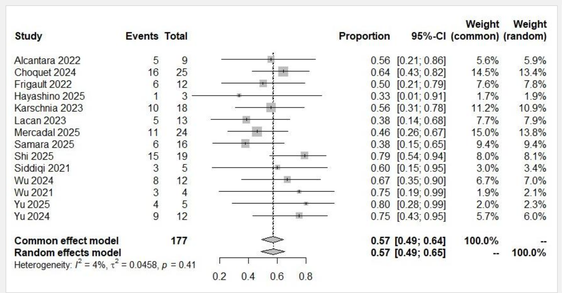

Figure 1. Pooled complete response rate.

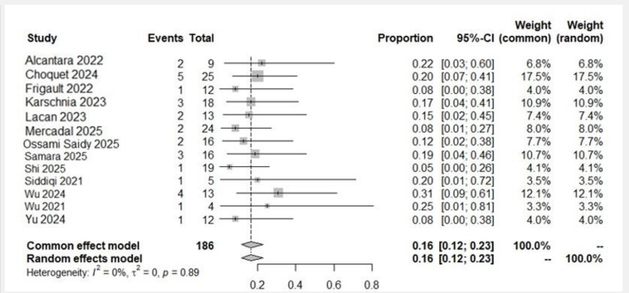

Figure 2. Pooled ICANS, grade ≥3

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