Systematic Review on CAR-T Therapy in Relapsed/Refractory Multiple Myeloma (RRMM) Patients with Renal Impairment

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Background

Renal impairment (RI) develops in up to 50% of patients with multiple myeloma (MM) and is linked with poor prognosis. Regardless of the notable efficacy of chimeric antigen receptor T cells (CAR-T) in relapsed/refractory MM (RRMM), patients with renal impairment (RI) have been largely excluded from the clinical trials resulting in limited data to guide the treatment decisions in this subgroup.

Objective

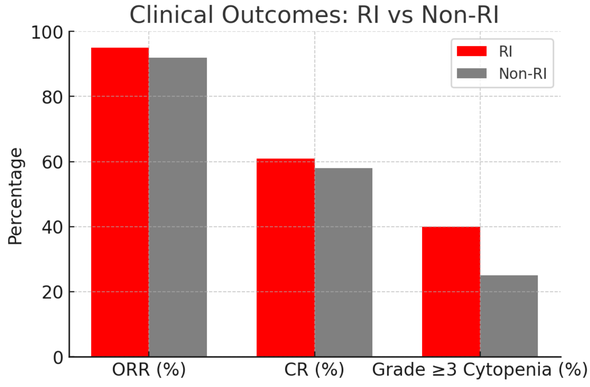
This systematic review was conducted to assess the feasibility, safety, and efficacy of CAR-T cell therapy in RRMM patients with RI.

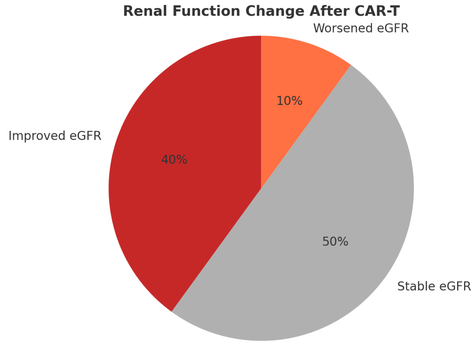
Methods

In this study, we conducted a systematic review of the literature across databases to evaluate the clinical efficacy and safety of CAR-T in RRMM patients with RI. Data on patient demographics, criteria for renal function, CAR-T construct, adverse events, response rates, and survival endpoints were collected. Definitions of RI varied among studies, but were generally based on creatinine clearance < 50 mL/min or eGFR < 90 mL/min/1.73m². Two reviewers independently screened all the studies for inclusion.

Results

A total of 53 patients with RI were enrolled across 3 studies comprising 273 RRMM patients. Regardless of CAR-T structure or the baseline renal function, ORRs in the RI patients were between 87% to 100% with CR rates reaching up to 61%. Patients with RI could tolerate CAR-T without unexpected toxicity and the incidence of CRS or neurotoxicity was similar to that of the non-RI groups. However, short term grade ≥3 cytopenias were more frequent in the RI subgroup. In the majority of cases, the renal function was stable or improved after CAR-T therapy, with several patients improving their eGFR category. Although progression-free (PFS) and overall survival (OS) were slightly reduced in certain RI sub groups, the clinical outcomes were still meaningful to support the overall feasibility of CAR-T therapy.





Conclusion

CAR-T therapy is an effective modality for RRMM patients with RI. Given the low toxicity profile and possible renal recovery, these results support the inclusion of patients with RI in future prospective trials and advocate extension of CAR-T belonging to this high risk subgroup of MM patients.

References

1. Li H, Yin L, Wang Y, et al. Safety and efficacy of chimeric antigen receptor T-cell therapy in relapsed/refractory multiple myeloma with renal impairment. *Bone Marrow Transplant*. 2020;55(12):2215-2218. doi:10.1038/s41409-020-0930-5

2. He J, Liu Y, Zhu X, et al. Safety and efficacy of anti-BCMA CAR-T cell therapy in relapsed/refractory multiple myeloma patients with renal impairment: a multicenter retrospective study. *HemaSphere*. 2021;5(S2):Abstract EP991. doi:10.1097/HS9.0000000000000783

3. Ding L, Wang Y, Hu Y, et al. Safety and efficacy of chimeric antigen receptor T-cell therapy in patients with relapsed/refractory multiple myeloma and renal impairment: a systematic review and pooled analysis. *Hematology*. 2023;28(1):e2195598. doi:10.1080/16078454.2023.2195598

Acknowledgments

Thank you to collaborators and data providers.
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