Cardiovascular Risk of CAR T-cell and Bispecific Immunotherapies in Relapsed or Refractory Multiple Myeloma: A Systematic Review and Meta-analysis

L. S. M. Kodali, MBBS, MPH[1], M. Mylavarapu, MBBS, MPH[2], D. S. Pasnoor, MBBS[3], N. Ganatra, MD[4], P. Jain, MBBS[4], A. Sanjeevi, MD[5].

[1]University of Michigan – Flint, Flint, MI, [2]Walker Baptist Medical Center, Jasper, AL, [3]Kamineni Academy of Medical Sciences and Research Centre, Hyderabad, TG, India, [4]Baptist Hospitals of Southeast Texas, Beaumont, TX, [5]Rochester General Hospital, Rochester, NY

SOHO2025

Introduction

- T-cell–redirecting therapies (CAR-T, chimeric antigen receptor T-cell; BsAb, bispecific antibody) improve outcomes in relapsed/refractory multiple myeloma (RRMM).
- Cardiovascular adverse events (CVAEs) are increasingly recognized but underexplored in early-phase trials.

Objective

To estimate the incidence of CVAEs in RRMM patients and assess the disparities between CAR-T and bispecific therapies through a systematic review and meta-analysis.

Methods

- **Design:** PRISMA-based systematic review and meta-analysis.
- **Data sources:** PubMed/MEDLINE, EMBASE, Scopus, Google Scholar.
- **Population:** Adults with RRMM treated with CAR-T or bispecific T-cell–engaging therapies.
- **Study types:** Single-arm retrospective studies, RCTs, post-marketing analyses.
- **Exposure groups:** CAR-T vs. bispecific therapies analyzed separately.
- **Outcomes:** Overall CVAE proportion; subgroup comparison by therapy type.
- **Statistics:** Random-effects model; pooled proportions with 95% CI; p<0.05 significant.

Results

- **Studies and Population:** 11 studies (5 retrospective, 5 RCTs, 1 post-marketing); ***999 patients***; ***157 CVAEs***.
- **Overall CVAEs**: **0.16** (95% CI: 0.12–0.21; p<0.001).
- **CAR-T subgroup** (7 studies): **0.18** (95% CI: 0.12–0.25; p=0.26).
- **Bispecific subgroup** (4 studies): **0.13** (95% CI: 0.08–0.20; p=0.26).

Conclusion

- Cardiovascular toxicity occurs in about ***1 in 6 patients*** receiving T-cell–redirecting therapies for RRMM.
- CAR-T shows a higher, but not statistically significant, CVAE rate compared with bispecific antibodies.
- Prospective studies are required for structured cardiovascular monitoring in trials and real-world care, along with defining risk and mitigation strategies.

References

1. Cai Z, Xia Z, He A, et al. Efficacy, safety, and pharmacokinetics of teclistamab in Chinese patients with relapsed/refractory multiple myeloma from the China cohort of MajesTEC-1. Cancer. 2025;131(1):e35665. doi:10.1002/cncr.35665
2. Iida S, Sunami K, Ito S, et al. Phase 1 study of talquetamab, a humanized GPRC5D x CD3 bispecific antibody, in Japanese patients with relapsed/refractory MM. Int J Hematol. Published online May 9, 2025. doi:10.1007/s12185-025-03991-5
3. Sayed A, Munir M, Ghazi SM, et al. Cardiovascular toxicities associated with bispecific T-cell engager therapy. J Immunother Cancer. 2024;12(2):e008518. doi:10.1136/jitc-2023-008518
4. Stepanovic A, Abonour R, Abu Zaid M, Farag S, Lee KP, Suvannasankha A. Teclistamab in Relapsed/Refractory Multiple Myeloma: Real-World Outcomes at a Single Academic Center in the Midwest. Blood. 2023;142(Supplement 1):7359. doi:10.1182/blood-2023-183085

Fig 1. Overall Pooled Proportion of Cardiovascular Adverse Events in RRMM patients treated with T-cell Redirecting Therapies

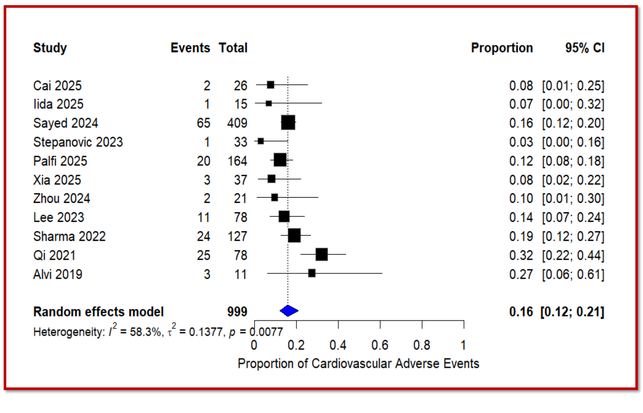
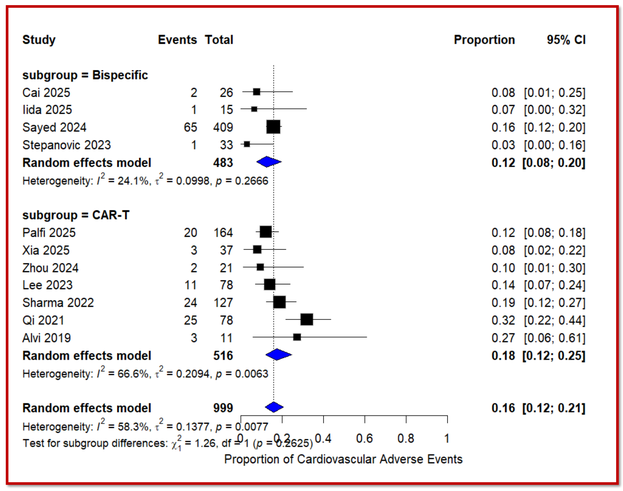


Fig 2. Subgroup Pooled Proportions of Cardiovascular Adverse Events in RRMM patients treated with CAR-T and Bispecific Antibodies



Disclosure: We have NO financial disclosures or conflict of interest with the presented material.