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Advances in CAR-T Cell Therapy in Relapsed/Refractory Multiple Myeloma: A Systematic Review and Meta-analysis of Clinical Trials in the Last Two Years

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INTRODUCTION

T-cells are engineered to express chimeric antigen receptors (CAR) to target cancer-associated antigens. CAR-T cell therapy has shown promising results in multiple hematological malignancies.

AIM

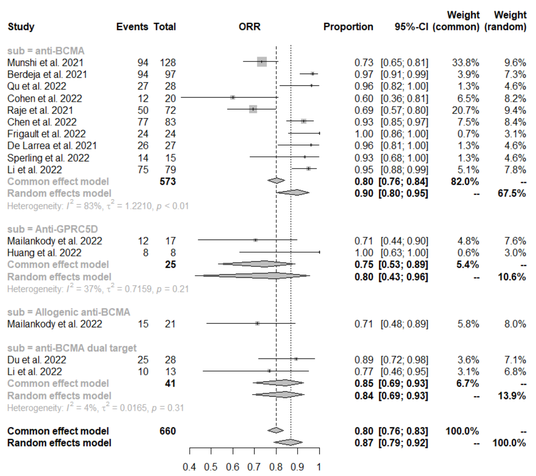
In this systematic review and meta-analysis, we will assess the efficacy of CAR-T cell therapies in relapsed/refractory multiple myeloma (RRMM) tested in the last 2 years.

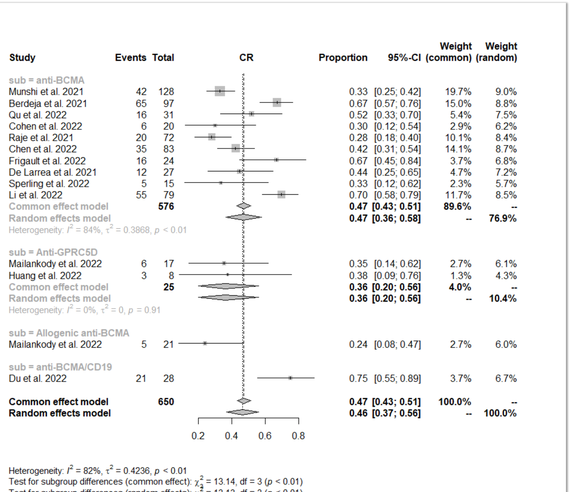
METHOD

A literature search was performed on PubMed, Embase, and clinicaltrials.gov with the keywords “multiple myeloma” and “CAR-T cell therapy” from 1/1/2021 to 2/31/2023. We screened 1,818 articles and included the results of 15 clinical trials (N=660). PRISMA guidelines were followed while conducting this study. We used R software to conduct this meta-analysis. Data was extracted for overall response, complete response, and negative minimal residual disease. Common effect model was used in analysis.

RESULTS

Among 660 patients in 15 clinical trials, 573 patients were treated with autologous anti-B-cell maturation antigen (anti-BCMA), 21 patients were treated with allogenic anti-BCMA, 25 patients were treated with anti-GPRC5D, and 41 patients were treated with dual target CAR-T cell agents. In 10 clinical trials (N=573) on anti-BCMA CAR T-cell therapy, pooled overall response (ORR), pooled complete response (CR), and pooled negative minimal residual disease (-MRD) were 90% (CI=80%-95%, I2=83%), 47% (CI=36%-58%, I2=84%), and 37% (CI=26%-50%, I2=85%), respectively. In two clinical trials (N=25) on anti-GPRC5D CAR T-cell therapy in patients pretreated with anti-BCMA, ORR, CR, -MRD, were 80% (CI=43%-96%, I2=37%), 36% (CI=20%-56%, I2=0), and 28% (CI=14%-49%, I2=0), respectively. In a clinical trial (N=21) on anti-BCMA allogenic CAR T-cell therapy, ORR, CR, -MRD were 71% (CI=48%-89%, I2=0%), 24% (CI=20%-47%, I2=0), and 24% (CI=8%-47%, I2=0), respectively. In two clinical trials (N=41) on dual-target CAR T-cell therapy, ORR, CR, -MRD was 84% (CI=69%-93%, I2=4%), 75% (CI=55%-89%, I2=0), and 75% (CI=55%-89%, I2=0), respectively.





CONCLUSIONS

Anti-BCMA, anti-GPRC5D, allogenic anti-BCMA, and dual-target CAR T-cell were effective in heavily pretreated MM patients. Anti-GPRC5D showed response in BCMA-pretreated patients. Overall response rates were similar among anti-BCMA, anti-GPRC5D, allogenic anti-BCMA, and dual-target CAR T-cell therapies. More randomized trials are needed to confirm these results.

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