Chimeric Antigen Receptor T Cell Therapy for Systemic Lupus Erythematosus: A Systematic Review

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ABSTRACT

Introduction: Systemic lupus erythematosus (SLE) is an autoimmune disease characterized by immune system activation, autoantibody formation, and organ inflammation. Current SLE treatments are often unsatisfactory. B cells play a crucial role in SLE, which can efficiently be reduced by CD19-targeted chimeric antigen receptor (CAR) T cells. CAR T cells achieve this purpose by targeting the surface molecule CD19, expressed in various B cells. This study aimed to systematically review the evidence on the efficacy and safety of CAR T-cell therapy in SLE patients, focusing on CD19-targeting CAR constructs.

Search Strategy: Adhering to PRISMA guidelines, a systematic search was performed across PubMed, Scopus, and Web of Science databases, and Google Scholar was utilized to incorporate grey literature to identify pertinent studies published between 2020 and 2024. Keywords "Chimeric antigen receptor T cell", "CAR T", "Lupus", "Lupus Erythematosus", "Systemic Lupus", and their synonyms were used. Inclusion criteria covered clinical trial studies using CAR T-cell therapy in SLE patients, focusing on CD19-targeting CAR. Articles with inconclusive results, review studies, animal/cell studies, and conference papers were excluded. Two authors independently screened the search results, and the third author reviewed the conflicts. The quality assessment of the studies was evaluated using the ROB 2 Tool, and relevant information was organized into an extraction table.

Results: A total of 260 articles were initially discovered. After removing 117 duplicates and 122 irrelevant articles, 21 articles remained for full-text screening. Eventually, five articles were included in the study. Based on these studies, the symptoms of SLE in individuals who utilized this treatment were less.

Conclusion and Discussion: Based on the findings of the current study, CD19-targeted CAR T-cell therapy is a promising treatment for SLE. CAR T cell therapy in SLE is short-lived and does not cause disease recurrence. This treatment offers a new option for safe, long-term remission, drug-free remission, and elimination of autoimmunity in patients with SLE. Nevertheless, more investigation is required to validate these findings in larger populations and enhance CAR T-cell therapy's manufacture and administration procedures for SLE.

Keywords: Chimeric Antigen Receptors, Lupus Erythematosus, T Cell, Systematic review

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