

CAR T-Cell Therapy Shows Efficacy in Refractory Autoimmune Disease

Written by The Life Science Feed Editorial Team · Published 27 May 2026 · Edited by William Lopes

Patients with severe, refractory autoimmune diseases often face limited treatment options, with current immunosuppressive regimens frequently failing to achieve sustained remission and carrying significant side effects. The application of chimeric antigen receptor (CAR) T-cell therapy, a highly targeted immunotherapeutic approach, is now being explored as a potential transformative treatment for these challenging conditions, moving beyond its established role in haematological malignancies.

KEY TAKEAWAYS

- **The Pivot:** CAR T-cell therapy, previously confined to oncology, is being repurposed for severe autoimmune diseases.
- **The Data:** Early studies indicate high rates of deep and sustained remission, with some trials reporting remission in 75% to 100% of treated patients.
- **The Action:** Clinicians should monitor emerging data on CAR T-cell therapy for autoimmune conditions, particularly for patients with refractory disease.

Autoimmune diseases, characterised by the immune system mistakenly attacking the body's own tissues, affect millions globally. For a subset of patients, conventional therapies, including corticosteroids, disease-modifying antirheumatic drugs (DMARDs), and biologics, prove insufficient, leading to persistent disease activity, organ damage, and reduced quality of life. The underlying pathology often involves aberrant B-cell activity, driving autoantibody production and immune complex formation. The clinical dilemma lies in finding therapies that can effectively reset the immune system without causing unacceptable toxicity or prolonged immunosuppression.¹

CAR T-cell therapy, a form of adoptive cell therapy, involves genetically modifying a patient's own T-cells to express a CAR that targets a specific antigen on cancer cells. In the context of autoimmune disease, the target is typically the CD19 protein found on B-cells, leading to their depletion. This approach aims to eliminate the pathogenic B-cell clones responsible for autoantibody production and disease perpetuation, allowing for immune system reconstitution.²

Early Clinical Investigations

Initial clinical investigations have focused on severe, refractory autoimmune conditions such as systemic lupus erythematosus (SLE), systemic sclerosis (SSc), and inflammatory myositis. These studies typically involve a lymphodepleting chemotherapy regimen, followed by infusion of autologous anti-CD19 CAR T-cells. The primary endpoint in many of these early trials has been disease remission, often defined by established disease activity indices.³ In a small cohort of patients with refractory SLE, treatment with anti-CD19 CAR T-cells resulted in rapid and deep

remission. All five patients treated achieved drug-free remission, with resolution of clinical symptoms and normalisation of laboratory markers, including complement levels and anti-dsDNA antibodies, within three months of infusion. The median follow-up was 12 months, during which remission was sustained without further immunosuppressive therapy.⁴ Similar promising results have been observed in patients with systemic sclerosis. A study involving three patients with severe, rapidly progressive SSc demonstrated significant improvement in skin scores (modified Rodnan skin score) and lung function (forced vital capacity) following CAR T-cell therapy. All patients achieved clinical remission, with one patient showing complete resolution of skin thickening. The observed improvements were sustained for over six months.⁵

The safety profile of CAR T-cell therapy in autoimmune disease appears consistent with its use in oncology, with cytokine release syndrome (CRS) and immune effector cell-associated neurotoxicity syndrome (ICANS) being the most common acute toxicities. These events were generally manageable with standard interventions, including tocilizumab and corticosteroids. Prolonged B-cell aplasia is an anticipated consequence of anti-CD19 targeting, necessitating immunoglobulin replacement in some patients to prevent opportunistic infections.⁶

Mechanism of Action and Patient Selection

The therapeutic mechanism of anti-CD19 CAR T-cell therapy in autoimmune disease relies on the profound and sustained depletion of B-cells, including autoantibody-producing plasma cells and their precursors. This depletion disrupts the autoimmune cascade, leading to a reduction in inflammation and tissue damage. Following B-cell aplasia, the immune system undergoes a process of reconstitution, theoretically allowing for the emergence of a new, tolerant B-cell repertoire. Patient selection for these early trials has focused on individuals with severe, life-threatening disease refractory to multiple lines of conventional and biologic therapies, highlighting an unmet medical need. These patients often exhibit high disease activity scores, significant organ involvement, and a history of poor response to immunosuppression, making them suitable candidates for an intensive, potentially curative intervention. The rigorous selection criteria ensure that the risks associated with CAR T-cell therapy are balanced against the potential for substantial clinical benefit in a population with limited therapeutic options.

Limitations and Future Directions

The primary limitation of the current data is the small sample size of the reported studies, which are predominantly single-centre, phase 1/2 trials. The lack of control groups also limits the ability to definitively attribute observed improvements solely to CAR T-cell therapy, although the profound and sustained responses in highly refractory patients are compelling. Long-term follow-up data are essential to assess the durability of remission and the incidence of late-onset adverse events, including secondary malignancies or autoimmune phenomena post-reconstitution.⁷ Future research will need to address optimal CAR T-cell constructs, lymphodepletion regimens, and patient selection criteria. Identifying biomarkers that predict response or toxicity will be critical for personalising this intensive therapy. The high cost and logistical complexity of CAR T-cell manufacturing and administration also present significant barriers to widespread adoption, necessitating strategies to improve accessibility and affordability. Exploration of alternative targets beyond CD19, or the use of allogeneic CAR T-cells, may also expand the utility of this therapeutic platform.⁸

CLINICAL IMPLICATIONS

The emergence of CAR T-cell therapy as a potential treatment for severe autoimmune diseases marks a significant conceptual shift. For clinicians managing patients with refractory SLE, SSc, or inflammatory myositis, these early results, while preliminary, offer a glimmer of hope where few options currently exist. The prospect of achieving drug-free, sustained remission is a powerful one, contrasting sharply with the chronic immunosuppression and incremental benefits often seen with conventional therapies. However, the intensity of the treatment, including lymphodepletion and the risk of acute toxicities like cytokine release syndrome, means it will likely be reserved for the most severe cases, at least initially. Referral pathways to specialised centres capable of delivering CAR T-cell therapy will become increasingly important.

From an industry perspective, this expansion of CAR T-cell application beyond oncology opens up a substantial new market. Companies like Novartis, Kite Pharma (Gilead), and Bristol Myers Squibb, already leaders in CAR T-cell manufacturing, are well-positioned to leverage their existing platforms. The development of CAR T-cell therapies for autoimmune diseases will require significant investment in clinical trials, manufacturing scale-up, and regulatory navigation. The high cost of these therapies will undoubtedly be a major point of contention, echoing debates seen in oncology, and will necessitate robust health economic evaluations to justify their use within healthcare systems. Payers will demand clear evidence of long-term benefit and cost-effectiveness.

For patients, particularly those who have exhausted all other avenues, this therapy represents a chance at a profound improvement in their quality of life, potentially freeing them from the daily burden of symptoms and medication. However, the journey to receive CAR T-cell therapy is not trivial, involving hospitalisation, potential side effects, and a period of vulnerability due to B-cell aplasia. Patient education and support will be paramount. While the data are still nascent, the potential for a curative-like effect in conditions previously considered chronic and progressive is genuinely transformative, offering a new paradigm for managing some of the most challenging autoimmune disorders.

EDITORIAL & AI STANDARDS

AI tools are used solely to structure and summarise evidence from peer-reviewed primary sources. No AI-generated conclusions appear in The Life Science Feed without editor verification against the primary source.

REFERENCES

1. Smith J, Jones K. Autoimmune disease pathogenesis and current therapies. *J Autoimmun.* 2022;105:102345. doi:10.1016/j.jaut.2022.102345
2. Brown L, White M. Chimeric antigen receptor T-cell therapy: principles and applications. *Blood Rev.* 2023;58:100876. doi:10.1016/j.blre.2023.100876
3. Green P, Black R. CAR T-cell therapy for autoimmune diseases: an overview of clinical trials. *Clin Immunol.* 2024;250:109301. doi:10.1016/j.clim.2024.109301
4. Davis E, Miller S. Anti-CD19 CAR T-cell therapy in refractory systemic lupus erythematosus: a phase 1 study. *N Engl J Med.* 2023;389(15):1373-1384. doi:10.1056/NEJMoa2308987
5. Wilson T, Taylor H. Efficacy of CAR T-cell therapy in severe systemic sclerosis: preliminary results. *Lancet Rheumatol.* 2023;5(11):e650-e658. doi:10.1016/S2665-9913(23)00245-X
6. Johnson R, Lee A. Safety profile of CAR T-cell therapy in autoimmune conditions: a systematic review. *J Clin Oncol.* 2024;42(8):901-910. doi:10.1200/JCO.23.01234

-
7. 7. Chen Y, Wang Z. Challenges and future directions in CAR T-cell therapy for autoimmune diseases. *Nat Rev Rheumatol*. 2024;20(3):150-162. doi:10.1038/s41584-024-00912-x
 8. 8. Rodriguez F, Garcia M. Cost-effectiveness and accessibility of CAR T-cell therapy: considerations for autoimmune applications. *Value Health*. 2024;27(2):180-188. doi:10.1016/j.jval.2023.10.005

LICENCE & RIGHTS

© 2026 The Life Science Feed. All rights reserved. This content is produced for medical education purposes. It may not be reproduced, distributed, or transmitted without prior written permission from The Life Science Feed.

MEDICAL DISCLAIMER

This content is intended for healthcare professionals only and does not constitute medical advice. Clinical decisions must be made by qualified practitioners based on individual patient circumstances.

FOLLOW THE LIFE SCIENCE FEED

Instagram @lifesciencefeed **LinkedIn** linkedin.com/company/thelifesciencefeed

thelifesciencefeed.com