May 2nd, 12:00 AM

# A Systematic Review on Belimumab's Effectiveness, Improved Health Outcomes and Quality of Life in Patients with Lupus Syndromes

Emily Meale
*Rowan University*

Alexandra Fontaine
*Rowan University*

ROWAN-VIRTUA School of Osteopathic Medicine

Project title

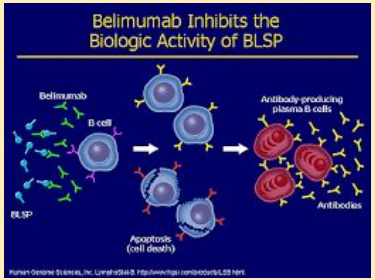
Author name(s)
Department

# A Systematic Review on Belimumab's Effectiveness, Improved Health Outcomes and Quality of Life in Patients with Lupus Syndromes

*Emily Meale, Alexandra Fontaine*
*Rowan-Virtua School of Osteopathic Medicine, Stratford, NJ 08084*

## BACKGROUND

**Systemic lupus erythematosus** (SLE) is a common autoimmune disease that has a high incidence in women of child-bearing age.
**Glucocorticoids** are commonly used to manage lupus. Long term glucocorticoid usage is associated with devastating **adverse effects**, so current treatment options aim to mitigate corticosteroids use to improve quality of life.
New management for SLE include biologics such as **Belimumab** which offer improved health outcomes and decreased adverse effects.




## SIGNIFICANCE

This research aims to explore the **treatment options** offered for lupus and demonstrate the **benefits of Belimumab** in patients with SLE.
Belimumab, the **first approved biologic therapy for SLE**, is administered intravenously or via self-injection. It **targets B-cells**, reducing disease activity and improving clinical outcomes.
Belimumab should be considered early in treatment regimens for SLE patients to decrease adverse health outcomes and avoid long term side effects from current treatment options.

## METHODS

Studies focused on clinical trials, meta-analyses, and systematic reviews regarding SLE treatment, with no exclusions. Mainly studied demographic: **women aged 15-44**. Evaluated short and long-term treatment outcomes, adverse effects, and quality of life changes.

Reviewed data from various sources, including qualitative and quantitative outcomes in SLE research, with no limitations on research designs. Concentrated on US-based clinical trials. Analyzed data to determine effective treatments and assess Belimumab's safety, efficacy, accessibility, and impact on quality of life.

## RESULTS

Clinical trials show that **Belimumab is effective at mitigating clinical manifestations of SLE** and **slowing disease progression** while also **decreasing lupus flares that necessitate glucocorticoid treatment**s. Decreased usage of corticosteroids within SLE management **improves quality of life** by decreasing prevalent adverse effects.

Disease activity was largely quantified by **titers of lupus specific antibodies and concentrations of complement factors**. Additionally, belimumab improved serologic activity in patients with serologically active disease; because of this improvement, patients were able to **reduce corticosteroid use.**

While generally well-tolerated, side effects may include headache, nausea, and increased infections.
Belimumab also shows promise as a **complementary treatment following B-cell depletion therapies like rituximab**, potentially reducing lupus exacerbations and anti-dsDNA antibody levels.

## DISCUSSION

**Accessibility** to healthcare, compounded by **diagnostic** complexities and **financial** burdens, presents significant challenges in managing lupus. Policy initiatives, community outreach, and advocacy are essential for addressing these barriers, alongside broader efforts to tackle social determinants of health.

**Treatment costs** for lupus are substantial, particularly with newer, expensive options like belimumab. While belimumab shows promise in improving health outcomes, its accessibility remains a concern due to high costs.

Early diagnosis and intervention are crucial for optimal management of lupus. While belimumab may not be the first-line treatment, its efficacy and safety profile warrant consideration, especially for patients responding well to rituximab.

## FUTURE DIRECTION

Ongoing research into emerging therapies like belimumab is essential for refining treatment strategies and improving outcomes for lupus patients. Collaboration between clinicians, researchers, and patients is key in addressing uncertainties and advancing lupus management.

While Belimumab does not currently hold a primary position in the SLE treatment hierarchy, its well-established efficacy, favorable safety profile, and **positive influence on health outcomes warrant consideration for earlier integration into treatment protocols.** Clinical practitioners are encouraged to judiciously assess patient responses to rituximab treatment, and where improved outcomes are observed, deliberate inclusion of Belimumab in therapy may be indicated.

# References


1. Lupus and Kidney Disease (Lupus Nephritis). National Institute of Diabetes and Digestive and Kidney Diseases. 2017 Jan 1 [accessed 2021 Mar 13]. https://www.niddk.nih.gov/health-information/kidney-disease/lupus-nephritis.
2. Classification of Autoimmune Diseases. Classification of Autoimmune Diseases - Autoimmune Disease | Johns Hopkins Pathology. [accessed 2021 Feb 28]. https://pathology.jhu.edu/autoimmune/classification
3. Hoffmann T, Oelsner P, Busch M, et al. Organ Manifestation and Systematic Organ Screening at the Onset of Inflammatory Rheumatic Diseases. *Diagnostics (Basel)*. 2021;12(1):67. Published 2021 Dec 29. doi:10.3390/diagnostics12010067
4. Systemic Lupus Erythematosus (SLE). Centers for Disease Control and Prevention. 2018 Oct 17 [accessed 2021 Feb 28]. https://www.cdc.gov/lupus/facts/detailed.html#sle
5. Shlomchik MJ, Craft JE, Mamula MJ. From T to B and back again: positive feedback in systemic autoimmune disease. Nat Rev Immunol. 2001;1:147–153.
6. Choi J, Kim ST, Craft J. The pathogenesis of systemic lupus erythematosus-an update. Curr Opin Immunol. 2012;24(6):651-657. doi:10.1016/j.coi.2012.10.004
7. Walport MJ. Complement. First of two parts New Engl J Med. 2001;344:1058–1066. doi: 10.1056/NEJM200104053441406.
8. Craft JE. Dissecting the immune cell mayhem that drives lupus pathogenesis. Sci Transl Med. 2011;3:73ps79.
9. Schiffer L, Sinha J, Wang X, Huang W, von Gersdorff G, Schiffer M, Madaio MP, Davidson A. Short term administration of costimulatory blockade and cyclophosphamide induces remission of systemic lupus erythematosus nephritis in NZB/W F1 mice by a mechanism downstream of renal immune complex deposition. J Immunol. 2003;171:489–497.
10. Anders HJ, Saxena R, Zhao MH, Parodisl, Salmon JE, Mohan C. Lupus nephritis. Nat Rev Dis Primers. 2020;6(1):7. Published 2020 Jan 23. doi:10.1038/s41572-019-0141-9
11. Lupus Blood Tests • Johns Hopkins Lupus Center. Johns Hopkins Lupus Center. Published 2017. https://www.hopkinslupus.org/lupus-tests/lupus-blood-tests/
12. Srivastava A. Belimumab in Systemic Lupus Erythematosus. Indian J Dermatol. 2016;61(5):550-553. doi:10.4103/0019-5154.190107
13. Fanourgiakis A, Tziolis N, Bertsias G, Boumpas DT. Update on the diagnosis and management of systemic lupus erythematosus. Ann Rheum Dis. 2021;80(1):14-25. doi:10.1136/annrheumdis-2020-218272
14. Anders HJ, Saxena R, Zhao MH, Parodisl, Salmon JE, Mohan C. Lupus nephritis. Nat Rev Dis Primers. 2020;6(1):7. Published 2020 Jan 23. doi:10.1038/s41572-019-0141-9
15. De Bosscher K, Vanden Berghe W, Haegeman G. The Interplay between the Glucocorticoid Receptor and Nuclear Factor-κB or Activator Protein-1: Molecular Mechanisms for Gene Repression. Endocrine Reviews. 2003;24:488–522.
16. Yasir M, Goyal A, Sonthalia S. Corticosteroid Adverse Effects. [Updated 2022 July 4]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK531462/
17. 1. Mejia JC, Basu A, Shapiro R. Chapter 17 - Calcineurin Inhibitors. ScienceDirect. Published January 1, 2014. https://www.sciencedirect.com/science/article/pii/B9781455740963000179
18. Mok CC. 2017. Calcineurin inhibitors in systemic lupus erythematosus. Best Practice & Research in Clinical Rheumatology. 31(3):429-438.
19. New Drug Approvals. Phase III trial of lupus drug Benlysta (belimumab) in patients with ANCA-anti-neutrophil cytoplasmic antibodies-positive vasculitis. New Drug Approvals. Available at: https://newdrugapprovals.org/2013/04/05/phase-iii-trial-of-lupus-drug-benlysta-belimumab-in-patients-with-anca-anti-neutrophil-cytoplasmic-antibodies-positive-vasculitis/. Accessed April 8, 2024.