

Subgroup Stratification in Rheumatoid Arthritis and Systemic Lupus Erythematosus: Advancing Precision Medicine

Introduction

Rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE) are heterogeneous autoimmune diseases with variable clinical manifestations, immunologic profiles, and treatment responses. Traditional classification systems categorize patients broadly; however, growing evidence supports subgroup stratification to improve prognostic accuracy and therapeutic precision.

Stratification in Rheumatoid Arthritis

In RA, subgrouping is commonly based on serological markers such as rheumatoid factor (RF) and anti-citrullinated protein antibodies (ACPA). Seropositive RA is often associated with more aggressive joint damage and extra-articular manifestations, whereas seronegative RA may follow a distinct clinical course.

Molecular stratification further distinguishes patients based on synovial tissue phenotypes—lymphoid, myeloid, fibroid, or pauci-immune patterns—identified through transcriptomic and histologic analysis. These profiles correlate with differential responses to biologic therapies, including TNF inhibitors and IL-6 receptor antagonists. Genetic risk alleles, particularly within HLA-DRB1 shared epitope variants, also contribute to disease susceptibility and severity.

Stratification in Systemic Lupus Erythematosus

SLE presents even greater heterogeneity, affecting multiple organ systems. Clinical stratification often distinguishes patients by dominant organ involvement, such as

lupus nephritis, neuropsychiatric lupus, or cutaneous lupus. Serologic markers, including anti-dsDNA, anti-Sm, and anti-phospholipid antibodies, provide additional subgroup differentiation and prognostic insight.

Emerging molecular stratification highlights interferon gene signatures, which identify patients with heightened type I interferon pathway activation. This subgroup may respond preferentially to targeted biologic therapies aimed at interferon signaling. Complement levels, cytokine profiles, and B-cell subset distribution also offer biologically meaningful clustering.

Role of Precision Medicine

Advances in genomics, proteomics, and single-cell RNA sequencing have accelerated efforts to define mechanistic subgroups in both RA and SLE. Integration of clinical features with molecular biomarkers enables predictive modeling of disease progression and therapeutic response. Such approaches aim to reduce trial-and-error prescribing and minimize adverse effects.

Conclusion

Subgroup stratification in RA and SLE represents a critical step toward precision medicine. By integrating serologic, genetic, and molecular data with clinical phenotypes, clinicians and researchers can better understand disease heterogeneity and optimize individualized treatment strategies. Continued research into biologically defined subgroups promises to improve outcomes and transform autoimmune disease management.

Sophia Lindström*

Department of Rheumatology and Clinical Immunology, Northfield University Medical Center

*Author for Correspondence:

s.lindstrom@northfieldumc.edu

Received: 01-May-2025, Manuscript No. fmijcr-26-185849; **Editor assigned:** 03-May-2025, Pre- fmijcr-26-185849 (PQ); **Reviewed:** 16-May-2025, QC No. fmijcr-26-185849; **Revised:** 21-May-2025, Manuscript No. fmijcr-26-185849 (R); **Published:** 28-May-2025, DOI: 10.37532/1758-4272.2025.20(5).436-436