

Abstract

The Emerging Role of Biomarker-Driven Diagnostics in Post-Streptococcal Glomerulonephritis [†]

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Post-streptococcal glomerulonephritis (PSGN) is an immune-mediated kidney disease that occurs after infection with *Streptococcus pyogenes* (Group A Streptococcus, GAS). Diagnosing PSGN remains challenging due to its varied clinical presentation and reliance on indirect serological markers. Identifying specific biomarkers is crucial for early detection and improved patient outcomes. Recent studies have identified key biomarkers such as Nephritis-Associated Plasmin Receptor (NAPlr) and Streptococcal Pyrogenic Exotoxin B (SpeB), both of which contribute to immune complex formation and glomerular inflammation. Additionally, elevated levels of C3 breakdown products, the soluble urokinase plasminogen activator receptor (suPAR), and urinary exosomal proteins have shown strong correlations with disease severity and kidney dysfunction. Advancements in OMICS technologies have revolutionized PSGN diagnostics. Proteomics has uncovered unique urinary protein signatures, while metabolomics has identified metabolic shifts linked to kidney injury. Transcriptomic analysis has further enhanced our understanding of gene expression changes in PSGN, thus paving the way for precision diagnostics. Innovative point-of-care (POC) diagnostic tools, integrating biosensors and microfluidic assays, allow the real-time detection of PSGN-specific biomarkers, enabling early intervention and personalized treatment strategies. These developments are promising for improving disease monitoring and reducing the risk of long-term renal complications. This review highlights the emerging role of biomarker-driven diagnostics in PSGN, emphasizing the potential of OMICS-based approaches to refine detection methods, enhance clinical decision-making, and ultimately improve patient prognosis.

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