



Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care

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Distinct Immune Signatures of Steroid Responsiveness in Childhood Nephrotic Syndrome

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Objectives : Idiopathic nephrotic syndrome (INS) is a common pediatric glomerular disorder, yet the immunopathogenesis underlying steroid responsiveness remains incompletely understood.

Methods : We applied single-cell RNA sequencing to peripheral blood mononuclear cells from three treatment-naïve children with steroid-sensitive nephrotic syndrome (SSNS) and one with steroid-resistant nephrotic syndrome (SRNS) prior to immunosuppressive therapy.

Results : SSNS patients demonstrated a marked expansion of memory B-cell subsets, upregulated B-cell receptor signaling, and enhanced BAFF/APRIL pathway activation, indicative of an extrafollicular humoral response. In contrast, the SRNS case exhibited a notably reduced frequency of memory B cells, diminished CD27 expression, and a distinct transcriptional program within activated B cells following an alternative differentiation trajectory. Additionally, increased naïve T-cell transcripts suggested active B–T cell crosstalk.

Conclusions : These data delineate a discrete immune landscape distinguishing SRNS from SSNS. Targeting activated B-cell subpopulations, alongside T-cell-mediated mechanisms, may inform novel therapeutic strategies for resistant cases.