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Circulating immune profile changes reflect memory immune responses in spinal cord injury patients

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Following a spinal cord injury (SCI), an inflammatory immune reaction is triggered which results in advanced secondary tissue damage. This study aimed to extensively analyse the circulating immune cell composition in traumatic SCI patients.

High-dimensional flow cytometry was performed on peripheral blood mononuclear cells of traumatic SCI patients and healthy controls (n=18 each). SCI blood samples were collected at multiple time points in the (sub)acute ((s)aSCI, 0-4 days and 3 weeks post-SCI) and chronic (cSCI, 6, 12, 18 and >18 weeks post-SCI) disease phase up to a total of 46 SCI samples.

Total and $CD4^+$ T cell frequencies were increased in cSCI patients. $CD4^+$ T cells and B cells were shifted towards memory phenotypes in (s)aSCI and cSCI patients, respectively. Most profound changes were observed in the B cell compartment. Decreased immunoglobulin (Ig)G^+ and increased IgM^+ B cell frequencies reflected disease severity, as these correlated with American Spinal Injury Association (ASIA) impairment scale (AIS) scores. Post-SCI B cell responses consisted of an increased frequency of B cells and B cell subsets expressing the survival receptor CD74. Expression of CD74 was also elevated on B cell subsets of cSCI but not (s)aSCI patients.

In conclusion, post-SCI inflammation is driven by memory immune cell subsets. The elevated CD74 expression on B cells of SCI patients suggests the potential involvement of CD74-related pathways in post-SCI B cell responses. Monitoring of circulating IgM^+ and IgG^+ B cell levels could aid in the clinical evaluation and prognosis of SCI patients.