March 2023

Mass Cytometry profiling of the peripheral blood immunome in patients with psoriasis and psoriatic arthritis uncovers potential biomarkers related to disease progression

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Cutaneous psoriasis (PsC) is an auto-immune disorder affecting 60 million people globally, among 30% of whom progress to psoriatic arthritis (PsA), a disease with poorly understood etiology, making diagnosis and treatment difficult. Indeed, a complete systemic immune profile of PsA has yet to be performed. In the study herein, we collected peripheral blood samples from patients with PsC, PsA with or without systemic therapy, and healthy controls (HC), and utilized mass cytometry by time of flight (CyTOF) to acquire immune cell profiles of major leukocyte subsets. We found that patients with PsC and/or PsA exhibited increased frequencies of intermediate (CD14+CD16+) and nonclassical (CD14-CD16+) monocytes as well as regulatory T cells. Separation of our heterogenous patient population revealed distinct immune profiles according to ethnicity and sex in patient groups. Analysis of homing markers revealed upregulation of CCR4, CCR7, and CXCR3 on Classical Monocytes and/or Naïve CD8+ T cells in PsC and/or PsA patients. Moreover, analysis of functional markers revealed upregulation of CD38, CD28, and CD25 on Tregs and EM CD4+ T cells in PsC and/or PsA patients. Unbiased machine learning algorithms (CITRUS) revealed upregulation of Classical Monocytes in PsC and PsA compared to HC patients. Lastly, CITRUS revealed upregulated Intermediate Monocytes in PsA compared to PsC patients, and upregulated Classical Monocytes in treated PsA compared to untreated PsA patients. Therefore, we provide a comprehensive profile of immune cell population frequencies and phenotypes in patients with PsC and PsA, highlighting Monocytes and Tregs as potential biomarkers for early diagnosis of PsA.