ImmunoTools *special* Award 2025

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Post-Translational Modifications of the T-Cell Integrin LFA-1 in Health and Disease

Description: The **goal** of this research project is to elucidate the role of post-translational modifications (PTMs) of the integrin, Leukocyte Function-associated Antigen-1 (LFA-1), in regulating T-cell activation, clustering, signaling, motility, and effector function. LFA-1, a heterodimeric receptor composed of the α_L (CD11a) and β_2 (CD18) subunits, mediates interactions between T-cells and Intercellular Adhesion Molecule-1 (ICAM-1) expressed on endothelial and antigen-presenting cells. These interactions are essential for T-cell adhesion, migration, and immune responses. Although the broad immunological relevance of LFA-1 has been appreciated for four decades, the precise molecular switches that govern its activation state, nanoscale organization, and downstream signaling remain incompletely defined. Emerging evidence implicates a spectrum of PTMs, including phosphorylation, glycosylation, methylation, and ubiquitination, in context-specific regulation of integrins. However, the detailed PTMs of LFA-1, associated enzymology across distinct T-cell subsets, their specific roles in LFA-1 functionality, T-cell motility and effector programs are yet to be delineated. Gaps remain in understanding differential expression and activities of PTM-related enzymes across T-cell subsets, such as naïve, activated, and memory cells, and how they impact immune function in health and disease.

Our overarching **objective** is to decode how PTMs sculpt LFA-1 conformation, clustering, and signal transduction, thereby modulating T-cell adhesion, migration, and effector capacity in both physiological and pathological milieus. We are addressing this objective by leveraging an interdisciplinary approach, spanning high-resolution mass spectrometry, advanced molecular, biochemical, cellular, imaging, flow-cytometry, and bioinformatic techniques using human T-cells and mouse

models. In this context, my research team would like to take advantage of the excellent initiative by ImmunoTools. I thank ImmunoTools for this *Special Award* and providing a diverse array of antibodies with distinct staining panels that would be immensely valuable to students working in this project, including my PhD student Ms Suresh Babu Gopika.

This project will generate new insights into LFA-1 regulation that could inform the development of innovative immunomodulatory therapies for diseases characterized by dysregulated T-cell responses, such as autoimmune conditions and cancer.

ImmunoTools *special* AWARD for **Associate Professor Navin Kumar Verma**
includes 10 reagents

FITC - conjugated anti-human CD3, Annexin V

FITC - conjugated anti-mouse CD45

PE - conjugated anti-human CD19, CD279

PerCP - conjugated anti-human CD4

APC - conjugated anti-human CD8, Annexin V

Recombinant mouse cytokines: rm IL-2, IL-7