Galectin-1-matured human monocyte-derived dendritic cells have enhanced migration through extracellular matrix

Jennifer A. Fulcher*, Sara Tajyar†, Ernest L. Levroney*, Mabel Pang*, Linda G. Baum*, and Benhur Lee*†

*Department of Pathology and Laboratory Medicine, †Department of Microbiology, Immunology, and Molecular Genetics, David Geffen School of Medicine at UCLA, Los Angeles, CA 90095

Dendritic cells (DCs) are potent mediators of the immune response, and can be activated by a variety of signals, primarily exogenous pathogen components. Galectin-1 is a member of the highly conserved β-galactoside-binding lectin family which binds galactoside residues on cell-surface glycoconjugates. Galectin-1 is known to play a role in immune regulation via action on multiple immune cells including T cells and B cells. Here we show that galectin-1 induces a phenotypic and functional maturation in human monocyte-derived dendritic cells (MDDCs) similar to but distinct from the activity of the exogenous pathogen stimuli, lipopolysaccharide (LPS). Immature human MDDCs exposed to galectin-1 upregulated cell surface expression of CD40, CD83, CD86, and HLA-DR, a characteristic phenotype of mature DCs, and galectin-1 treated immature MDDCs secrete high levels of IL-6 and TNF-α, stimulate T cell proliferation, and show reduced endocytic capacity, similar to LPS-matured DCs. However, unlike LPS-matured DCs, galectin-1-treated MDDCs did not produce the Th1-polarizing cytokine IL-12. Microarray analysis revealed that while galectin-1 generally modulated many of the same DC maturation genes as LPS, galectin-1 also uniquely upregulated a significant subset of genes related to cell migration through extracellular matrix. Indeed, compared to LPS, galectin-1-treated human MDDCs exhibited significantly better chemotactic migration through Matrigel, an *in vitro* extracellular matrix model. Our findings show that galectin-1 is a novel endogenous activator of human DCs that upregulates a significant subset of genes distinct from those regulated by a model exogenous stimuli (LPS). One unique effect of galectin-1 is to increase DC migration through ECM, suggesting that galectin-1 may be an important component in initiating an immune response.