

Glycan-lectin Lattices Regulate T Cell Function: The Unique Galectin Death Pathways

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The formation of multivalent complexes of soluble galectins with glycoprotein receptors on the plasma membrane helps to organize glycoprotein assemblies in microdomains on the cell surface. Formation of galectin-glycan lattices or scaffolds can be critical for organizing plasma membrane domains, such as lipid rafts, or for targeted delivery of glycoproteins to the apical or basolateral surface. Galectin-glycan lattice formation is also involved in regulating the signaling threshold of several cell surface glycoproteins, including T cell receptor and growth factor receptors. Galectin-glycan lattices can also determine glycoprotein residency time on the cell surface by inhibiting endocytosis of specific receptors or ion channels, thus increasing the effective concentration of these glycoproteins at the interface of the cell surface with the extracellular milieu. We have recently found that one galectin family member, galectin-9, binds to a specific glycoprotein enzyme on the T cell surface to retain the enzyme and regulate the redox potential on the surface of the cell. This effect controls T cell migration via integrins, and may also regulate T cell susceptibility to viral pathogens and to cell death. This effect is especially pronounced for Th2 cells, that are resistant to galectin-9 induced cell death, but display a profound increase in migratory capacity in the presence of galectin-9. This is a novel function for galectin-glycoprotein lattices on T cells, and may be applicable to other types of immune cells, such as eosinophils, that also express galectin-9.

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