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Review

Peptide - mediated mast cell activation: ligand similarities for receptor recognition and protease - induced regulation

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Abstract

MCs are crucial regulators of the innate immune response. MC degranulation is a rapid response mechanism that allows for the release of a stored plethora of inflammatory mediators, including histamine, heparin, various serine proteases, chemokines, and cytokines. The activation of MCs can lead to the de novo expression of a variety of chemokines and cytokines that can influence a variety of outcomes: inflammation, angiogenesis, and others. A variety of IgE - independent mediators, including IgG, cytokines, chemokines, exogenous molecules, drugs, and cationic peptides, and others, can directly trigger MC activation. For decades, various peptide stimuli, including peptide toxins, neuropeptides, antimicrobial peptides, and endogenous bioactive peptides, have been associated with MC allergic reactions in various physiologic and pathologic conditions. Recently, an activation mechanism has been established, whereby the $MRGPRX_2$ receptor is involved in most of the peptide stimuli - related activation of human MCs. Interestingly, most of these peptide sequences seem to have a strong structural similarity that includes abundant positive charges and aromatic/aliphatic amino acids. In this review, we discuss the structures of known peptide stimuli and the receptors with which they interact for the express purpose of highlighting peptide elements as building blocks for tissue engineering applications.