

Immunomodulatory Mechanisms of mCA4, a Synthetic Host Defense Peptide

Abstract:

Host defense peptides (HDPs) represent a group of essential compounds of innate immunity that can elicit strong anti-infective properties and immune regulation and are ubiquitously present in all organisms. These small positively charged amphipathic cationic peptides possess diverse roles regarding regulating and modulating the immune system, namely chemotaxis, cell differentiation, and pro- and anti-inflammatory cytokine production, by activating various intracellular cell signaling pathways. The activation of these pathways promotes wound healing, and acts as anticancer, and anti-infective therapeutic agents. This study aims to evaluate the immunomodulatory potential of HDP recently synthesized and characterized by the Ahmed group, originally derived from chicken Angiogenin 4. Our experimental procedures involve the treatment of mouse macrophages with mini chicken Angiogenin 4 (termed as mCA-4), evaluation of cytokine secretion, and modulation of two well-known immunoregulatory pathways, namely nuclear factor kappa B (NF- κ B) and Mitogen-activated protein kinase (MAPK) by Western blot analysis. Our data indicate that mCA-4 is a pro-inflammatory peptide and activates these pathways, resulting in the secretion of pro-inflammatory mediators, including IL-1 β , NO, and TNF- α , in treated macrophages. Future investigations will involve the evaluation of other intracellular pathways that may be involved in immunomodulation by this peptide, providing valuable insights into its therapeutic potential.

Key words: Host defence peptide, Immunomodulation, Pro-inflammatory mediator, Cell-signalling pathway.

Graphical abstract:

