Rational design of vaccine adjuvants based on dendritic cell receptor agonists

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Finding safe efficacious adjuvants in order to enhance immune responses against target immunogens has been a major unsolved challenge, most particularly in the context of a growing interest in designing new types of vaccines capable of eliciting Th1 immune responses. Importantly, recent advances in our understanding of the physiology of immune responses offer new avenues to design and test candidate adjuvants, based on either synthetic or natural molecules, with the aim to mimic and recapitulate pro-inflammatory signals initiating both innate and adaptive immune effector mechanisms. Thus, adjuvants of the future shall be the highly designer molecules encompassing immune stimulatory molecular patterns of pathogens together with the structural elements that act as delivery vehicles for vaccines which attract, target or activate professional antigen presenting cells. When used alone or in combination, they should facilitate antigen presentation by professional APCs and lead to a potent induction of T cell-mediated effectors and immune memory mechanisms. Amongst the novel compounds recently evaluated, immune-stimulatory molecules such as the muramyl dipeptides, ceramides and the saponin derivatives appear most promising. An overview of the development in this area, immunogenicity of the new generation vaccine adjuvants developed in our lab based on the afore-mentioned scaffolds, their mechanism of action and merits shall be presented.

Biography
Halmuthur M Sampath Kumar obtained his PhD degree in the year 1995 from Indian Institute of Chemical Technology, Hyderabad. He later worked on various aspects of agrochemical and pharmaceutical technology development at Indian Institute of Chemical Technology, Hyderabad. He later moved to Max Planck Institute for Molecular Physiology at Dortmund in the year 2000 as Alexander von Humboldt Fellow to work with Prof. Waldmann in the area of nuclear localization and gene therapy till 2002. He continued working at IICT-Hyderabad till 2004 and relocated to Regional Research Laboratory-Jammu- presently rechristened as IIIM-Jammu. He instituted a new department of synthetic and biological chemistry research at IIIM-Jammu dedicated to adjuvant research. He had been the Chairman of the department till 2009. Currently he is the Project Coordinator and Nodal Scientist for the immunochemistry programme at IICT-Hyderabad, where the focus of his research is on the development of novel small molecule immune-modulators based on natural product scaffolds, vaccine (Th1) adjuvants and delivery systems.

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