

Review Article

Vaccine adjuvants: past, current and future

Parisa Soleimani Roudi (M.A)¹, Abolghasem Golian (Ph.D)^{*2}, Alireza Haghparsat (Ph.D)³
Mohammad Reza Bassami (Ph.D)⁴, Reza Majidzadeh Heravi (Ph.D)⁵

¹Ph.D Candidate in Poultry Nutrition, Department of Animal Sciences, Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran. ²Professor, Department of Animal Sciences, Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran. ³Associate Professor, Department of Pathobiology, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran. ⁴Associate Professor, Department of Clinical Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran. ⁵Assistant Professor, Department of Animal Sciences, Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran.

Abstract

Adjuvants are an essential component of modern vaccines. An adjuvant is an entity added to a vaccine formulation to ensure that robust immunity to the antigen is inoculated. The adjuvant is typically vital for the efficacy of vaccines using subunit (peptides, proteins and virus like particles) and DNA antigens. Furthermore, these components are used to reach the current new goals of preventing and/ or treating chronic infectious diseases and cancers. This review focuses on formulation aspects of adjuvants, safety considerations, progress in understanding their mechanisms of action and also their side effects with using 97 articles are accessible in pubmed central and google scholar indexing which published during 1980-2016. Adjuvants can be broadly divided into two classes, based on their principal mechanisms of action; the first class are vaccine delivery systems that generally particulate and mainly function to target associated antigens into antigen presenting cells. The others are immunostimulatory adjuvants that predominantly derived from pathogens and often represent pathogen associated molecular patterns which activate cells of the innate immune system. Adjuvants induce cellular and humoral responses, in particular neutralizing antibodies that able to inhibit the binding of pathogens to their cellular receptors. Efficient Th1-immunity-inducing adjuvants are highly in demand. The adjuvants promote good cell-mediated immunity against subunit vaccines that have low immunogenicity themselves. However, attempts to develop a new generation of adjuvants, which are essential for new vaccines, is important, but their use is limited because, little is known about their mechanisms of action and health risks.

Keywords: Adjuvant, Immune response, Vaccine

*** Corresponding Author: Golian A (Ph.D), E-mail: golian-a@um.ac.ir**

Received 7 Dec 2016

Revised 17 Aug 2017

Accepted 2 Jan 2018

Parisa Soleimani Roudi (<https://orcid.org/0000-0002-3213-536X>), Abolghasem Golian (<https://orcid.org/0000-0001-9419-1175>)