A Potent Peptide Adjuvant for Vaccines and Immunotherapies

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BACKGROUND

Vaccines traditionally have and still consist of whole-inactivated or live-attenuated pathogens or toxins. The usage of these modified pathogens is however unattractive for several reasons. Live-attenuated pathogens can cause disease by reverting to a more virulent phenotype, especially in the non-developed immune system of newborns or immunodeficient patients, and whole-inactivated pathogens contain reactogenic components that can cause undesirable vaccine side effects. Therefore, there is growing interest and ongoing research to develop a new generation of vaccines containing recombinant protein subunits, synthetic peptides, and plasmid DNA. While these new modalities promise to be less toxic, many are poorly immunogenic when administered without an immune-stimulating adjuvant. As adjuvants are a crucial component of the new generation of vaccines, there is a great need for safer and more potent adjuvants.

TECHNOLOGY DESCRIPTION

UC San Diego researchers have discovered a short peptide that acts as a potent adjuvant directly on myeloid dendritic cells (DCs) to potentiate cellular immune responses to peptide antigen and both cellular and humoral immune responses to protein antigen *in vivo*. The short peptide, named Hp91, has a sequence corresponding to an area within the endogenous molecule high-mobility group box (HMGB1) protein 1. Hp91 promotes both Th1 and Th2 types of immune responses, and the *in vivo* production of the immunomodulatory cytokines, IFN-γ, TNF-α, IL-6, and IL-12 (p70), as well as antigen-specific activation of cytotoxic (CD8+) T cells.

APPLICATIONS

The peptide can be potentially used in human and animals:

- As an adjuvant in cancer immunotherapies.
- As an adjuvant for vaccines against infectious diseases caused by bacteria or viruses.
- As an adjuvant to increase the potency of existing vaccines, such as influenza, and allow scarce vaccine to be used for more recipients.
- For delivering therapeutics intratumorally either topically as a cream, or injected via the vasculature.

ADVANTAGES

The peptide can be made synthetically, produced in high quantities at GMP quality, and lyophilized without a loss in activity. It is inexpensive and naturally biodegradable. The peptide can be genetically engineered to DC targeting molecules like DEC-205, which promotes strong immune responses when linked to a DC stimulatory molecule. Since the peptide is derived from an endogenous molecule, it is expected to be well tolerated.

STATE OF DEVELOPMENT

The peptide has been tested *in vivo* in a mouse model.

INTELLECTUAL PROPERTY INFO

Patent application filed.

RELATED MATERIALS

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OTHER INFORMATION

KEYWORDS

HMGB-1 peptides, adjuvants, vaccine, immunotherapy, dendritic cells

CATEGORIZED AS

- **Medical**
  - Disease: Cancer
  - Disease: Infectious Diseases

RELATED CASES

2011-014-0

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PATENT STATUS

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United States Of America	Issued Patent	9,539,321	01/10/2017	2011-014
United States Of America	Issued Patent	8,999,349	04/07/2015	2011-014

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