Advances in PROTEIN CHEMISTRY and STRUCTURAL BIOLOGY

Peptide and Protein Vaccines

VOLUME 99

Edited by Rossen Donev

Conventional vaccine strategies proved highly efficacious for decades in reducing mortality and morbidity due to infectious diseases. The major drawbacks of conventional vaccines, such as those including whole organisms or large proteins, seem to be the inclusion of unwanted antigens that not only contributes little to the protective immune response, but also are likely to promote allergenic and/or reactogenic responses. Thus, peptide vaccines are an attractive alternative strategy based on the engineering of short peptide fragments that induce highly targeted immune responses, allowing the avoidance of allergenic and/or reactogenic reactions. Considering the demand for development of novel peptide vaccines and the broad interest from specialists with different background, we focused this volume of the Advances in Protein Chemistry and Structural Biology on Peptide and Protein Vaccines. This volumes reviews new promising strategies of peptide vaccine development recently progressed in preclinical and/or clinical stage with main focus on the roles of peptides in the vaccine formulation from epitope to adjuvant. An overview on applications of liposomes to the development of membrane-proximal external region-targeting vaccines is presented. Strategies for developing successful prophylactic and therapeutic vaccines using lipoprotein-based immunogens that are safe, cost-effective and suitable for human use are also discussed in details. Furthermore, several different chemistries that have been pursued to obtain novel platforms onto which antigenic epitopes can be tethered, with the aim to achieve a higher antibody response are discussed. A chapter in this volume focuses on the role of mutations in viral proteins for the design strategy of vaccines against the viruses, which has been exemplified in hepatitis B virus. In the final chapter, authors review a strategy for improving the efficacy of peptide vaccines. They discuss recent studies providing a potent method of epitope screening and antibody production without conventional carriers but using a natural phosphodiester bond CpG-DNA and a specific liposome complex as an adjuvant, instead. The aim of this volume is to promote further research and development in the design of peptide vaccines in order to achieve highly targeted immune responses against different pathological conditions while avoiding allergenic and/or reactogenic reactions.

Cover image: Maleimide linked to a Lys-core bearing peptide epitopes to enhance immunogenicity. For further details, please read Ramesh et al.

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An imprint of Elsevier
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ISBN 978-0-12-802827-8
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