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Commentary

Immunomodulatory role of adjuvants in vaccines

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DESCRIPTION

Adjuvants have been used to increase the immune response to antigens for over 70 years. Ramon first showed that it was possible to increase the levels of diphtheria or tetanus antitoxin by adding bread crumbs, agar, tapioca, starchy oil, lecithin, or saponin to vaccines. In this chapter, a framework for adjuvants in modern medicine is provided as a forum for detailed discussions of promising adjuvants in subsequent chapters. Following a general discussion of adjuvants that include their definition, modalities, safety, positive characteristics, barriers to development, and pre and clinical management issues, examples of adjuvants for clinical trials should be provided for clinical trials to improve diversity. For more explanations of this complex topic and historical perspective, the reader is referred to the latest policy adjuvants and a selection of useful review articles published over the past 18 years. Interest in vaccine adjuvants is growing rapidly for a number of reasons. First, a large number of young people who have been vaccinated have emerged over the past decade to prevent or treat infectious diseases, cancer, infertility, and viral and autoimmune diseases. Many of these people need adjuvants. Second, vaccines have become very commercially available in the last few years. Thirdly, the Children's Vaccine Initiative (CVI) established in 1990 has helped to strengthen the political and public health interest in policy adjuvants by establishing desirable policies for the development of current and innovative policies. Fourthly, advances in the fields of analytical biochemistry, molecular cleansing, integrated technologies, and improved understanding of immunological processes and pathogenesis of diseases helped to develop the technical basis for adjuvant development and application. Finally, the development of experimental additives has been driven by the failure of aluminum compounds (1) to develop more human immunodeficiency, (2) to develop more subunits to vaccinate subunits in animals, and (3) to promote cytotoxic T-cell reactions.

Adjuvants that develop such vaccines will play an important role in mucosal immunization. Some of the most promising adjuvants have been completed, in or near a clinical trial involving microspheres; proteosomes, liposomes, cochleates, and viral-like particles. Escherichia coli are powerful additives that add a local and antibody response to serum antibodies to co-administered antigens. Flexible toxic molecules show very low toxicity but sufficient adjuvanticity is maintained to improve local IgA, systemic IgG, and immune responses to cellular infections in co-administered vaccines. Clinical trials using flexible LT toxins as injectable antigen vaccine devices are ongoing. Surprisingly, cholera toxins deposited on the skin of volunteers allow transdermal vaccination with tetanus toxoid. Reduced micro-organisms, which are orally controlled as living vectors of integrated genes that include antigen-negative antigens, pass phase I tests to stimulate the immune response. Many of these initial efforts to reactivate the immune response to volunteers using mucosal adjuvants have been relatively successful. The first attempt to vaccinate volunteers against LT implanted in a rotating plant and used as an edible vaccine has been very successful. It remains to be seen whether other antigen proteins (e.g. HBsAg) when supplied with mutant plants will be immunogenic or instead cause antigen tolerance.

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