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Commentary

Immune Enhancing Adjuvant for Anti Caries Vaccine

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DESCRIPTION

Dental caries is a disease that affects the hard tissues of the teeth and is caused by a number of factors, which is known as multifactorial aetiology. Carbohydrates from our diet are the primary contributors to the formation of dental caries lesions, which are then fermented by the action of oral microorganisms such as *Streptococci and Lactobacillus*. This microorganism has the ability to change the environment or local environment of the oral cavity by forming a medium rich in extracellular polysaccharides and low pH, thereby indirectly creating a favorable environment for the growth of other acid-genetic and uric acid bacterial species such as *Lactobacillus*. Dental caries is still the most common disease among children, outnumbering other well-known chronic diseases like asthma by a factor of five. This is a very concerning figure for a developed country. Dental caries has long been thought to be a childhood disease, but it is now spreading into adulthood. For example, the prevalence of caries in children ranges from 27% to 64%, whereas it ranges from 26% to 85% in adults. Adjuvants are thus required to help PAc induce sufficiently effective and long-lasting immune responses to provide caries protection. PRRs of the innate immune system, particularly toll-like receptors and nucleotide-binding and oligomerization domain like receptors are common targets of adjuvants that influence the type and strength of immune response to vaccination, primarily by activating the innate immune response, which in turn activates the acquired immune response.

Dental caries is caused by interactions between bacteria that produce acid, a substrate that the bacteria can metabolize, and a variety of host factors such as teeth and saliva. Endogenous bacteria in the biofilm produce weak organic acids as a by-product of fermentable carbohydrate metabolism. The acid causes the local pH value to fall below a critical level, causing demineralization of tooth tissues. Cavitation will develop if the diffusion of calcium, phosphate, or carbonate out of the tooth is allowed to continue.

Early childhood can see the onset of aggressive tooth decay affecting infants and toddlers primary teeth. Dental caries vaccines would be the first non-living vaccine to be administered *via* mucosal route during the first three years of life in the management of dental caries. S-IgA antibodies against *Streptococcus mutans* adherence and biofilm formation can be induced by an anticaries DNA vaccine, lowering the incidence of dental caries. A new fusion anti-caries DNA vaccine has been developed. PAc, a cell surface protein, and GTFs are two important virulence factors in *Streptococcus mutans*. A fusion anticaries vaccine, pGJA-P/VAX, encoding two major antigenic domains of Streptococcus mutans, PAc and GLU, was successful in lowering the levels of dental caries produced by *Streptococcus mutans* in gnotobiotic however, to be ineffective against S. sobrinus infection. Vaccines for subunits Vaccines made from synthetic peptides: *Streptococcus mutans* colonisation in mouse teeth was inhibited by intranasal immunisation with combination with the cholera toxin B subunit. A monoclonal antibody formed by immunising with intact Ag I/II and reacting with the fragment containing the proline-rich region also inhibited the development of experimental dental caries. It provides antibodies in both the gingival crevicular fluid and the saliva. Attenuated expression vectors/recombinant vaccines: oral immunisation with recombinant *Salmonella typhimurium* expressing *Streptococcus sobrinus* surface protein antigen A induced long-lasting mucosal immune responses, which may provide protection after a cariogenic *Streptococcus sobrinus* challenge. Because *Salmonella avirulent* strains are an effective vaccine vector, recombinant fusions have been used.

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