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Mucosal immunization for dental caries – A feasibility study

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Dental caries is painful, morbid condition, manifested mainly in children, as localized destruction of susceptible dental hard tissues by acidic by-products from bacterial fermentation of dietary carbohydrates. Treatment is painful, time-consuming, expensive, involves drilling and filling. Several microorganisms have been identified in carious lesions; the members of mutans *streptococci* are main causative agents. A preventive approach by interfering with initial *S. mutans* colonization, which can be facilitated by mucosal vaccination, would be more acceptable to children than injection. A Panel on Caries Vaccine sponsored by The National Institute of Dental and Craniofacial Research (NIDCR), NIH, has identified several antigenic targets on *S. mutans* for dental caries vaccine. This investigation aimed to study feasibility of achieving mucosal immunization against dental caries upon administration of *Streptococcus mutans* antigens via intranasal and sublingual routes. Initially, some key antigens (NIDCR) from *S. mutans*, namely fimbrial glycoprotein, cell-associated glucans, glucosyl transferase and serotype-specific cell wall polysaccharide, were extracted and purified, followed by their in-depth characterization by organoleptic, biochemical and structural analysis. Further, *in-vivo* efficacy was studied by antigen administration (selected antigens) via intramuscular, intranasal and sublingual routes. Comparative antibody titers (IgG & IgA) in serum, saliva, nasal lavage and bronchioalveolar lavage were determined by indirect ELISA technique. Vaccine delivery by all three routes induced positive humoral immune responses against antigens. Intranasal and sublingual vaccination showed better results compared to invasive intramuscular vaccination (Unpaired t-test, $p<0.05$). In conclusion, mucosal immunization for *S. mutans* antigens indicates a potential approach for developing non-invasive vaccine for dental caries prevention in children.

Biography

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