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Mucosal immunization for dental caries – a feasibility study

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Dental caries is a 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 the main causative agents. A preventive approach by interfering with initial S. mutans colonization, which can be facilitated by a vaccine, administered by mucosal route, would be more useful. 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.

The aim of this investigation was to study the feasibility of achieving mucosal immunization against dental caries using antigens from Streptococcus mutans, for intranasal and sublingual administration, which would be more acceptable to children, than an injection.

In the first step, key antigens (NIDCR) from S. mutans were extracted, purified and characterized. Further, in vivo efficacy studies in Wistar rats were carried out to assess comparative antibody titers (IgG & IgA) in serum, saliva, nasal lavage and BAL, on administration of these antigens via three routes- intramuscular (IM), intranasal (IN) and sublingual (SL) ; antibody titres being determined by indirect ELISA technique.

Increased induction and persistence of humoral immune responses (IgG in serum) in both IN and SL group, compared to the invasive IM route was evident. Also, significant antibody titers (IgA) in saliva, nasal lavage and BAL, in comparison to IM routes were seen. (Unpaired t test, $p<0.05$)

In conclusion, mucosal immunization by intranasal and sublingual routes for the S. mutans antigens indicates the potential of the mucosal vaccine delivery approach for developing a needle-free vaccine for prevention of dental caries in children.

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