DNA-BASED VACCINE FOR ALLERGY PREVENTION AND THERAPY

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It is possible to use allergen gene cloned in DNA vaccine vector, which will gradually give tolerance via its effect on T cells and producing inhibitory IgG's. This process finally can minimize the Th_2-biased immune reactions to allergen. The expressed allergen in the body can modulate the immune system toward Th_1 and reduces the amount of IgE in blood when accompanied with appropriate adjuvants being single administration vaccine with limited side effects. DNA vaccine can identify allergen between groups of proteins from allergenic sources using Expression Library Immunization (ELI). Appending CpG motifs on the vector or CpGizing of amino acid codons can have considerable effect on modulating immune systems toward Th_1. The allergen gene should be modified because Mammalian codon usage is different from that of microorganisms[1]. The genetic vaccine of major allergen of Mugwort pollen, Art v 1 using a synthetic codon optimized vector with human codon usage, revealed a strong and allergen specific induction of antibody response[2]. Using DNA fusion vaccine has been investigated by some researchers. Vaccination with allergen-IL-18 fusion DNA reduced IL-4 and increased IFN-γ production[3]. Using ISS (immunostimulatory sequences or CpG motifs) linked to allergen has revealed the high efficiency of this method in enhancing the immune response against allergens and modulating the immune system toward Th_1-biased profile. Oral gene delivery of Chitosan-DNA nanoparticles could generate immunologic protection in a murine model of allergy. The pCMV-Ara h 2 (vector containing peanut dominant allergen gene) used with nanoparticles showed substantial reduction in allergen induced anaphylaxis[4].

References:

1. *Mol. Biol. Evol 1985; 2:13-34*
2. *Allergy 2003; 58:1-8*
3. *The Journal of immunology 2001; 166,959-965*
4. *Nature Medicine 1999; 5, 4: 387-391*