EXPRESSION STRATEGIES FOR PLANT-BASED PRODUCTION OF A VACCINE ADJUVANT

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(ABSTRACT)

Today s development of novel vaccines stresses the need for edible vaccines that are inexpensive, easily administered and capable of being stored and transported without refrigeration. Without these characteristics, developing countries find it difficult to adopt vaccination as the central strategy for preventing their most devastating diseases. A promising approach is the production of vaccines in plants we commonly consume. Two major obstacles have been encountered in developing vaccines in plants. First, the expression level of foreign antigens tends to be low and second, co-expression of an adjuvant may be required to facilitate an appropriate immune response. Ricin, a plant toxin that survives the human digestive process, has been proven to stimulate an immune response and could therefore serve as a suitable adjuvant. The long-term goal is to produce a vaccine that protects against the disease entamoebic dysentery.

The specific goal of this research was to produce ricin in tobacco as adjuvant for the vaccine. Vectors were constructed that fused the ricin coding sequence to different plant promoters and transgenic tobacco plants were generated by transformation with *Agrobacterium tumefaciens*. The levels of expression in these transgenic plants were tested using immunoblot assays. Southern blot analysis was performed for the highest expressors of each construct. The enzymatic activity of the tobacco-synthesized ricin was shown using a protein translation inhibition assay. Expression of ricin was also confirmed using transient transformation of hairy root cultures. Future experiments will address the practical use of the tobacco-synthesized ricin as adjuvant, as well as the expression of the ricin B subunit fused to a protective antigen of *Entamoeba histolytica* in tobacco as edible vaccine.