

PERSPECTIVES OF THE DEVELOPMENT OF MUCOSAL VACCINES AGAINST DANGEROUS INFECTIONS ON THE BASE OF TRANSGENIC PLANTS

Salyaev R.K. *, N.I. Rekoslavskaya, A.S. Stolbikov, A.V. Tretyakova

The Siberian Institute of Plant Physiology and Biochemistry, SB RAS, Irkutsk, Russia

*e-mail: salyaev@sifibr.irk.ru

Mucosal vaccines created on the base of transgenic plants reacting with mucosal layers of the intestines and other organs are considered to be the perspective method of the vaccination. These vaccines induce both mucosal and general humoral immunogenicity after the peroral administration. The folding of antigenic proteins synthesizing in plants occurs via eukaryotic type and has advantages before yeast and prokaryotic platforms. This feature results to more adequate synthesis of antibodies against pathogens and to the interaction with effector molecules of complement. Earlier we together with The State Scientific Center "Vector", Institute of chemical biology and fundamental medicine SB RAS and Dr R.Hammond from Laboratory of Plant Pathology (Maryland, USA) created two candidate vaccines : one of them against AIDS (HIV-1) and hepatitis B on the base of the chimeric gene TBI-HBS, encoding simultaneously 9 antigenic determinants of HIV-1 and the main surface antigen of hepatitis B (HBsAg). The second candidate vaccine was created against hepatitis B on the base of the genetic construct with the gene preS2-S encoding the synthesis of two subunits of the main surface antigen of hepatitis B and the signal peptide HDEL which directed antigens for the accumulation on ER. Both vaccines were tested on mice and confirmed their immunogenicity as the pronounced antibodies response. Twice vaccinated mice maintained the antibodies response during 11 months after there was little tendency to lowering. It was established that transgenic plants – vaccines (tomato) kept the capability to the synthesis of antigenic determinants in seven seed generations during 7 years. The results of the development of the mucosal vaccine against cervical carcinoma (carcinoma of uterine cervix) evoked by human papillomaviruses of high oncogenic risks were presented in this report. We created the genetic construct consisting of 35S CaMV promoter, Ω (omega) leader of TMV, the target gene HPV16 L1 and the nos terminator. The target gene HPV16 L1 of the most oncogenic type 16 of human papillomavirus was chosen as the object. Different procedures of the plant transformation were elaborated and the transgenic plants synthesizing the antigenic protein L1 of human papillomavirus of type 16 were obtained. The insertion and the expression of the target gene were controlled by northern blotting, the synthesis of antigenic protein HPV16 L1 was determined by ELISA and western blot. The antigenic protein of HPV16 L1 was synthesized in amount of 20 – 50 ng/mg of total soluble proteins in tomato transgenic plants. The results of the examination of the immunogenicity of the vaccine obtained by means of the peroral immunization of mice were showed in the report. Therefore it was demonstrated the principal opportunity of the creation of mucosal vaccines on the base of transgenic plants against several dangerous diseases.