Immunological analysis of the Hepatitis B virus "a" determinant displayed on chimeric virus-like particles of Macrobrachium rosenbergii nodavirus capsid protein produced in Sf9 cells

ABSTRACT

Chimeric virus-like particles (VLPs) have been widely exploited for various purposes including their use as vaccine candidates, particularly due to their ability to induce stronger immune responses than VLPs consisting of single viral proteins. In the present study, VLPs of the Macrobrachium rosenbergii nodavirus (MrNV) capsid protein (Nc) displaying the hepatitis B virus "a" determinant (aD) were produced in Spodoptera frugiperda (Sf9) insect cells. BALB/c mice immunised with the purified chimeric Nc-aD VLPs elicited a sustained titre of anti-aD antibody, which was significantly higher than that elicited by a commercially available hepatitis B vaccine and Escherichia coli-produced Nc-aD VLPs. Immunophenotyping showed that the Sf9-produced Nc-aD VLPs induced proliferation of cytotoxic T-lymphocytes and NK1.1 natural killer cells. Furthermore, enzyme-linked immunospot (ELISPOT)analysis showed the presence of antibody-secreting memory B cells in the mice splenocytes stimulated with the synthetic aD peptide. The significant humoral, natural killer cell and memory B cell immune responses induced by the Sf9-produced Nc-aD VLPs suggest that they present good prospects for use as a hepatitis B vaccine candidate.

Keyword: Virus-like particles; Sf9 cells; Hepatitis B; Macrobrachium rosenbergii nodavirus; Cytotoxic T-lymphocytes; Natural killer cells; Memory B cells; BALB/c mice