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P33. Complexes of Hepatitis B Virus-Like Particles and Silica Nanoparticles for Improvement of Vaccine Efficiency and Their Time and Temperature Stability

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Adherence of hepatitis B virus-like particles (VLP) [1] to silica (SiO_2) nanoparticles was explored for immunomodulation purposes. Optical absorbance measurements, transmission electron microscopy and fluorescence microscopy were employed to study the adherence. The results demonstrated that hepatitis B VLP + SiO_2 complexes were formed. Preliminary immunological experiment with immunization of Balb/c mice with the VLP only and VLP + SiO_2 complexes was performed. Immunization with VLP + SiO_2 complexes resulted in increase in antibody production in mice blood. The amount of antibodies produced depended on concentration of SiO_2 nanoparticles.

VLP + SiO_2 complexes were tested on time and temperature stability. Temperature is important when studying processes happening when the vaccine is inside living organism. The complexes were considered stable until wavelenth-shift in the optical absorbance maximum was observed when increasing time after the preparation or temperature of heating. Two types of VLP were used for preparation of the complexes. The complexes prepared from VLP kept in refrigerator at +4°C remained stable during 4 hours after preparation and endured heating up to 43°C. However, the complexes prepared from VLP kept in freezer at -18°C and unfrozen demonstrated better stability remaining stable during 8 hours and enduring heating up to 45°C.

The observed results suggest that complexes of hepatitis B VLP and silica nanoparticles can possibly improve efficiency of VLP-based vaccine against hepatitis B viral disease. Time after preparation and heating temperature are factors influencing stability of the complexes.

Keywords: *hepatitis B, silica nanoparticles, vaccines, virus-like particles, optical absorbance.*

References:

1. Virus particle explorer, Human Hepatitis B Viral Capsid, http://viperdb.scripps.edu