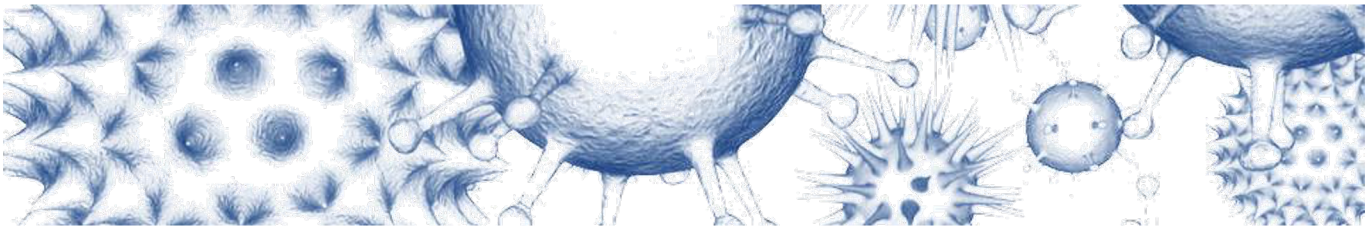

9 – THE DEVELOPMENT OF BROAD-SPECTRUM RECOMBINANT BETACORONAVIRUS VACCINE WITH PLANT VIRUS BASED PLATFORM ADJUVANT

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Coronaviruses cause hard respiratory syndromes. SARS-CoV appeared in 2002, MERS-CoV – in 2012 and is still circulating in the Middle East, SARS-CoV-2 onset in 2019 led to the global pandemic. Considering the risk of the new highly pathogenic coronaviruses emergence, broad-spectrum coronavirus vaccine development is desirable. S-protein is the main coronaviruses' antigen and consists of two subunits. S1-subunit contains receptor-binding domain (RBD) being the main target of virus-neutralizing antibodies. S2-subunit includes two heptad repeats (HR1 and HR2) mediating membrane fusion. Here we designed the following recombinant antigens: (i) Co1 represented the consensus sequence of SARS-CoV-2 RBD-domain, (ii) PE – polyepitope protein consisted of highly conservative for SARS-like coronaviruses antigenic determinants of S2, (iii) M-protein represented the consensus sequence of MERS-CoV RBD-domain and (iv) CoF being the Co1 protein fused to the conservative S2 epitope located in HR2. Antigenic properties of these proteins were confirmed by western-blot analysis employing commercial (MyBioSourse, USA) polyclonal antibodies to the full-size S-protein of SARS-CoV (432054) and SARS-CoV-2 (434243) as well as to the S1-subunit of MERS-CoV (430258). As a platform-adjuvant, we used previously developed in our laboratory spherical particles (SPs), forming via tobacco mosaic virus heating. For SPs-antigens compositions contained simultaneously Co1, PE and CoF, the clear recognition by both above-mentioned SARS-specific antibodies was demonstrated by immunofluorescence analysis. Their immunogenicity was analyzed in a mice model; SPs were proved to increase antibody titers to the coronaviruses' antigens. Therefore, obtained recombinant antigens and their compositions with SPs are a promising base for broad-spectrum coronavirus vaccine. Funding: RFBR №20-04-60006.