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Designing recombinant viral-vector vaccine for combined protection against influenza and group B streptococci

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Background: Development of safe and effective vaccines against group B streptococci (GBS) is of high priority due to the fact that GBS is the main cause of newborn mortality and recently became among the major threat of the elderly. One of the promising approaches for GBS vaccine design is the use of cold-adapted influenza viruses contained in live attenuated influenza vaccine (LAIV) as vectors to deliver GBS antigens to the target cells. We analyzed immune epitopes of ScaAB protein and modeled chimeric influenza proteins carrying various combinations of ScaAB epitopes.

Methods: Three-dimensional structure of chimeric influenza hemagglutinin (HA) carrying ScaAB epitopes were modeled using sequence of H7N9 influenza A virus. Experimental MHC I and MHC II-restricted T cell epitopes for H-2(d) haplotype were analyzed using the tools of the Immune Epitope Data Base. Three-dimensional modeling of chimeric influenza HAs carrying ScaAB epitopes at the N-terminus was performed by homology algorithm using on-line resource SWISS-MODEL. The chimeric HA-ScaAB molecules were modeled using a program USCF Chimera 1.10.2 and visualized using RasMol 2.7.5 and Chimera 1.10.2 program.

Results: We selected several cassettes containing up to 3 ScaAB experimental B-cell epitopes as well as several predicted MHC I and MHC II-restricted T cell epitopes specific for Balb/c mice. Three-dimensional modeling demonstrated that these epitopes are exposed at the surface of the viral particles and do not compromise influenza HA structure.

Conclusions: The recombinant LAIV-GBS chimeric vaccine is the first attempt to design recombinant vaccine for simultaneous protection against influenza and GBS.

Biography

Alexander Suvorov is presently acting as Head of Molecular Microbiology division of Federal, State Budgetary Scientific Institution "Institute of Experimental Medicine" in Russia

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