Broad-spectrum vaccine based on meningococcal serine IgA1 protease

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Serine IgA1 proteases from Gram-negative bacteria are important virulence factors for a number of pathogens, including *Neisseria meningitidis*, *Neisseria gonorrhoeae* and *Haemophilus influenzae*. These highly specific enzymes catalyze the hydrolysis of Pro-Ser or Pro-Thr peptide bonds in the hinge region of secretory (sIgA1) and serum (IgA1) human immunoglobulin A1. By cleaving sIgA1 present on the host mucosa, IgA1 proteases facilitate the adhesion of pathogenic bacteria to the mucosal surface and the development of the inflammatory process. The prospect of using IgA1 proteases as the basis for a universal vaccine against *N. meningitidis*, *N. gonorrhoeae* and a significant part of *H. influenzae* strains is based on the high homology of the primary structures of these enzymes. Using the analysis of modern data by BLAST, we showed that the mature IgA1 protease (A^{28}-P^{1004}) from *N. meningitidis* serogroup B strain H44/76 has Top Identity above 85% in various strains of these pathogens. The aim of our research is to develop a broad-spectrum vaccine candidate that would provide protection against all serogroups of *N. meningitidis* and against other pathogens that secrete homologous serine-type IgA1 proteases. We have created a number of recombinant proteins based on fragments of the IgA1 protease A^{28}-P^{1004} and have shown that immunization of the host organism with these compounds leads to the formation of neutralizing antibodies that prevent the development of infection. As one of the possible methods of antigen delivery, the liposome method has been proposed. The conditions for obtaining two liposome preparations based on a recombinant protein with a molecular weight of 59.4 kDa and a DNA molecule in the vector encoding it in eukaryotic cells were screened. The resulting liposomal preparations can be used to create a vaccine against a number of pathogens that produce IgA1 protease. The work was supported by Project of Ministry of Science and Higher Education № 075-15-2021-1049.