Identification of epitopes of *Clostridium difficile* surface proteins and immunochemical characterization of these epitopes protein conjugates with nanoadjuvant

Clostridioides difficile (CD) is a bacterium that is affecting more and more people each year. The infection is associated with the use of antibiotics, which by disrupting the quantitative and qualitative composition of the intestinal microflora, allow the development of pathogenic bacteria. CD, after entering the host organism, subsequently produces toxins that are damaging the intestine and leads to severe diarrhea and inflammation. The most commonly applied method of treatment is antibiotic therapy. However, first CD strains resistant to the first-line antibiotics employed to combat the CD infection have been described. Moreover, the antibiotic treatment is expensive and causes prolonged patient stay in the hospital. Consequently, research into new treatments and prevention of CD infections is absolutely necessary.

This dissertation describes novel, immunoreactive CD proteins that can be exploited as vaccine antigens or, on the second hand, employed in the production of therapeutic antibodies. One of these proteins, that is the Cwp22 protein, was subjected to detailed mapping in order to determine its epitopes. The process of confirming epitopes for their vaccine application has been described. The immunoreactive peptides of the Cwp22 protein conjugated to a carrier protein were used to examine the properties of the new mucosal adjuvant. As part of this work, a set of nanoadjuvants with diverse physicochemical and biological properties was formulated and characterized. Their adjuvant properties were confirmed in *in vivo* studies.

The efforts presented in this work are comprehensive and can also be utilized in the case of other infections. For example, the nanoadjuvant characterized in this work can be successfully used for other antigens. The work initiated in this dissertation will be sustained.

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