Abstract

Cystic fibrosis (CF) is an insidious genetic disease with autosomal-recessive inheritance. The impaired function of the CFTR protein, caused by a mutation in the eponymous gene, results in a wide range of symptoms, the most serious being the effect on the respiratory system. The main impact on the respiratory system is the appearance of thick mucus, which contributes to the accumulation of bacterial cells in the patient's lungs. Life-threatening pathogens include *Burkholderia cenocepacia* (BC) and *Pseudomonas aeruginosa* (PA). These bacteria produce several virulence factors such as BC2L-A or BC2L-C lectins in BC and PA-IIL in PA. The virulence factors allow bacteria to bind via protein-saccharide interactions to lung cells with altered glycosylation, which is seen in the CF patient.

This diploma thesis focuses on the above-mentioned lectin interaction and the inhibitory effect of hen IgY antibodies or trivalent fucosylated glycoclusters on the adherence of BC (strain ST-32, CCM 7291) / PA (strain PAK, ST 1763) to lung epithelial cells of the CuFi-1 (from a CF patient) / NuLi-1 (from a healthy donor). The possible influence of glycoclusters on PA (PA-lux strain) cell viability was studied, but no significant effect was observed. To verify the expression of the BC2L-C lectin, it was necessary to prepare antibodies. The expression of the entire BC2L-C lectin was proved using hen antibodies against the N-terminal domain of BC2L-C lectin on "Western Blot". On the contrary, BC2L-A lectin in BC cultures using immunochemical methods was not observed. The methodology of fluorescent labeling of bacterial cells with the compound PKH26 was successfully optimized beforehand the adherence assays evaluating the extent of bacterial binding to lung epithelial cells. The adherence assays demonstrated a significant reduction in the adherence of bacterial cells (BC or PA) to lung epithelial cells (CuFi-1 or NuLi-1) caused by the protective ability of antibodies against the BC2L-C lectin or trivalent fucosylated glycoclusters (A/B/C).

The thesis proves that both hen-specific antibodies and fucosylated glycoconjugates have therapeutic potential as prophylactic agents against bacterial infections in CF patients.

Keywords: cystic fibrosis, lung epithelial cells, *Burkholderia cenocepacia*, *Pseudomonas aeruginosa*, lectins, hen antibodies, glycoclusters, study of adherence