

# Abstract

Cystic fibrosis (CF) is an autosomal recessive disease caused by mutations in the *CFTR* gene (CF transmembrane conductance regulator). These mutations result in absent or defective CFTR chloride channel function. The susceptibility to bacterial respiratory infections due to the accumulation of thickened mucus and altered glycosylation in lungs is typical for this disease. Bacteria *Pseudomonas aeruginosa* (PA) is a major cause of these infections. Among other virulent factors, the pathogenicity of these bacteria is caused by fucose-specific PA-IIL lectin which plays a role as an adhesin. The effect of anti-PA-IIL egg yolk antibodies and multivalent fucose-based PA-IIL inhibitors on PA adherence to lung epithelial cells was studied in this work.

Chicken antibodies were isolated from egg yolks before and after immunization with antigen PA-IIL. Specific anti-PA-IIL antibodies were obtained by affinity chromatography using a column with an immobilized PA-IIL. Reactivity of IgY was verified by ELISA. The presence of PA-IIL in the bacterial culture of *Pseudomonas aeruginosa* (PAK, ST 1763) and the ability of antibodies to recognize this bacterial lectin were verified by Western blotting followed by immunodetection. Appropriate culture conditions have also been found for the expression of this lectin. The effect of antibodies on PAK adhesion was studied *ex vivo* using a lung epithelial cell line from a CF patient (CuFi-1) and a healthy individual (NuLi-1). Cell lines and bacteria were fluorescently labeled with PKH dyes.

It was found that the number of subcultures of cell lines does not affect their behavior in the *ex vivo* model of bacterial adhesion. Specific anti-PA-IIL antibodies did not show the ability to affect PAK adhesion to lung epithelial cells. The observed inhibitory effect of chicken antibodies was neither specific nor reproducible and is probably dependent on many variables.

For comparison, the effect of fucose-based multivalent PA-IIL inhibitors was studied on CuFi-1 cell line. Some of these inhibitors significantly reduced PAK adherence to lung epithelial cells (up to 70 %) and thus represent a possible means of preventing PA infections in CF patients.

Key words: cystic fibrosis, *Pseudomonas aeruginosa*, IgY, multivalent inhibitors