Abstract

Cystic fibrosis is a hereditary disease manifested by a change in lung conditions leading to increased colonization of pathogens, especially *Pseudomonas aeruginosa* (PA). The lung epithelial cells of cystic fibrosis (CF) patients frequently contain glycoconjugates with low sialylation which leads to the reveal of carbohydrate structures to which PA are bind easier, e.g. with PA-IIL lectin. Treatment of PA infection with antibiotics is problematic due to the formation of resistance. Therefore, new therapeutic approaches are studied. One of the studied options is passive immunization with chicken antibodies against PA-IIL lectin. These antibodies show the ability to reduce PA adhesion to lung epithelial cells *ex vivo*. In order to further study the effect of chicken antibodies, it is necessary to create an appropriate experimental *in vivo* model.

The aim of this study was to optimize the mouse model to mimic lung conditions as in CF patients. First of all, it was necessary to select a suitable bioluminescent strain from these three strains PA-lux 1, PA-lux 2 and PA-XEN 41. On the basis of the highest measured luminescence value, the strain PA-lux 1 cultivated in a conical bottom tube was selected.

Subsequently, an experiment was carried out on mice in which the effect of the enzyme neuraminidase and the course of infection after application of the dose of bacteria $5{,}5 \cdot 10^5$ a $2{,}75 \cdot 10^6$ was observed. Bacterial infection was not induced during this experiment, this could be caused due to several possible reasons that were further investigated. First, the presence of PA-IIL lectin was verified, which was detected in an Erlenmeyer flask using specific chicken antibodies, and a change in the culture method was considered. Another reason could be the reduced viability of PA-lux bacteria. Therefore, the growth curve for PA-lux 1 and PA-lux 2 was measured. PA-lux 2 bacteria appeared to be better adapted to the new environment. Due to these results and the measured values of relative luminescence, the PA-lux bacteria and the cultivation method were changed for further experiments. For further experiments, PA-lux 2 cultures were cultivated for 6 hours in an Erlenmeyr flask. Further, the dose of bacteria was optimized for the emergence of acute bacterial infection with survival of 50 % of mice. The results from these experiments suggest that the optimal dose of bacteria is likely to be between $1 \cdot 10^6$ and $2 \cdot 10^6$ dose of bacteria.

Key words

mouse models, *Pseudomonas aeruginosa*, bacterial infection, bioluminiscence