Postdoc Journal
Vol. 3, No. 12, December 2015

Journal of Postdoctoral Research
www.postdocjournal.com

FFC Proceedings 2015

13th Convention of Investigators in Cystic Fibrosis – Italian Cystic Fibrosis Research Foundation (FFC)

Lactoferrin-loaded niosomes in reducing inflammation and infection of cystic fibrosis airways

Berlutti F[1]

[1]Department of Public health and Infectious Diseases, Sapienza University of Rome, Rome, Italy (Grant No. FFC#16/2014– FFC#12/2015, Extension) doi.org/92k

Background. CF airway inflammation is related to genetic CFTR defect and to dysregulation of iron homeostasis and it can precede bacterial infection. Bacterial infections are favored by iron overload thus worsening inflammation and cell damage. A dangerous vicious circle involving inflammation damage, bacterial infection, and dysregulation of iron homeostasis, is established in CF airways.

Hypothesis and objectives. We hypothesize that lactoferrin (Lf), an iron-chelating glycoprotein of the innate immunity of human secretions, could be a key molecule exerting anti-inflammatory and anti-microbial activities interrupting the vicious circle. Our results show that Lf administered by aerosol reduces inflammation and infection in pre-clinical mouse models of acute and chronic lung infection. Since in airways secretions Lf activity can be reduced by proteolytic enzymes, Lf-liposomes have been prepared to protect Lf against proteolytic activity.
Our aims are: to confirm the anti-inflammatory and anti-bacterial effects of aerosol administration of Lf in wild type and CF mice with P. aeruginosa lung infections. Moreover, we intend to optimize the preparation protocol and to fully characterize Lf-loaded liposomes to be administered by aerosol in mouse models of P. aeruginosa lung infection.

Essential Methods. Milk-derived bovine Lf (bLf) is used as it shows similar structure and functions of human Lf, it is generally recognized as a safe substance by FDA (USA), and it has been successfully employed in clinical trials. Acute and chronic P. aeruginosa lung infections will be established in the airways of wt and CF mice. BLf loaded-liposomes (bLf-LIPOs) will be fully characterized.

Preliminary results. In WT mice bLf reduced significantly the inflammatory response both of acute and chronic infections and the bacterial load even if at not significant levels. BLf is efficiently entrapped in liposomes and protected against the activity of trypsin. BLf-LIPOs were no cytotoxic on CFBE cells.

Expected results and their significance. We expect to consolidate the data on the effect of bLf in WT mice and to evaluate the bLf effects on CF mice. Moreover, we aim to analyse the effect of aerosolized bLf-LIPOs in pre-clinical animal models. This study represents the basis for the development of product to be administered in humans as aerosol formulation in the treatment of CF airway infection.

Acknowledgment. FFC #16/2014: funded by FFC, supported by Delegazione FFC di Torino, Gruppo di Sostegno FFC di Altamura Bari, Trofeo di golf FFC 2015