Aim: To examine whether polyunsaturated fatty acid (PUFA) application would affect CI transport in model airway epithelial and submucosal cells.

Methods: 16-HBE, CFBE (homozygous for deltaF508), Calu-3 and CFSME cells were co-cultured with the following PUFAs: linoleic (LA), arachidonic (AA), a-linolenic (ALA), ecosapentaenoic (EPA) and docosahexanoic (DHA) acids during 72 hours. Upon cessation of PUFAs incubation with cells, the parameters of CI transport were estimated using the fluorescent chloride indicator MQAE and digital imaging technique.

Results: In 16-HBE and Calu-3 cells, which are model counterparts of bronchial epithelium and glandular submucosal cells expressing wCFTR, all PUFAs used in this study attenuated the rate of CI efflux. In contrast, LA increased basal CI- transport in both cell lines whereas the other PUFAs accelerated the rate of basal CI- efflux only in 16-HBE but not in Calu-3 cells. In CFBE cells expressing AF508 CFTR, the function of CFTR was not affected by any PUFAs whereas AA, LA and DHA similarly to 16-HBE and Calu-3 cells were able to accelerate the rate of basal CI- efflux.

Conclusion: PUFAs increased the basal chloride efflux in CF cells, the most efficient fatty acid being DHA. This chloride efflux is not mediated by CFTR but may be mediated by Ca-dependent chloride channels, which is being investigated further.

Alpha-melanocyte stimulating hormone (alpha-MSH), a 13 amino acid neuropeptide, exhibits anti-inflammatory, anti-yeptic and antibacterial properties. We investigated the in vivo effect of alpha-MSH on changes in pulmonary function provoked by histamine.

Methods: Bronchoconstriction was induced by 10 mg/kg histamine i.v. in Hartley guinea-pigs (6 animals per group, male-female 1:1, weight 500–700 g). Changes in the respiratory rate, type of respirations or amplitude of respirations were continuously monitored (classical Kozent and Rössler’s method of whole body plethysmography modified by Gjurs). Bronchoconstriction following pre-treatment with 3 doses of alpha-MSH (0.01 mg/kg, 0.1 mg/kg and 1 mg/kg) was compared to histamine response without pre-treatment.

Results: The lowest dose of alpha-MSH was ineffective, but pre-treatment with 0.1 mg/kg and 1 mg/kg alpha-MSH exhibited strong and pharmacologically relevant reduction of bronchoconstriction (p < 0.05 and p < 0.001 respectively). We found a dose-related modulatory effect of alpha-MSH on histamine induced changes in pulmonary function.

Conclusion: Our results show that exogenous alpha-MSH modulates processes in the lungs of guinea pigs. This neuropeptide is found in human bronchoalveolar lavage fluid; it binds to melanocortin MC3 receptor identified in the lung tissue and also to melanocortin MC1 and MC5 receptors expressed on different inflammatory cells present in the airway. Several chronic inflammatory diseases have already been identified as potential therapeutic targets of alpha-MSH. Therefore, beneficial effects beyond blocking bronchoconstriction in CF are possible and we feel further studies on this matter are justified.