Abstract AJ

Impairment of nasal mucociliary clearance in former smokers with stable chronic obstructive pulmonary disease relates to presence of a chronic bronchitis phenotype

Background: Associations between nasal and bronchial impairment have been repeatedly described in chronic obstructive pulmonary disease (COPD) whereas nasal mucociliary clearance (MCC) in COPD patients is not yet fully understood. We studied nasal MCC parameters in COPD patients and compared them with healthy adults (HA) and with cystic fibrosis (CF) patients with compromised MCC.
Methodology: Pilot study of seventeen COPD patients without exacerbation; all of them were examined to investigate and compare nasal and bronchial ciliary beat frequency (CBF) and ciliary beat pattern. Main observational study of 98 COPD ex-smokers and subjects from control groups (15 CF and 39 HA) evaluated for nasal MCC time (NMCCt) and by digital video microscopy of nasal mucosa recording ciliary beat frequency (CBF) and ciliary beat pattern (index of ciliary dyskinesia).
Results: It was found no difference in mean ciliary beat frequencies between nasal (6.0 Hz ± 1.3) and bronchial (5.9 ± 1.3) mucosa ($p = 0.427$). We found medium association in degree of ciliary dyskinesia ($\kappa = 0.733$). In the main observational study: the NMCCt was decreased in HA (575 sec, 95% CI 522, 735) compared to those with COPD (904 sec, CI 770, 1086) $p < 0.01$ and decreased in those with COPD compared to those with CF (1660 sec, CI 899, 2553) $p < 0.05$. CBF in COPD (5.9 Hz, CI 5.4, 6.4) was lower compared to HA (7.2 Hz, CI 6.3, 7.5) $p < 0.01$. The index of ciliary dyskinesia in COPD patients differed from HA ($p < 0.001$). We detected higher NMCCt (1081 sec, CI 910, 1405; 649 sec, CI 531, 820) $p < 0.01$ and lower nasal CBF (5.4 Hz, CI 5.1, 5.8; 7.0 Hz CI 6.2, 8.9) $p < 0.001$ in patients with chronic bronchitis phenotype (CB) compared to non-CB patients.
Conclusions: It was not found any difference in nasal and bronchial ciliary beat frequencies and degrese of ciliary dyskinesia in our pilot study (COPD smokers). Subsequently we confirmed the presence of impaired nasal MCC in COPD ex-smokers. These impairments were apparent predominantly in the CB phenotype of COPD.