Exhaled breath profiling by electronic nose enabled discrimination of allergic rhinitis and extrinsic asthma

Abstract

Aim: To assess whether an e-nose could discriminate between subjects affected by allergic rhinitis with and without concomitant extrinsic asthma, as well as from healthy controls, in terms of exhaled VOC-profile.

Methods: Fourteen patients with Extrinsic Asthma and Allergic Rhinitis (AAR), 14 patients with Allergic Rhinitis without asthma (AR) and 14 healthy controls (HC) participated in a cross-sectional study. Exhaled breath was collected by a standardized method and sampled by an e-nose (Cyranose 320). Raw data were reduced by Principal component analysis and analyzed by canonical discriminant analysis. Cross-validation accuracy (CVA) and Receiver Operating Characteristic(ROC)-curves were calculated. External validation in newly recruited patients (7 AAR, 7 AR and 7 HC) was tested using the previous training model.

Results: Breathprints of patients with AR clustered from those with AAR (CVA = 85.7%), as well as HC (CVA = 82.1%). Breathprints from AAR were also separated from those of HC (CVA = 75.0%). External validation confirmed the above findings.

Conclusions: An e-nose can discriminate exhaled breath from subjects with allergic rhinitis with and without extrinsic asthma, which represent two different diseases with partly overlapping features. This supports the view of using breath profiling to diagnose asthma also in patients with allergic rhinitis.