

VOLATILE ORGANIC COMPOUNDS IN THE BREATH OF CYSTIC FIBROSIS PATIENTS: A PILOT PHASE.

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INTRODUCTION

Cystic Fibrosis (CF) is a respiratory tract disease in which impairment of mucociliary clearance and innate defense mechanisms lead to susceptibility to chronic inflammation and hence lung injury and fibrosis.

Although *Staphylococcus aureus* and *Haemophilus influenzae* initially colonize CF patients, *Pseudomonas aeruginosa* (PA) is the most prevalent adulthood CF pathogen. Current diagnostic techniques lack sensitivity and commonly miss early infection, especially in young children. A sensitive and specific noninvasive technique for the diagnosis of PA infection would be helpful in treatment.

Breath analysis offers great potential as a non-invasive method for diagnosis of lower respiratory tract infections without the need for bronchoscopy or alveolar lavage. This study wants to investigate the possible use of IMS in early detection of CF infection.

MATERIALS AND METHODS

Fifteen CF patients (53.3% male, age 31.07 (6.91)) and 15 Healthy controls (46.7% male, age 33.33 (5.43)) were included. Breath samples were collected after breathing tidally for 3 minutes through a mouthpiece connected to a VOC-filter and a 6-way valve. Ten ml alveolar air was collected and immediately analyzed with a MCC-IMS (B&S Analytik, Dortmund, Germany).

Fifty-seven peaks were selected manually using the software VisualNow v3.4. Through peak analysis the presence and intensity of the VOCs were obtained and compared using the statistical software SPSS v21.

RESULTS

- No significant differences were found in age and gender between CF patients and controls.
- Three peaks were found statistically significant increased in the breath of CF patients and were associated with CF: P7, P19 and P43 (figure 1).

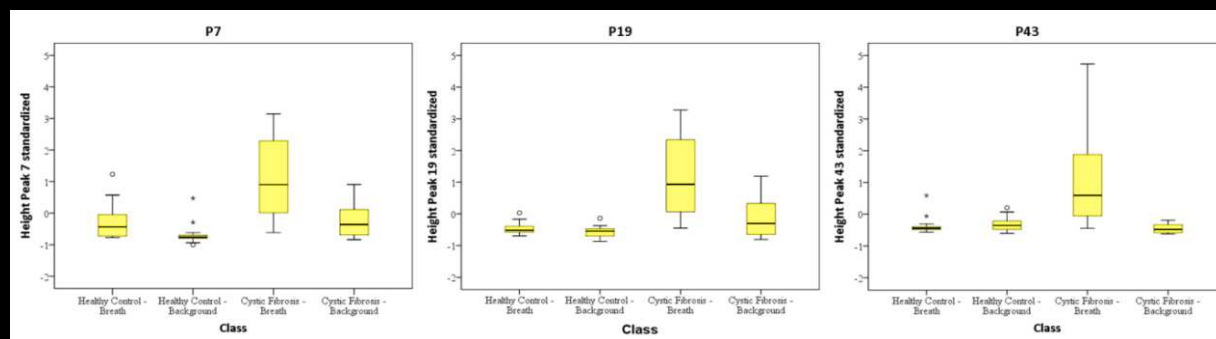


Fig 1: Standardized intensity (V) of VOCs in breath of CF patients.

Table I: Odds ratio for CF when having the peak.

Peaks ^a	Odds Ratio ^b	95% CI	p-value	Rt (s)	1/K ₀ (Vs/cm ²)
P7	5.18	1.4 - 19.1	0.013	6.1	0.579
P19	211.72	2.4 - 1816.9	0.019	3.8	0.585
P43	20.83	1.4 - 316.9	0.029	32.1	0.824

^aStandardized. ^bAdjusted for age and gender. CI = Confidence Interval. Rt = Retention Time. 1/K₀: Inverse Reduced Ion Mobility.

CONCLUSION

- Three peaks were found to be associated with CF (P7, P19 and P43).
- Further GC-MS analysis could provide the identity of the VOCs and relate them to pathogenesis or exacerbation of the disease due to infection.
- Early detection of those peaks could possibly improve patient treatment and hospital time.