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Title: Human breath analysis supports the existence of individual phenotypes

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Body: Objectives: Breath analysis holds promise to diagnose lung diseases non-invasively. However, like other biofluids, the exhaled metabolic phenotype varies during the course of the days. This may complicate the interpretation of diagnostic breath tests. The main goal of this study was to assess the amplitude of this temporal noise in human exhaled breathprints. Methods: The assessment was pursued by analyzing the composition of exhaled breath of a group of healthy subjects during nine days at different times of the day. The used technique allows for the in vivo collection of breath mass spectral signatures. The mass spectra were subsequently statistically post-processed. Results: We found that, despite of the expected temporal fluctuations in breath composition, each subject showed a characteristic exhaled breathprint, distinguishable from the other subjects and stable over time. The figure shows the projection of the mass spectral breathprints onto two dimensions. Each convex hull comprises all the measurements collected during nine days from each individual. As visually apparent, each subject tends to occupy his/her own space. Conclusions: We conclude that individual signatures of breath composition exist. This finding may support current efforts towards the development of non-invasive diagnostic technologies which can be precisely tailored to meet the specific needs when populations or individuals are investigated over extended time periods.