Clustering asthma and COPD provides new evidence for both “British” and “Dutch” hypotheses of COPD development

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Aim: We sought to determine the extent to which severe asthma and COPD represent distinct or overlapping conditions in terms of their sputum cellular and mediator profiles.

Methods: We compared the clinical, physiological and sputum mediator profiles between patients with severe asthma (n=80) and COPD (n=75). Biological subgroups were determined by factor, cluster and discriminant analysis of 18 sputum cytokines. Subgroup stratification was validated using the best discriminator from the 'test' set in an independent 'validation' set of severe asthma (n=159) and COPD (n=58).

Results: Discriminant analysis, using a combination of clinical and biological variables, was able to completely distinguish severe asthma and COPD. Factor and cluster analysis of the sputum cytokine profiles revealed 3 biological subgroups verified by discriminant analysis. These were: Cluster 1 (n=52/49/3 [n/asthma/COPD]) - eosinophilic asthma predominant with high Th2 cytokines, Cluster 2 (n=45/26/19) - neutrophilic asthma and COPD overlap with elevated bacterial load representing 1/3rd of each disease group, and Cluster 3 (n=42/3/39) - non-neutrophilic COPD predominant. Sputum IL1β was the best discriminator to separate patients in Cluster 2 (asthma-COPD overlap) from those in both Clusters 1 (asthma) and 3 (COPD) was therefore used to determine the asthma/COPD overlap group in the validation set. Sputum cellular and cytokine profiles were very similar between the test and validation sets.

Conclusion: Sputum cytokine profiling can determine distinct and overlapping groups of patients with severe asthma and COPD and may contribute to improved patient classification to enable stratified medicine.

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