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Cluster analysis of World Trade Center (WTC) related lower airway diseases

Rafael E. de la Hoz, Yunho Jeon, John Doucette, Jonathan Weber, Anthony Reeves, Raúl San José Estépar, Juan Celedón
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Article | Info & Metrics

Abstract

Introduction: Cluster analysis can help classify the heterogeneous chronic lower airway diseases found in former workers at the World Trade Center (WTC) disaster site without *a priori* assumptions.

Methods: We selected the first available chest CT scan with quantitative CT measurements of lung density, air trapping (AT_{EXP}856 and MLD_{EI}), and wall area percent on 311 former WTC workers who also had complete clinical, and spirometric data from the closest surveillance visit. We performed agglomerative hierarchical cluster analysis, using Gower distance measure.

Results: A 4-cluster solution was most satisfactory. Ever smokers predominated in clusters 2 and 4. In cluster 4 (n=32), obstruction, bronchodilator response (BDR), and emphysema predominated, FEV_1%predicted was the lowest, and there was less dyspnea. This group included more Caucasians, former smokers, subjects with more pack-years of smoking, and those least likely to have arrived early at the WTC disaster site. In contrast, subjects in cluster 2 (n=141), also predominantly Caucasian, were more likely to be gaining weight and to currently smoke, and had less BDR and air trapping QCT metrics. Cluster 2 subjects were the most likely to have arrived within 48 hours at the WTC disaster site. A low FVC pattern was observed in clusters 1 and 3. Cluster 3 subjects (n=79) had higher baseline BMI and were less likely to lose weight. Cluster 1 subjects (n=59) had more BDR and dyspnea, and higher FEV_1% of predicted.

Discussion: Cluster analysis confirms low FVC and COPD/emphysema as distinctive chronic lower airway disease phenotypes on long term surveillance of the WTC workers, and suggests characteristics of subgroups with diverging outcomes.

COPD Occupation

Footnotes

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This abstract was presented at the 2021 ERS International Congress, in session “Prediction of exacerbations in patients with COPD”.

Testosterone attenuates pulmonary epithelial inflammation in male rats of COPD model through preventing NRF1-derived NF-κB signaling
Xueting Wang et al., Journal of Molecular Cell Biology, 2021

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