

World Trade Center Collapse Produced Airway Injury and Air Trapping.

M. D. Weiden, MD^{1,2}, **N. Ferrier, MD**², **A. Nolan, MD**¹, **W. N. Rom, MD**¹, **A. Comfort**¹, **J. Gustave**², **S. Zheng, MD**¹, **R. Goldring, MD**², **K. Berger, MD**¹, **K. Cosenza**¹, **A. Beringer**¹, **L. Glass**¹, **R. Lee**¹, **R. Zeig-Owens**¹, **M. Webber**¹ and **D. J. Prezant, MD**¹.
Email: michael.weiden@med.nyu.edu

¹ Division of Pulmonary/Critical Care, New York University, New York City, NY and ² Bureau of Health Services, New York City Fire Department, Brooklyn, NY.

Background: The collapse of the World Trade Center (WTC) on 9/11/01 produced a massive toxic exposure in a well defined cohort of 12,000 FDNY personnel. This group received intensive post-exposure medical evaluation and had pulmonary function testing pre- and post-WTC. We observed a high incidence of reactive airways disease and an accelerated decline in lung function with parallel decline in FEV1 and VC.

Methods: We analyzed the results of lung function testing performed at a single physiology laboratory on 1876 patients who presented for evaluation of persistent respiratory complaints.

Results: The mean duration between pre-9/11 and first post-9/11 spirometry was 1.6 years. This subset of patients who sought evaluation had greater annualized decline in FEV1 post-9/11 than the entire cohort (490cc vs. 372cc, p<0.0001). A vast majority of the symptomatic group maintained normal TLC, FRC and DLCO. However, they had an FEV1/FVC of (74 % ±10) and an RV of 131% ±39 predicted. Only 18% (330/1876) had abnormal spirometry. Of these 87% (287/330) had evidence of obstruction as defined by positive methacholine, BD response or FEV1/FVC<0.75. The most common physiologic abnormality was air trapping with an elevated RV which correlated well with reduction in lung function, bronchodilator response and methacholine reactivity. High resolution chest CT demonstrated a high incidence of peribronchial inflammation and air trapping. Physiologic abnormalities only correlated with peribronchial thickening.

Conclusion: These data demonstrate that airway injury with air trapping was the predominate cause of the pseudorestrictive pattern seen post –9/11 exposure.

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