

World Trade Center Collapse Produced Airway Injury and Air Trapping.

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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 ($74 \% \pm 10$) and an RV of $131 \% \pm 39$ 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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