

World Trade Center Particulate Matter-Induced Cardiorespiratory and Vascular Dysfunction (CaRVD) and Obstructive Airways Disease

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RATIONALE. Airway hyperreactivity(AHR) is associated with at least a 30% increase in cardiovascular risk. Recent prospective studies have demonstrated an association between impaired lung function and central arterial stiffness prior to development of overt vascular disease through systemic inflammation. We have validated cardiovascular disease biomarkers such as MetSyn as predictive of World Trade Center-Lung Injury (WTC-LI) and WTC-AHR. Pulmonary vascular injury may occur prior to the development of abnormal lung mechanics. Prospective studies demonstrated an association between impaired lung function and central arterial stiffness which occur prior to frank vascular disease. **METHODS.** Prospective longitudinal assessment of BMI, smoking status, medication use, lipids, glucose, vitals, and pulmonary function tests were obtained from the electronic medical record of subjects that completed a WTC-HP assessment since March of 2018. Cardiovascular disease (CVD) was defined as having had a myocardial infarction, stroke, unstable angina, coronary artery surgery/angioplasty, or CVD-related death up till March of 2019. **RESULTS.** Of N=9,802 firefighters exposed at the WTC site, N=8,784 had complete data. N=1,938 had WTC-OAD (either airway hyperreactivity by positive bronchodilator (improvement of FEV₁ by 12% and at least 200mL), methacholine challenge (PC₂₀<16) or WTC-LI (FEV₁<lower limit of normal at any point after 9/11). Of the group with WTC-OAD, N=139 have CaRVD and were compared to N=1799 without CaRVD. Baseline demographics of the cohort are shown in Table 1. CaRVD cases (which made up 7.2% of those with WTC-OAD) were not significantly different in age, BMI, or exposure history compared to non-CaRVD. Smoking history was significant different by Pearson-Chi square. **CONCLUSION.** A subset of patients with WTC-OAD have surprisingly less WTC-CaRVD compared to what could be expected in other populations. Furthermore, classic CVD risks such as BMI and age are not significantly different in WTC-CaRVD when compared to those without WTC-CaRVD. This may be due to several confounders such as the healthy worker effect and the relatively younger population of firefighters. Furthermore, the effects of hypertension, a known risk factor of cardiovascular disease, was not examined on disease outcomes in this population. This will be a focus of future work. There may also be a benefit in further screening of this at-risk population for potential underlying WTC-CaRVD especially as they age.

Table 1. Demographics of WTC-OAD Population

	Yes CaRVD	No CaRVD
Total, n (%)	139 (7.2%)	1799(92.8%)
Age at 9/11 (SD)	44.7(7.1)	39.3(7.0)
Race (%)		
Asian/Native American/Other/2+	0(0)	4(1.9)
Non-Hispanic White	129(96.4)	1701(96.4)
Non-Hispanic Black	5(3.6)	30(1.7)
Hispanic	5(3.6)	64(3.6)
Arrival Group (%)		
Arrived morning of 9/11	28(20.1)	345(19.2)
Arrived afternoon of 9/11	71(51.1)	954(53.0)
Arrived on 9/12	25(18.0)	315(17.5)
Arrived after 9/12	15(10.8)	185(10.3)
BMI (SD)	30.6(4.6)	30.1(4.5)
Smoking (%)		
Never	66(47.5)	1255(69.8)
Former	64(46.0)	492(27.3)
Current	9(6.5)	52(2.9)

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