Occupational Risk Factors For Percent Emphysema On Computed Tomography In The Multi-Ethnic Study Of Atherosclerosis

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RATIONALE: Previous studies have demonstrated an association of occupational exposure to dust, fumes, and vapors or gas with low lung function and chronic obstructive pulmonary disease. To date, no studies have assessed the relationship between occupational exposure and lung structure. We hypothesized that exposure to dust, fumes, and vapors or gas is associated with the percentage of emphysema-like lung (percent emphysema) on computed tomography (CT) scans in a multiethnic sample of the US population.
METHODS: The Multi-Ethnic Study of Atherosclerosis (MESA) recruited 6,814 adults in six US metropolitan areas in 2000-02 ages 45-84 years and free of clinical cardiovascular disease. Self-reported occupational exposure to dust, fumes, and vapors or gas, years of exposure and severity were assessed on 3,936 MESA participants. Cumulative exposure was estimated as exposure-years = duration of exposure x severity, with the latter arithmetized as mild=0.5, moderate=1.0, and severe=1.5. Occupational exposures were also estimated based upon a job-exposure matrix for all participants. Percent emphysema was defined as the percentage of lung voxels below −950 Hounsfield units on cardiac CT scans. Analyses were adjusted for age, race, height, weight, gender, smoking status, pack-years, education, second-hand smoke exposure, asthma and family history of emphysema.
RESULTS: Among 3,936 participants (mean age 61.4 years; 49% men, 36% white, 26% African-American, 23% Hispanic, and 16% Asian; 36% retired), 37% reported exposure to dusts, 24% to fumes and 19% to vapors or gas, the median exposure-years among those exposed was 9.0 (Interquartile Range [IQR] 5.0. 17.5), and the median percent emphysema was 3.0% (IQR 1.2, 5.8). Greater cumulative exposure was independently associated with percent emphysema (3% increase per doubling of exposure-years, 95% CI: 0.07%, 6.5%; P=0.01), as was greater severity of exposure (P=0.02). The association was of greatest magnitude for exposure to dusts. Results for the job-exposure matrix were not statistically significant.
CONCLUSION: In a large, population-based study, greater cumulative occupational exposure to dust, fumes, and vapors or gas was associated with a greater extent of percent emphysema on CT scan. These findings suggest that occupational exposures may contribute to irreversible changes in lung structure in addition to changes in lung function.

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