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RUNNING HEAD: Air Pollution and Ventricular Arrhythmias

KEYWORDS: air pollution, arrhythmias, fibrillation, epidemiology, heart arrest

ABBREVIATIONS:

BC	Black carbon
CI	Confidence Interval
ICD	Implanted cardioverter defibrillator
NO_2	Nitrogen dioxide
O_3	Ozone
OR	Odds Ratio
PM_{10}	Particulate matter less than 10 μm aerodynamic diameter
$PM_{2.5}$	Particulate matter less than 2.5 μm aerodynamic diameter
ppb	Parts per billion
ppm	Parts per million
pyr	Person year of follow-up
SO_2	Sulfur dioxide
SO_4	Sulfate ion
$\mu g/m^3$	Micrograms per cubic meter

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Abstract

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ABSTRACT

Epidemiologic studies have demonstrated a consistent link between sudden cardiac deaths and particulate air pollution. We used implanted cardioverter defibrillator (ICD) records of ventricular tachyarrhythmias to assess the role of air pollution as a trigger of these potentially life-threatening events. The study cohort consisted of 203 cardiac patients with ICD devices in the Boston metropolitan area followed for an average of 3.1 years between 1995 and 2002. Fine particle mass and gaseous air pollution plus temperature and relative humidity were measured on almost all days, and black carbon, sulfate, and particle number on a subset of days. Date, time, and intracardiac electrograms of ICD detected arrhythmias were downloaded at the patients' regular follow-up visits (~ every three months). Ventricular tachyarrhythmias were identified by electrophysiologist review. Risk of ventricular arrhythmias associated with air pollution was estimated with logistic regression, adjusting for season, temperature, relative humidity, day of the week, patient, and a recent prior arrhythmia. We found increased risks of ventricular arrhythmias associated with two-day mean exposure for all air pollutants considered, although these associations were not statistically significant. We found statistically significant associations between air pollution and ventricular arrhythmias for episodes within three days of a previous arrhythmia. The associations of ventricular tachyarrhythmias with fine particle mass, carbon monoxide, nitrogen dioxide, and black carbon suggest a link with motor vehicle pollutants. The associations with sulfate suggest a link with stationary fossil fuel combustion sources.

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