AIR POLLUTION EFFECTS ON RISK OF ICD-DETECTED ATRIAL AND VENTRICULAR ARRHYTHMIAS: WHO ARE THE MOST VULNERABLE PATIENTS?

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Background and Aims: Implanted cardioverter defibrillators (ICD) monitor and treat arrhythmias and provide electrocardiographic records of the timing of ventricular and atrial arrhythmias. Diabetes, history of myocardial infarction (MI) and other risk factors have been shown to increase vulnerability to cardiac air pollution effects. In this study we explore which patient characteristics modify the associations between fine particulate matter ($PM_{2.5}$) and arrhythmias among a cohort of 200 dual chamber ICD patients prospectively followed at the Tufts Medical Center in Boston.
Methods: Patients were followed November 2006 through June 2010. We analyzed the association between air pollution and the onset of arrhythmias with a case-crossover approach. Cardiac events were matched with control time periods by month and day of the week. $PM_{2.5}$ exposure was included as 24-hour moving averages. Effect modification by patient characteristics was examined by including an interaction term. Risks of arrhythmias associated with air pollution were estimated with conditional logistic regression, adjusted for temperature and relative humidity. Odds ratios (OR) are reported for an interquartile range increase in exposure.
Results: A total of 135 patients with a mean follow-up time of 2.0 years had 3012 episodes (1917 atrial and 1095 ventricular arrhythmias). A 5.0 $\mu g/m^3$ increase in 24-h $PM_{2.5}$ was associated with an increased risk of atrial arrhythmias (OR 1.18, 95% CI 1.05 to 1.34) for diabetic, but not for non-diabetic patients (p-value interaction=0.03) and with an increased risk of ventricular arrhythmias (OR 1.17, 95% CI 1.04 to 1.31) for obese subjects, but not for non-obese (p-value interaction=0.06). We also found associations between $PM_{2.5}$ and increased risk of both atrial and ventricular arrhythmias in subjects with a history of angina or MI.
Conclusions: Diabetic and obese subjects and those with angina or MI may be more vulnerable to particle exposure in this population of patients with ICD devices