PROSPECTIVE ASSOCIATION OF CADMIUM EXPOSURE WITH FATAL AND NON-FATAL CARDIOVASCULAR DISEASE: THE STRONG HEART STUDY

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Background and Aims: Cadmium, a widespread toxic metal, is related to increased cardiovascular mortality in the US population. Prospective evidence evaluating the association of cadmium exposure with cardiovascular events other than mortality is lacking. Our goal was to evaluate the prospective association of urine cadmium concentrations with cardiovascular disease incidence in cardiovascular disease-free American Indians from Arizona, Oklahoma and the Dakotas who participated in the Strong Heart Study (SHS) in 1989-91 and were followed through December 30th, 2007.
Methods: We included 2,078 adults 45 to 74 years old who had complete information on urine cadmium concentrations, potential confounders and fatal and non-fatal cardiovascular end-points (total cardiovascular disease, coronary heart disease, stroke and heart failure). Urine cadmium was measured using inductively coupled plasma mass spectrometry (ICPMS). Multi-adjusted hazard ratios (HR) were computed using Cox-proportional hazards models.
Results: The geometric means of urine cadmium concentrations were 1.26, 0.97 and 0.96 • g/g creatinine in participants from the Dakotas, Oklahoma and Arizona, respectively. A total of 661 cardiovascular events were identified during the follow-up. After adjustment for cardiovascular disease risk factors including smoking status and pack-years, the hazard ratio for total cardiovascular disease incidence comparing the highest to the lowest quartile of urine cadmium concentrations was 1.41 (95% CI 1.08, 1.82). The corresponding hazard ratios for the incidence of coronary heart disease, stroke and heart failure were 1.11 (95% CI 0.82, 1.52), 2.17 (95% CI 1.19, 3.96) and 1.82 (95% CI 1.08, 3.06), respectively. The corresponding hazard ratio for cardiovascular mortality was 2.03 (95% CI 1.30, 3.18).
Conclusions: Urine cadmium, a biomarker of long-term cadmium exposure, was prospectively associated with increased risk of cardiovascular disease, in particular stroke and heart failure. These findings further suggest that cadmium exposure is a cardiovascular disease risk factor. Efforts to reduce cadmium exposure in the population are needed.