Arsenic methylation and bladder cancer risk in Taiwan

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摘要

Abstract

OBJECTIVE: The mechanism of arsenic detoxification in humans remains unclear. Data are especially lacking for low-level arsenic exposure. We hypothesize that arsenic methylation ability, defined as the ratios of monomethylarsonic acid (MMA(V))/inorganic arsenic (primary arsenic methylation index, PMI) and dimethylarsinic acid (DMA(V))/ MMA(V) (secondary arsenic methylation index, SMI), may modify the association between cumulative arsenic exposure (CAE, mg/L-year) and the risk of bladder cancer. In this study we investigated the relationship among arsenic methylation ability, CAE, and the risk of bladder cancer in a hospital-based case-control study in southwestern Taiwan. METHODS: From January 1996 to December 1999 we identified 49 patients with newly diagnosed cases of bladder cancer at the National Cheng-Kung University (NCKU) Medical Center; controls consisted of 224 fracture and cataract patients selected from the same medical center. The levels of four urinary arsenic species: arsenite (As(III)), arsenate (As(V)), MMA(V), and DMA(V)) were determined in all subjects by using the high-performance liquid chromatography hydride-generation atomic absorption spectrometry (HPLC-HGAAS). CAE was estimated by using published data collected in a survey from 1974 to 1976. RESULTS: Compared to a CAE < or = 2 mg/L-year, CAE > 12 mg/L-year was associated with an increased risk of bladder cancer (multivariate odds ratio (OR) 4.23, 95% confidence interval (CI) 1.12-16.01), in the setting of a low SMI (< or = 4.8). Compared to women, smoking men (OR 6.23, 95% CI 1.88-20.62) and non-smoking men (OR 3.25, 95% CI 0.95-11.06) had higher risks of bladder cancer. Given the same level of PMI, smoking men (OR 9.80, 95% CI 2.40-40.10) and non-smoking men (OR 4.45, 95% CI 1.00-19.84) had a higher risk of bladder cancer when compared to women. With the same level of SMI, both smoking men (OR 6.28, 95% CI 1.76-22.39) and non-smoking men (OR 3.31, 95% CI 0.84-12.97) had a higher risk of bladder cancer when compared to women. CONCLUSIONS: Subjects with low SMI have a substantially increased risk of bladder cancer, especially when combined with high CAE levels.

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