

Arsenic Methylation and Skin Cancer Risk in Southwestern Taiwan

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Abbreviations used: Arsenite, As(III); arsenate, As(V); monomethylarsonic acid, MMA(V); monomethylarsonous acid, MMA(III); dimethylarsinic acid, DMA(V); cumulative arsenic exposure, CAE; primary arsenic methylation ability, PAM; and secondary arsenic methylation ability, SAM; OR, odds ratio; CI, confidence interval.

ABSTRACT

Arsenic is a known carcinogen and people around the world expose to it. Data are especially lacking on low-level arsenic exposure. We conducted a hospital-based case-control study in southwestern Taiwan to explore the association among arsenic methylation ability, defined as the ratios of urinary MMA(V)/inorganic arsenic (primary arsenic methylation ability, PAM) and urinary DMA(V)/MMA(V) (secondary arsenic methylation ability, SAM), cumulative arsenic exposure (CAE) and the risk of skin cancer. From 1996 to December 1999, 76 newly-diagnosed skin cancer cases and 224 fracture and cataract patients (controls) were identified from the National Cheng-Kung University (NCKU) Medical Center. CAE was estimated using published well-written data collected in 1974 to 1976. Compared to a CAE \leq 2mg/L-year, CAE >15 mg/L-year was associated with an increased risk of skin cancer (OR, 7.48, 95 % CI, 1.65 to 33.99), given a low SAM (\leq 5). Compared to women, men (OR, 3.34; 95 % CI, 1.53 to 7.29) had higher risk of skin cancer when compared to women. Given the same level of PAM or SAM, men (OR, 3.25; 95 % CI, 1.43 to 7.40; OR, 4.02; 95 % CI, 1.69 to 9.56) had a higher risk of skin cancer when compared to women, respectively. Subjects with low SAM have a substantially increased risk of skin cancer, especially when combined with high CAE levels. Males in all strata of arsenic exposure and methylation ability are at higher risk of skin cancer.