

Serum β -carotene level, arsenic methylation capability, and incidence of skin cancer

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摘要

Abstract

To elucidate the associations of arsenic-induced skin cancer with serum beta-carotene level and arsenic methylation capability, a total of 654 residents of age 30 or older were recruited from three arseniasis-hyperendemic villages in Taiwan and regularly examined for skin lesions during the follow-up period. There were 33 cases affected with newly diagnosed skin cancer during the follow-up, giving an incidence of 14.74 per 1000 person-years. Although most study subjects had stopped consuming high-arsenic artesian well water more than 20 years ago, the risk of skin cancer was found to increase significantly with cumulative arsenic exposure before the cessation of drinking artesian well water in a dose-response relationship. Frozen serum samples collected at the recruitment from newly developed skin cancer cases and matched controls were tested for beta-carotene levels by high-performance liquid chromatography. Frozen urine samples of these subjects were examined by high-performance liquid chromatography to speciate arsenite (AsIII), arsenate (AsV), monomethylarsonic acid (MMA), and dimethylarsinic acid and then quantitated by hydride generator combined with atomic absorption spectrometry. Skin cancer cases had a significantly lower serum level of beta-carotene than matched healthy controls. Although the primary methylation capability indexed by the ratio of MMA/(AsIII + AsV) was greater in cases than in controls, the secondary methylation capability indexed by the ratio of dimethylarsinic acid/MMA was lower in cases than in controls. An elevated proportion of MMA in total urinary arsenic level was associated with an increased risk of skin cancer. Subjects with a cumulative arsenic exposure of ≥ 20.0 mg/liter-year and a proportion of MMA in total urinary arsenic level $>26.7\%$ had a multivariate-adjusted odds ratio of developing skin cancer as high as 20.91 (95% confidence interval, 2.63-166.5) compared with those who had a

cumulative arsenic exposure of <20.0 mg/liter-year and a MMA percentage of < or = 26.7%. Whether the association with capability of inorganic methylation is also applied to cancers of internal organs, including lung, liver, and urinary bladder, remains to be elucidated