

Arsenic methylation is associated with breast cancer risk in northern Mexico

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Background and Aims: Arsenic (iAs) exposure has been associated with several types of cancer (1). However, most studies to date have not yet implicated iAs as a cofactor for breast cancer (BC). BC incidence and mortality are 3-fold higher in Northern Mexico (NM) than in the rest of the country (2). iAs levels in drinking water are a source of concern since they have been above international standards (3). We hypothesized that iAs exposure and individual Arsenic-methylation ability are potential cofactors for BC risk.

Methods: We investigated 840 BC incident cases and 973 controls from a population-based case-control study performed in NM. Women were directly interviewed about dietary and reproductive BC covariables. iAs metabolites in urine were determined by HPLC/ICP-MS. Methylation capacity was assessed by calculating the percentage of iAs species and primary [MMA(V)/(As(III)+As(V))] (PMI) and secondary [DMA(V)/MMA(V)] methylation indexes (SMI).

Results: The range of total urinary Arsenic was 0.4-303.9 ug/L. Most women (91%) had values above 50 ugAs/L. %MMA(V) was significantly higher in BC cases while %DMA(V) was significantly lower. PMI was positively associated with BC (OR T3vsT1=1.47; 95%CI=1.17-1.84; p for trend=0.001), while SMI was negatively associated (OR T3vsT1=0.54; 95%CI=0.42-0.68; p for trend<0.001).

Conclusions: As exposure may pose a risk for BC, particularly in women with higher capacity to methylate iAs to MMA(V) and lower capacity to further methylate MMA(V) to DMA(V). This is consistent with studies indicating that the proportion of MMA(V) in urine was positively associated whereas that of DMA(V) was inversely associated with the risk of skin, bladder and lung cancer (4,5). Further research is needed about the temporal relationships between disease and methylation capacity and the presence of potential association modifiers, including environmental and genetic factors involved in one carbon metabolism.

References:

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