Stability of arsenic species & insoluble arsenic in human urine.

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摘要

Abstract

Urinary arsenic species are important short-term biomarkers that have been used in epidemiological studies. However, the stability of soluble arsenic species and the amount of arsenic lost during sample pretreatment remain unclear. The objective of this study is to evaluate the stability of soluble arsenic species in urine and aqueous standards, as well as to assess the amount of insoluble and soluble arsenic lost during pretreatment (centrifugation and filtration, respectively). High-performance liquid chromatogram inductively coupled plasma mass spectrometry was used to speciate arsenic species [Arsenite [As(III)], arsenate [As(V)], monomethylarsonic acid [MMA(V)], monomethylarsonous acid [MMA(III)], dimethylarsinic acid [DMA(V)], and arsenobetaine [AsB]] in aqueous standards and in urine samples. The arsenic levels in both freshly collected urine samples (pH = 5.5-7.0) and National Institute of Standards and Technology Standard Reference Material 2670 toxic elements in frozen-dried urine (pH 4.4) remained constant up to 6 months when stored at -20 degrees C. In an aqueous solution mixed with 10 micro g/liter of As(III), As(V), MMA, and DMA standards, and stored at 4 degrees C, As(III) and As(V) were stable only up to 4 weeks, and MMA and DMA remained stable up to 4.5 months. The same phenomenon was observed for 100 micro g/liter mixed aqueous standards. There was no significant loss of arsenic species in urine (<5%) when passed through a 0.45- micro m filter. The amounts of insoluble arsenic in urine lost during centrifuge ranged from 1/2 to 1/17 of soluble arsenic. These findings indicated that the urinary matrix plays an important role in stabilizing arsenic species. Also, the loss of insoluble arsenic in urine during centrifuging results in underestimation of arsenic exposure, and may explain the lack of an association between arsenic exposure and the risk of health outcomes reported in some epidemiological studies.