Public Abstract

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Title:Arsenic Speciation of Swine Urine by High-Performance Liquid Chromatography and Inductively Coupled Plasma Mass Spectrometry for Possible Use in Human Exposure Assessments

Millions of people are exposed to arsenic in the United States and worldwide. Commonly found arsenic species in human urine are AsIII (arsenite), AsV (arsenate), MMA (monomethyl arsenic acid), DMA (dimethylarsinic acid) and AB (arsenobetaine). Evidence has shown that these species vary in toxicity, and since each of these metabolites can be detected through analysis, they have the potential to be used as biomarkers for human exposure. For human exposure assessments in areas that have naturally occurring arsenic contaminated sources, or those who live or work near contaminated environmental sites where arsenic has been used, it is important to fully understand what species of arsenic residents are being exposed to in order to grasp the risk of arsenic exposure specifically and in its entirety.
Since it is difficult to determine direct human exposures, a swine model was used as a surrogate. Swine urine was collected from two different swine studies where animals were given non-toxic doses of arsenic contaminated soil and another group receiving a soluble reference dose using sodium arsenate for comparison. The urine samples from these studies were used to modify an arsenic speciation method using high-performance liquid chromatography and inductively coupled plasma mass spectrometry (LCICPMS). It is evident that when comparing the percent of arsenic species found in swine urine samples with what is found in humans a correlation can be made. There was a range of 64-74% DMA in swine samples for all test soils where a range of 60-75% DMA has been reported in human urine samples. This further illustrates the importance of arsenic speciation in swine urine since it does appear that it could correlate to human exposure. If proper measurement systems are utilized to quantify As species of health concern, dosed swine can be used to assess and predict human toxicological effects of As exposure.