

Abstract

This thesis develops high-performance liquid chromatography-inductively coupled plasma mass spectrometry (HPLC-HG-ICP-MS) method used for the analysis of glutathione arsenic complexes in biological samples. The aim of the thesis was to verify the suitability of this methods and to perform pilot studies on analysis of the enzymatic methylation assay containing glutathione and urine.

Inclusion of post-column hydride generation step resolves the problem of changing sensitivity of ICP-MS with gradient elution. Using the standards of glutathione complexes, it was verified that the HPLC-HG-ICP-MS method can provide both qualitative and quantitative analysis of these complexes. The limit of detection was found at 5 pg/ml. Analysis of the methylation assay of arsenic with glutathione showed that only DMA₅GS complex occurs in the assay during methylation. It was verified that the presence of the enzyme is required for the complex formation. In the samples of urine from unexposed people analyzed by HPLC-HG-ICP-MS and hydride generation-cryotrapping-inductively coupled plasma mass spectrometry (HG-CT-ICP-MS), only the presence of free pentavalent arsenic species was found, whereas neither glutathione complexes nor trivalent species could be observed.