

Study of the protein-bound fraction of iron and platinum in biological samples by single-dimensional electrophoresis and laser ablation inductively coupled plasma mass spectrometry (LA ICP MS)

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In this work the analytical futures of single-dimension electrophoresis followed by LA ICP MS determination will be presented. Platinum and iron speciation was investigated for this purpose. Platinum complexes are now a well-established class of antitumor agents and play an important role in cancer chemotherapy. Since cancer chemotherapy is often associated with high toxic risks, and therapeutic drug monitoring based on and pharmacokinetic parameters may reduce toxicity and even enhance efficacy. Iron is recognized as an essential element in the living organisms. About one third of the total body iron is bound to storage proteins, primarily ferritin or hemosiderin in the liver, spleen, and bone marrow. About two third of the total body iron impact metabolic and enzymatic processes in living organisms. Iron plays an important and essential role as cofactors of proteins in biological systems. The absence or a deficit of iron in proteins results in deficiency diseases, but this metal can also catalyze cytotoxic reactions.

The investigation of metal-containing proteins is a new and challenging task in the proteomics field including the protein identification and the determination of the metal concentration, which requires sensitive analytical techniques.

Laser ablation inductively coupled plasma mass spectrometry (LA ICP MS) has gained increased popularity due to its ability to perform direct and almost non destructive analysis of solids. The direct multi-element determination of major, minor and trace elements in a variety of solids samples is possible. Moreover, with LA ICP MS the information on lateral distribution of selected elements and their isotopes on the surface and within a depth profiles in sub-surface domains could be collected.

LA ICP MS technique has been developed for the direct determination of iron and platinum speciation in human protein separated by single-dimensional gel electrophoresis.

Total concentration of both elements in biological samples (urine, serum, whole blood) was determined after sample digestion by an inductively coupled plasma mass spectrometry (ICP MS).