Lead toxicity is frequently attributed to the displacement of essential metals such as zinc. Lead(II) ions mainly inhibit the enzymatic activity of ALAD, a key zinc-containing metalloenzyme in the heme biosynthetic pathway with much higher affinity to bind to Pb(II) than Zn(II) ions via its cysteiny1 residues. Also for silver(I) ions the interaction with thiol-containing species such as cysteine and glutathione plays a key role in bacterial inactivation and Ag(I) antimicrobial activity. We will present the results of our investigations on Pb(II) and Ag(I) complex formation with small thiol-containing molecules of biological interest such as cysteine, penicillamine, N-acetylcysteine and glutathione, using a combination of different techniques, including X-ray absorption fine structure (XAFS) spectroscopy, multinuclear NMR (207Pb, 109Ag) and X-ray crystallography.


Keywords: Heavy Metal Thiolate Complexes, XAFS Spectroscopy, NMR Spectroscopy