

Metallothioneins are sulfur-rich proteins that are mostly known for their role in detoxifying of the organism after exposure to heavy metals. However, their role in maintenance of cellular processes is much more complex. One of their important physiological function is to control the zinc level in cells. Too much or too little concentration of this microelement causes problems in function of multiple proteins requiring this metal. Despite the fact that metallothioneins were discovered in late 50's there is a lot that we do not know about this proteins. Therefore in the project for the first time we aim to obtain and characterize the metallothionein proteins or selected homologs from all domains of life, with emphasis on zinc proteins from human. The meticulous analysis of their binding with zinc will shed new light in their cellular functions. Moreover it will provide an explanation why so many different proteins from this family are present in cells, even though their sequence is very similar. During the realization of the project we will employ multiple biophysical, structural and calorimetric methods to fully explain on molecular level the binding/dissociation process and stability of the complex of metallothionein with zinc. Our multidisciplinary project will also aim at the development of analytical methods that will allow us to precisely quantify the concentration of various metallothionein types in cells. Overall the obtained results will provide new insights into an important family of protein that govern multiple critical processes in the cell.