

Hepcidin is a protein which is responsible for regulation of iron level in whole organism. It is secreted in relatively high quantity into bloodstream when no iron is needed. Accordingly, when *e.g.* red blood cell production is needed, hepcidin level is decreased.

Hepcidin has a structure with probable sites, to which various metals can bind. One of them is very similar to proteins called metallothioneins. Said proteins have functions generally associated with various metal interaction, *e.g.* Heavy metal detoxification, regulation of level of essential metals.

It is widely recognized that various metals are engaged in interplay between each other and modulate metabolism of others. It is also known that hepcidin gene expression is enhanced in the presence of cadmium or zinc. However, to this date no-one didn't investigate thoroughly how aforesaid metals can be bound by hepcidin and its precursor – prohepcidin.

My working hypothesis assumes that hepcidin (as well as prohepcidin) in certain conditions can bind to cadmium and zinc very strongly. It can influenced organism at many levels. Starting with metabolism of these metals, through iron level regulation to affecting survivability of cells exposed to aforementioned metals.

To test this hypothesis I am going to chemically synthesize and purify hepcidin and its selected analogues for comparative study. Then I plan to investigate hepcidin binding to cadmium and zinc to test whether this binding is strong enough to be biologically relevant in organisms. Various methods will be used in this study, namely circular dichroism spectroscopy, UV-vis spectroscopy, microscale thermophoresis and isothermal titration calorimetry. Using various methods based on different mode of action will allow to compare and validate the results. This will allow me to estimate binding constants of hepcidin-Zn and hepcidin-Cd complexes.

Knowing this, I will be able to specify whether these complexes are strong enough to possibly happen inside the cells. Initial research looks promising. If my assumptions will be confirmed, it will be basis for future biological research, which will shed more light on mutual interactions between metals in human organism.