

Abstract

Charles University

Faculty of Pharmacy in Hradec Králové

Department of Pharmacognosy and Pharmaceutical Botany

Candidate: Jana Nadějová

Supervisor: PharmDr. Jana Karlíčková, Ph.D.

Title of Thesis: Interaction of essential amino acids with iron ions

Iron is an important trace element that is needed for the proper functioning of the body. Lack of iron, as well as an excess of iron, can lead to pathological conditions, so it is necessary to control the level of iron in the blood and in case of overloading the body with iron, its chelation can be considered a possible therapeutic tool.

Chelators for these therapeutic purposes should be the body's own substance. Amino acids are therefore ideal candidates for the regulation of iron homeostasis in the body, so this thesis focuses on some of them. The individual amino acids are linked by a peptide bond to form proteins. Proteinogenic amino acids are divided into essential, which must be ingested through food, and nonessential, which the body can create on its own.

The aim of this study was to compare the iron-chelating and iron-reducing activity of the essential amino acids L-histidine, L-methionine, and the nonessential amino acids L-cysteine, its dimer L-cystine, L-aspartic and L-glutamic acid. The research also included a substance derived from L-cysteine, N-acetylcysteine. Testing of all substances was performed using spectrophotometric methods at pH, which mimic the (patho)physiological environment in the human body.

None of the tested substances showed significant chelating activity of iron ions. The reducing activity of iron ions was observed for N-acetylcysteine and L-cysteine at all pHs at different intensities.

Key words: essential amino acids, chelation, reduction, iron