Abstract

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Title of Thesis: Comparison of ferrozine and direct spectrophotometry by assessment of iron chelation

Iron is an essential element for the human body, which is necessary for many physiological reactions. Excess/insufficient iron intake or metabolism disorders lead to excess or deficiency of iron.Excess of iron can ultimately cause fibrosis of the pankreas and liver, cardiomyopathy, diabetes and joint damage. Iron overload is treated by iron chelators or phlebotomy.

Iron chelators are various compounds which form a complex with iron and help to eliminate iron from the body. Deferoxamine is a standardly clinically used chelator which is administered subcutaneously or intravenously. This treatment is expensive, time-consuming for patiens and has a low compliance. It is thus desirable to find iron chelators, which could be administered orally, will have fewer side effects than deferoxamine and will not be expensive.

Nowadays, the research focuses on flavonoids. Flavonoids are polyphenols contained in plants. Many of them have potentially positive effects for the human body and they chelate iron too. Iron chelation can be measured by different methods. In this work we compared ferrozin methodology and direct spectrophotometric method in the assesment of ferrous and ferric ions chelation by 2 flavonoids - quercetin and rutin. During the measurement, we used a reducing agent hydroxylamin for the determination of total iron chelation and we used a indicator ferrozin for the determination of ferrous ions.

Results showed, that both approaches achieved analogous and complementary results. In cases, where the tested compounds were able to form stable complexes with iron, both methods give the same result. Conversely, in situations where the complex is unstable, the results were different and the ferrozin method revealed a higher stoichiometry or was unable to determine it.

In conclusion, testing substances with a moderate chelating potential, the use of both competitive and non-competitive approach provides a more precise characterization of the complex stoichiometry.