

ABSTRACT

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Title of thesis: Interactions of 7,8-dihydroxyflavone with physiological metals

7,8-dihydroxyflavone belongs to the phenolic substances collectively referred to as flavonoids. Flavonoids are bioactive components abundantly distributed in the daily diet with the ability to modulate health and disease through miscellaneous mechanisms including their antioxidant activity. However, they can also exhibit prooxidative effects under certain conditions. Due to this fact, which is related to individual factors, i.e. presence of various substitutions on the flavonoid come, it is therefore essential to understand the redox behavior based on the relationship between structure and effect and to understand their physiological, pharmacological and thus also potential toxic properties.

The interaction with physiological metals is determined by the structure of the molecule through the dihydroxy moiety in positions 7 and 8. These mentioned metals are essential for many biochemical processes in biological systems. Their homeostasis is strictly regulated in the human body and disruption of this balance can lead to the development of various pathophysiological states.

This thesis presents flavonoids and physiological metals from a theoretical point of view, where we have used current literature to obtain relevant knowledge. In the practical part of the thesis, we focused on their effects, especially in terms of redox processes. Specifically, we investigated the chelating ability of 7,8-dihydroxyflavone with iron, copper, cobalt, zinc, magnesium and calcium by using competitive methodology and the reduction ability of this substance to ferric and copper ions. Furthermore, we observed the influence of the substance on iron and copper-initiated

Fenton reaction. We tested the effect of this flavone on copper-initiated lysis of red blood cells.

In conclusion, we found that 7,8-dihydroxyflavone is able to chelate ferrous ions most efficiently and reduce copper ions more effectively. By analysing the Fenton reaction in the presence of copper and ferric ions at pH 7.5 and 6.8, the compound shows pro-oxidant activity whereas at pH 5.5 and 4.5 antioxidant activity. The substance has protective activity on human erythrocytes in the presence of copper ions.

Key words: chelation, copper, iron, zinc, cobalt, calcium, magnesium, flavonoid