ABSTRACT

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Title of the Rigorous Thesis: Copper chelating properties of flavanones

Copper is an essential trace element playing an essential role in our body. As part of couproenzymes, it is involved in many physiological processes. However, at the same time, it also poses a certain risk to the human body. Free copper has the ability to potentiate the formation of reactive oxygen species and thus to promote oxidative stress. Therefore, copper homeostasis must be carefully regulated.

Flavanones belong to one of the subclasses of flavonoids. These natural substances are very interesting from a scientific point of view due to their possible various pharmacological effects. In this work, we focused on their copper-chelating properties. Flavanones, which are expect to possess a low potential for side effects, could find application as copper chelators and thus expand the current therapeutic modalities for some diseases associated with copper imbalance (e.g. Wilson's disease, tumors).

Four selected flavanones (hesperetin, hesperidin, naringenin and naringin) were tested for their ability to chelate copper ions using two spectrophotometric indicators - hematoxylin and disodium salt of bathocuproindisulfonic acid (BCS).

The hematoxylin screening method showed that all tested flavanones demonstrated the ability to chelate cupric ions at pH 5.5 - 7.5. Tested substances were not however able to significantly chelate neither cuprous nor cupric ions using the BCS as the indicator with high affinity for cupric ions (highly competitive environment). It can be summed up that they are weak chelators. A structural prerequisite for the chelation of copper ions is the 4-keto-5-hydroxy group, which is found in all tested flavanones.

Although these substances are capable of chelating, their chelating potential is small and therapeutic use is unlikely.