

# ABSTRACT

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**Title of diploma thesis:** Effect of benzoic acids (flavonoid metabolites) on copper catalyzed Fenton reaction and hemolysis

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Copper is a biogenic trace element that is present in several enzymes and proteins in the human body. The ability of copper to change its oxidation state is essential for its biological functions and enables enzymatic redox reactions in the organism. Homeostasis of copper is strictly regulated in the human body as its disruption can lead to the toxic effects of copper.

Flavonoids are secondary plant metabolites that are a common part of our diet and their consumption has positive effects on our bodies. However, under certain conditions, they can also have a pro-oxidative effect, which is related to their ability to reduce transition metal ions. Flavonoids are massively metabolized in the human body before reaching systemic circulation into small phenolic substances including benzoic acids.

Seven benzoic acid derivatives were tested as part of this thesis. Their influence on the production of hydroxyl radicals arising during the copper-catalyzed Fenton reaction at two (patho)physiological pH values (4.5 and 7.5) was determined using the HPLC method. 2,4-dihydroxybenzoic acid showed the highest antioxidant activity at both pH values. In contrast, 2,4,6-trihydroxybenzoic acid and benzoylaminoacetic acid showed a pro-oxidative effect.

Subsequently, the determination of the effect on copper-induced lysis of rat red blood cells was used to verify the antioxidant or pro-oxidative action of the tested substances. None of the tested compounds exhibited the ability to protect rat erythrocytes from copper toxicity. On the contrary, 2,4,6-trihydroxybenzoic acid and 3-hydroxybenzoic acid led to the worsening of hemolysis.