

Abstract

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Title of diploma thesis: The impact of benzoic acids, metabolites of flavonoids, on the iron-catalysed Fenton reaction

Oxidative stress is a condition in which there is an increased production of free radicals that exceeds endogenous antioxidant activity and leads to damage of biomolecules. A number of human diseases are associated with oxidative stress. However the use of antioxidants has failed in clinical trials, but it is possible that the fact that antioxidants may preferentially exhibit prooxidant activity under elevated antioxidant concentrations in various pathophysiological conditions. Various *in vitro* and epidemiological studies have confirmed the presence of antioxidant and prooxidant properties in flavonoids. However, on the basis of their pharmacokinetics, it is evident that after their oral intake, significant metabolism in the colon takes place, where small phenolic substances are formed in interaction with the intestinal microflora. There is a possibility that the antioxidant and harmful prooxidant properties that have been attributed to flavonoids are in fact a characteristic of their metabolites. In our work, we have focused specifically on the investigation of these properties in benzoic acid derivatives using the ferric ion-induced Fenton reaction. Increased and decreased hydroxyl radical production, respectively, was demonstrated by HPLC measurements. A total of 8 benzoic metabolites were tested under 2 pH conditions. In substances containing two free hydroxyl groups (2,4-dihydroxybenzoic acid and 3,4-dihydroxybenzoic acid), there was a manifestation of antioxidant activity. Additional hydroxyl groups in the case of 2,4,6-trihydroxybenzoic acid did not increase the

antioxidant activity, on the contrary, the substance showed prooxidant activity. In the absence of a hydroxy group in the molecule, (benzoic acid, benzoylaminoacetic acid), neither antioxidant nor prooxidant activity was observed. Analogously, substances with one hydroxy group (3-hydroxybenzoic and 4-hydroxybenzoic acid) also had a neutral effect on this reaction. This work showed significant differences in the anti- and prooxidant activities of the tested substances, which, due to the *in vitro* nature of this thesis, need to be verified also under *in vivo* conditions.