

MEETING ABSTRACTS

NATURAL PHENOLIC COMPOUNDS AND BIOLOGICAL TRACE METALS: DOUBLE-EDGED SWORD

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Many natural (poly)phenolic compounds including flavonoids are able to chelate biological trace metals such as iron, copper and cobalt. On the other hand, they are also frequently reducing these metals to lower oxidation states. Although this later reduction process is commonly understood as an antioxidant effect, it might be also associated with recovery of the catalyst in the known metal-catalyzed Fenton chemistry and can hence paradoxically lead to a tissue damage (pro-oxidation). For this reason, the final biological outcome ensuing from (poly)phenol-metal interaction varies from compound to compound depending on the individual differences in chelation and reduction toward the selected metal, and abilities to directly scavenge reactive oxygen species such as hydroxyl radical. Firstly, chelation properties of a row of flavonoids toward iron, copper and cobalt will be discussed. This will be followed by comparison of their ferric and cupric reducing capacity, ability to inhibit or potentiate iron, copper and cobalt triggered Fenton reaction and to block or stimulate metal-based red blood cell lysis. Also limited *in vivo* pro-oxidation data from rats will be mentioned.

Keywords: flavonoid; iron; copper; cobalt; pro-oxidation

References

1. Laughton MJ, Evans PJ, Moroney MA, Hoult JR, Halliwell B. Inhibition of mammalian 5-lipoxygenase and cyclo-oxygenase by flavonoids and phenolic dietary additives. Relationship to antioxidant activity and to iron ion-reducing ability. *Biochem Pharmacol.* 1991;42(9):1673-81.
2. Macáková K, Mladěnka P, Filipický T, Říha M, Jahodář L, Trejtnar F, Bovicelli P, Proietti Silvestri I, Hrdina R, Saso L. Iron reduction potentiates hydroxyl radical formation only in flavonols. *Food Chem.* 2012;135(4):2584-92.
3. Lomozová Z, Catapano MC, Hrubša M, Karličková J, Macáková K, Kučera R, Mladěnka P. Chelation of Iron and Copper by Quercetin B-Ring Methyl Metabolites, Isorhamnetin and Tamarixetin, and Their Effect on Metal-Based Fenton Chemistry. *J Agric Food Chem.* 2021;69(21):5926-5937.