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In vitro antioxidant activity of tocopherols and tocotrienols and comparison of vitamin E concentration and lipophilic antioxidant capacity in human plasma

Mol. Nutr. Food Res. 54 (2010) 731-742

### Abstract

A comparative study investigated four tocopherols, four tocotrienols, and  $\alpha$ -tocopheryl acetate on their antioxidative activities in five different popular assays, which were adapted to non-polar antioxidants.  $\alpha$ -Tocopherol, used as calibration standard, showed the highest ferric reducing antioxidant power. Greater ring methyl substitution not only led to an increase of scavenging activity against the stable 2,2-diphenyl-1-picrylhydrazyl radical, but also to a decrease in oxygen radical absorbance capacity. Regarding  $\alpha$ -tocopherol equivalent antioxidant capacity no significant differences in the antioxidant activity of all vitamin E isoforms were found. In contrast, a significantly lower peroxy radical-scavenging activity of  $\alpha$ -tocochromanols was determined in a chemiluminescence assay. Except oxygen radical absorbance capacity, no significant differences of the antioxidant activity related to the side chain could be detected. The data show that the reducing ability and radical chain-breaking activity of the several vitamin E forms depends on the circumstances under which the assays are performed. In our opinion, the used lipophilic methods can be useful for estimating the antioxidant activity of strong non-polar antioxidants, *e.g.* carotenoids, too. Furthermore, we could show a significant correlation between the total tocopherol content in human plasma and the lipophilic antioxidant capacity measured by  $\alpha$ -tocopherol equivalent antioxidant capacity and 2,2-diphenyl-1-picrylhydrazyl.