The comparison of antioxidant properties and nutrigenomic redox-related activities of vitamin C, C-vitamers, and other common ascorbic acid derivatives

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Under the name 'vitamin C' hides a group of compounds with antiscorbutic activity of L-ascorbic acid. Apart of their natural presence in plant-derived foods, some derivatives of L-ascorbic acid are widely implemented in the food industry as antioxidants, including the D-isomers, which lack vitamin C activity. Our research concentrated on the relationship between chemical structure, electrochemical properties and redox-related bioactivities for most common of these derivatives. Within physiological range of concentrations, there was no simple relationship between their redox properties and biological activity. Clear distinctions in antioxidant activity were observed mostly at high concentrations, which were strongly correlated with electrochemical and kinetic parameters describing redox-related properties of the studied compounds. Despite obvious similarities in chemical structures and antioxidant activity, we showed that ascorbic acid analogues may exhibit different nutrigenomic effects. This notion about diverse redox-related biological behaviour of structurally related reducing compounds is true also for other dietary antioxidants we investigated.