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# Hypothesis for the Mechanism of Ascorbic Acid Activity in Living Cells Related to Its Electron-Accepting Properties

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## Abstract

Electron-accepting properties, and in particular resonance dissociative electron attachment (DEA) to ascorbic acid (AA), are investigated by means of DEA spectroscopy in vacuo. The experimental features are assigned in silico and discussed in relation to expected dissociative electron transfer processes in vivo with the support of density functional theory calculations and the polarizable continuum model. It is shown that formation of the two most abundant AA metabolites in living cells, namely monodehydroascorbic acid and dehydroascorbic acid, can be stimulated by cellular electron transfer to AA under reductive conditions. Prooxidant effects caused by AA are suggested to be mediated by hydroxyl radicals formation via the DEA mechanism. The involvement of excited electronic states under UV-irradiation in plants could open additional DEA channels leading to specific AA activity forbidden under dark state conditions.

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