

Inhibition of ATP synthesis in chloroplasts by lipid soluble nitroxide radical spin labels

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The influence of various stearic acid spin labels (SASLs) that contain a bulky oxazolidine ring at various positions along the steryl chain on electron transport, proton uptake and photophosphorylation in bean chloroplasts has been investigated using potentiometric methods. SASLs added at rather low concentration (about 10 μ M) efficiently inhibit (50% of control) ATP synthesis. However, a decrease in light-induced uptake of protons accompanied by stimulation of the electron transport was observed only at much higher concentrations of SASLs (about 0.1 mM). The influence on electron and proton transport depends on the position of the oxazolidine free-radical moiety along the stearic chain, with effects stronger in the order of 16- > 12- > 5-SASL. Incorporation of stearic acid without the spin label or water-soluble nitroxide radicals in the same range of concentrations only slightly decreases ATP formation and proton uptake. It is concluded that direct interaction of the oxazolidine free-radical moiety with the membrane sector CF₀ of the ATP synthase and not the drop in transmembrane pH difference causes inhibition of photophosphorylation by SASLs.