

## **Study of the effects of salicylic acid on soybean mitochondrial lipids and respiratory properties using the alternative oxidase as a stress-reporter protein.**

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### **Abstract**

Biotic and abiotic stresses can lead to modifications in the lipid composition of cell membranes. Although mitochondria appear to be implicated in stress responses, little is known about the membrane lipid changes that occur in these organelles in plants. Besides cytochrome c oxidase, plant mitochondria have an alternative oxidase (AOX) that accepts electrons directly from ubiquinol, dissipating energy as heat. AOX upregulation occurs under a variety of stresses and its induction by salicylic acid (SA) has been observed in different plant species. AOX was also suggested to be used as a functional marker for cell reprogramming under stress. In the present study, we have used etiolated soybean (*Glycine max* (L.) Merr. cv Cresir) seedlings to study the effects of SA treatment on the lipid composition and the respiratory properties of hypocotyl mitochondria. AOX expression was studied in detail, as a reporter protein, to evaluate whether modifications in mitochondrial energy metabolism were occurring. In mitochondria extracted from SA-treated seedlings, AOX capacity and protein contents increased. Both AOX1 and AOX2b transcripts accumulated in response to SA, but with different kinetics. A reduction in external NADH oxidation capacity was observed, whereas succinate respiration remained unchanged. The phospholipid composition of mitochondria remained similar in control and SA-treated plants, but a reduction in the relative amount of linolenic acid was observed in phosphatidylcholine, phosphatidylethanolamine and cardiolipin. The possible causes of the fatty acid modifications observed, and the implications for mitochondrial metabolism are discussed.