

Effects of Salicylic Acid on Alternative Pathway Respiration and Alternative Oxidase Expression in Tobacco Calli

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The alternative pathway (AP) respiration of plants is a cyanide-resistant and non-phosphorylating electron transport pathway in mitochondria. Alternative oxidase (AOX) is the terminal oxidase of the AP and exists in plant mitochondria as two states: the reduced, non-covalently linked state or the oxidized, covalently cross-linked state. In the present study, the effects of 20 μM exogenous salicylic acid (SA) on both AP activity and AOX expression in mitochondria of tobacco (*Nicotiana rustica* L. cv. yellow flower) calli were investigated. The results showed that SA treatment enhanced the AP activity. During the process of SA treatment, the AP activity increased dramatically and achieved the peak value after 8 h of treatment. Then it declined until 16 h, and maintained a steady level between 16 and 24 h. Changes in both the total AOX protein level and the reduced state were in accordance with the AP activity, but the oxidized state changed differently. The *aox1* gene transcript level also showed a similar change as the AP activity and AOX protein level. The induction of AOX expression by low concentrations of SA was inferred through a reactive oxygen species (ROS)-independent pathway. These results indicate that the enhancement of AP activity in response to SA is correlated to the expression of AOX, and the reduced, non-covalently linked state of AOX plays an important role during this process.

Key words: Alternative Pathway (AP), Alternative Oxidase (AOX), Salicylic Acid (SA)