

# Effects of Hydrogen Sulfide on Alternative Pathway Respiration and Induction of Alternative Oxidase Gene Expression in Rice Suspension Cells

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The toxic effects of  $H_2S$  on plants are well documented. However, the molecular mechanisms responsible for inhibition of plants by  $H_2S$  are still not completely understood. We determined the effects of NaHS in the range of 0.5–10 mM on the growth of rice suspension culture cells, as well as on the expression of the alternative oxidase (AOX) gene. AOX is the terminal oxidase of the alternative pathway (AP) and exists in plant mitochondria. The results showed that  $H_2S$  treatment enhanced the AP activity. During the process of  $H_2S$  treatment for 4 h, the AP activity increased dramatically and achieved the peak value at a concentration of 2 mM NaHS. Then it declined at higher concentrations of NaHS (5–10 mM) and maintained a steady level. The *AOX1* gene transcript level also showed a similar change as the AP activity. Interestingly, different NaHS concentrations seemed to have different effects on the expression of *AOX1a*, *AOX1b*, and *AOX1c*. The induction of AOX expression by low concentrations of NaHS was inferred through a reactive oxygen species (ROS)-independent pathway. At the same time, rice cells grown in culture were very sensitive to  $H_2S$ , different  $H_2S$  concentrations induced an increase in the cell viability. These results indicate that the  $H_2S$ -induced AOX induction might play a role in inhibiting the ROS production and have an influence on cell viability.

**Key words:** Alternative Pathway, Alternative Oxidase, Hydrogen Sulfide