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Iron (Fe) is a critical element in all aerobic organisms as it participates in a variety of metabolic networks. In this study,

Involvement of Fumarase C and NADH Oxidase in Metabolic Adaptation of *Pseudomonas fluorescens* Cells Evoked by Aluminum and Gallium Toxicity▽

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aluminum (Al) and gallium (Ga), two Fe mimetics, severely impeded the ability of the soil microbe *Pseudomonas fluorescens* to perform oxidative phosphorylation. This was achieved by disrupting the activity and expression of complexes I, II, and IV. These toxic metals also inactivated aconitase (ACN) and fumarase A (FUM A), two tricarboxylic acid cycle enzymes dependent on Fe for their catalytic activity, while FUM C, an Fe-independent enzyme, displayed an increase in activity and expression under these stressed situations. Furthermore, in the Al-and Ga-exposed cells, the activity and expression of an H_2O-forming NADH oxidase were markedly increased. The incubation of the Al-and Ga-challenged cells in an Fe-containing medium led to the recovery of the affected enzymatic activities. Taken together, these data provide novel insights into how environmental pollutants such as Al and Ga interfere with cellular Fe metabolism and also illustrate the ability of *Pseudomonas fluorescens* to modulate metabolic networks to combat this situation.