# Overactivation of glutamate consuming pathways in l-glutamate treated tomato fruits lead to resistance against *Alternaria Alternata*

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## Abstract

Previous studies reported the ability of l-glutamate (glutamate) to induce host resistance against *Alternaria alternata*, but the underlying mechanism is still scarce. Here, temporal alteration in antioxidant enzymes and glutamate consuming pathways were transcriptionally and enzymatically monitored in tomato fruits. The results showed that exogenous glutamate application enhanced the activities of antioxidant enzymes, including peroxidase, superoxide dismutase and catalase, in tomatoes upon inoculation with *Alternaria alternata*, while lower concentrations of $H_2O_2$ and malondialdehyde were observed. Interestingly, glutamate led to a decline in carbon:nitrogen ratio and induction of deaminating activity of glutamate dehydrogenase, resulting in replenishment of the tricarboxylic acid cycle. Concurrently, proline dehydrogenase mediated the proline catabolism was downregulated by glutamate, accompanied by the enhanced biosynthesis of proline due to increased expression of pyrroline-5-carboxylate synthase. Together our findings favored a model whereby overactivation of antioxidant enzymes and glutamate consuming pathways, deamination of glutamate and proline biosynthesis from glutamate, played a vital role in the mechanism of glutamate-induced resistance.