S-nitrosylation regulates Drosophila immunity

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S-nitrosylation, the incorporation of a nitric oxide moiety into a protein thiol group, has emerged as a major post-translational modification (PTM) during pathophysiological responses in plants and animals. However, the genetic basis of this PTM remains largely unexplored. To address this issue, we have been investigating whether S-nitrosylation has a role in the genetic reference system, Drosophila melanogaster, during innate immune function. By knocking out S-nitrosoglutathione reductase (gsnor), which encodes an enzyme that indirectly controls the level of total S-nitrosylation, we provide evidence demonstrating a striking role for this PTM in the immune response of D. melanogaster. Due to lower expression of antimicrobial peptides, gsnor mutants succumbed more rapidly to both Gram-positive bacterial and fungal infections relative to wild-type. As the Toll pathway mediates responses against both Gram-positive bacteria and fungi, we have been exploring whether key components of this network might be target for S-nitrosylation. Indeed, preliminary data has shown that at least one of the proteases within the Toll pathway is S-nitrosylated both in vitro and in vivo. These findings might represent a novel mechanism by which S-nitrosylation regulates Drosophila immune responses.

Keywords: S-nitrosylation; Toll signaling pathway, Drosophila melanogaster