

Opposing Functions of Calcineurin and CaMKII Regulate G-Protein Signaling in Egg-Laying Behavior of *C. elegans*

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ABSTRACT

Calcineurin is a Ca^{2+} -calmodulin-dependent serine/threonine protein phosphatase that has been implicated in various signaling pathways. Here we report the identification and characterization of calcineurin genes in *C. elegans* (*cna-1* and *cnb-1*) which share high homology with *Drosophila* and mammalian calcineurin genes. *C. elegans* calcineurin binds calcium and functions as a heterodimeric protein phosphatase establishing its biochemical conservation in the nematode. Calcineurin is expressed in hypodermal seam cells, body-wall muscle, vulva muscle, neuronal cells, and in sperm and the spermatheca. *cnb-1* mutants showed pleiotropic defects including lethargic movement and delayed egg-laying. Interestingly, these characteristic defects resembled phenotypes observed in gain-of-function mutants of *unc-43*/ Ca^{2+} -calmodulin-dependent protein kinase II (CaMKII) and *goa-1*/ G_o -protein α -subunit. Double mutants of *cnb-1* and *unc-43(gf)* displayed a synergistic severity of movement and egg-laying defects, suggesting that calcineurin has an antagonistic role in CaMKII-regulated G-protein-coupled phosphorylation signaling pathways in *C. elegans*.

Key words: *cnb-1*, PP2B, deletion mutant, *unc-43*, CaMKII