


The role of Ca^{2+} conducting cyclic nucleotide gated ion channels in signal transduction cascades related to plant growth, development, pathogen defense and programmed cell death

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cAMP is known to act as a secondary messenger in plants; however no specific protein has been hitherto identified as activated by cAMP in a manner associated with a signaling cascade in plants. Ca^{2+} influx has long been known as an early signal initiating cytosolic innate immune responses to pathogen perception in plant cells, but other molecular components linking pathogen recognition to Ca^{2+} influx are not delineated. We have recently identified a cyclic nucleotide gated channel (CNGC) gene product as facilitating the Ca^{2+} flux that initiates innate immune signaling in the plant cell cytosol; cyclic nucleotides activate conductance through this channel. Work undertaken as one part of the dissertation research reported here shows that elevation of cytosolic cAMP is a key event in this signaling cascade. We also show that CNGC2 can conduct Ca^{2+} into cells and provide a model linking the Ca^{2+} current to downstream NO production. However, the mechanism linking cytosolic Ca^{2+} rise to NO generation during pathogen response signaling in plants is still unclear. Research described here suggests that the initial pathogen recognition signal of Ca^{2+} influx into the cytosol activates calmodulin (CaM) and/or a CaM-like protein (CML), which then acts to induce downstream NO synthesis (by activation of nitric oxide synthase (NOS)) as intermediary


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Summary : Free the role of calcium ion-conducting cyclic nucleotide gated ion channels in signal transduction cascades related to plant growth development pathogen defense and programmed cell death pdf download - currently little is known about the roles of cngcs in plant growth and development here we present evidence that primary roots of cngc1 loss-of-function mutant seedlings grew faster than roots of wild type wt plants and had larger angles of gravicurvature and less no generation upon gravistimulation these phenotypes could be due to disruption of channels formed at least in part by atcngc1 which contributes to ca2 uptake into plants including roots and alteration in arabidopsis primary root growth in another study leaf ca2 accumulation is reduced in the leaves of cngc2 loss-of-function mutant dnd1 compared to wt many early senescence-associated phenotypes were more prominent in dnd1 leaves than wt application of an no donor effectively rescues many dnd1 senescence related phenotypes

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