

A Cyclic Nucleotide-Gated Channel (CNGC16) in Pollen Is Critical for Stress Tolerance in Pollen Reproductive Development

- Cyclic nucleotide gated channels (CNGCs) have been implicated in diverse aspects of plant growth and development, including responses to biotic and abiotic stress, as well as pollen tube growth and fertility.
- Genetic evidence here identifies CNGC16 in *Arabidopsis thaliana* as critical for pollen fertility under conditions of heat stress and drought.
- Two independent T-DNA disruptions of *cngc16* resulted in a greater than 10-fold stress-dependent reduction in pollen fitness and seed set. This phenotype was fully rescued through pollen expression of a CNGC16 transgene, indicating that *cngc16-1* and *16-2* were both loss-of-function null alleles.
- The most stress-sensitive period for *cngc16* pollen was during germination and the initiation of pollen tube tip growth.
- A q-PCR analysis indicates that *cngc16* mutant pollen have attenuated expression of several heat-stress response genes, including two heat shock transcription factor genes, HsfA2 and HsfB1.
- Together these results provide evidence for a heat stress response pathway in pollen that connects a cyclic nucleotide signal, a Ca²⁺-permeable ion channel, and a signaling network that activates a downstream transcriptional heat shock response.

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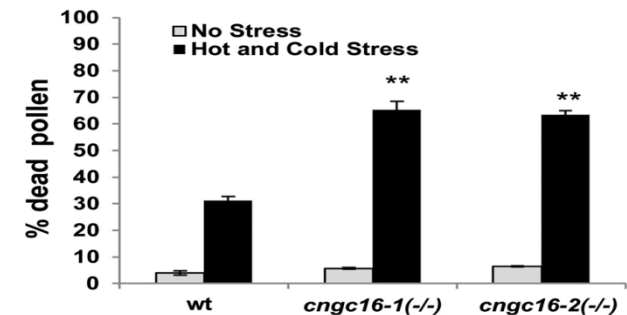
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A cyclic nucleotide-gated channel (CNGC16) in pollen is critical for stress tolerance in pollen reproductive development.

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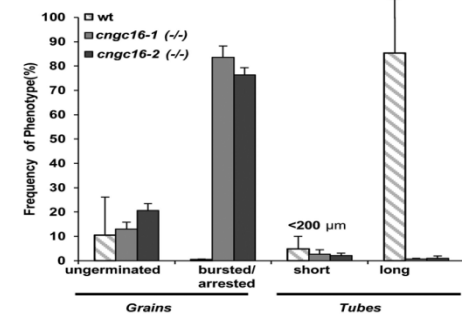
Viability staining showing *cngc16* mutants are hypersensitive to stress.



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cngc16 pollen show poor growth and bursting when germinated in vitro.



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