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AtBAG6, a novel calmodulin-binding protein, induces programmed cell death in yeast and plants

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Objectives

We have isolated AtBAG6, calmodulin(CaM)-binding protein that that contains a central BCL-2-associated athanogene (BAG)domain. In this study, we found that AtBAG6 can induce programmed cell death (PCD) in yeast and plants.

Materials and Methods

1. Material

   Yeast-*Saccharomyces cerevisiae*

   Plant-*Arabidopsis thaliana* plants

2. Methods

A cDNA expression library in a ZAPII vector (Stratagene, La Jolla, CA, USA) was constructed with RNA from four weeks old *Arabidopsis thaliana* (ecotype Columbia) plants that were treated with heat shock (37C) for 2h. And then, it was screened with HRP-conjugated *Arabidopsis* calmodulin-2 (AtCaM2::HRP) as a probe.

Results and Discussion

Calmodulin (CaM) influences many cellular processes by interacting with various proteins. Here, we isolated AtBAG6, an *Arabidopsis* CaM-binding protein that contains a central BCL-2-associated athanogene (BAG) domain. In yeast and plants, overexpression of *AtBAG6* induced cell death phenotypes consistent with programmed cell death (PCD). Recombinant AtBAG6 had higher affinity for CaM in the absence of free Ca2+ than in its presence. An IQ motif (IQ*XXX*RG*XXX*R, where X denotes any amino acid) was required for Ca2+-independent CaM complex formation and single amino acid changes within this motif abrogated both *AtBAG6*-induced CaM-binding activity and cell death in yeast and plants. A 134-amino acid stretch, encompassing both the IQ motif and BAG domain, was sufficient to induce cell death. Agents generating oxygen radicals, that are known to be involved in plant PCD, specifically induced the *AtBAG6* transcript. Collectively, these results suggest that AtBAG6 is a stress-upregulated CaM-binding protein involved in plant PCD. [Supported by PDRC]

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