

Ancestral role of Presenilin in plants: regulation of cytoskeleton/polarity

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Presenilins are multi-transmembrane domain proteins harboring the active site of an unusual aspartate protease complex, gamma-secretase. Gamma-secretase is responsible for the intramembrane cleavage of notch, amyloid precursor protein and other type I transmembrane proteins in non-plant systems. Based on sequence similarity, we identified presenilin homologue in *Physcomitrella patens*. It contains only one copy of presenilin as compared to the higher plant *Arabidopsis thaliana* which has two copies of presenilin. We made a presenilin deletion in *P. patens* (Δps) using homologous recombination that displayed a unique phenotype in filaments, as well as in colony and gametophore morphology. The same Δps phenotype was observed using RNAi in a transient system. The wild type phenotype was restored when the full length cDNA of PpPS was expressed. Mutations in the putative protease active site region of PpPS using the transient RNAi system demonstrates that the phenotype in moss is unrelated to the previously reported enzymatic activity of presenilin. The same results were obtained using mouse presenilin, i.e. wild type and active site mutants are able to complement the phenotype in the RNAi system of *P. patens*. We will discuss these results in *P. patens*, and similar evidence we obtained in mammalian cell cultures, in terms of a possible functional role of presenilin in regulating cytoskeleton/polarity.