

Genetic Control of the Maintenance of AIA Cell Identity

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As development progresses in multicellular organisms, the developmental potential of an individual cell becomes increasingly restricted until a final differentiated cellular identity is adopted. Work in recent years has indicated that a cell's differentiated identity can be unstable, and the need for factors that maintain this differentiated identity is apparent though poorly understood. Here I present the characterization of a gene, *ctbp-1*, that might act to maintain the identities of one or more cell types in *C. elegans*.

ctbp-1 encodes the worm homolog of the C-terminal Binding Protein (CtBP) family of proteins, shown in mice and *Drosophila* to function as transcriptional corepressors that act during development. *ctbp-1* mutant adult worms show defects in the gene expression, cellular morphology and cellular function of the embryonically-born AIA neurons. By contrast, *ctbp-1* L1 worms do not display any of these defects. We hypothesize that *ctbp-1* worms properly establish the AIA cellular identity but fail to maintain this identity as the worm ages.

To understand how *ctbp-1* acts to regulate AIA cellular identity, we have performed a genetic suppressor screen looking for reversion of AIA gene misexpression in *ctbp-1* animals. From this screen we identified *rpm-1*, which encodes an E3-ubiquitin ligase previously studied for its role in synaptogenesis and axon termination. How *ctbp-1* and *rpm-1*, two seemingly disparate factors, converge to maintain the integrity of a cell's identity is unknown. We are seeking additional genes that interact with *ctbp-1* to help clarify the functional relationship between *ctbp-1* and *rpm-1* and elucidate the mechanism by which AIA cell identity is maintained. We hope that by understanding the maintenance of cellular identity in *C. elegans* we will gain insights into instances in which a failure of cell-identity maintenance can lead to disease, as in the reprogramming of cellular identity during cancer initiation.

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