Consequences of a DOT-1.1 Deletion on Germ Cell Components in Caenorhabditis elegans

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The evolutionarily conserved DOT1 family of proteins is essential for development in higher mammals. However, overactive DOT1L acts as an oncoprotein, most notably in childhood leukemia. Although deleting DOT1 genes leads to excessive cell death, down-regulation may be a promising treatment if potential negative impacts and apoptosis can be avoided. Consequently, our study focused on the outcomes of a DOT1 gene knockout and on the molecular components that cause DOT1 gene deletion lethality. Using Caenorhabditis elegans (C. elegans) as a convenient system, we bred a nematode strain with a dot-1.1 deletion in concert with a ced-3 mutation to minimize the typical side effects of a dot-1.1 knockout. We hypothesized that (1) a dot-1.1 deletion would impact the P granule morphology and localization due to the similar consequences that occur with a dot-1.1 deletion and P granule function inhibition, and (2) dot-1.1 deletion lethality is linked to irregular pgl-1 expression because faulty gene expression can lead to embryonic lethality and dot-1.1 and pgl-1 have similar characteristics. In this study, we found no change in P granule structure in mutants. However, we discovered that the dot-1.1 deletion occasionally caused P granules expression in a third cell in embryos and larvae along with the two expected germ cells, indicating an additional cell with germline potential. Furthermore, we found no significant difference in levels of PGL-1::GFP expression after dot-1.1 was deleted, suggesting that pgl-1 expression functions properly in a background without dot-1.1 and therefore is not the cause of embryo death in dot-1.1 mutants.

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