Public Abstract

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ANALYSIS OF INTERACTIONS BETWEEN THE GERMLINE RNA HELICASES (GLHs) AND THEIR REGULATORS KGB-1 AND CSN-5 IN *CAENORHABDITIS ELEGANS*

One of the most fundamental questions in developmental biology is: how does an animal reproduce itself to ensure its genes are passed on for posterity? To allow faithful reproduction of its genome for future generations and to guarantee the viability of its progeny, an animal must carefully regulate the germline tissues crucial for reproduction. We use the small free-living soil nematode *Caenorhabditis elegans* to address questions of germline development. Our focus centers on a family of four proteins known as the germline RNA helicases (GLHs), and other proteins that interact with the GLHs. The GLHs are components of structures known as P granules, non-membranous aggregates of protein and RNA that segregate with the germline lineage throughout development and are found associated with every germ cell nucleus in the adult worm. Work in our laboratory has shown that the GLH proteins are essential for fertility, as are two of their interactors: KGB-1 and CSN-5. The elimination of both GLH-1 and GLH-4 results in sterility; the worms have very small, under-proliferated gonads and produce no oocytes. The same phenotype is seen when CSN-5 is eliminated, and worms lacking CSN-5 protein show reduction in GLH proteins associated with germ cells. In contrast, the elimination of KGB-1 protein results in sterility only when worms are raised at non-permissive temperatures. Mutants in the *kgb-1* gene (which do not produce KGB-1 protein) have gonads normal in size, but they do not develop properly, and the germ cells replicate their DNA without nuclear division, resulting in large nuclei with many extra copies of the genome. No viable oocytes or embryos are produced in *kgb-1* mutants and we find vast excesses GLH-1 protein in these sterile worms. We believe that a balance of GLH-1 protein levels is necessary for fertility, and this balance may be regulated coordinately by KGB-1 and CSN-5