Molecular role of a *C. elegans* germline-specific RNA helicase

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N6-methyladenosine (m^6A) is catalysed by RNA methyltransferase "writers", while the functional consequences are mediated by "readers" that specifically recognize the modification. The YTH reader proteins recognize m^6A via the YTH domain to modulate splicing, translation, or stability of mRNAs. One of five mammalian YTH proteins, YTHDC2 is a germline-specific RNA helicase that is essential for mouse fertility. Importantly, YTHDC2 is the only YTH protein conserved in nematodes.

In mammals, deletion of YTHDC2 leads to misregulation of the germline transcriptome and prevents proper progression through meiosis. This function is independent of m^6A-binding but requires YTHDC2 RNA helicase activity. The molecular mechanism by which it regulates germline transcripts is currently unknown. We are studying the nematode ortholog, F52B5.3 (wYTHDC2), to investigate how this conserved RNA helicase targets and regulates germline transcripts. Consistent with a lack of the m6A writer-reader system in *C. elegans*, wYTHDC2 lacks a recognizable YTH domain.

Here, we show that deletion of wYTHDC2 leads to temperature sensitive post-embryonic developmental arrest via a classic stress response pathway induced by environmental conditions like reduced food availability. We have identified wYTHDC2 as a component of germline P-granules, evolutionarily conserved RNA-rich condensates that ensure proper germline gene expression. P granules also contain factors important for small RNA production, and heritable small RNAs have recently been implicated in inherited response to environmental changes. This suggests a potential role for wYTHDC2 in recruitment of RNA targets to P-granules, where they serve as substrates for small RNA generation, which may be maternally deposited to influence development.