cnd-1/NeuroD is required for RME head neuron cell fate specification in the nematode Caenorhabditis elegans.

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Transcription factors are proteins that control gene transcription. NeuroD is a deeply conserved transcription factor that regulates neuronal differentiation and pancreatic development. Mutations in this gene correlate with several neurological disorders, creating an imperative for further study. The nematode Caenorhabditis elegans has a NeuroD ortholog, cnd-1, which means we can use the powerful genetic tools available in this organism to investigate the role of cnd-1/NeuroD1 in nervous system development.

Our preliminary observations revealed that cnd-1 loss of function mutants show exaggerated left/right head movement, suggesting the CND-1 is required for formation of the underlying head neuromuscular circuitry. In addition, previous work published by the Hudson lab showed that cnd-1 controls expression of another transcription factor, ceh-5, which is the C. elegans ortholog of human Vax2. ceh-5 is expressed in the RME GABAergic inhibitory motor neurons and the head muscles of C. elegans.

In this study, we used an RME-specific fluorescent reporter gene, unc-25p::GFP, to investigate the role of cnd-1 in establishing RME neuron fate. Wild type animals ($n = 20$) showed around four GFP-positive RME head neurons, consistent with previously published work. However, cnd-1(gk718) null mutants showed a statistically significant loss of around 1-2 RME head neurons ($n = 12$ animals observed, $p < 0.001$). A pan-neuronal nuclear marker, prom-1::his-24::dsRED, was used to confirm neuron identity. These results suggest that cnd-1 may regulate a neurodevelopmental circuit required for normal inhibitory neuron cell fate specification and head movement. work is on-going to investigate the role of ceh-5 in this process.