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Title:	Learning and memory are regulated by the camp-dependent PKA regulatory Subunit gene kin-2 in AWC neurons
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Keywords:	Learning and memory camp-dependent regulatory Subunit
Issue Date:	Apr-2022
Publisher:	IISER Mohali
Abstract:	<p>The FEM-3 mRNA-binding factor 1 (FBF-1) protein belongs to the PUF family of translational regulators, which post-transcriptionally regulate the action of several genes by binding to the 3'-UTR of mRNA sequences. PUF proteins in humans have been implicated in Alzheimer's disease, cerebellar ataxia, and spatial memory formation. In <i>C. elegans</i>, FBF-1 has been implicated in the process of forgetting, and it post-transcriptionally activates the cGMP-dependent protein kinase C mRNA <i>egl-4</i>, which is required for non-associative learning. We found that the 3'-UTR of the kin-2 mRNA sequence, encoding the cAMP-dependent protein kinase A regulatory subunit, contained an FBF-1 consensus sequence. KIN-2 forms an essential part of cAMP signalling, by regulating the activity of PKA, which has been implicated in several functions including memory formation. Hence, we hypothesised that FBF-1 post-transcriptionally regulates kin-2 mRNA expression and this is required for learning and memory in <i>C. elegans</i>. We studied protein-mRNA interactions in Yeast-3-Hybrid systems and found that kin-2 mRNA contains a site in the 3'-UTR where FBF-1 shows strong binding. On a behavioural level, we studied control strains to understand memory formation, using a positive associative olfactory paradigm. An existing kin-2 mutant was used as a control to find phenotypes associated with it, and we saw that learning ability was impaired in these worms. We also tested a <i>nos-1</i> mutant, since PUF proteins interact with the NANOS protein, and found that <i>nos-1</i> mutants did not show impairments in learning or memory formation. We propose that kin-2 activation is possibly regulated by FBF-1, based on the FBF-1 activation of <i>egl-4</i>. We also studied the role played by starvation in the experimental paradigm used and found that mild starvation causes changes in butanone attraction, hence addressing the reliability of butanone in testing memory through this setup.</p>
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