C44B9.1 Encodes an Evolutionarily Conserved Presynaptic Protein that Regulates *C. elegans* Behavior

Nicolas Paquin, Allan Froehlich, Daniel Omura and Bob Horvitz.
HHMI, Dept. Biology, MIT, Cambridge, MA 02139 USA

C. elegans modulates its locomotion in response to environmental signals and past feeding experiences. In the absence of food, worms increase their locomotion. Animals that have been well-fed slow their locomotory rates when they encounter food less than do animals that have been food-deprived, presumably because food-deprived animals have a greater need for food.

We isolated mutations that cause well-fed animals to behave as if they had been food-deprived, thus modifying their behavioral state by uncoupling the food-dependent slowing of animals from past feeding experience. In this way, we isolated two alleles of a highly conserved uncharacterized gene, *C44B9.1*. Mutations in *C44B9.1* cause a severe locomotion defect of well-fed animals in the presence of food but have little effect on the locomotion of well-fed animals in the absence of food. *C44B9.1* is expressed in most if not all neurons, and the locomotion defect of *C44B9.1* mutants can be rescued by neuronal but not body-wall muscle expression of *C44B9.1*. Expression of the murine homolog of *C44B9.1* in mutant worms rescues their locomotion defect, suggesting that *C44B9.1* has an evolutionarily conserved function. The behavioral phenotype and drug-sensitivity profile of *C44B9.1* animals are similar to those of mutants defective in the regulation of synaptic vesicle exocytosis, such as *unc-64* (syntaxin) and *unc-31* (CAPS). C44B9.1 localizes to synapse-rich areas of neural processes. Like synaptic vesicles, C44B9.1 fails to be transported from and accumulates in neuronal cell bodies of mutants for the kinesin-like protein UNC-104/KIF1A. These results suggest that *C44B9.1* and its homologs are associated with synaptic vesicles. We are currently investigating the mechanism of *C44B9.1* action.

Talk
Meeting: *C. elegans* Neurobiology
Session: Behaviour
No. characters (counting spaces): 1972 (max: 2000)