Abstract: We analyzed the synaptic physiology of unc-13 mutants in the nematode C. elegans. Mutants of unc-13 had normal nervous system architecture, and the densities of synapses and postsynaptic receptors were normal at the neuromuscular junction. However, the number of synaptic vesicles at neuromuscular junctions was two- to threefold greater in unc-13 mutants than in wild-type animals. Most importantly, evoked release at both GABAergic and cholinergic synapses was almost absent in unc-13 null alleles, as determined by whole-cell, voltage-clamp techniques. Although mutant synapses had morphologically docked vesicles, these vesicles were not competent for release as assayed by spontaneous release in calcium-free solution or by the application of hyperosmotic saline. These experiments support models in which UNC-13 mediates either fusion of vesicles during exocytosis or priming of vesicles for fusion.

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