

Shaker Mutants Lack Post-tetanic Potentiation at Motor Endplates

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The two-electrode voltage clamp technique was employed to measure endplate currents in larval neuromuscular junctions of wild-type (Canton-S) and of three different *Drosophila* Shaker mutants: ShakerKS133, Shaker102 and f5Shaker5. In the Shaker mutants, nerve-evoked endplate currents (neepc) were 4-5-fold larger than those measured in Canton-S. Shaker motor endplates were found to lack post-tetanic potentiation (PTP), but could undergo facilitation. Moreover, PTP but not facilitation was lost in wild-type larvae if the neuromuscular junction was exposed to 4-aminopyridine (4-AP), a blocker of Shaker A-type K^+ currents. Endplate currents were depressed by Ca^{2+} channel blockers like Mg^{2+} , at millimolar concentrations, and Co^{2+} and Cd^{2+} , at micromolar concentrations, but not by nifedipine (100 nM) and verapamil (100 nM). After exposure to Ca^{2+} channel blockers, Shaker endplates exhibited PTP. In particular, Cd^{2+} was most effective in depressing neepes and in restoring PTP in all Shake