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Single Calcium Channels in Rat Superior Cervical Ganglion Neurons

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Whole-cell recordings from adult rat sympathetic neurons demonstrate that calcium current is comprised of at least three types, N, L & R. We are using cell-attached patch recording to identify the single calcium channels that underlie these macroscopic currents. Single channels were resolved the presence of 100 mM Ba^{2+} and 1 μ M BayK 8644 over the voltage range -40 to +50 mV. Holding potential (HP) was either -40 or -80 mV. In our preliminary data we find evidence for 3 types of calcium channels in these cells with mean single channel conductances of 21 pS (n=4), 24 pS (n=5), and 16 pS (n=3). The mean unitary current at 0 mV was -1.25 pA (n=4), -1.31 pA (n=5) and -0.76 pA (n=3) for the respective conductances. Based on the characteristics of previously identified calcium channels, we have tentatively identified the three channel types as N, L & E, respectively. L-channels showed large tail openings and activated at voltages > -40 mV. N-channels opened at voltages > -10 mV and failed to show tail openings at -40 mV. However, the unitary current and conductance are too similar between N- and L-channels to be used as the only separation criteria. E-channels had a smaller unitary current and conductance than putative N- or L-channels. In addition, E-channels appeared to inactivate at a -40 mV HP, and therefore were recorded at HP -80 mV.