Altered voltage dependent calcium currents in a neuronal cell line derived from the cerebral cortex of a trisomy 16 fetal mouse, an animal model of down syndrome

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Human Down syndrome (DS) is determined by the trisomy of autosome 21 and is expressed by multiple abnormalities, being mental retardation the most striking feature. The condition results in altered electrical membrane properties (EMPs) of fetal neurons, which are qualitatively identical to those of trisomy 16 fetal mice (Ts16), an animal model of the human condition. Ts16 hippocampal cultured neurons reportedly exhibit increased voltage-dependent calcium currents (ICa) amplitude. Since Ts16 animals are unviable, we have established immortalized cell lines from the cerebral cortex of Ts16 (named nCTb) and normal littermates (named CNh). Using the whole-cell patch-clamp technique, we have now studied ICa in CTb and CNh cells. Current activation occurs at -40 mV in both cell lines (Vholding = -80 mV). Trisomic cells exhibited a 2.4 fold increase in the maximal Ca2+ current density compared to normal cells (CNh = -6.3 ± 0.77 pA/pF, n = 18; CTb = -16.4 ± 2.423 pA/pF; $P<0.01$, n = 13). Time d