An essential role of Cav1.2 L-type calcium channel for urinary bladder function.

Mice deficient in the smooth muscle Cav1.2 calcium channel (SMACKO, smooth muscle alpha1c-subunit calcium channel knockout) have a severely reduced micturition and an increased bladder mass. L-type calcium current, protein, and spontaneous contractile activity were absent in the bladder of SMACKO mice. K+ and carbachol (CCh)-induced contractions were reduced to 10-fold in detrusor muscles from SMACKO mice. The dihydropyridine isradipine inhibited K+- and CCh-induced contractions of muscles from CTR but had no effect in muscles from SMACKO mice. CCh-induced contraction was blocked by removing extracellular Ca2+ but was unaffected by the PLC inhibitor U73122 or depletion of intracellular Ca2+ stores by thapsigargin. In muscles from CTR and SMACKO mice, CCh-induced contraction was partially inhibited by the Rho-kinase inhibitor Y27632. These results show that the Cav1.2 Ca2+ channel is essential for normal bladder function. The Rho-kinase and Ca2+-release pathways cannot compensate the lack of the L-type Ca2+ channel.