Modulation of BK channel voltage gating by different auxiliary ? subunits

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Calcium- and voltage-activated potassium channels (BK) are regulated by a multiplicity of signals. The prevailing view is that different BK gating mechanisms converge to determine channel opening and that these gating mechanisms are allosterically coupled. In most instances the pore forming ? subunit of BK is associated with one of four alternative ? subunits that appear to target specific gating mechanisms to regulate the channel activity. In particular, ?1 stabilizes the active configuration of the BK voltage sensor having a large effect on BK Ca2+ sensitivity. To determine the extent to which ? subunits regulate the BK voltage sensor, we measured gating currents induced by the pore-forming BK ? subunit alone and with the different ? subunits expressed in Xenopus oocytes (?1, ?2IR, ?3b, and ?4). We found that ?1, ?2, and ?4 stabilize the BK voltage sensor in the active conformation. ?3 has no effect on voltage sensor equilibrium. In addition, ?4 decreases the apparent number of charg