Proton modulation of a Ca2+-activated K+ channel from rat skeletal muscle incorporated into planar bilayers

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The effect of pH on the activation of a Ca-activated K+ [K(Ca)] channel from rat skeletal muscle incorporated into planar lipid bilayers was studied. Experiments were done at different intracellular Ca2+ and proton concentrations. Changes in pH modified channel kinetics only from the Ca-sensitive face of the channel. At constant Ca2+ concentration, intracellular acidification induced a decrease in the open probability (P0) and a shift of the channel activation curves toward the right along the voltage axis. The displacement was 23.5 mV per pH unit. This displacement was due to a change in the half saturation voltage (V0) and not to a change in channel voltage dependence. The shifts in V0 induced by protons appeared to be independent of Ca2+ concentration. The slope of the Hill plot of the open-closed equilibrium vs. pH was close to one, suggesting that a minimum of one proton is involved in the proton-driven channel closing reaction. The change in Pa with variations in pH was due to bo