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DIRECT MODULATION OF MAXI-K CHANNEL IN SMOOTH MUSCLE CELL

Lee Moo Yeol, Chung Sungkwon, Bang Hyo-Weon, Uhm Dae Yong
Department of Physiology, College of Medicine, Chung-Ang University, Seoul 156-756

The activities of Maxi-K channels were recorded using inside-out patches. The application of 30 nM of non-specific G protein activator, GTPγS, to the intracellular side of the channels increases the channel activities about 3-fold, indicating that there exist some G proteins within the patch membranes to regulate the channel activities. This effect can be reversed by the additional applications of GDPβS, which is known to replace the bound GTPγS from the G proteins. The effect of GTPγS was not affected by pertussis toxin treatment, suggesting that the G protein regulating the channels is not G_i/G_o. When we apply the antibody against the novel G protein, G_h, to GTPγS-activated channels, this reverses the effect of GTPγS, while the non-immune sera show no effect.
To identify the receptors activating this G_h protein, several α- and β-adrenergic agonists and antagonists are applied to the extracellular side of pipettes. In the presence of isoproterenol the channel activities are increased compared to the control patches, and the application of GTPγS further increases the activities. These effects are also blocked by the antibody against G_h or propranolol. The presence of α-agonist does not affect the channel activities. These results indicate that the β-adrenergic system activates Maxi-K channels via G_h protein.