

Functional effects of vascular K_{IR} channels

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(Introduced by M. Hill)*

Potassium ion (K^+) channel activity is one of the major determinants of vascular muscle cell membrane potential and thus vascular tone. Four types of K^+ channels are functionally important in the vasculature - Ca^{2+} -activated K^+ channels, voltage-dependent K^+ channels, ATP-sensitive K^+ channels, and inwardly rectifying K^+ (K_{IR}) channels. The latter type will be the subject of this review.

Recent advances in vascular K_{IR} channel research indicate that this channel: 1) is present in vascular muscle; 2) modulates basal arterial tone; 3) mediates powerful hyperpolarization and vasodilator responses to small but physiological increases in extracellular K^+ ; 4) may contribute to vasodilatation in response to flow-induced shear stress; 5) may be inhibited by protein kinase C activity; 6) may be involved in vasorelaxation mediated by endothelium-derived hyperpolarizing factor; and 7) may be functionally altered by gender and in cardiovascular diseases. Vascular effects of K_{IR} channels have so far been most extensively studied in the cerebral circulation where K_{IR} function may be important in coupling cerebral metabolism and blood flow. Despite the lack of selective inhibitors of K_{IR} channel subtypes, the use of gene knockout technology is beginning to enable more extensive insight to be gained regarding the functional role of these channels in blood vessels.