ANTIARRHYTHMIC CALCIUM CHANNEL BLOCKER VERAPAMIL INHIBITS TREK CURRENTS IN SYMPATHETIC NEURONS.

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Abstract

Background and Purpose: Verapamil, a drug widely used in certain cardiac pathologies, exert its therapeutic effect mainly through the blockade of cardiac L-type calcium channels. However, we also know that both voltage-dependent and certain potassium channels are blocked by verapamil. Because sympathetic neurons of the superior cervical ganglion (SCG) are known to express a good variety of potassium currents, and to finely tune cardiac activity, we speculated that the effect of verapamil on these SCG potassium channels could explain part of the therapeutic action of this drug. To address this question, we decided to study, the effects of verapamil on three different potassium currents observed in SCG neurons: delayed rectifier, A-type and TREK (a subfamily of K2P channels) currents. We also investigated the effect of verapamil on the electrical behavior of sympathetic SCG neurons. Experimental Approach: We employed the Patch-Clamp technique to mouse SCG neurons in culture. Key Results: We found that verapamil depolarizes of the resting membrane potential of SCG neurons. Moreover, we demonstrated that this drug also inhibits A-type potassium currents. Finally, and most importantly, we revealed that the current driven through TREK channels is also inhibited in the presence of verapamil. Conclusion and Implications: We have shown that verapamil causes a clear alteration of excitability in sympathetic cells. This fact undoubtedly leads to an alteration of the sympathetic-parasympathetic balance which may affect cardiac function. Therefore, we propose that these possible peripheral alterations in the autonomic system should be taken into consideration in the prescription of this drug.

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