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Function and Expression of Mg^{2+} Permeable Cation Channels in Na^{+} Dependent and Independent Hypertensive Rats

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Summary

Magnesium ion (Mg^{2+}) is the second most common intracellular cation in mammalian cells. Experimental and clinical studies suggest that Mg^{2+} deficiency plays an obligatory role in the pathogenesis of hypertension. The exact mechanisms are unclear, but effects on the vasculature have been implicated. Recently, TRPM6 and TRPM7 cation channels involved in the transient receptor potential melastatin (TRPM) ion channel family were identified as magnesium transporters,.

In this study, we investigated gene expression of TRPM6 and TRPM7 in various tissues from spontaneously hypertensive rats (SHR) and Wistar-Kyoto rats (WKY). TRPM6 gene was highly expressed in kidney of WKY (14 weeks old), while TRPM7 gene was detected in heart, aorta, liver, kidney and adipose of WKY, suggesting that TRPM7 but not TRPM6 is involved in regulating magnesium influx in vascular smooth muscle cells. However, the expression level of TRPM7 in SHR (14 weeks old) was not different from that in WKY. TRPM7 gene was also detected in brain, heart, aorta, liver, kidney and adipose of juvenile prehypertensive SHR (4 weeks old) and WKY (4 years old) and the expression level in both rats was comparable.

Taken together, these data suggest that both TRPM6 and TRPM7 have minor roles in the pathogenesis of hypertension in Na^{+} independent hypertensive rats.