Attenuated Acetylcholine-Relaxation due to Intracellular Alkalinization in Salt-sensitive Hypertension.

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Summary

The intracellular alkalinization attenuated acetylcholine (ACh) relaxation. The purpose of this study was to clarify whether the changes in intracellular pH plays a role in the attenuated ACh relaxation of salt-induced hypertension. We investigated the effect of intracellular alkalinization by 3mM NH4Cl and acidification by removal of NH4Cl on ACh relaxation in salt-loaded (8% salt diet, 4 weeks) and non-salt-loaded (0.66% salt diet, 4 weeks) salt-sensitive and its control rats (young [6 week-old] spontaneously hypertensive rats (SHR) and age-matched Wistar-Kyoto rats (WKY)/4 week-old Dahl salt-sensitive [S] and salt-resistant [R] rats). Salt loading increased blood pressure in young SHR but not in WKY. ACh relaxation was similar between non-salt-loaded SHR and WKY. Salt loading attenuated ACh relaxation in both SHR and WKY, which was greater in SHR. Intracellular alkalinization attenuated ACh relaxation similarly in salt-loaded and non-salt-loaded WKY. In non-salt-loaded SHR, intracellular alkalinization attenuated ACh relaxation but not in salt-loaded SHR. On the other hand, intracellular acidification did not affect ACh relaxation except for salt-loaded SHR, in which ACh relaxation was improved. Similarly, salt loading increased blood pressure in Dahl S rats but not in R rats. ACh relaxation was attenuated in salt-loaded Dahl S rats but not in other groups of Dahl rats. Intracellular alkalinization attenuated ACh relaxation in other groups than salt-loaded Dahl S rats but did not affect in salt-loaded Dahl S rats. Intracellular acidification improved ACh relaxation in salt-loaded Dahl S rats alone. Thus, we conclude that attenuation in endothelium-related relaxation of salt-loaded salt-sensitive hypertension may be due to intracellular alkalinization.