Analysis on the regulatory mechanism of chloride transport in the ascending thin limb of Henle's loop

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Summary

To elucidate the regulatory mechanism of Cl^- transport in the ascending thin limb (ATL) of Henle's loop, a series of experiments were conducted in the *in vitro* microperfused ATL from hamster kidney.

The effects of various agents on transepithelial diffusion potential of NaCl (Vd) were examined in the in vitro microperfused ATLs. One mmol/l amiloride and 7 μmol/l nigericin did not alter Vd. 10 μmol/l nicardipine slightly but significantly increased Vd. Twenty-five μmol/l BAPTA/AM largely decreased Vd. While acidification of the ambient solution to pH 5.8 induced decrease in Vd, the same magnitude of intracellular acidification by ambient NH_4Cl removal did not alter Vd.

Nigericin and BAPTA-AM both exaggerated the inhibitory response of Vd to ambient acidification. Calmodulin inhibitors such as trifluoperazine and W-7 also increased the magnitude of the inhibitory effect of ambient acidification onVd. KN62, the calmodulin-dependent kinase II inhibitor, did not alter the inhibitory effect of ambient acidification on Vd.

These data strongly suggest that intracellular calcium regulates pH sensitivity of Cl^- channels via calmodulin-dependent process. Calmodulin-dependent kinase II is not involved in this regulatory process.