

Role of Sodium Ion Exchange in Plasma Membrane
in Cardiac Hypertrophy *in vitro* and *in vivo*

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Summary

To test whether Na^+/H^+ exchange plays an important role in cardiac hypertrophy, the effects of Na^+/H^+ exchange inhibitor were studied in cultured neonatal rat cardiomyocytes and in cardiomyopathic Syrian hamsters (Bio 14.6). Na^+/H^+ exchange inhibitors, amiloride and ethyl-isopropyl-amiloride inhibited the norepinephrine-induced protein synthesis in cultured cardiomyocytes in serum free medium, suggesting that α_1 -adrenergic stimulation enhanced the protein synthesis through activation of Na^+/H^+ exchange *in vitro*. Moreover, treatment with amiloride (5mg/kg/day, *p.o.*) of the hamsters (Bio 14.6) from 120 to 350 days in age decreased ventricular/body weight ratio by 14 %, compared with the no-treatment controls. Histological examinations showed that the amiloride treatment reduced ventricular cross-sectional area (207 ± 10 to 172 ± 9 mm^2 , $p < 0.05$, $\text{mean} \pm \text{SE}$), and % area of calcification and fibrosis (11.4 ± 1.4 to 4.0 ± 0.4 %, $p < 0.01$). These results indicate that amiloride attenuates the myocardial hypertrophy in the cardiomyopathic hamsters. Thus, we conclude that Na^+/H^+ exchange is involved in pathogenesis of cardiac hypertrophy both *in vitro* and *in vivo*.