

Role of Sodium Ion Exchange in Plasma Membrane in Cardiac Hypertrophy

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Summary

To test whether Na^+/H^+ (sodium/hydrogen) exchange plays an important role in neurohumoral signal transduction in cardiac hypertrophy, we studied the effects of Na^+/H^+ exchange inhibitors on ion exchange and protein synthesis in rat cardiomyocytes stimulated with neurohumoral factors. Norepinephrine enhanced Na^+/H^+ exchange through α_1 -adrenergic receptor, leading to intracellular alkalinization and increase in Ca^{2+} concentration. Na^+/H^+ exchange inhibitors, *i. e.* amiloride and ethyl-isopropyl-amiloride (EIPA), inhibited norepinephrine-induced protein synthesis. Angiotensin II increased intracellular pH and Ca^{2+} through Na^+/H^+ exchange activated by protein kinase C, and enhanced protein synthesis associated with expression of the protooncogenes (*c-fos*, *c-myc*). Amiloride also attenuated the angiotensin II-induced protein synthesis. Furthermore, arginine-vasopressin increased intracellular pH and Ca^{2+} through V_1 -receptor, which was attenuated by EIPA. Thus, we conclude that Na^+/H^+ exchange is involved in signal transduction through α_1 -adrenergic, angiotensin II and V_1 -receptor in rat cardiomyocyte growth.