35) Renal sodium metabolism in SHR: Renal micropuncture study (microinjection method)

- The rate of ^{22}Na recovery during hypertonic saline infusion -

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Introduction

It has been reported that sodium metabolism in SHR played an important role in the onset and maintenance of hypertension, and the difference in renal sodium handling between SHR and WKY has been investigated. In this paper, the rate of urinary ^{22}Na recovery following proximal and distal tubule injections during hypertonic saline infusion was studied in SHR and WKY.

Materials and Methods

Male SHR and WKY (12-15 wks old) were studied: body weight $246 \pm 31\text{g}$, $318 \pm 40\text{g}$, kidney weight $0.84 \pm 0.09\text{g}$, $0.89 \pm 0.24\text{g}$, systolic blood pressure (tail cuff method) $166 \pm 11\text{mmHg}$, $117 \pm 4\text{mmHg}$, respectively. The rats were anesthetized with Nembutal ($5.0\text{mg}/100\text{gBW}$, intraperitoneal). Jugular vein was catheterized and infused with $0.9\%\text{NaCl}$ solution for 60 minutes and $3.0\%\text{NaCl}$ solution at a rate of $2.5\text{ml}/100\text{gBW/hr}$. Renal clearance studies were performed during the infusion of $3.0\%\text{NaCl}$ solution. The left kidney was exposed for micropuncture (microinjection method) according to the technique of Gottschalk and Mylle. The trace amount (20nl) of ^3H methoxy-inulin and ^{22}Na was prepared for tubular injection. Urine sample was collected from left ureter for ten minutes following injection, and measured of the radioactivity by liquid scintillation counter.

Results and Discussion

Results of the renal clearance studies showed that sodium and water excretion rates were significantly less in SHR than WKY during infusion of $3.0\%\text{NaCl}$ solution, whereas inulin clearance didn't change: urine volume were $\text{SHR } 22.4 \pm 7.6$, $\text{WKY } 33.4 \pm 12.6\text{ml}/100\text{gBW/min}$, urinary sodium excretion 3.26 ± 1.84 , $6.54 \pm 2.54\text{ }\mu\text{Eq}/100\text{gBW/min}$, inulin clearance 0.64 ± 0.17 , $0.65 \pm 0.1\text{ml}/100\text{gBW/min}$, respectively. ^{22}Na recovery rates following proximal tubule injection were $\text{SHR } 14.3 \pm 3.9\%$, $\text{WKY } 19.3 \pm 4.0\%$ ($0.1 > p > 0.05$), and following distal tubule injection were $89.8 \pm 13.2\%$, $86.8 \pm 6.8\%$ (NS). The rate of ^{22}Na recovery of proximal injection tend to be less in SHR than WKY.

These results suggest that difference in renal NaCl handling between SHR and WKY may be due to an increased NaCl reabsorption in the wide area of renal tubule in SHR.