15) Activity and Molecular Weight of Renin of Plasma and Kidney in SHRSP. Nobuko Morita*, Kozo Okamoto*, Kazuo Murakami**, Fumiaki Suzuki** and Tadashi Inagami***. Department of Pathology, Kinki University School of Medicine, Osaka-fu 589. **Institute of Applied Biochemistry, University of Tsukuba, Ibaragi-ken 300-31. ***Department of Biochemistry, Vanderbilt University School of Medicine, TN, USA.

The plasma renin activity (PRA) of SHRSP remarkably increases concurrently with age or elevations in blood pressure, in contrary of that of Wistar-Kyoto (WK) or SHR substrain B₂ (Matsunaga, et al. JPN CIRC J 39: 1305, 1975; Morita, et al. JPN HEART J 18: 573, 1977). In this study, we investigated the molecular weight of renin in the plasma and kidneys of WK, SHR and SHRSP.

MATERIALS AND METHODS

WK, SHR (substrains B₂ and C) and SHRSP, aged 60 to 260 days, were used. Blood was collected through a polyethylene catheter implanted in the femoral artery, without anesthesia. Kidneys from rats killed by decapitation were homogenized in 0.45 M ice cold sucrose containing 10 mmoles tetrachion in a loosely fitted glass homogenizer. It was then centrifuged successively at 150 x g (F-1), 700 x g (F-2), 6,000 x g (F-3), 20,000 x g (F-4) and 100,000 x g (F-5). The particle fractions were resuspended in 0.01 M pyrophosphate buffer (pH 6.5). The molecular weight of renin in each fraction and in the plasma were determined by gel filtration on Sephadex G-100. The column (1.6 x 90 cm) was eluted with 0.01 M pyrophosphate buffer (pH 6.5) containing 0.1 M NaCl. Renin activity was determined by radioimmunoassay of angiotensin I.

RESULTS AND DISCUSSION

I. Plasma renin (PR); The PRA of WK was approximately 16 ng/hr/ml throughout their entire lifespans (60-260 days). In substrain B₂, PRA had almost the same values as for WK. In substrain C, PRA had significantly lower values in comparison with WK and substrain B₂, i. e. 8.2 ± 1.6 ng/hr/ml at 120 days old. The molecular weight of PR were identical for WK, substrains B₂ and C: the values being 38,000 to 43,000. In young SHRSP (blood pressure: lower than 200 mmHg), PRA had almost the same value as it did for WK. Also, the molecular weight of their renin was small (39,000-47,000). In SHRSP of 150 days of age (blood pressure: 246 ± 17.3 mmHg), the PRA values were high (40.9 ± 12.1 ng/hr/ml) and two kinds of molecular weight of renin, small form and big form (55,000-59,000), were detected in some animals. But the activity of the big form was lower than that of the small form, and for rats of 180 days age (blood pressure: 259 ± 7.7 mmHg), the PRA became 63.8 ± 9.9 ng/hr/ml and the renin molecular weight was mostly big form. In 260 days old SHRSP (blood pressure: more than 260 mmHg), renin with molecular weight of 52,000-60,000 was detected in some animals.

II. Kidney renin; Since the F-3 indicated the highest level of renin activity of all fractions, this fraction was used as the renin granular fraction of the kidneys. In young WK, small molecular weight renin (approximately 38,000) was observed. However, old WK had both form, and small form had higher activity than big one. In young SHRSP, the main molecular weight of the renin was small (41,000). On the other hand, for those blood pressure had elevated to more than 250 mmHg, both big and small renin was observed and the activity of the big form was higher than that of the small one.

SUMMARY

1. Although the PRA of substrain B₂ was almost the same as that of WK, the PRA of substrain C had significantly low values in comparison with that of them.

2. The molecular weights of PR in WK and SHR had almost the same values, but in SHRSP it increased in accordance with elevation in blood pressure.

3. Young WK and SHRSP had only small molecular weight renin in the kidneys, but old WK and SHRSP had both big and small ones.

4. In kidneys of old SHRSP, the activity of the big molecular weight renin was higher than that of the small one, in contrary of old WK.

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