at the end of infusion were 7.25 ± 0.27 ng/ml and 3.23 ± 0.76 ng/ml, respectively. Although mean P-NA returned to the basal values (0.54 ± 0.27 ng/ml) at 1h after cessation of the infusion, PL-NA gradually restored to the control levels (0.84 ± 0.43) within 3 days. 2) Mean U-NA and PL-NA were significantly increased in the stressed rats as compared with control rats. (U-NA; 6.25 ± 2.51 vs. 0.58 ± 0.22 μ g/day, PL-NA; 0.50 ± 0.06 vs. 0.25 ± 0.05 ng/mg), while there were no significant differences in mean P-NA. PL-NA was correlated with U-NA contents in both cold exposure and control groups ($r=0.64$ $p<0.05$, $r=0.83$ $p<0.01$). 3) there were no differences in NA uptake rate of platelet between the patient with essential hypertension and normotensive controls.

Conclusion : These results suggest that platelet NA content is a reliable and stable index for the activity of the sympathetic nervous system.

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EFFECTS OF CHRONIC TREADMILL EXERCISE ON HEMODYNAMIC IN YOUNG SPONTANEOUSLY HYPERTENSIVE RATS

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The effects of chronic treadmill exercise were determined in spontaneously hypertensive rats (SHR), a best animal model for essential hypertension in man. Trained SHR (4 week-old) run on a rodent treadmill at a speed of 20 m/min for 60 min, 4 days/wk from 6 to 18 weeks of age. After one week rest, the distribution of cardiac output under a conscious state were measured by radionucleic microsphere method. There was no difference in blood pressure between trained and untrained SHR. Total peripheral resistance (TPR) in trained SHR was decreased compared with that in untrained SHR. Blood flow in brain, heart, lung and gastrocnemius in trained SHR increased compared with those in trained SHR. Blood flow in gastrointestinal tract decreased. These data suggest as follows; (1) Decreased TPR by chronic treadmill exercise is resulted from a decreased vascular resistance in gastrocnemius. (2) It is due to increased vascular resistance in gastrointestinal tract that blood pressure was not significantly decreased by chronic treadmill exercise. Therefore, chronic exercise without mental stress is useful for hypertensive childhood because blood flow in gastrointestinal tract is reduced by mental stress.

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PUMPING ABILITY OF REGRESSED CARDIAC HYPERTROPHY IN SPONTANEOUSLY HYPERTENSIVE RATS

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This study was designed to evaluate the pump-

ing ability of hypertensive hypertrophic and regressed heart in 30, 19-week old male, Wistar-Kyoto (WKY) and spontaneously hypertensive (SHR) rats, respectively.

Ten WKY and SHR were given water ad libitum and 20 WKY and SHR were provided water with captopril (CP) of 2 mg/ml for 4 weeks. Under light ether anesthesia and open chest, catheters were induced into femoral vein for infusion, carotid artery and left ventricle via left atrium for recording mean arterial pressure (MAP) and left ventricular end-diastolic pressure (EDP). Cardiac output (CO) was determined by electromagnetic flowmetry. After baseline hemodynamic measurements, ventricular performance curve (VPC) was obtained by acute blood infusion (40ml/kg/min) and relationships between stroke index and EDP. Snakes were put on the descending aorta of 10 treated WKY and SHR for elevating their pressures to the level of control rats.

Four weeks CP-treatment reduced MAP ($p<0.01$) associated with reduced total peripheral resistance ($p<0.01$) and unaltered CO, and decreased cardiac weight in both strains ($p<0.01$). VPC indicated no significant difference between treated and untreated WKY and SHR. However, VPC obtained from pressure-loaded SHR shifted to right and downward significantly ($p<0.01$).

From these results, it is concluded that pumping ability was unaltered in CP-treated hypertensive heart associated with regression, but the reserved performance for afterload decreased.

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CARDIAC [³H]-NIMODIPINE BINDING IN EXPERIMENTAL HYPERTENSION IN RATS

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INTRODUCTION : The abnormality of calcium regulation has been reported in hypertension, but the precise mechanism is still unclear. In this study, the cardiac calcium channel was examined by the radioligand binding method to clarify the changes in the calcium channel in the experimental hypertension of rats.

MATERIAL AND METHODS : Three types of experimental hypertension were used. The cardiac membrane fraction was incubated with 0.2-2.0 nM [³H]-nimodipine (136 Ci/mmol) at 25°C for 60 minutes, and then the membrane bound radioligand was collected on a glass fiber filter and counted. The nonspecific binding was determined by adding 1 μ M nifedipine in the same incubating medium. The binding data were analyzed by the Scatchard method.

RESULTS : In 8 weeks old spontaneously hypertensive rats (Okamoto & Aoki), the maximal binding (B_{max}) was 86.7 ± 6.5 fmol/mg protein (mean $\pm$ SEM, n=11) and the affinity (K_d) was 0.410 ± 0.033 nM. These values were not significantly different from those of Wistar-Kyoto rats (B_{max} 90.7 ± 3.2 , K_d 0.411 ± 0.030 nM, n=11). There was no significant difference in those values between two-kidney, one clip hypertensive rats (B_{max} 108.8 ± 11.0 , K_d 0.308 ± 0.124 , n=11) and the controls (B_{max} 108.2 ± 9.4 , K_d 0.395 ± 0.141 , n=11). There was also no significant difference in B_{max} and K_d values between DOCA-salt hypertensive rats (B_{max} 92.3 ± 4.8 , K_d 0.276 ± 0.023 , n=9) and the controls (B_{max} 84.2 ± 7.0 , K_d 0.332 ± 0.058 , n=11).

DISCUSSION : These results indicate that the number of cardiac calcium channel in the experimental hypertension is not significantly

different from each normotensive controls, because the [^3H]-nimodipine binding site has been thought to be the calcium channel existing on the cell membrane.

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 94-98 O. Imura, *Sapporo*
 99-103 A. Takeshita, *Fukuoka*

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EFFECTS OF KETANSERIN ON HEMODYNAMIC CHANGES AFTER INTRACEREBROVENTRICULAR(i.c.v.) CORTICOTROPIN RELEASING FACTOR (CRF) ADMINISTRATION

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In order to elucidate the relation of the serotonergic nervous system and the hypothalamus-pituitary system in hemodynamic regulation, the effects of a serotonin S_2 receptor antagonist, ketanserin on i.c.v. CRF induced hemodynamic changes were investigated.

Methods: Male Wistar rats (n=14) weighing approximately 200g were used. Twenty minutes after either intravenous (i.v. group) or i.c.v. (i.c.v. group) ketanserin administration of 100 μg , 10 μg of CRF was given i.c.v. and mean arterial pressure (MAP) and heart rate were observed for 40 minutes, which was followed by blood sampling for plasma norepinephrine (PNE) and beta endorphin (BE). The experiment was performed under conscious state. Results: Resting MAP and heart rate (HR) were similar in both groups and were approximately 85mmHg and 360bpm, respectively. Neither i.v. or i.c.v. ketanserin induced significant changes in MAP and HR. Although there was a consistent pressor response (+8 $\pm$ 2.5mmHg) and increase in HR (+55 $\pm$ 25bpm) after CRF administration in i.v. group, there was not significant changes in MAP and HR in i.c.v. group, +4.1 $\pm$ 2.0mmHg and +30 $\pm$ 15bpm, respectively. PNE and BE was significantly lower in i.c.v. group than those in i.v. group, 0.18 $\pm$ 0.05 $\mu\text{g/L}$, 98 $\pm$ 10pg/ml, and 0.37 $\pm$ 0.04 $\mu\text{g/L}$, 481 $\pm$ 92pg/ml, respectively. Discussion and Conclusions: It is suggested that the pressor response to i.c.v. CRF is related to the increased peripheral sympathetic tone, and that CRF may participate in the hemodynamic regulatory mechanism. The central serotonergic nervous system may play an important role in the hemodynamic changes, since i.c.v. ketanserin which is a specific serotonin S_2 receptor antagonist abolished the i.c.v. CRF induced MAP and HR responses.

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RELATIONSHIP BETWEEN α_2 -ADRENOCEPTORS (α_2 -A) AND PROSTAGLANDINS IN THE RAT KIDNEY

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Renal α_2 -A density is increased in Dahl salt

sensitive rats and spontaneously hypertensive rats compared to Dahl salt resistant rats and Wistar Kyoto rats respectively. A functional role for renal α_2 -A remains undefined. Recently we found that stimulation of renal α_2 -A inhibited the antinatriuretic and antidiuretic action of vasopressin and cAMP production by vasopressin. In the present study, the renal interactions of α_2 -A and prostaglandins on electrolyte excretion and cAMP production were studied in specific nephron segments and in the isolated perfused kidney.

In single nephron segments (plus β blockade and phosphodiesterase inhibitor, 2min. incubation, 37°C), prostaglandin E_2 (PGE $_2$) stimulated (P<.05) cAMP levels in the glomerulus, thin descending limb of Henle (tDL) and cortical collecting tubule. α_2 -A stimulation with epinephrine (E) suppressed (P<.05) cAMP formation only in the tDL among these segments. Yohimbine but not prazosin blocked this effect of E. In the perfused kidney (Krebs-Henseleit: ficol 3.5%+albumin 1%, plus β and α_1 blockade, 36°C), arachidonic acid (AA) (10^{-5}M) increased (P<.05) urinary water excretion. α_2 -A stimulation with epinephrine (28nM) attenuated the effect of AA on water excretion. α_2 -A blockade by yohimbine (300nM) reversed the effect of E, confirming α_2 -A mediation. Adenylate cyclase inhibition by adenosine P-site stimulation (SQ22536, 100 μM) also blocked the effects of AA. These results suggest that α_2 -A antagonize the effects of AA possibly through inhibition of adenylate cyclase and tDL may be one of the possible site of action of PGE $_2$ and α_2 -A. Thus, including the previous results of relationship between vasopressin and α_2 -A, the effect of α_2 -A activation was determined by the function-specific adenylate cyclase that was predominant when α_2 -A were activated.

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CHANGES IN RENAL PROSTAGLANDIN SUBSTRATES IN SPONTANEOUSLY HYPERTENSIVE RATS

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Renal PGs are involved in the regulation of blood pressure by a variety of mechanisms. Increased PGs biosynthesis has been reported in SHR. The purpose of this study is to clarify the relationship between the changes in renal lipids and the increased arachidonic acid cascade. Experiments were carried out on two groups of male spontaneously hypertensive stroke prone rats (SHRSPs, 5 and 40 weeks of age) and age-matched Wistar-Kyoto control rats. After direct blood pressure measurement, kidneys were excised. The cortex was separated from the medulla, then the renal tissue was homogenized. Renal microsomal phospholipids were determined by the method of Bartlett. Fatty acids were measured by GLC after transmethylation. Phospholipase A $_2$ activity was determined by using 2- ^{14}C arachidonyl phosphatidylcholine. Phospholipase A $_2$ activity was enhanced and phosphatidylethanolamine decreased in SHRSPs. Quite different patterns of microsomal phospholipid fatty acids between young and old ones in SHRSPs were found. Palmitate and stearate decreased, but arachidonate increased with age. Arachidonate in phosphatidylethanolamine was unchanged with age in SHRSPs. We conclude that the degradation of phospholipid