38) Decreased Concentrations of Lymphocyte and Platelet β -Adrenoceptors in Spontaneously Hypertensive Rats. Kazuya Fukuda, Akira Baba, Yoshinari Nakamura, Masato Kuchii, Ichiro Nishio, and Yoshiaki Masuyama. Division of Cardiology, Department of Medicine, Wakayama Medical College, Wakayama-city 640.

INTRODUCTION : Sympathetic nervous system is assumed to be an important factor in the pathogenesis hypertension. Recently developed radioligand binding technique provides new insights into the research of adrenergic function in hypertension. We have been reported the changes in adrenoceptors of various tissues in experimental hypertension. Several adrenoceptor binding studies have been done in patients with essential hypertension using peripheral blood cell preparations. However, these results have been controversial, and little is known about changes in adrenoceptors of blood cells in experimental models of hypertension. In this study, we examined the β -adrenoceptors of lymphocytes and platelets in spontaneously hypertensive rats (SHR, Okamoto & Aoki) and Wistar-Kyoto rats (WKY).

MATERIAL AND METHODS : Seven and 82 weeks old SHR and WKY were used. Rats were anesthetized with pentobarbital. Blood samples were collected in tubes containing 10 mg of EDTA-2Na and centrifuged at $160 \times g$ for 10 min. at 4°C . The supernatant (platelet rich plasma) was washed and resuspended in the incubation buffer containing 10 mM MgCl_2 and 50 mM Tris-HCl (pH 7.4). The pellet was layered on Ficoll-Paque solution (Pharmacia Fine Chemicals Co.) and centrifuged at $400 \times g$ for 30 min. at 18°C , and then lymphocyte fraction was washed and resuspended in the same incubation buffer. These intact lymphocytes and platelets were incubated with [^3H]-[ring, propyl- $^3\text{H}(\text{N})$]-dihydroalprenolol (104.8 Ci/mmol) for 12 min. at 37°C . After incubation, the membrane-bound radioligand was collected on a glass fiber filter and counted. Receptor concentration (B_{max}) and the binding affinity (expressed as K_d value) were calculated by the Scatchard method.

RESULTS : As shown in table, a significant decrease was observed in the β -adrenoceptor concentration of lymphocytes in 7 and 82 weeks old SHR compared with age-matched WKY. There was no significant difference in the binding affinity between SHR and WKY in both ages. Platelet β -adrenoceptor concentration was also significantly decreased in SHR in 7 and 82 weeks compared with age-matched WKY without changes in the binding affinity.

Rats	Age (Weeks)	Lymphocytes		Plateletes		n
		B_{max} (fmol/mg prot.)	K_d (nM)	B_{max} (fmol/mg prot.)	K_d (nM)	
WKY	7	37.8 ± 2.5	0.87 ± 0.14	26.3 ± 3.1	2.22 ± 0.57	8
SHR	7	$18.6 \pm 5.3^{**}$	0.87 ± 0.11	$12.7 \pm 1.5^{**}$	1.78 ± 0.39	8
WKY	82	40.8 ± 2.7	1.03 ± 0.14	31.9 ± 2.0	1.75 ± 0.51	10
SHR	82	$32.7 \pm 2.7^*$	0.76 ± 0.08	$19.0 \pm 1.3^{**}$	1.92 ± 0.61	8

Values are expressed as mean $\pm$ SEM. * $p < 0.05$, ** $p < 0.01$.

DISCUSSION : In SHR, the β -adrenoceptor concentrations of lymphocytes and platelets were significantly decreased in both 7 and 82 weeks of age. Several reports have revealed the decrease in lymphocyte β -adrenoceptor concentration following adrenergic agonist treatment or pheochromocytoma (down regulation) and the increase in sympathetic nervous activity in young SHR. These data are compatible with the existence of down regulation mechanism in the decrease of β -adrenoceptor concentrations of lymphocytes and platelets in 7 weeks old SHR. However, there may be another factor such as genetic change because the β -adrenoceptor numbers of these cells were still decreased in old SHR when sympathetic nervous activity is no longer elevated.