20) Regional Cerebral Blood Flow (rCBF) in Stroke-prone SHR (SHRSP) Treated with β -Blocker (Propranolol). Yukio Yamori⁺, Akifumi Nakanishi*, Masahiro Kihara⁺, Ryoichi Horie⁺, Katsumi Ikeda⁺, Yasuo Nara⁺ and Akira Ooshima⁺. ⁺Japan Stroke Prevention Center, *Shimane Prefectural Central Hospital and ⁺Department of Pathology, Shimane Medical University, Izumo 693.

INTRODUCTION

Yamori and Horie demonstrated that rCBF was reduced in the predilection sites of cerebrovascular lesions in SHRSP for several months before they developed stroke and that antihypertensive treatments which reduced blood pressure (BP) improved rCBF and efficiently prevented cerebrovascular lesions (STROKE 8: 456, 1977). Since these previous studies clearly indicated the importance of rCBF in the pathogenesis as well as the prevention of stroke, the present study further observed an acute effect of β -blocker (propranolol) on rCBF in SHRSP and WKY.

MATERIALS AND METHODS

Five male stroke-prone SHR (SHRSP) at the age of 4 months and 4 age-matched male Wistar-Kyoto (WKY), maintained at Japan Stroke Prevention Center (Izumo, - Japan) were used. rCBF was measured by a hydrogen clearance method in conscious rats (Yamori & Horie: STROKE 8:456, 1977). Two weeks after the implantation of platinum electrodes in the frontal cortex, measurements were performed at least three times for each subject and their average value was used. BP was measured by a tail pulse pick-up method. Experimental procedure is as follows: after control rCBF and BP measurements, β -blocker (propranolol) was perorally administered in a dose of 30 to 40 mg/kg/day for three days and rCBF and BP were measured again.

RESULTS

Before treatment with β -blocker, BP was significantly higher in SHRSP than in WKY and after the treatment a slight decrease in BP was observed in both WKY and SHRSP, but the reduction was not significant. On the other hand, rCBF was decreased to 94.8% of the pretreatment control value in WKY and increased to 123% in SHRSP; there was a statistical significance between them. All numerical data are summarized in Table.

SUMMARY WITH DISCUSSION

In the present study, it became clear that β -blocker (propranolol) had effectively improved rCBF in adult SHRSP with severe hypertension in which rCBF was significantly lower than control WKY. Yamori and Horie's previous studies clarified the BP reduction in SHRSP with severe hypertension increased rCBF and prevented the development of cerebrovascular lesions (STROKE 8: 456, 1977). It is noteworthy that β -blocker, without reducing BP significantly in SHRSP with severe hypertension, increases rCBF significantly. Because of the high frequency of pulse rate over 400/min in conscious rats, blood flow in cerebral arteries near recurrent branchings is regarded as being nearly similar to steady flow. Since our previous hemorheological study demonstrated that pulsatile flow increased flow into recurrent branches and that the effect of pulsation was augmented with the increased pulse pressure (Niimi et al: JAP HEART J 20:681, 1979), it is theoretically considered that β -blocker, which reduces heart rate without affecting BP and thereby increases pulse pressure, favourably increases the reduced blood flow into recurrent arteries especially under severe hypertension. The present experiment substantiated this hypothesis and suggested that β -blocker, even without reducing blood pressure markedly, would be useful for preventing cerebrovascular lesions caused by hypoxia due to reduced rCBF in the predilection sites of stroke fed by recurrent arteries.

Strains	BP(mmHg) M $\pm$ SE		rCBF(ml/min/100g) M $\pm$ SE		Change in CBF (%)
	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment/Post treatment
WKY	124.0 $\pm$ 6.3	121.5 $\pm$ 4.3	80.5 $\pm$ 1.9	76.4 $\pm$ 2.2	94.8 $\pm$ 0.8
SHRSP	223.8 $\pm$ 7.3**	206.8 $\pm$ 8.0**	50.6 $\pm$ 4.0**	61.5 $\pm$ 4.9*	123.0 $\pm$ 9.0*

*, **: Significant differences from the values of WKY (p<0.05, 0.001)