Autoregulation for Cerebral Blood Flow in Spontaneously Hypertensive Rats (SHR). Masahiro Kihara, Yuji Ishinaga, Yasuo Nara, Ryoichi Horie, and Yukio Yamori. Department of Pathology, Shimane Medical University, Japan Stroke Prevention Center, Izumo, Japan.

INTRODUCTION

Blood pressure limits for autoregulation in hypertensive and normotensive men were reported by Strandgaard et al. in 1973 (BR MED J 1: 507-510).

In the present study, spontaneously hypertensive rats (SHR) and normotensive Wistar-Kyoto rats (WKY) were used for the determination of the upper and lower ends of the autoregulation curve, comparing with the results in humans.

MATERIALS AND METHODS

Four-month-old male SHR and WKY, 5 in each group, were used for the experiment. Under anesthesia (pentobarbital 40 mg/kg, i.p.), these rats were placed in a stereotaxic apparatus, and enamel insulated platinum electrodes (0.3 mm in diameter and 25 mm in length) were bilaterally implanted into the frontal cerebral cortex. The electrodes were placed 2 mm from midsagittal line, 2 mm anterior to the bregma and inserted 2.5 mm in depth from the convex of the skull. These electrodes and a reference electrode on the midsagittal line, 4 mm anterior to the bregma, were connected to a miniature receptacle and the whole assembly was fixed on the skull with dental cement. Regional cerebral flow (rCBF) was measured in conscious rats in a small gas chamber by the hydrogen clearance method. In each rat the measurement was made 2 weeks after the operation to avoid variation due to the effect of the implantation.

Before the first measurement of rCBF, the left femoral artery and vein were catheterized for the direct measurement of arterial blood pressure (BP) and for the gradual injection of norepinephrine by a Harvard pump, respectively. BP was elevated by norepinephrine infusion and reduced by the withdrawal of blood. rCBF was measured at various blood pressure levels.

RESULTS WITH DISCUSSION

Autoregulation curves were obtained in 5 SHR and 5 WKY, which permitted to find the blood pressure limits for autoregulation. The upper limits of blood pressure in SHR and WKY were 200 to 225 and 125 to 150 mmHg, respectively. The lower limits in them were BP 125 to 150 and around 75 mmHg. These results show upper and lower limits for autoregulation are shifted upward in SHR in comparison with those in WKY, and also suggest an abrupt or extreme lowering of hypertension by antihypertensive agents might cause cerebral circulatory disturbances to induce cerebral ischemia.

(This study was supported by grants from the Ministry of Education, and Salt and Tobacco Public Monopoly Corporation. The authors appreciate the skilful technical assistance of Mr. K. Omura.)