Hypertension Persisted Following Bilateral Adrenal Medullectomy

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It was reported that spontaneously hypertensive rats (SHR) became normotensive following bilateral adrenalectomy (Aoki: Jap Heart J **4**: 443, 1963). Hypertension was restored by the administration of adrenal cortical hormones in the adrenalectomized SHR (Aoki: Jap Heart J **4**: 561, 1963; **5**: 57, 1964). Recent biochemical observations indicated an increase in adrenal catecholamine content in SHR (Ozaki et al: Jap Circulat J **32**: 1364, 1968). An increase in tyrosine hydroxylase and dopamine- β -hydroxylase activity in the adrenal medulla in SHR has also been reported (Nagatsu et al: Nature **230**: 381, 1971). To clarify whether the adrenal cortex or medulla is primarily responsible for hypertension, blood pressure and adrenal catecholamine content was determined after adrenal medullectomy in SHR.

The mean systolic arterial blood pressure of the normotensive Wistar rat (NWR) was used as control 125 ± 3 , and was decreased to 110 ± 5 mmHg 4 days after bilateral adrenalectomy. In the SHR blood pressure was 182 ± 3 mmHg, and it gradually decreased to 130 ± 5 mmHg 4 days after the adrenalectomy. The normotensive level of 131 ± 10 mmHg was maintained to the end of the experiment. On the contrary, blood pressure of medullectomized SHR persisted between 180 and 190 mmHg for 7 days after the operation. At autopsy on the eighth day after removal of the medulla, it was replaced with blood, and there was no indication of the regeneration of medullary cells.

The content of adrenaline and noradrenaline in the adrenals of control NWR were 708 ± 25 and 162 ± 20 $\mu\text{g}/\text{Gm}$, respectively. Those in the adrenal medullectomized NWR were only 10 ± 5 and 3 ± 3 $\mu\text{g}/\text{Gm}$. In the medullectomized SHR, catecholamines were also greatly reduced from 670 ± 20 (adrenaline) and $190 \pm$ (noradrenaline) to 20 ± 9 and 2 ± 5 $\mu\text{g}/\text{Gm}$, respectively.

The results demonstrate that the hypertension in SHR persisted by the absence of the adrenal medulla, but high blood pressure became to normotensive level following adrenalectomy. It is suggested that adrenal cortical activity may contribute to persistence of hypertension in SHR by inducing

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intracellular electrolyte imbalance of cardiovascular muscle, the electrolyte include calcium being important for the regulation of muscular tone in the cardiovascular system.