34) Role of Adrenal Medulla in SHR hypertension. Juro Iriuchijima
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In the maintenance of arterial pressure level, the role of adrenomedullary secretion is considered of minor importance compared with vasoconstrictor fiber activity. However, as far as the rat in the conscious state is concerned, tonic secretion of adrenaline from the adrenal medulla seems to play the major role in maintaining the normal resting level of arterial pressure. In the rat, as in most mammals, the major part of hormones from the adrenal medulla is adrenaline.

When phentolamine, an alpha adrenoceptor blocking agent, was injected intraperitoneally at a dose of 10 mg/kg into a normotensive conscious rat, the arterial pressure was lowered on the average from about 110 mmHg to about 80 mmHg in 10 minutes. When the same injection was repeated 2-3 days after adrenalectomy, the decrease in arterial pressure was only from 110 to 100 mmHg.

These findings indicate that the resting arterial pressure level is maintained for the most part by steady secretion from the adrenal medulla and that, after adrenalectomy, the pressure level was maintained more by an increase of vascular smooth muscle tone rather than by a compensatory increase in vasoconstrictor fiber discharge.

Qualitatively the same holds for SHR also. On administration of phentolamine, the arterial pressure was lowered from 150 to 80 mmHg. After adrenalectomy, the magnitude of the lowering of arterial pressure on phentolamine was reduced to from 140 mmHg to 125 mmHg. The maintenance of the high arterial pressure level in SHR depends on adrenomedullary secretion to a large extent. The greater decrease in arterial pressure on phentolamine in SHR than in normal rats is ascribable to a greater steady adrenomedullary secretion and/or to a greater vascular reactivity to adrenaline.

The latter possibility seems to be plausible at least, considering that the pressure in adrenalectomized SHR was still within the hypertensive range. This fact suggests a greater vascular contractility and, contractility and catecholamine sensitivity seem to be related phenomena.

When adrenaline was infused intravenously in the conscious state, the percent increase in superior mesenteric flow resistance was significantly greater in SHR than in normal rats at the rate of infusion ranging from 0.0625 to 0.5 microgram/min/kg body weight.