Vectorcardiographic Features in the Young SHR

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Left ventricular hypertrophy (LVH) in essential hypertension has been regarded as being secondarily engendered. However, in SHR, it has been often noted that LVH, indicated as an increase in left ventricular weight or heart weight, may be progressing in the young when hypertension can be hardly recognized (Yamori: Jap Heart J 15: 194, 1974, Sen et al: Circulat Res 35: 775, 1974). To clarify the pathogenesis of LVH, in respect to the initiating mechanism of spontaneous hypertension, we investigated vectorcardiographic features on the heart of the young SHR.

Material and Methods:

Vectorcardiography in rats which had been established in our laboratory (Yamori et al: Jap Circulat J 40: 1315, 1976) revealed various characteristics of vectorcardiogram (VCG) in 5-month-old SHR, such as left superior deviation of major QRS portion, ST-T changes with prolonged QT interval, increased maximum spatial QRS vector and so forth. VCG by our method was applied to 40-day-old male rats, 9 of SHR and 10 of Wistar-Kyoto rats (WK) as control. Features of VCG as mentioned above were later analyzed in relation to blood pressure and body weight of the materials.

Results and Discussion:

VCGs of 40-day-old SHR showed characteristic features, compared with those of age- and blood pressure-adjusted WK. The means of blood pressure of SHR and WK were 126 and 120 mmHg, respectively. To compare the VCG findings among these 2 strains, a few conventional indices for QRS vector were applied. The angle of maximum QRS vector in the frontal plane was measured. The means of the angle were $-12^\circ \pm 22$ (SE.) and $28^\circ \pm 6$ (SE.) of SHR and WK, respectively. The incidences of the negative angle were 6/9 in SHR and 0/10 in WK; there was statistically significant difference. Clockwise rotation in the frontal plane was noted in only one SHR and in none of WK. These differences in VCG between SHR

<table>
<thead>
<tr>
<th>Strain</th>
<th>Age (days)</th>
<th>Blood Pressure (mmHg)</th>
<th>Incidence of Left Superior Deviation of Max. QRS Vector in the Frontal Plane</th>
<th>Incidence of Clockwise Rotation of QRS Vector in the Frontal Plane</th>
</tr>
</thead>
<tbody>
<tr>
<td>WK</td>
<td>$38 \pm 1$</td>
<td>$120 \pm 3$</td>
<td>0/10</td>
<td>0/10</td>
</tr>
<tr>
<td>SHR</td>
<td>$41 \pm 1$</td>
<td>$126 \pm 3$</td>
<td>$6/9^*$</td>
<td>1/9</td>
</tr>
</tbody>
</table>

* Statistically significant difference from WK ($p<0.01$)

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and WK, suggest that "LVH", changes of the ventricular myocardium, are rapidly progressing even at the initiating stage of spontaneous hypertension.

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