47) Vectorcardiographic QRS and T loops (McFee-Parungao lead system) in spontaneously hypertensive rats. Souichiro Sekiya*, Tomoe Miyazawa**, Takeshi Tsutsumi*, Sadayuki Sato**, Hirofumi Osada*, Kenich Harumi*. (*) Division of Cardiology, Showa University Fujigaoka Hospital, Yokohama 227 and (**) Department of Clinical Physiology, Kanagawa Prefectural College of Medical Technology, Yokohama 241.

To evaluate electrophysiologically the development of the left ventricular hypertrophy (LVH) in SHR, the vectorcardiograms (VCG) were recorded from both SHRs and normal Wistar rats (WR) by modified McFee-Parungao lead system for the dog.

Forty five SHRs and twenty nine WRs (6-, 16-, 30-weeks-age) were used. In five SHRs, VCGs and arterial blood pressures (BP) were obtained at 6-, 16- and 30-weeks-age. BP was measured by a tail cuff method in awake state, and then VCG was recorded after being anesthetized with Urethan-Chloralose. Each VCG was analyzed by following parameters; the magnitude and the spatial orientation of maximum QRS and T vectors (maxQRSv, maxTv), the QRS-T angle and the ratio of maxTv/maxQRSv (T/QRS).

BP of WRs was remained within normotensive range throughout 6-, 16- and 30-weeks-age, whereas that of SHRs continued to rise from 118 ± 15.7 mmHg in 6-weeks-age to 165 ± 10.8 mmHg in 16-weeks-age and to 195 ± 17.6 mmHg in 30-weeks-age, and those BPs were statistically significant ($p < 0.01$) each other. VCG parameters in WRs were not changed throughout 6-, 16- and 30-weeks-age. No significant differences were found between the VCG parameters in 6-weeks-age SHRs and WRs. Spatial orientation of maxQRSv in both 6-weeks-age cases was anterior, inferior and left. The angles of maxQRSv in 6-weeks-age SHRs were $33.6 \pm 42.4^\circ$ and $35.9 \pm 36.0^\circ$ in the frontal and horizontal planes, respectively. Spatial orientation of maxQRSv was superior and left in 16-weeks-age SHRs and was superior and posterior in 30-weeks-age SHRs. The angles of maxQRSv in 16-weeks-age SHRs were $-38.1 \pm 25.6^\circ$ and $-6.6 \pm 40.1^\circ$ in the frontal and horizontal planes, respectively, which were significantly different from those in 6-weeks-age SHRs ($p < 0.05$). In 30-weeks-age SHRs, the angle of maxQRSv in the frontal plane was $-45.2 \pm 24.6^\circ$ and in the horizontal plane was $-38.6 \pm 30.5^\circ$ which was significantly different from that in 16-weeks-age SHRs ($p < 0.01$). The magnitude of maxQRSv in 16-weeks-age SHRs tended to be greater than those in other groups, but grouped differences were not significant. The maxTvs in 16- and 30-weeks-age SHRs were oriented to the right, but grouped differences were not significant. The magnitude of maxTv in 30-weeks-age SHRs was significantly smaller than those in other groups ($p < 0.05$), and T/QRS was also reduced. The QRS-T angles in 16-weeks-age SHRs were $138.9 \pm 29.3^\circ$ and $113.9 \pm 53.3^\circ$ in the frontal and horizontal planes, respectively, which were significantly increased than those in 6-weeks-age SHRs ($52.1 \pm 41.2^\circ$ and $56.2 \pm 38.3^\circ$ in the frontal and horizontal planes) ($p < 0.01$). The QRS-T angle in 30-weeks-age SHRs was further increased and the values were $152.2 \pm 15.4^\circ$ and $141.8 \pm 29.6^\circ$ in the frontal and horizontal planes, respectively, which were significantly different from those in 16-weeks-age SHRs ($p < 0.05$). There is a good correlation between the increase in BP and the QRS-T angle in both planes ($r = 0.93$, $p < 0.005$).

Above VCG findings produced in SHR were very similar to those of LVH due to pressure overloading in humans. SHR is a useful experimental model for VCG study of LVH.