1) Vectorcardiographic QRS and T loops ( McFee-Parungao lead system ) in Spontaneously Hypertensive Rats - Souichiro Sekiya, Takeshi Tsutsumi, Hirofumi Osada, Kenichi Harumi*. Tomoe Miyazawa, Sadayuki Sato**. *Cardiovascular Division, Showa University Fujigaoka Hospital, Yokohama 227. **Department of Clinical Physiology, Kanagawa Prefectural College Yokohama 241.

Vectorcardiograms ( VCG ) were recorded from five spontaneously hypertensive rats ( SHR ) and the five age-matched normal wister rats ( WR ). SHR were 16 weeks of age, body weight 297±22.6 g, blood pressure 176±7.7 mmHg. In WR, body weight was 362±19.2 g, blood pressure 115±10.8 mmHg. Before recording VCG, the effects of anesthetics, nembutal (30mg/kg) or urethan-chloralose (urethan 450mg/kg, chloralose 40mg/kg) intraperitoneally on ST and T wave in WR were investigated. For the potential distribution on the chest, sixty three unipolar electrocardiograms on the chest surface of WR were recorded in prone position. McFee-Parungao lead system was applied to the recording VCG by using steel fishhook electrodes. The electrodes distance was 2 cm in two electrodes of left and right side of thorax, and from the top and the bottom line of three electrodes on the center of chest, which was determined to measure the heart size of other five WR. VCG were taken in prone position and recorded in the magnetic tape. The parameters for the analysis of VCG were the direction of inscription of QRS and T loops, the magnitude and the orientation of maximum QRS vector ( max QRSv ) and maximum T vector ( max Tv ) in each plane.

ST and T wave in urethan-chloralose anesthesia was more similar to those without anesthesia than nembutal. The potential distribution on the chest of WR was characterized by that the maximum positive potential during QRS was appeared near left sternal edge and at the level of the center of the heart, zero was located near the right mid clavicular line. Max QRSv was oriented to anterior, left and inferior in WR and posterior, left and superior in SHR. The angles of max QRSv were 74.5±10.96 degrees in WR and -53.4±10.85 degrees in SHR in horizontal plane, and 48.0±5.94 degrees in WR and -20.9±44.97 degrees in SHR in frontal plane, and 146.8±7.15 degrees in WR and -23.8±27.58 degrees in SHR in left sagittal plane. The magnitudes of max QRSv were significantly greater in SHR than those in WR in all planes. The magnitudes of max QRSv were 8.89±0.66 mV in WR and 1.13±0.27 mV in SHR in frontal plane, and 1.21±0.23 mV in WR and 1.43±0.12 mV in SHR in left sagittal plane. In SHR, the direction of inscription of QRS loop showed counter clockwise rotation in all planes. Max Tv was oriented to anterior, left and inferior in WR. The same orientation of max Tv was observed in SHR. The angles of max Tv were 85.5±13.39 degrees in WR and 88.6±7.94 degrees in SHR in frontal plane, and 138.4±9.57 degrees in WR and 128.6±9.12 degrees in SHR in left sagittal plane, and 86.8±10.48 degrees in WR and 87.3±11.72 degrees in SHR in horizontal plane. In SHR, the magnitudes of max Tv in left sagittal and horizontal planes were significantly less than those in WR. The magnitude of max Tv was 0.30±0.02 mV in WR and 0.28±0.04 mV in SHR in frontal plane, and 0.46±0.05 mV in WR and 0.36±0.03 mV in SHR in left sagittal plane, and 0.32±0.09 mV in WR and 0.25±0.03 mV in SHR in horizontal plane. In SHR, the direction of inscription of T loop was counter clockwise rotation in all planes.

The results indicated that urethan-chloralose was a suitable anesthetic for recording QRS and T loops in rat. The fact that the maximum positive potential was appeared near the sternum on the chest in WR may account, in part, for the anterior displacement of QRS loop recorded by McFee-Parungao lead system. The angles of max QRSv in horizontal plane was markedly different from that in SHR. The max QRSv in horizontal plane measured by McFee-Parungao lead system was seemed to be sensitive to evaluate the left ventricular hypertrophy in SHR. Vectorcardiographic specific configurations in SHR (16 weeks) were left, posterior and superior shift of QRSv and the increase of QRS-T angle and the slight reduction of the magnitude of max Tv.