2D15-1 Effect of low intensity exercise by head-up tilt
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Purpose: Head-up tilt exercise is one method of the physical therapy to the disused syndrome. In inclining the head and trunk, circulatory dynamics change is suspected, this study aim to investigate the effect of low intensity exercise. Methods: Five healthy male (21.4±0.9 years) participated in this study. We change angle of inclination with 0 degrees, 20 degrees, 40 degrees, 60 degrees, 80 degrees, and each stage is three minutes. In each stage, we measured R-R interval of 120 beats by My beat (Union Tool Co., Japan). By Lorenz plot of R-R interval, we reviewed a difference between head-up tilt without exercise and with low intensity exercise which are done by elevating of scapula one time in three seconds.

Result and Discussion: Lorenz plots are scatterplots that show the R-R interval as a function of the preceding R-R intervals. And it has been proposed that these plots be useful for visualizing the variability of the heart rate. As a result, one subject did not show a difference, but in other subjects, width of the scatter diagram of the Lorenz plots becomes smaller by exercise at angles of inclination more than 40 degrees. It is thought that these changes are because sympathetic nerve strongly acted. Even to a patient with cervical injuries, elevating scapula is easiest exercise. These results suggest the exercise is useful to prevent orthostatic hypotension.

Key words: Head-up tilt, Lorenz plot, sympathetic nerve

2D15-2 Effects of exercise in the morning on physiological response during unsteady workload exercise in the evening
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Purpose: The purpose of this study to examine the effects of exercise in the morning on physiological response in the evening during unsteady workload exercise. Methods: The study included 9 healthy men. The study was performed under 2 conditions: the exercise (E) condition and the control (C) condition. In the E condition, the participants performed cycling exercises for 15 min at 08:30. The exercise intensity was adjusted to 40% of VO2max. In the C condition, the participants did not perform exercise in the morning. All the participants performed cycling exercises for 32 min at 17:00. The evening exercises were performed in 2 parts: a calibration part and a gradual increase and decrease of workload exercise part. HR, BP and oxygen uptake were measured in both conditions. Results and Discussion: HR, SBP and DP at 60% and 40% VO2max were significantly lower in the E condition than the C condition. The phase lags of HR and oxygen uptake with the increase and decrease of the workload were significantly shorter in the E condition than the C condition. The amplitude of oxygen uptake was significantly larger in the E condition than the C condition. In conclusion, the physiological response during exercise in the evening is enhanced by exercise in the morning.

Key words: pre-exercise, unsteady exercise, physiological response