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The aim of the study was to examine effects of environmental factors in airplane on hematological change in venous blood on lower leg during quite sitting. The subjects were 10 healthy male students. Amount of their diets and water intake was controlled from 19:00 pm on the day before the experiments. Four experimental conditions were designed by combinations of the humidity conditions (20% or 60%) and air pressure (sea level or 2000 m). The subjects sat for 130 minutes under the experimental conditions on separate day. Venous blood was sampled from leg before and after the sitting. Regarding the results of ANOVA, significant interaction between time and humidity was observed in blood viscosity, hematocrit and total protein ($p<0.05$). However, there were no significant differences in these indices among the conditions. Although the present study did not clarify effects of low humidity and hypobaric condition on rheological change in venous blood, a possibility that prolonged sitting could be a risk factor of thrombogenesis in leg vein would be well conceivable.

1-5

1-6 Relationship between Internal Work and Metabolic Rate During Cycling Exercise

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This study was carried out to clarify the effect of internal work (W_{INT}) on energy metabolism during cycling exercise. Seven healthy male subjects (age; 22.5±0.9 yr, height; 169±4.8 cm, mass; 65.0±7.5 kg) performed an unloaded cycling test with different pedal frequencies (40, 60, 80, 100 and 120 rpm) on a cycle ergometer. The exercise test consisted of 3-min rest followed by 5-min unloaded cycling exercise in order to evaluate metabolic rate ($\dot{V}O_2$). The mean values (±SD) of $\dot{V}O_2$ during unloaded cycling exercise measured for 40, 60, 80, 100 and 120 rpm were 369.5±54.9, 402.0±60.2, 556.8±89.3, 888.3±127.3 and 1481.3±245.1 ml/min. An exponential relationship was observed between $\dot{V}O_2$ and W_{INT} during unloaded cycling exercise ($y=350.44e0.016x$, $R2=0.99$), indicating that a greater $\dot{V}O_2$ per unit of W_{INT} needs to perform the higher W_{INT} during cycling exercise. This $\dot{V}O_2$ exponential rise with the increased W_{INT} may result form the greater recruitment of low-efficiency type II muscle fibers and the greater consumption of ATP at sarcoplasmic reticulum in faster pedal frequency compared with slower pedal frequency.

1-7 The Effects of Respiratory Cycle on Physiological Responses

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Previous papers suggest that subjects with type A behavioral pattern (TABP) may show the different physiological responses compared with type B. In this study, we examined the physiological differences between type A and B during the controlled respiration.

Ten Type A and ten Type B subjects (male) participated in the experiment. For the pacing conditions, visual metronome was used. The pacing conditions were 0.16 Hz, 0.25 Hz, 0.33 Hz, and mean frequency of spontaneous respiration. We measured EEG, ECG, and blood pressure during the periods of controlled respiration.

Type A subjects showed higher cardiovascular sympathetic index (CSI) at 0.16 Hz than 0.25 Hz ($p<0.05$). Moreover, type A subjects showed lower delta relative power at 0.16 Hz than 0.33 Hz in the O1 ($p<0.05$). In the same region, type B subjects showed lower beta relative power at 0.16 Hz than 0.25 Hz ($p<0.05$). We suggest that TABP may affect on the regulation of autonomic nervous system and EEG in the left occipital region at 0.16 Hz respiration.

1-8 Effects of Lighting on The Electrogastrogram of Japanese and Chinese

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The present study was conducted to investigate the influence of different lighting condition and taste stimulus on the autonomic nervous system measured by electrogastrogram (EGG). In total, 16-experimental conditions (4 lighting conditions×4 taste solutions) were conducted. The four lighting conditions were 200 and 1500 lx in illuminance and by 3000 and 7500 K in color temperature. The four taste solutions were sweet (glucose), salty (salt), sour (acetic acid), and bitter (quinine). The subjects were healthy seven Japanese and six Chinese males. The changes of EGG normal wave ratio (EGG-NR; 2–4.5 cpm power/1–10 cpm power) after stimulation were compared among taste conditions. As a result, the main effect of taste was significant. EGG-NR of the sweet and the salty taste were higher than the bitter taste. Then separate analyses were conducted for Japanese and Chinese. EGG-NR for the sweet taste and the salty taste were higher than the bitter one in Japanese, but there were no difference in Chinese. We also compared EGG-NR in different lighting conditions, the main effect of color temperature was significant, but not in the illuminance. EGG-NR increased significantly in the lower