BIII10 Assessment of Controlling Respiration in Measurements of Heart Rate Variability
Tenhiko Fuwa, Yasunori Kanzaki and Kazuyoshi Sakamoto
The University of Electro-Communications

In the measurements of heart rate variability (HRV), subjects' respiration usually needs to be controlled at a constant frequency to avoid the influence of changing a breath period upon autonomic activity. Controlling respiration, however, forces subjects to breathe in instructed rhythm. This factor itself may cause some stress and mislead the assessment of a mental work load. In this study, the effects of controlling respiration were evaluated by three kinds of breath instructions: (1) the LED or (2) the sound of a metronome and (3) the voice instruction cassette-tape using two words, “inspire” and “expire”. During controlled breathing at 15 breaths/min, a beat-to-beat heart rate was continuously measured and then a HRV power spectrum density was calculated by a microcomputer to get the peak amplitude in the high frequency (HF; 0.15-0.5Hz) and the low frequency (LF; 0.04-0.15Hz) components. As a result, a LF to HF ratio in (3) was significantly lower (p<0.05, n=8) than in (1) or (2). It means that (3) has less effect on subjects' stress than the metronome, and therefore, the voice instruction is a more appropriate method to assess the stress of the mental work load.

BIII11 Relation between Baroreceptor Reflex Sensitivity and Heart Rate Variability, Baroreceptor Reflex Sensitivity and Blood Pressure Variability

Hidetoshi TAKEYASU and Shigeki WATANUKI
Dept. of Physiol. Anthrop., Kyushu Univ. of Design sciences

The purpose of this study was to investigate the characteristics of baroreceptor reflex sensitivity (BRS) as an index of parasympathetic nervous activity. BRS was evaluated by the relationship between R-R interval and systolic blood pressure with or without controlled respiration frequency of 0.25 Hz when the subjects (8 young males) immersed their right hands to the water temperature of 12, 17, 22, 27 and 32 °C for 3 min.

The correlation between BRS and RSA (respiratory sinus arrhythmia) was significant (P< 0.01), however, the correlation coefficient was not so high (r =0.19). BRS was lower in controlled respiration than spontaneous respiration, while RSA was not changed. Those results suggest that both indices as parasympathetic nervous activity might reflect different psychophysiological conditions.

BIII12 Effects of combined environment of ambient temperature, color temperature and noise on heart rate variability

Keita ISHIBASHI, Hidetoshi TAKEYASU, Hiroyuki TAMURA, Shigeki WATANUKI and Akira YASUKOUCHI
Department of Physiological Anthropology, Kyushu University of Design sciences

The objective of this study is to investigate the combined effects of ambient temperature, color temperature and noise on heart rate variability (HRV). Eight healthy males, aged from 22 to 24 years old, served as subjects. Combined conditions consisted of three ambient temperatures (21, 28, and 35°C (50%RH)), three color temperatures (3000, 5000, and 7500K), and three noise conditions (background noise plus 0, 5, and 10dB of white noise). The main effect of ambient temperature was significant on heart rate, HF and LF/HF in HRV, and the comfort sensation. There were two significant interactions observed in HR and LF/HF but not in comfort sensation. These results implied that psychological value of comfort was not always followed by physiological value.