A-16 Relationship between physiological tremor and evoked EMG (H reflex) under drinking condition

Naoaki ITAKURA, Hiroyuki KOSHINO and Kazuyoshi SAKAMOTO
Department of Communications and Systems Engineering, University of Electro-Communications

Physiological tremor is the invisible mechanical vibration observed in body parts of normal subject. In our recent research, it has been clear that the total power of the physiological tremor after drinking was decreased in comparison with that before drinking. So we propose to compare the influence of drinking on physiological tremor and evoked EMG (H reflex). H reflex activity reflects the excitability of alpha motor neurones at a spinal level.

In this research, the physiological tremor of index finger and the H reflex from soleus muscle are measured at every 15 minutes for 3 hours under drinking condition and normal condition respectively. Both the total power of the physiological tremor and the amplitude of the H reflex are decreased under drinking condition while both are not decreased under normal condition. These results suggest that one of the causes that the total power of the physiological tremor are decreased under drinking condition, is a decreasing of excitability of alpha motor neurones at a spinal level.

A-17 Effect of hyperoxia on the respiratory and circulatory functins

Yoshihisa OHHARA[1], Michiko KITAGAWA, Yoshitaka KAWAMURA, Chiharu KONDOU, Mitsuhiro OHKURA[2], Hisanaga NAKAYA, Takayuki FUJIWARA[3], Ryouich YOSHIDA[4]

1)Seiwa Hospital, 2)Kochi Rehabiritation College 3)School of Allied Medical Sciences, Shinshu University 4)Tabaiespec CORP

The aim of this study is to evaluate the responses of res- piratory and circulatory functions while under controlled stress loads in a hyperoxia environment, and to analyze the application of the results regarding therap-eutic exercise.

Subjects were 10 male students. An electrically braked bicycle ergometer was used for work. Subjects were run through two tests. On the first day, approximately 15 minutes of work was done keeping a constant heartrate of 120 bpm. On the second day, approximately 15 minutes of work was done kee-ping a constant workload of 120 Watts. During these work periods, the sub-jects were monitored for the following; H.R, VO2, Volume of Workload, and Pulmonary Ventilation.

Results: We found that in a hyperoxia environment with a stable heartrate, the volume of workload was able to increase by 28%. Also in the same enti-ronment with a stable workload, the heartrates tended to decrease by 6.4%.

A-18 The influence of enriched oxygen breathing on "Post-Lunch-Deep"

Kei TOMIOKA [1], Naosi KAKITUBA [2], Hajime HARADA [1], Tetsuo KATSUURA [1], Qiang YI[1], Shiniti MIZUTANI[1], Hirosi NOMURA[1], Hideaki SAITO[1] and Yumi HIRASAWA [1]
1) Department of Ergonomics, Faculty of Engineering, Chiba University, 2) Toyota College of Technology

Getting sleepy after lunch is experienced by most people, and called "Post-Lunch-Deep". The purpose of the present study was to clarify the influence of enriched oxygen breathing on sleepiness after lunch.

Subjects were six male students. The experiment was divided into 4 sessions. These session started at 11:00, 13:00, 14:00, and 15:00. Each session lasted about one hour. During the experiment, the subject breathed enriched O2 air (30%) or normal air (21%O2) through a gas mask. EEG, ECG(HRV) and subjective rating were measured.

β/α ratio of EEG in Oz region has a tendency to be higher in 30%O2, and this tendency was significant 1 hour after lunch. The result of frequency analysis of HRV, in 30%O2 breathing LF/HF ratio has shown a tendency to be higher than in 21%O2 breathing, and it was significant 2～3 hours after lunch.

These results suggested that 30%O2 breathing has a tendency to prevent the decrement of arousal level after lunch.

A-19 Effects of oxygen breathing on physiological factors associated with sleepiness after lunch

Naoshi Kakitsuba[1], Kei Tomioka[2], Shinichi Mizutani[2], Qiang Yi[2], Yumi Hirasawa[2] and Tetsuo Katsuura[2]
1) Dept. of Arch., Toyota Collage of Tech.
2) Dept. of Ergo., Sch. of Eng., Chiba Univ.

We often experience sleepiness after lunch. It may be due to specific dynamic action, protein digestion and other related factors. The present study has observed change in various physiological factors associated with sleepiness and evaluated how oxygen breathing affects sleepiness. Six male subjects performed a repetitive VDT task while breathed air or 30% oxygen. Skin potential level(SPL), critical fusion frequency (CFF), oxygen consumption (VO_2), transcutaneous O_2/CO_2 and sleepiness level were recorded after lunch. Results were as follows; (1) SPL and CFF were closely related to sleepiness level. (2) During 30% oxygen breathing, CFF and VO_2 changed differently, and $PtO_2/PtCO_2$ were constantly 20-25 mmHg higher as compared to air breathing.

A-20 The Effects of 30% Oxygen on Thermal Responses during and after Prolonged Exercise

Yutaka TOCHIHARA[1], Tadakatsu OHNAKA[1], Nobuhiro OHATA[1] and Kazuyo TSUZUKI[2]
1) Department of Physiological Hygiene, The Institute of Public Health 2) National Institute of Bioscience and Human-Technology

It has been suggested that breathing O_2-enriched gases will enhance excise tolerance in humans. Although changes in circulatory and respiratory responses due to increased inspired oxygen concentrations were reported many times, there is no study on the thermal responses. Heart rate, respiratory frequency, rectal temperature, skin temperature and sweat rate on the back were measured during and after 30 minutes of exercise while breathing either air or 30% oxygen. Six healthy male adults served as the subjects in an air temperature of 25 C.

There were no significant differences in heart rate, respiratory frequency, rectal temperature and sweat rate between air and 30% oxygen during both 40% Vo_2 max and 70% Vo_2 max exercises. Mean skin temperatures during and after breathing 30% oxygen were significantly lower than those during and after breathing air. These difference would be caused by the decreases in oxygen uptake during breathing O_2-enriched gases.

A-22 Effects of Oxygen on Spontaneous Wheel-Running Activity in Old Rats

Isamu ICHIKAWA
Department of Industrial Health, The Institute of Public Health

This study presents the influence of oxygen of concentrations up to about 40% on spontaneous wheel-running activity in old rat s, in stationary state and/or after forced wheel-running. In each experiment 4 male rats were put into cages with running-wheel of 1 m/rotation in an exposure chamber. Concentrations of oxygen used in inhalation experiments of oxygen alone were from 21.4 to 39.8% and in combination experiments with the forced running at a speed of 10 m a minute were from 24.9 to 44.6%. Results obtained are as follws. ① By exposure to oxygen the spontaneous running activity was raised during daytime and suppressed at night, but such disorder was returned quickly to repular pattern after stoppage of the oxygen exposure. ② By the forced running the spontaneous activity was suppressed strongly. The degree of suppression was in proportion to the speed of wheel-rotation, and the recovery from this suppression was also delayed in proportion to the speed. ③After the forced running a suppression in the spontaneous activity was got the best improvement by exposure to oxygen of 30.7%, but made intensify by oxygen over 40%.

From these results it seems to suggest that we should select adequate concentrations of the oxygen inhalating for reduction of fatigue from hard works and sports, etc. based on as many data from scientific experiments as possible we could.