

hyperbolic tangent line can fit well to represent the features of oxygen saturation curves during breath holding which can be to quantify autoregulation of vasomotor activity.

**Keywords:** Near infrared spectroscopy, sleep deprivation, breath holding

#### CPA44

##### 以生理指標評估眼部按摩器對消除心智疲勞的效果之研究

Evaluation of the effect on dispelling mental fatigue for eye massager by physiological measurements

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In this study, we attempted to evaluate the effect on dispelling mental fatigue for eye massagers by using physiological indices including electroencephalography (EEG) and heart rate variability (HRV). Thirty university male students divided into experimental and control groups with 20 and 10 subjects respectively participated as volunteer subjects. They are paid for their participation in the study. Participants could lead to mental fatigue during 2 hours of experimental tasks (mental arithmetic via computer). After experimental tasks, their EEG and HRV were measured immediately. The participants of experiment group wore the eye massager for 15 minutes, while the ones of control group took a rest for 15 minutes with eyes closed only. We found EEG basic indices of  $\alpha$  and  $\beta$  bands were decreased while  $\theta$  band was increased for experiment group, and the degree was superior to the control group. In addition to basic indices, EEG ratio indices of  $(\alpha/\theta)$  and  $(\beta/\theta)$  were decreased at the same condition, while  $(\theta/\alpha)$  was increased for experiment group, and the degree was also superior to the control group. It revealed that the alertness level of participant wearing the eye massager increased more than that of one with eyes closed only. For measurement of HRV, the low frequency component (LF) of HRV arose and high frequency component

(HF) reduced. The value of LF/HF ratio, i.e. sympathetic/parasympathetic balance index for experiment group decreased significantly more than that for control group. As mentioned above, the participants wearing the eye massager had significant relaxation and advantaged dispelling mental fatigue. For subjective measure, the NASA-TLX rating scale of the experiment group had more mental relaxation than that of control group. The final results appeared that the eye massager had pronounced effect on dispelling mental fatigue and psychological relaxation.

**Keywords:** Eye massager, Mental fatigue, Electroencephalography, Heart rate variability

#### CPA45

##### 非對稱多頻寬均值移動極點搜尋法應用於脈波波形之心跳偵測

ASYMMETRIC MULTIBANDWIDTH MEAN SHIFT EXTREMES SEEKING FOR BEAT DETECTION OF BLOOD PRESSURE WAVEFORMS

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This paper proposes a novel asymmetric multibandwidth mean-shift extreme seeking method for beat detection. The method aims to locate peaks and troughs in pressure waveforms. Three signals, intracranial pressure (ICP), arterial blood pressure (ABP), and pulse oximetry (SpO<sub>2</sub>), are used to verify the proposed method. The experiment results show that the method achieves a sensitivity of 97.3% and positive predictivity of 95.65% under 42,535 beats with an acceptance interval of eight milliseconds ( $\pm 1$  sample).

**Keywords:** pressure waveform, mean shift, beat detection

#### CPA46

##### 上臂動脈血流調解擴張功能之評估:以氣囊袋