

Development of New Diagnosis Tool for Evaluating Autonomic Function during Virtual Reality Immersion

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ABSTRACT

It was a famous accident that Japanese children, while watching a TV animation, suddenly complained of spasm and vertigo, and were carried into hospital. In this study, a new diagnosis equipment evaluating autonomic function during audiovisual stimulating machine was developed and evaluated. From the previous studies, we constructed the multiparameter autonomic function evaluating machine to diagnose the responses to the audiovisual stimulation. Our system could evaluate the electrocardiography, arterial blood pressure, respiration, stroke volume detected by the ultrasonic cardiography, and oxygen saturation detected by the near infrared spectroscopy. It was quite new information to evaluate the peripheral vascular resistances. Healthy adult volunteers were utilized in this experiment under satisfactory informed consent. Content was projected into the wide size screen and volunteers were suffering audiovisual screen about 20 minutes. Various sizes of screen with 1:2 size, 1:1 size and 5:8 size were utilized in this experiment. There was no significant arrhythmia during an experiment. No significant alteration was observed in the value of oxygen saturation in the brain blood flow during an experiment. Spectral analysis was performed to evaluate the heart rate variability (HRV) during an experiment. LF, HF and LF/HF were calculated, however, there were no significant changes during an experiment because of wide standard deviation. There was significant alteration in some cases in 1/f fluctuations of blood pressure, however, these was no significant tendency if we gather the all data. Our results suggested that significant response was observed in the autonomic function according to the various sizes of screen in some subjects. We must continue our study aiming at safety audiovisual stimulating equipment.

Key words: autonomic nervous system, virtual reality, audiovisual stimulation, peripheral vascular resistances, 1/f fluctuations

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