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Abstract
In recent years, due to the prosperity of internet, people in Taiwan who suffer from eye diseases have a trend of increase. Myopia is an example among them so that eye health care is very important. From another point of view, Chinese medicine using auricular point manual acupuncture at related ear reflexology to improve or cure diseases (including eye disease) has been passed for more than two thousand years. However, until now some mechanisms are still unknown.

For these reasons, this study aims to develop a system platform for scientifically investigating acupoint electrical stimulation effect on pattern reversal-visual evoked potentials (PR-VEP), and eventually to find optimal stimulation parameters. Meanwhile, utilizing these results we can achieve a wearable well-designed acupoint electrical stimulator. The developed system platform is mainly divided into two parts: (1) Acupoint stimulation- Acupoint stimulation uses two Digitimer’s single phase constant current stimulators, which can generate biphasic constant current output with adjustable frequency and intensity；(2) Visual stimulation and EEG recording- Visual stimulation uses a computer screen with pattern reversal displaying. EEG recording uses a Neuroscan’s EEG machine, where electrodes are placed on the Oz, O1 and O2 positions of occipital area. The experimental methods of the study were first to let volunteers with high myopia receive pattern reversal visual stimulation frequencies of 1~3 Hz, and bi-auricular eye points and non-point electrical stimulation frequencies of 1~8 Hz. Other stimulation parameters were kept constant (such as 1 mA stimulation current) and a test protocol was specifically designed. Then, PR-VEP (P100) was extracted from the recorded EEG signals by EEGLAB software. Finally, a statistical method was used to evaluate the obtained PR-VEP. The preliminary results find that, when the pattern reversal frequency changing from 1 to 3 Hz, some relative eye-points electrical stimulation frequencies show a positive statistical meaning of latency variety of P100 ($p < 0.05$), which are 1 Hz vs. 1, 3, and 5 Hz; 2 Hz vs. 2 and 4 Hz; 3 Hz vs. 3 Hz. Higher electrical stimulation frequencies over 6 Hz, the latency varieties of P100 have no such a positive effect. Under the previously described stimulation conditions, the amplitude varieties of P100 also have no such a positive effect. Moreover, non-point electrical stimulation also does not find the same effect. So, we can conclude that, under some specific stimulation conditions, the latency of P100 can be reduced and demonstrate that it could bring the activation effect on visual nerve pathway.

By the experimental results, we have been developed a wearable acupoint electrical stimulator based on PIC10F206 controller with bi-phasic constant current output (intensity: ±0.5~1.5 mA; frequency: 1~5 Hz) which can be used for eye health care.
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