Effects of Transcutaneous Spinal Cord Stimulation on Autonomic Nervous System Regulation

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INTRODUCTION

Transcutaneous spinal cord stimulation (tSCS) is a promising technique to treat motor disorders. In some cases, it could replace traditional invasive stimulation, which is both risky and expensive [1]. At present, we lack fundamental information about how tSCS interacts with the function of different systems in the human body. Among other factors, due to its non-specificity, the autonomic nervous system (ANS) may be modulated by stimulation [2], which may explain some of the effects of this technique.

Objective: To study how tSCS delivered at different frequencies affects the function of the ANS

EXPERIMENTAL DESIGN

The ECG of the subjects was acquired using a bipolar lead following the main line of the heart from V1 to V4. For the tSCS, an electrode was placed in the posterior neck region (C6 level), and another one on the clavicle of the dominant side.

PROCESSING

Time domain metrics
- Mean Heart Rate (HRM)
- Standard deviation of Normal Intervals (SDNN)
- Standard deviation between adjacent normal beats (SDSD)
- Proportion of normal RR interval differences greater than 50 ms between consecutive beats (pNN50)

Frequency domain metrics
- Power at High Frequency (PHF)
- Power at Low Frequency (PLF/PHF)
- Ratio between low and high frequency (PLF/PHF)

Conclusions & Future Work

The three of them (PHF, SDNN, pNN50) are parasympathetic nervous system markers

Conclusions
- Effects disappear when the beginning and end of the record are ignored.

REFERENCES