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Abstract

The Development of an Electrical Pulse Stimulation System for Examining In Vitro Models of Exercise †

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Abstract: Background and objectives: Electrical pulse stimulation (EPS) is widely used to investigate the mechanisms behind the beneficial effects of physical activity in in vitro studies. The aim of our study was to develop a cheap, stable EPS system and protocol capable of causing C2C12 mouse myoblasts cells to contract. Method: The EPS system consists of a control unit, a WEP PS305D power supply unit, and a FY6800 signal generator. The control unit is a circuit board developed by us that connects the power supply unit with the signal generator. The control unit consists of two pairs of electrodes that can be connected to a six-well plate equipped with a manually mounted platinum wire. The stability of the system was evaluated using a Hantek 6022BE oscilloscope to measure ninety minutes of electrical pulse stimulation of C2C12 mouse myotubes. A protocol was established for cell culture and EPS parameters. The contraction of the myotubes was confirmed under a Leica DMi1 inverted microscope. Results: Our custom system is very accurate and has a wide range of EPS parameter adjustment options. The results show that the system is stable over ninety minutes of EPS with variable parameters. The EPS protocol was also optimized. Discussion: To date, only a few custom EPS systems have been described. Our system is relatively cheap, easy to build, and stable, and so could serve as an alternative to commercially available systems.

Keywords: electrical pulse stimulation; myotubes; cell culture; protocol

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