

Master Thesis / Research Project – Pulsed Electromagnetic Field Generator

PEMF is a non-invasive and safe modality frequently used in sports medicine to accelerate healing and recovery, however, with many other areas of application. Magnetic field pulses with low rise times serve to induce microcurrents in the target tissue, which mediate the local cell response.

The objective of this thesis is to develop and implement a flexible and compact pulse generator for low to medium power PEMF therapy and test it with custom coils. Tunable parameters include power level, waveform, pulse and carrier frequency.

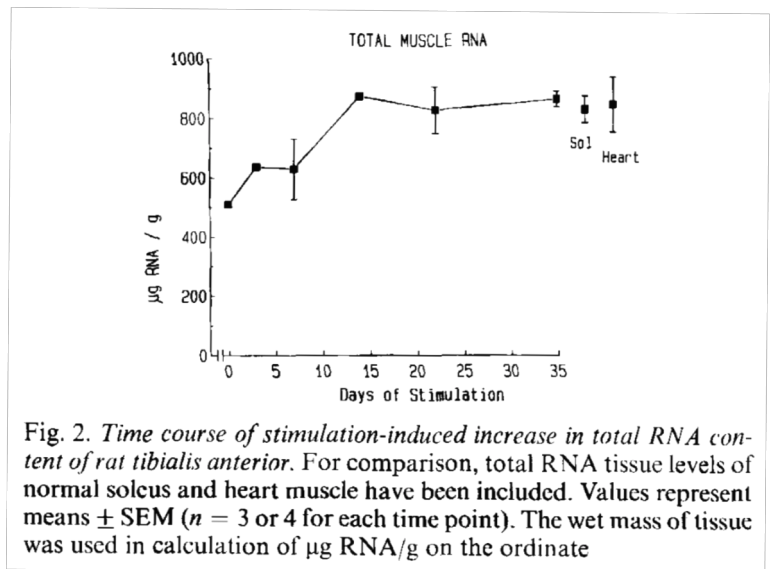


Fig. 2. Time course of stimulation-induced increase in total RNA content of rat tibialis anterior. For comparison, total RNA tissue levels of normal solcus and heart muscle have been included. Values represent means \pm SEM ($n = 3$ or 4 for each time point). The wet mass of tissue was used in calculation of $\mu\text{g RNA/g}$ on the ordinate

Masterarbeit / Forschungsprojekt – Generator für Gepulste Elektromagnetische Felder

PEMF ist eine nicht-invasive, sichere Modalität, die häufig in der Sportmedizin verwendet wird, um Wundheilung und Erholung zu beschleunigen, aber auch viele weitere Anwendungsgebiete umfasst. Magnetfeld-Pulse mit niedrigen Anstiegszeiten dienen der Induktion von Mikroströmen im Ziel-Gewebe, welche die lokale Zell-Reaktion mediieren. Ziel dieser Arbeit ist es, einen flexiblen und kompakten Puls-Generator für PEMF-Therapie bei niedriger bis mittlerer Leistung zu entwickeln, implementieren und mit eigenen Spulen zu testen. Die Parameter beinhalten Leistungsstufe, Wellenform, Puls- und Träger-Frequenz.

Prerequisites / Anforderungen: PCB Design, Embedded Systems

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Further Reading / Quellen:

- Goodwin 2003 “Physiological and Molecular Genetic Effects of Time-Varying Electromagnetic Fields on Human Neuronal Cells”
[ntrs.nasa.gov/search.jsp?R=20030075722]
- Vadala 2016 “Mechanisms and therapeutic effectiveness of pulsed electromagnetic field therapy in oncology” [doi.org/10.1002/cam4.861]
- Hood 1989 “Chronic stimulation of rat skeletal muscle induces coordinate increases in mitochondrial and nuclear mRNAs of cytochrome-c-oxidase subunits”
[doi.org/10.1111/j.1432-1033.1989.tb14551.x]