

THE RESPONSE OF THE HUMAN CIRCULATORY SYSTEM TO AN ACUTE 200- μ T, 60-HZ MAGNETIC FIELD EXPOSURE

Purpose: Recent research by the authors on the effects of extremely low-frequency (ELF) magnetic field (MF) exposure on human heart rate (HR), heart rate variability (HRV), and skin blood perfusion found no cardiovascular effects of exposure to an 1800 microtesla, 60 Hz MF. Research from our group using rats, however, has suggested a microcirculatory response to a 200 microtesla, 60 Hz MF exposure. The present pilot study investigated the effects of 1 h of exposure to a 200 microtesla, 60 Hz MF on the human circulation. Microcirculation (as skin blood perfusion) and HR were measured using laser Doppler flowmetry. Mean arterial pressure was monitored with a non-invasive blood pressure system.

Methods: Ten volunteers were recruited to partake in a counterbalanced, single-blinded study consisting of two testing sessions (real and sham exposure) administered on separate days. Each session included four consecutive measurement periods separated by rest, allowing assessment of cumulative and residual MF effects.

Results: A within-subjects analysis of variance did not reveal session by time period interactions for any of the parameters which would have been suggestive of a MF effect ($p > 0.05$). Perfusion, HR, and skin surface temperature decreased over the course of the experiment ($p < 0.05$).

Conclusions: The MF used in this experiment did not affect perfusion, HR, or mean arterial pressure. Decreasing perfusion and HR trends over time were similar to our previous results and appear to be associated with a combination of inactivity (resulting in decreasing body temperatures) and reduced physiological arousal.