

Chronic electromagnetic field exposure decreases HSP70 levels and lowers cytoprotection

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Abstract

Electromagnetic field (EMF) exposures have been shown to induce heat shock proteins (HSPs), which help to maintain the conformation of cellular proteins during periods of stress. We have previously reported that short-term exposure of chick embryos to either 60 Hz (extremely low frequency: ELF), or radio-frequency (RF: 915 MHz) EMFs induce protection against hypoxia.

Experiments presented in the current report are based on a study in which long-term (4 days), continuous exposure to ELF-EMFs *decreased* protection against ultraviolet radiation. Based on this result, it was hypothesized that de-protection against hypoxia should also occur following long-term, continuous, or daily, repeated exposures to EMFs. To test this hypothesis, chick embryos were exposed to ELF-EMFs (8 μ T) continuously for 4 days, or to ELF or RF (3.5 mW incident power)-EMFs repeated daily (20, 30, or 60 min once or twice daily for 4 days). Several of the exposure protocols yielded embryos that had statistically significant decreases in protection against hypoxic stress (continuous and 30 or 60 min ELF twice daily; or 30 or 60 min once daily RF).

This is consistent with our finding that following 4 days of ELF-EMF exposure, HSP70 levels decline by 27% as compared to controls. In addition, the superposition of ELF-EM noise, previously shown to minimize ELF-EMF induced hypoxia protection, inhibited hypoxia de-protection caused by long term, continuous ELF or daily, repeated RF exposures.

This EMF-induced decrease in HSP70 levels and resulting decline in cytoprotection suggests a mechanism by which daily exposure (such as might be experienced by mobile phone users) could enhance the probability of cancer and other diseases.

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