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Study of potential health effects of electromagnetic fields of telephony and Wi-Fi, using chicken embryo development as animal model

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Abstract

The objective of this study is to investigate possible biological effects of radio-frequency electromagnetic fields (RF-EMF) as used in modern wireless telecommunication in a well-controlled experimental environment using chicken embryo development as animal model.
Chicken eggs were incubated under continuous experimental exposure to GSM (1.8 GHz), DECT (1.88 GHz), UMTS (2.1 GHz) and WLAN (5.6 GHz) radiation, with the appropriate modulation protocol, using a homogeneous field distribution at a field strength of approximately 3 V/m, representing the maximum field level in a normal living environment.

Radiation-shielded exposure units / egg incubators were operating in parallel for exposed and control eggs in a climatised homogeneous environment, using 450 eggs per treatment in three successive rounds per treatment. Dosimetry of the exposure (field characteristics and specific absorption rate) were studied. Biological parameters studied included embryo death during incubation, hatching percentage, and various morphological and histological parameters of embryos and chicks and their organs, and gene expression profiles of embryos on days 7 and day 18 of incubation by microarray and qPCR.

No conclusive evidence was found for induced embryonic mortality or malformations by exposure to the used EMFs, or for effects on the other measured parameters. Estimated differences between treatment groups were always small and the effect of treatment was not significant. In a statistical model that ignored possible interaction between rounds and exposure units, some of the many pairwise comparisons of exposed versus control had P values lower than 0.05, but were not significant after correction for multiple testing.