Mortality of chicken embryos exposed to EMFs from mobile phones

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Conclusion: Exposure to mobile phone-radiated EMFs during development worsens embryonic mortality in chickens.

Method: We previously reported that continuous exposure of chicken embryos to electromagnetic fields (EMFs) emitted by television and computer worsens embryonic death (Bioelectromagnetics, 1997, 18: 514-523). The present study was designed to assess the effects of EMFs radiated by mobile phones on the development of chicken embryos.

Abstract: Two groups of 60 eggs each were incubated (21 days, 38 ± 1°C, 45-55% humidity, permanent darkness) under the following electromagnetic exposure conditions: control group (without the telephone); exposed group (24h/24h exposure with the telephone switched on and placed downwards, 10 mm above the eggs; the letter were distributed on a plateform with locations numbered from 1 to 60; see exposure system in page 2). The mobile phone used (Bosch, CARTEL SL 2G2, Germany) radiates in the radiofrequency band with 2 W power. The VLF and ELF values measured at different positions at the level of the eggs are outlined as ratios, adjacent to the exposure system (page 2). The values over and under the bar correspond to the telephone switched off and on respectively.

Embryonic mortality was evaluated by candling the eggs and numbering dead embryos at two-day intervals from embryonic day 3 (ED3) to embryonic day 13 (ED13): ED3, ED5, ED7, ED9, ED11, ED13. Counting could not be performed from ED14 to hatching (ED21) because the eggs had become so opaque (intense vascularization, increased embryo body size) that the embryos could hardly be mirrored through the shell. For the latter period, embryonic mortality was assessed by opening the eggs from which the chicks did not hatch at ED21.

Three independent experiments were carried out. Embryonic mortality was expressed either as cumulative mortality (previous + current counts) or as total death rate (percentage of necropsied embryos from ED3 to ED21). In the exposed group, EMF exposure was accompanied by increased embryonic loss during the whole embryonic period, while noticeable variations in the control group occurred mainly at the end of incubation (ED21); furthermore mean total death rate (TDR) for the three experiments was 6-fold higher in EMF-exposed group than in their control counterparts (72.3% vs. 11.9%; see Table 1). Consistently, necropsy distribution in the exposed group was essentially restricted to an area around the source of EMF (mobile phone), which contrast with rather sparse distribution in the control group (see the diagrams of cumulative mortality in page 2).

Together these findings demonstrate that exposure to mobile phones-radiated EMFs during development worsens embryonic mortality