

**PROCEEDINGS OF THE FIRST
WORLD
CONGRESS IN
MAGNETOTHERAPY**



LONDON, May 1996

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BIOEFFECTS OF CONTINUOUS EXPOSURE OF EMBRYOS AND YOUNG CHICKENS TO ELF DISPLAYED BY DESK COMPUTERS: PROTECTIVE EFFECT OF TECHNO AO ANTENNA

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We previously demonstrated that chicken immune and adrenocorticotrophic systems synergistically respond to antigenic stress (1). Furthermore this answer is altered by continuous exposure of embryos and young chickens to ELF electromagnetic fields. (2). Now we report the replication of a previous study (3) showing the efficiency of an electromagnetoprotective device.

TECHNO AO antenna (8-12Hz: 100fT: patent registration number: PCT/FR 93/00546) is an autonomous magnetic oscillator made up of oscillating paramagnetic solution contained in a syntonised double antenna.

METHOD

The following parameters were assessed: embryonic and post-hatching mortality; plasma corticosterone and specific humoral immune responses to antigen challenge; body weight. Incubation was carried out in a dark room heated to 38+/-1deg. C. Fertilised eggs were placed laterally 0.5- 0.53m from a computer (Goupil G5 286 10) whose monitor screen was hidden with black tissue to avoid exposure to visible spectrum. The magnetic field intensity measured 0,5 in this area (computer switched off) was 26 nT for ELF and 19 nT for VLF. When the computer was switched on , the intensity was 565 nT for ELF and 38 nT for VLF. Three groups of 30 eggs each were incubated and treated as follows:

sham exposed-exposed (control group) with the computer switched off (CL);

field-exposed group with the computer on (IR) ;

field exposed group with the computer on but equipped with TECNO AO antenna (IR+P).

After hatching, the chicks from each group were continuously exposed until the age of 38 days under the irradiation schedule applied to the corresponding embryos. The mortality was evaluated at three day intervals during the embryonic period and for one week after hatching. Young chickens were immunised subcutaneously three times with porcine thyroglobulin (125 µg/100 g bw) at the age of 21, 30 and 36 days: blood samples were collected at the age of 20, 29, 35 and 38 days and blinded. Serum titers of specific anti-thyroglobulin antibodies were determined by an indirect ELISA technique whereas plasma levels of cortisone were measured by radiocompetition assay. All the animals were weighed on day 38.

RESULTS

Statistical analysis was performed by the Mann-Whitney test for intergroup differences. In the control group (CL: n=17), total mortality was 40%. After exposure to electromagnetic field (IR: n=10), the death rate reached 67%, but significantly dropped (56%) in the TECNO AO antenna protected group (IR+P: n=12). Irrespective of experimental groups, anti-thyroglobulin IgC titers increased significantly throughout the experimental session until day 38 ; field exposed chickens (IR)

exhibited significantly lower titers of IgC (10.175 ± 3.437) than their sham-exposed (CL: 122.500 ± 17.128) or TECNO AO protected (IR+P) counterparts whose antibody production were comparable (151.458 ± 29.964). From the first to the third immunisation, control chickens exhibited progressively rising corticosterone levels reaching a maximum value on day 38 (9 ± 0.4 ng/ml). Conversely in the irradiated group, corticosterone concentration remained steadily low and was only 50% of control value on day 38 (4 ± 0.1). Hormonal response of the TECNO AO protected group was equivalent to that of controls (9 ± 0.6 ng/ml). Little intergroup discrepancies were observed in the general mean body weight, but striking sex differences were recorded with males appearing more sensitive to ELF than females. This data is in keeping with the previous one (3).

DISCUSSION

Taken together, these results suggest that continuously applied during embryonic and post-hatching periods, ELF issued from desk computers increase mortality, alter immune and endocrine responsiveness to antigen challenge and reduce body weight in chickens. Embryonic phase of development seems to be the most sensitive to ELF effects as witnessed by

data reported elsewhere (4).

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