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ELF MF EXPOSURE PLUS A POOR DIET PRODUCE HORMONAL AND METABOLIC CHANGES IN PREGNANT RATS

BRAZIL

Key words: ELF, animal study, in vivo, diet, hormones, metabolism

Madison, Wisconsin---A Brazilian study that examined the effects of both diet and ELF EMF exposure on pregnant rats produced mixed results. The study was done by Caroline Wanderley Souto Ferreira Anselmo and colleagues from the Universidade Federal de Pernambuco in Recife, Brazil.

METHODS

After the first day in which pregnancy was detected, 20 female Wistar rats were divided into 4 treatment groups:

- Group A (n = 6), the control group, was fed a normal, balanced diet of casein and was not exposed to EMF.
- Group B (n = 4) was also fed casein but was exposed for 2 h per day to a 60-Hz magnetic field at 3 microT (30 mG).
- Group C (n = 6) was fed a “regional basic diet” (RBD) and was not exposed to EMF.
- Group D (n = 4) was fed an RBD and was also exposed for 2 h/day to ELF MF.

The RBD was based on the typical diet consumed in north-eastern Brazil and consisted of beans, manioc flour, dried and salted meat, and sweet potato that had been palletized. This diet is deficient in proteins, calories, fat, vitamins, and minerals.

After the rats had given birth, they were anesthetized and blood samples were taken for analysis of glucose, cortisol, insulin, and the thyroid hormones T3 and T4. The data were analyzed with ANOVA and Tukey tests with $p < 0.05$ considered to be significant.

RESULTS

The results by endpoint were as follows:

- For glucose, the only significant difference was between Groups C (63.4 +/- 12.2 mg/dL) and D (135.1 +/- 55.1 mg/dL) ($p = 0.012$).
- For insulin, the only significant difference was between Groups A (1.22 +/- 0.55 microIU/mL) and C (0.28 +/- 0.08 microIU/mL) ($p = 0.03$).
- For cortisol, the only significant difference was between Groups A (0.75 +/- 0.25 microg/dL) and C (0.34 +/- 0.12 microg/dL) ($p = 0.045$).
- “The T3 serum concentration of the rats was significantly different among Groups ($p = 0.01$). The average for Group A was 1.47 +/- 0.05 nmol/L, for Group B was 0.42 +/- 0.09 nmol/L, for Group C was 0.13 +/- 0.03 nmol/L, and for Group D was 0.04 +/- 0.01 nmol/L,” the authors report.
- For T4, Group A differed significantly from Groups B, C, and D, and Group B differed significantly from Group C, with the levels for Groups A, B, C, and D being 14.89 +/- 2.17 nmol/L, 9.25 +/- 1.92 nmol/L, 3.87 +/- 1.10 nmol/L, and 7.24 +/- 3.47 nmol/L respectively.

Anselmo et al. point out that the ratio of the serum concentrations of T4 to T3 differs by a “huge” -- almost 18-fold -- amount between Groups A, the control group, and D, the group both fed RBD and exposed to EMF.

From the results for glucose and for T3 and T4, the authors suggest that exposure to ELF MF alters both stress responses and energy metabolism, particularly in conjunction with undernutrition.

BIBLIOGRAPHIC INFORMATION: Anselmo CWSF, Pereira PB, Catanho MT, Medeiros MC. Effects of the electromagnetic field, 60 Hz, 3 microT, on the hormonal and metabolic regulation of undernourished pregnant rats. *Braz J Biol.* 2009 May;69(2):397-404.

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