Operant Tests in Rats after prenatal Exposure to Low Density 1800MHz(CW)-RF

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Our facing Problem

- **Mobile telecommunications technologies have been introduced:**
- **without full provision of information about their nature**
- **without prior discussion within the scientific community about possible consequences for health**

Concerns about possible health risks associated with EMF

- Scientific reports have suggested that exposure to electromagnetic fields emitted from these devices could have adverse health effects as below;
- Cancer
- Reduced fertility
- Memory loss
- Alzheimer's and Parkison's diseases
- Adverse changes in the behavior and development of children
- and many others.

The Use of Mobile Phones in China

Over 2003 period alone approximately 60 million phones were sold in the mainland, China.

At present (April 2004) there are about 300 million mobile phones in circulation.

Objective

Our experiment was motivated by research needs as defined by the World Health Organization(WHO), to clarify potential health risk of EMF's presented by cellular telephone technology.

Appropriate end points for this study

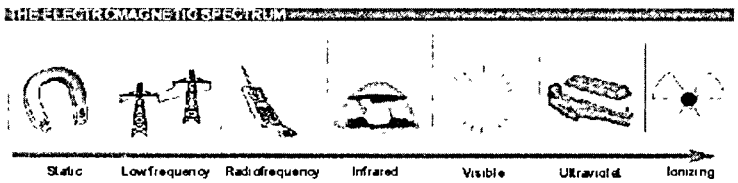
- **Functional or behavioral changes in an organism often take place prior to structural changes.**
- **Functional changes in the central nervous system(CNS) are among the earliest to become observable.**
- **the sensitivity of CNS-functions to interfering agents during animal development**

the International EMF Project

In May 1996, in response to growing public health concerns in many Member States over possible health effects from exposure to an ever-increasing number and diversity of EMF sources.

the World Health Organization (WHO) launched an international project to assess health and environmental effects of exposure to electric and magnetic fields(EMF),which became known as the International EMF Project.

Electromagnetic Spectrum



Material and Methods

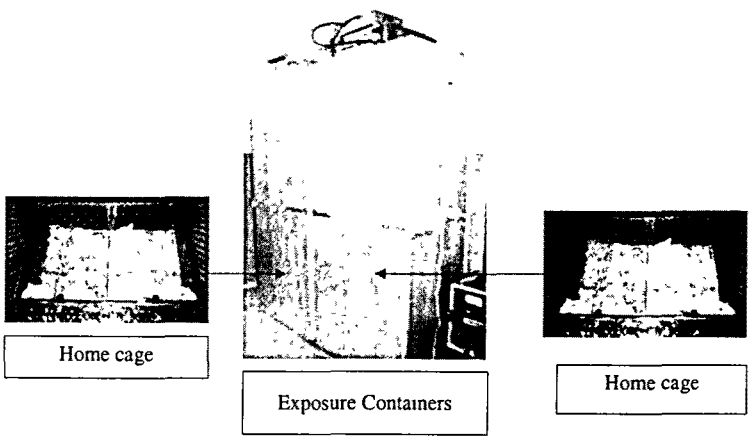
Prenatal Exposure

A group of 8 pregnant WISTAR rats was continuously exposed from post conception days 1-20 to an EMF of 1800MHz(CW)-RF.

RF-Radiation was applied to the animals in far-field conditions at a power-density of either 0.5 mW/cm^2 or 1.0mW/cm^2.

A third group of 8 pregnant control rats was simultaneously sham-exposed

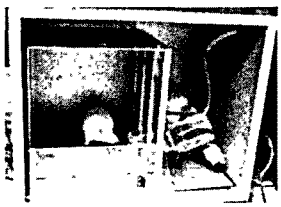
Exposure Chambers

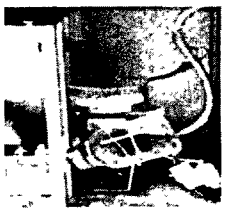


Operant tests in Offspring

- **In the context of a double blind study, male and female offspring of exposed and control dams were coded and tested when adult(10 weeks old) in 4 simultaneously Skinner Box by 6 different contingencies of DIFFERENTIAL REINFORCEMENT OF HIGH (DRH) and OF LOW (DRL) RATE.**

Operant Chambers(Skinner Box)





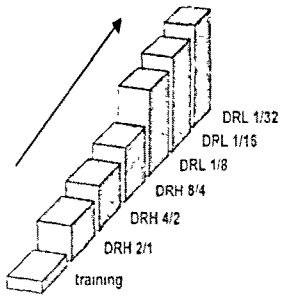
Rats were required press a lever for food reward in three sets of 3 different DRH and DRL schedules each.

A test session lasted 15 hours, was run during night(16:00-07:00), and was subdivided into alternating 30 min ON- and 60 min OFF-periods. Food reinforcement was available during ON-periods only.

Animals were challenged by requirement which were incrementally increased in subsequent test session.

test session

- Subjects were trained automatically by a DR0
- Differential Reinforcement of High Rate
- DRH 2/14/28/4- where 2,4,and final 8 lever press were required within 1,2, reps.4 sec to obtain a reinforcement.
- *Example:DRH2/1 asks the rat to press the bar 2times in 1 second for 1 food pellet.*
- Differential Reinforcement of Low Rate, DRL 1/8DRL 1/16, DRL 1/32)
- *Example: DRL1/16, this blocking interval lasts 16s. The duration of the interval is signaled by a cue light.*

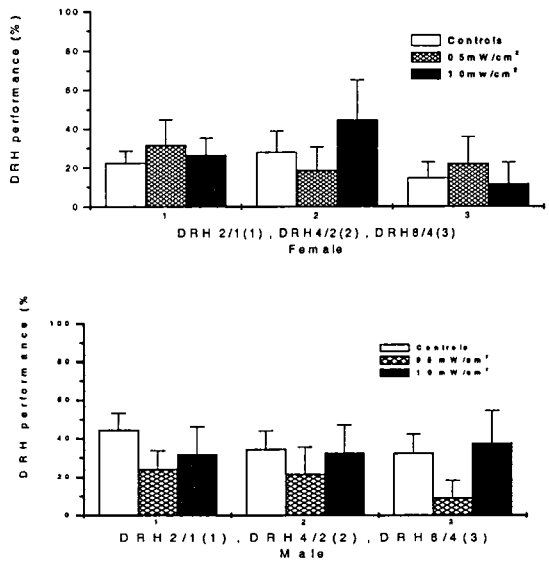


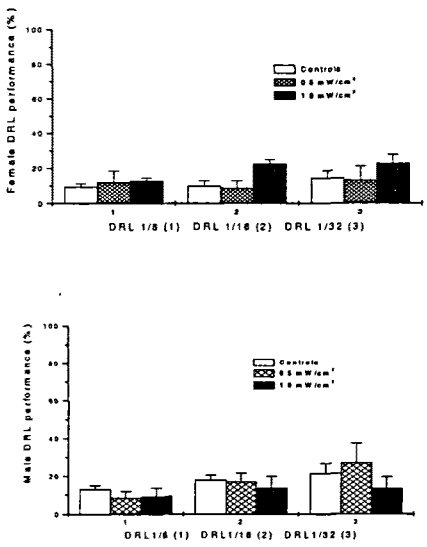
Analysis

- Lever pressed during ON and OFF periods and reinforcements in the individual test Chambers were counted and stored in the custom-built, computer-assisted operant-behavior control equipment.
- Operant behavior in 4 male and 4 female animal groups (n=8) was expressed as performance (ratio of reinforcements vs. lever presses) where the specific test requirement was taken into account.

Results

- **No differences between exposed and control animals were observed concerning weight gain in the dams, delivery date, little size, sex ratio, weight gain in the offspring, and developmental landmarks (eye opening, pinna detachment, incisor eruption, surface right, vaginal opening, descent of testes) in litter mates.**





Conclusion

- **RF-induced operant performance changes in the offspring of prenatally exposed were not observed**
- **This study showed negative results in the offspring of rats exposed to either 0.5 mW/cm^2 or 1.0mW/cm^2 in far field.**