

## **PRECAUTIONS SUGGESTED FOR THE USE OF CELL PHONES, ESPECIALLY FOR EMBRYOS AND CHILDREN, BASED ON A SERIES OF BIO-ELECTROMAGNETIC EXPERIMENTS**

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During the last twenty years, a series of experimental works carried out on various experimental animals (mice, rats, quails and chicken) for comparative reasons, to show the sensitivity of their embryos to the radiofrequency radiation. These works were performed and published in cooperation with Prof. Th. Xenos (Department of Electrical and Computer Engineering, A.U.Th).

The first experimental study that took place, about 20 years ago, around the "antenna park" of Hortiatis, arose strong indications on the potential adverse effects from the non ionizing radio-frequency radiation on the prenatal development of the experimental mice. Twelve pairs of mice were placed in locations of different power densities of 168-1053 nW/cm<sup>2</sup> and repeatedly mated five times. The 118 collected newborns were examined macro- and microscopically. A progressive decrease in the number of newborns per dam was observed, which ended in irreversible infertility. These results were strong indication of the embryo-toxicity from radio-frequency radiation sources. The "experiment of Hortiatis", performed in situ, was attended by a series of experimental studies in labo. Some of them are presenting following in brief: (a) Two groups of 12 pregnant rats were continuously irradiated to non thermal pulsed microwaves, to a power density of 5.0  $\mu$ W/cm<sup>2</sup>, at 9.35 GHz. The first group was irradiated during 1st-3rd day after fertilization and the second during 4th-9th day of the gestation. The 58 % of the dams of the first group and 50 % of the second did not give birth. The uteri of these dams presented traces of embryonic absorption. These results support the aspect that very low power density microwaves, applied in pregnant rats, during embryogenesis and organogenesis, may cause adverse effects on their embryos. (b) Six groups of 40 quail embryos, in ovo, were exposed to different degrees of low power radio-waves radiation at 95 MHz, during the first three incubation days. A 17.91 % of embryonic and fetal deaths were observed among the exposed embryos, in relation to a 3.33 % among the controls. (c) Sixty quail embryos, in ovo, were exposed to a very low power density of 5.0  $\mu$ W/cm<sup>2</sup> pulse modulated microwave radiation, at 9.31 GHz, during the three incubation days. An abnormally high rate of embryonic and fetal deaths (65 %) was observed among the exposed embryos, in relation to 11.7 % among the controls. (d) Three groups of 54 chicken embryos, in ovo, were exposed, for 16 hours daily, to non thermal low power densities, at 95 MHz, of VHF radio-waves during 3rd-10th day of incubation (the first group in power densities of 30  $\mu$ W/cm<sup>2</sup> and the second and third group 150 mW/cm<sup>2</sup>). Embryonic deaths and congenital malformations have been observed, 27.7 % in the first group, 33.3 % in the second and 38.8 % in the third, instead of 1.7 % in the control group. (e) 380 chicken embryos, in ovo, were exposed to non-thermal very low power density radiation of 8.8  $\mu$ W/cm<sup>2</sup> at 9.152 GHz (172 embryos in pulse modulated and 208 in non-modulated microwaves), during 3rd-10th incubation day. Developmental retardation, grave malformations, stillborns, embryonic deaths and

fetal deaths were found in 62.78 % of the first group, 47.12 % of the second and only 3.44 % of the controls. These results supported the aspect that very low power density microwaves, applied to chicken embryos, in ovo, during organogenesis, cause abnormal development. The high sensitivity of the mouse, rat, chicken and quail embryos to the low power density microwaves is a strong indication of corresponding high sensitivity of higher mammalian or human embryos, because of their similarities on the initial stages of their prenatal development. According to the results from our experimental studies, as well as to the precautionary principle, every possible precaution from the radiofrequency radiation, as those of the cell phones, is suggested for the human embryos as well as for the children.