

Short report on the national activities on EMF

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➤ **General research activities in India related to EMF health –**

- i. **Shahin S, Mishra V, Singh SP, Chaturvedi CM. 2.45-GHz microwave irradiation adversely affects reproductive function in male mouse, *Mus musculus* by inducing oxidative and nitrosative stress. *Free Radic Res.* 2014; 48(5):511-25.**

The study reported that MW irradiation induced a significant decrease in sperm count and sperm viability along with the decrease in seminiferous tubule diameter and degeneration of seminiferous tubules. Reduction in testicular 3β HSD activity and plasma testosterone levels was also noted in the exposed group of mice. Increased expression of testicular i-NOS was observed in the MW-irradiated group of mice. Further, these adverse reproductive effects suggest that chronic exposure to nonionizing MW radiation may lead to infertility via free radical species-mediated pathway.

- ii. **Kesari KK, Meena R, Nirala J, Kumar J, Verma HN. Effect of 3G cell phone exposure with computer controlled 2-D stepper motor on non-thermal activation of the hsp27/p38MAPK stress pathway in rat brain. *Cell Biochem Biophys.* 2014; 68(2):347-58.**

The data indicated that microwave radiation emitted from 3G mobile phone significantly induced DNA strand breaks in brain. Meanwhile a significant increase in micronuclei, caspase 3 and apoptosis were also observed in exposed group ($P < 0.05$). Western blotting result shows that 3G mobile phone exposure causes a transient increase in phosphorylation of hsp27, hsp70, and p38 mitogen-activated protein kinase (p38MAPK), which leads to mitochondrial dysfunction-mediated cytochrome c release and subsequent activation of caspases, involved in the process of radiation-induced apoptotic cell death. Study shows that the oxidative stress is the main factor which activates a variety of cellular signal transduction pathways, among them the hsp27/p38MAPK is the pathway of principle stress response. Results conclude that 3G mobile phone radiations affect the brain function and cause several neurological disorders.

- iii. **Meena R, Kumari K, Kumar J, Rajamani P, Verma HN, Kesari KK. Therapeutic approaches of melatonin in microwave radiations-induced oxidative stress-mediated toxicity on male fertility pattern of Wistar rats. *Electromagn Biol Med.* 2014; 33(2):81-91.**

The present study reported that melatonin prevent oxidative damage biochemically by significant increase ($p < 0.001$) in the levels of testicular LDH-X, decreased ($p < 0.001$) levels of MDA and ROS in testis ($p < 0.01$). Meanwhile, it reversed the effects of MWs on XO, protein carbonyl content, sperm count, testosterone level and DNA fragmentation in testicular cells. These results concluded that the melatonin has strong antioxidative potential against MW induced oxidative stress mediated DNA damage in testicular cells.

- iv. **Behari J, Nirala JP. Specific absorption rate variation in a brain phantom due to exposure by a 3G mobile phone: problems in dosimetry. Indian J Exp Biol. 2013; 51(12):1079-85.**

The authors concluded that SAR values are sensitive to the angular position of the moving platform and are well below the safety criteria prescribed for human exposure. The data are suggestive of having a fresh look to understand the mode of electromagnetic field -bio interaction.

- v. **Kesari KK, Siddiqui MH, Meena R, Verma HN, Kumar S. Cell phone radiation exposure on brain and associated biological systems. Indian J Exp Biol. 2013; 51(3):187-200.**

The present study summarizes the public issue based on mobile phone radiation exposure and their biological effects. This review concludes that the regular and long term use of microwave devices (mobile phone, microwave oven) at domestic level can have negative impact upon biological system especially on brain. It also suggests that increased reactive oxygen species (ROS) play an important role by enhancing the effect of microwave radiations which may cause neurodegenerative diseases.

➤ **New policies and legislations regarding EMF exposure**

Under the direction of the honorable Prime Minister of India, an Experts Committee has been established at the Department of Science and Technology (DST), Ministry of Science and Technology, Govt. of India to identify the researchable areas to study the effect of electromagnetic radiations emitted from Cell Phones and Cell Phone Towers on human health, animals, environment, plants, agriculture etc.. The Committee invited proposals in the above mentioned areas from various Institutions in the country. Numbers of proposals have been received in response to the call of proposals, in these disciplines and currently these proposals are under evaluation.

➤ **Areas of public concern and National response**

Both electronic and print media are regularly raising the concern of the people who are living near the cell phone towers. Even few Court Cases have been filed under various High Courts of the country in relation to installation of cell phone towers and their adverse effect on the health of the people. Various residential welfare associations and number of independent activist have raised the various types of health hazards being faced by the people living near the cell phone towers. In few cases it has been published in the news paper indicating that the incidence of cancer has increased among the people residing near the cell phone towers.

➤ **New public information activities**

Numbers of public debates are being organized to obtain the views of the people and to educate them regarding the adverse effects of Radio Frequency Radiations emitted from cell phones and cell phone towers.