



# Cancer Development and Electromagnetic Fields in Near Future

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Radiation is classified roughly in three different categories according to its electromagnetic field frequency; non-ionized (non-ionizing) electromagnetic radiation, ionizing electromagnetic radiation and ionizing particle radiation (1,2). X-rays and gamma rays classified as ionizing electromagnetic radiation are used in many areas, especially in health care industry for diagnostic and therapeutic purposes (1-3). The effects of increasing electromagnetic pollution on living organisms have continuously been a current issue (4). Many studies have been conducted and the results have been discussed in order to assess the effects of electromagnetic pollution on various biological systems. Electromagnetic waves could cause serious illness on living beings depending on their physical characteristics and health conditions (5). As a consequence of rapid development of next-generation communication systems and eventual increase in the number of users, electromagnetic pollution steadily increases. In fact, it is obvious that any electromagnetic wave with high frequency may create at least a moderate thermal effect on living organisms. Therefore, to claim that high-frequency electromagnetic fields have no effect on living beings is not consistent with the scientific facts. A number of epidemiologic studies have managed to establish an association between some types of cancer and an increase in the number of base stations and the use of mobile phones (6,7). In a case-control study performed in northern Italy in 2010, the risk for development of certain malignancies following an exposure to magnetic field produced by power lines was investigated, and the density of electromagnetic fields was calculated (8). In conclusion of the study, increased risk for hematological malignancy has been shown in children under the age of 14, even though the difference could not reach the statistical significance. Studies investigating the effects of long-term use of mobile phones ( $\geq 10$  years) on cancer development have great importance for understanding the real effect since long-term exposure to environmental effectors may lead to the development of solid tumors (9). Similarly, in a study conducted by Lönn et al on 752 people living in Sweden, it has been reported that at least 10 years of mobile phone use increases the risk of acoustic neuroma (9). Still there

are many points not fully known of the potential effects of electromagnetic radiation emitted by mobile phones, base stations, wireless internet connections on health. Although there are some studies reported contradictory results, the health risk brought by widespread electromagnetic fields is an indisputable fact (8). Review of similar publications (9) in the literature reveals the necessity of

reporting the cancerous changes in determination of the effects of electromagnetic fields on both living beings and the environment and making measurements based on long-term observations regarding with the subject. Experimental and functional studies are also required to determine the pathophysiology of molecular damage at the cell and tissue levels. In the near future, enhancing by the increase of high frequency and broadband wireless data transfer systems, it is obvious that all humanity will be surrounded by communication-based electromagnetic waves. Additionally, depletion of fossil fuels will facilitate the widespread use of alternative transportation systems such as electric vehicles eventually resulting in much higher extent of pollution of electromagnetic fields inevitably. The problem named increased electromagnetic pollution caused by the development of technology remains an issue to be urgently intervene because its deleterious effects on health will emerge in long period of time.

## Conflict of interests

The authors have no conflict of interests to disclose.

## Acknowledgements

None.

Zafer Akan graduated from Yuzuncu Yil University, Faculty of Science, Department of Physics and MSc in the Yuzuncu Yil University School of Medicine, Department of Biophysics, and PhD in the Marmara University School of Medicine Department of Biophysics and University of North Carolina Department of Biochemistry-Biophysics Aziz Sancar Lab. NC USA at 2009. Main research area of Zafer Akan is about cancer molecular pathway and boron neutron capture therapy for soft tissue, head and neck cancers. Moreover Zafer Akan has published works about antioxidants and cancer relations. Besides involved in the editorial boards of many international scientific journals, he is already, editor in chief of *International Journal Medical Science and Discovery*.



Received 23 April 2015, Accepted 14 September 2015, Available online 1 October 2015

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