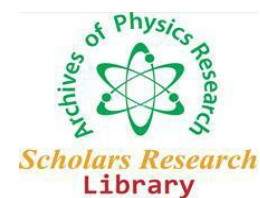




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Can Non-Ionizing Radiation Cause Cancer?

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ABSTRACT

Our exposure to non-ionizing radiation (NIR) has been increasing steadily with our use of electricity, electronic equipment and more recently with our use of wireless technology. Concurrently, epidemiological studies have been documenting an increased cancer risk for people who use cell phones for 10 years or more [1,2] and for those who live near cell phone base stations [3,4,5], broadcast antennas [6,7], radar installations [8], or powerlines [9]. Health care authorities and physicists dismiss these studies because non-ionizing radiation doesn't have enough energy to break chemical bonds and, hence cannot cause cancer. Right? Wrong!

Keywords: Non-ionizing radiation, Radiation, Cancer, Chemical bonds, Free radical

INTRODUCTION

The statement that non-ionizing radiation cannot cause cancer because it does not have enough energy to break chemical bonds is based on a flawed assumption that doesn't take into consideration the complexity of biological systems. Ionizing radiation, like chemical oxidizing agents, can create free radicals, which are known to be carcinogenic. What seems to be a conundrum is that exposure to non-ionizing radiation also leads to an increase in free radicals. This conundrum can be resolved if we examine the production of free radicals in living systems.

Free radical production is a normal byproduct of respiration and metabolism and causes cellular damage that can lead to cancer, aging and a variety of diseases [10]. Healthy organisms produce antioxidants (such as glutathione and melatonin and enzymes like catalase and superoxide dismutase) and use dietary antioxidants (like vitamin A, C, E, CoQ10, manganese, selenium, zinc, etc.) to prevent cellular damage,

Free radicals increase, if more are produced than can be neutralized. Ionizing radiation increases free-radical generation and non-ionizing radiation interferes with repair processes inside living organisms both of which result in a buildup of free radicals and greater free radical damage, including cancers.

RESULTS

[11] reviewed the literature consisting of experimental data on oxidative effects in living cells exposed to low intensity radio frequency radiation (RFR). Of the 100 peer-reviewed studies available, 93 confirmed that RFR induces oxidative effects in biological systems that included both cancer and non-cancer pathologies. They concluded that low-intensity RFR is an oxidative agent with high pathogenic potential.

Extremely low frequency (ELF) electromagnetic fields (EMF) (less than 300 Hz) have even less energy than RFR and yet these frequencies have also been associated with cancers [9], free radical production and oxidative stress. Lai [12] compiled abstracts related to extremely low frequency electromagnetic fields and oxidative stress and found that of the 110 publications, 97 (84%) reported effects that include oxidative damage including DNA and neurological damage; apoptosis (cell death); altered antioxidant

enzyme activity; and altered immune system response. Supplementation with anti-oxidants (Zn, Se, Vitamin C and melatonin) reduced the harmful effects of ELF EMFs.

CONCLUSION

The empirical evidence clearly shows that NIR is carcinogenic despite the fact it doesn't have enough energy to break chemical bonds. The International Agency for Research on Cancer needs to alter their designation of both ELF and RFR from a class 2b "possible carcinogen" to at least a class 2a "probable carcinogen." And the International Commission on Non-Ionizing Radiation Protection [13] needs to change their guidelines to levels that truly protect public health, especially since our exposure is likely to increase with a greater variety of wireless devices coming on the market.

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