

Cell Phone and Cancer Risk

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Abstract: Thanks to the technology, mobile devices including cell phones have become an integral part of the modern life. Therefore, public concern pertaining to short-term and long-term possible adverse effects of using cell phone and electromagnetic radiation exposure of it is growing rapidly. There are various studies by which the positive and negative results have been demonstrated. The relationship between cell phone exposure and developing cancer risk has been still unclear. This review presents the relationship between cell phone use and cancer risk and declaration of some organisations.

INTRODUCTION

Thanks to advances in industrial and technological field, cell phones have become an integral part of the modern life and available for users because of the falling costs. Within this perspective, it leads to the rise of the number users in many countries as well as Turkey. Public concern pertaining to possible adverse effects especially causing cancer due to electromagnetic field (EMF) exposure from cell phone is growing rapidly [1].

Electromagnetic field is separated into 3 categories according to frequencies. These are non-ionizing, ionizing and ionizing-particle radiations. The EMF category of cell phone is non-ionizing radiation. Non-ionizing radiation refers to any type of electromagnetic radiation that does not carry enough energy to ionize atoms or molecules [1-3]. Specific absorption rate (SAR) is a measure of the rate at which energy is absorbed by the human body when exposed to a radiofrequency (RF) EMF. It has units of watts per kilogram (W/kg). Although the limit of SAR values varies between 0.008 and 4.2 W/kg, the average of SAR is 0.13–1.4 W/kg [4]. Accepted upper limit of SAR value of the cell phone is 0.1 W/kg. As known, cell phones are used for communication by transmitting radio frequency. Such radiation exposure is not only derived from cell phones but also derived from Wi-Fi, television, and radio transmitters [5]. It is known that EMF exposure can cause damage on chemical bonds but not on humans' deoxyribonucleic acid (DNA) [6]. Nevertheless, EMF could be absorbed by the tissues [5]. The cause-effect relationship and mechanism have been unclear. Because of the public concern about EMF exposure, it has been under investigation.

Cell Phone Exposure in a Short-Term

To understand the short-term effect of EMF exposure on physiological changes, cognitive performance and pathological setting have been investigated. The studies have reported that headache, dizziness, tachycardia could occur due to keeping the cell phone close to the body. However, these symptoms were not significant [7, 8]. Up to now any convincing evidences have not been shown except for the tissue heating effect [9].

Cell Phone Exposure in a Long-Term

The link between potential long-term exposure of EMF and brain tumors and cancer have been searched on cell phones. Although many animal studies have been performed to try to search the long-term effects of EMF exposure, they could not able to demonstrate an increase in developing cancer. Fifty-minute or long cell phone exposure could cause an increase in brain glucose metabolism despite the fact that clinical importance of increased brain glucose metabolism have not known [10, 11]. Few studies trying to search the relationship between EMF exposure and long-term health effects have showed that some chromosomal and genetic damages could be detected. Therefore, consequences of

such damages of having long-term EMF exposure could be a bit risky for increased neoplasia or age-related diseases. For instance, using long hours (≥ 100 hours of cumulative use) and starting to use cell phone before the age of 20 can cause a higher risk for developing intracranial tumors and neuropsychiatric problems [12-14].

Cell Phone and Cancer

The first concern on EMF exposure and related issues especially cancer dates back to three or four decades but the evidence of association between them is weak and limited. That's why The International Agency for Research on Cancer has classified it as Group 2B (Possibly Carcinogenic). Therefore, information on using of the cell phone use about increased cancer risk is contradictory [15]. In order to understand the association, many investigations have been performed. In a meta-analysis consisted of 17 articles on intracranial tumors and cell phone use published in 2012 [16, 17]. The link could not be demonstrated. Evidence for a relationship between cancer and cell phone use has not been shown in an extended study [18].

Concerning this subject, the largest study, INTERPHONE, conducted by researchers from 14 countries, searched the association of cell phone use, duration of cell phone use and intracranial tumors such as meningioma and gliomas. They found no significant relationship [19]. They only reported a little increase in developing glioma risk when using long term but then added that those findings had to be investigated and supported. The association between EMF exposure and intracranial tumors was not demonstrated by other studies either. [20, 21].

Studies evaluating the relation with cranial tumors have revealed positive correlation in long-term use. The positive correlation was found between cancer risk and at least 10 year-use by taking survey and assessing the retrospective data [22, 23].

As there have been uncertainties about this subject for decades, some organizations such as World Health Organization (WHO), The American Cancer Society (ACS), and The U.S Centers for Disease Control and Prevention (CDC) need to state declarations. WHO declared that no cancer event have been developed. ACS states that there could be a risk but not strong enough. CDC declared that no scientific evidence was reported [11].

CONCLUSION

Thanks to advances in industrial and technological fields, mobile devices especially cell phones have become available for users because of the falling costs. Although many studies have tried to look for the relationship between RF exposure of cell phone and cancer, they have pointed the risks of long-term cell phone use (≥ 100 hours/ ≥ 10 years) causing cancer and/or age-related diseases. Therefore, cell phone users have been concerned about possible health effects of long-term cell phone use due to the contradictory results.

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