

## Cancers of the Brain and CNS: Global Patterns and Trends in Incidence

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### ABSTRACT

Miranda-Filho et al. in their recently published paper entitled “Cancers of the brain and CNS: global patterns and trends in incidence” provided a global status report of the geographic and temporal variations in the incidence of brain and CNS cancers in different countries across continents worldwide. While the authors confirm the role of genetic risk factors and ionizing radiation exposures, they claimed that no firm conclusion could be drawn about the role of exposure to non-ionizing radiation. The paper authored by Miranda-Filho et al. not only addresses a challenging issue, it can be considered as a good contribution in the field of brain and CNS cancers. However, our correspondence addresses a basic shortcoming of this paper about the role of electromagnetic fields and cancers and provides evidence showing that exposure to radiofrequency electromagnetic fields (RF-EMFs), at least at high levels and long durations, can increase the risk of cancer.

### Keywords

Mobile Phones, Cancer, Radiofrequency (RF), electromagnetic fields (EMFs)

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With great interest, we have read the article by Miranda-Filho et al. entitled “Cancers of the brain and CNS: global patterns and trends in incidence” that is published in the journal of Neuro-Oncology (2016) doi:10.1093/neuonc/now166 [1]. In this article, the authors provided a global status report of the geographic and temporal variations in the incidence of brain and CNS cancers in different countries across continents worldwide. The paper authored by Miranda-Filho et al. not only addresses a challenging issue, it can be considered as a good contribution in the field of brain and CNS cancers. However, it has at least one basic shortcoming regarding its literature review. The authors confirmed the role of genetic risk factors and ionizing radiation exposures but claim that no firm conclusion could be drawn about the role of exposure to non-ionizing radiation, a new type of inescapable exposure which has been increased exponentially over the past decades “*Exposure to non-ionizing radiation, especially radiofrequency fields from mobile phones but also low frequency fields, infections with some viruses, use of hormonal contraceptives, hormone replacement therapy, statins, vitamin D level, alcohol, height, BMI, and occupational exposures have been investigated, but no firm conclusions can be drawn at present*”. They also cite a Nordic study which could not show any association between increased mobile phone use and glioma “*A recent study conducted in the Nordic countries (Denmark, Finland, Norway, and Sweden) revealed that although mobile phone use increased dramatically, the incidence of glioma remained almost constant between 1979 and 2008 in all 4 countries*”. It seems that Miranda-Filho et al. did not consider the findings of other studies which found a significant link between exposure to non-ionizing radiation and cancer. For example, a recent large-scale study conducted by the U.S. National Toxicology Program (NTP) revealed statistically significant increases in cancer in rodents exposed to GSM or CDMA signals for two-years. This study showed that when the intensity of the radiation increased, the incidence of cancer among the rats also increased [2]. This

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25,000,000 USD study that is the most complex study completed by the NTP, showed that the occurrence of malignant gliomas in the brain and schwannomas of the heart, can be linked to exposure to mobile phone radio-frequency radiation (RFR) “*The occurrences of two tumor types in male Harlan Sprague Dawley rats exposed to RFR, malignant gliomas in the brain and schwannomas of the heart, were considered of particular interest, and are the subject of this report*”.

It is worth noting that the NTP study is criticized for its possible flaws by some researchers. In this light we can even exclude this study and consider other studies which seem to be more valid. Bortkiewicz et al. have recently performed a meta-analysis and reported that their findings supported this hypothesis that long-term use of mobile phones was linked to increases risk of intracranial tumors [3]. Another meta-analysis performed recently by Wang and Guo showed a significant association between mobile phone use (> 5 years use) and the risk of glioma [4]. Furthermore, Yakymenko et al. have previously reviewed the published data on carcinogenic effects of long term exposure to low intensity microwave radiation [5]. They stated that there were reports indicating that exposure to low intensity microwave could lead to cancer progression in laboratory animals and humans. They also stated that the carcinogenic effect of these radiations was more prominent for long term exposures (> 10 years).

Moreover, as Miranda-Filho et al. had claimed that in case of low frequency fields there is no firm conclusions at present, it is worth noting that the findings of a case-control study performed by Carlberg et al. on occupational exposure to extremely low-frequency electromagnetic fields and glioma risk found an increased risk in late stage (promotion/progression) of astrocytoma grade IV [6].

There are scientists who believe that we cannot see the fingerprint of any increase in brain cancer incidence at population-level. They focus on this point that mobile phones were introduced 30 years ago and became ubiquitous 20 years ago or so. Therefore, we should be high on the shoulder of any brain cancer temporal risk distribution by now and if that risk were real and significant we should be able to see it, while we cannot. Based on the current evidence, it can be claimed that the fingerprint (increased brain cancers) is indeed visible now! “*Mobile phone use has been increasing in Western, developed societies (de Vocht et al., 2011; Khurana et al., 2009) as well as worldwide (Khurana et al., 2009), and in parallel the incidence of certain types of brain cancers has also been increasing in the previous decades (Dobes et al., 2011; Zada et al., 2012)*” [7]. Moreover, EMF-induced cancers cannot be limited to brain and CNS cancers and other cancers (e.g. thyroid cancers) should be taken in to account “*This study*

*has shown an increasing incidence of thyroid cancer in Sweden and the Nordic countries. Better diagnostic imaging cannot solely account for the increase*”... “*Exposure to RF-EMFs also merits in-depth investigation. The design of our study does not permit conclusions regarding causality*” [8].

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