Medical Safety & Global Health
ISSN: 2574-0407
OPEN ACCESS Freely available online
Editorial

Editorial Note on Impact of Mobile Phones on Public Health

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EDITORIAL

The dramatic upsurge in information and communication technology in the past decade has had a great impact on our daily lives. The use of mobile phones has increased exponentially in Australia with a high proportion of all age groups now using them. In early 2000, the number of subscribers to cellular telephone services had grown to about 500 million worldwide. The use of these telephones exposes us to radiofrequency electromagnetic fields. Other sources of this type of energy field include antennas used for AM and FM radio, TV, cellular telephony, paging systems and amateur radio. Computers, microwaves and cordless phones also emit this type of energy, but these products have to meet safety requirements before manufacture. Moreover, cordless phones have a very low energy level because of the short distances over which they have to transmit. Information regarding human exposure to radiofrequency emissions from portable phones, wireless phones and other devices is available on the web (http://www.fcc.gov/oet/rfsafety/cellpcs.html). For a specific apparatus, if you can find the Federal Communications Commission (FCC) ID number, this site will give you the maximum specific absorption rate (SAR) value. Specific concerns have been raised about the potential adverse health effects which might be caused by exposure to the electromagnetic fields generated by cellular telephones. Analogue phones operate on radiofrequency (microwave) signals in the 800–900-MHz range. In this issue, Dr Finnie and co-workers report on the effect of GSM-like radiofrequency fields on vascular permeability in the brains of mice.

They used a purpose-designed exposure system at 898.4 MHz and the mice were exposed for 60 min at a SAR of 4 W/kg. Most safety guidelines recommend that mobile phones should not cause a localised exposure in excess of a SAR of 1.6 W/kg and studies of human head models show that, generally, cellular phones have SAR levels below 1.6 W/kg. Exposure of the mice to 4 W/kg did not significantly disrupt the integrity of the blood–brain barrier. However, the authors will extend this study to a more chronic model (12 months) so that the exposure will more closely reflect our use of mobile telephones. The effects of the radiofrequency field on the integrity of the blood–brain barrier will again be studied but, more importantly, the mouse brains will be examined for evidence of tumour development and growth. This appears to be the most important public health concern: does exposure to electromagnetic energy emitted by mobile phones (when in use) increase the risk of tumours or accelerate the growth of tumours in adjacent tissues? The most highly exposed area of the body to radiofrequency energy from handheld cellular phones is the ipsilateral ear and cheek regions. This relates to the proximity of the phone antenna. There is less concern over car-mounted phones because the antenna is mounted on the roof and the vehicle acts as a shield.

The proposed mechanism of action of the radiofrequency energy would appear to be non-thermal because the heating effect of the radiofrequency energy is negligible. A typical cellular phone, which operates at a power output of 0.25 W, results in a SAR of about 1.5 W/kg and causes a rise in brain temperature of about 0.1°C. Direct genotoxic effects also seem unlikely based on several experimental studies. There are currently insufficient data to answer the question of the role of radiofrequency energy exposure in tumour induction and/or promotion. In several experimental studies of the effects of radiofrequency exposure, biological events have been demonstrated. Salford et al. demonstrated increased blood–brain barrier permeability in rat brain after exposure to continuous and pulsed 915-MHz microwaves at SARs between 0.016 and 5 W/kg. In another study, the incidence of lymphoma was increased following whole-body radiofrequency exposure in a transgenic mouse model. These transgenic mice (E mu-Pim1) are moderately predisposed to develop lymphomas spontaneously. Two other animal studies involving radiofrequency exposure to the head found no increase or a decrease in brain tumours. The latter study raises an interesting possibility: could radiofrequency exposure prevent or inhibit the development and growth of brain tumours?

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Received: November 03, 2021, **Accepted:** November 08, 2021, **Published:** November 13, 2021

Citation: Kato H (2021) Editorial Note on Impact of Mobile Phones on Public Health. Med Saf Glob Health. 10: 153