



Comment on I. B. Ergüder et al., “Effects of mobile phone use on brain tissue from the rat and a possible protective role of vitamin C – a preliminary study” [Int. J. Radiat. Biol. 86 (2010) 1044–1049]

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LETTER TO THE EDITOR

Comment on I. B. Ergüder et al., “Effects of mobile phone use on brain tissue from the rat and a possible protective role of vitamin C – a preliminary study” [Int. J. Radiat. Biol. 86 (2010) 1044–1049]

SIR: The paper by Ergüder et al. (2010) “Effects of mobile phone use on brain tissue from the rat and a possible protective role of vitamin C – a preliminary study,” presents a plausible hypothesis. However, while the biomedical aspects of the study design appear well thought-out, the engineering and physical aspects appear to reflect at least one serious misunderstanding. Also, some additional aspects of the experiment’s control conditions are not discussed. The necessity of adequately understanding all aspects of biomedical exposure and other relevant environmental aspects in experiments dealing with biological effects of physical exposures, including non-ionizing and ionizing fields, is well known. We (Greenebaum 2003) and others have previously described the lack of cross-disciplinary input to experiment design as a major problem in the literature and a significant contributor to the presence of conflicting results.

The radio frequency (RF) exposure conditions in Ergüder et al. (2010) are mischaracterized and the actual exposure of the animals cannot be determined. It is likely to be quite small, certainly much less than the authors infer. The authors state that they placed a mobile phone in the standby mode 10 cm above the cage in which a group of rats is housed and called the phone for 10 min, four times daily. They quote the published specific absorption rate (SAR) for this model as their exposure measurement.

This description has at least two major shortcomings:

- (1) The published SAR is intended to give the amount of RF power absorbed in the head of an adult who holds the phone touching the head when the phone is transmitting at full power (see, e.g., authors’ reference, <http://sarvalues.com>, or Hansson Mild and Greenebaum 2007). When in standby mode or when receiving a call, the phone only occasionally transmits and then only very briefly, at either a fraction of its full power or at full power, sufficient to provide satisfactory reception of its signal by the nearby base station. Knowing the phone’s quoted SAR gives no indication of how strongly it actually transmitted.
- (2) The amount of RF power (SAR) absorbed by an organism decreases very rapidly as the distance between the

phone and the organism increases. Furthermore, it is highly dependent on both the distance and orientation with respect to the antenna and on absorption and reflection of RF by nearby objects, including the rats’ cages and their relative position to each other’s bodies. Thus, the animals’ actual internal exposure to RF power (or local field strength, which under some hypotheses is a more reasonable dosimetric parameter and is calculable within limits from absorbed power and tissue properties), is quite unclear and is most likely much less than the authors imply.

In addition, the authors’ system of controls is at least questionable, since unexposed animals are located in a separate room from those exposed. If the mobile phones produced light or noise when called, that could be quite upsetting to the animals and could be important confounders. These points, however, are not discussed as are conditions such as temperature, noise and ambient RF and low-frequency fields which may or may not be similar in the two rooms.

In conclusion, the experiments testing the reasonable hypothesis of Ergüder et al. had serious problems resulting from an incomplete understanding of the physical factors to which the animals were exposed. It is vital for experimental teams to include expertise from all relevant disciplines. Their results, if confirmed, are important. This work should be repeated with proper exposure dosimetry, probably using a microwave exposure system that can be more easily characterized for a group of animals than a cell phone, and with other confounder controls in place.

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Declaration of interest

The author reports no conflicts of interest. The author alone is responsible for the content and writing of the paper.

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