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Mobile Phone Technology: An Assessment in Respect of Radiation Dangers

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ABSTRACT

There has been research and increasing media attention in respect of mobile phones as a cause of brain cancer in recent years. The purpose of the current report is to provide an assessment of the issue. The report considers the principle hierarchy of medical evidence in accordance with formal evidence based medicine (EBM) guidelines. As a means of validation, the report considers experiential and observational evidence. The principle findings of the report: at this stage the evidence is not sufficient to definitively implicate mobile phone technology as a cause of brain cancer.

Keywords (Terms): Carcinoma; EBM; Meta-Analysis; Mobile; Non-Ionizing; Radiation; RCT; Systematic Review; Technology.

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RESEARCH TEXT

There has been research and increasing media attention in respect of mobile phones as a cause of brain cancer in recent years (Khurana, 2009; Cresswell, 2010; NCA, 2009; SMH, 2011). The purpose of the current report is to provide assessment of the issue. Review of the literature would seem to indicate that the research conducted does not adequately address the issue. In brief, the principles of evidence based medicine (EBM) dictate the hierarchy of medical evidence as displayed directly below (Dettori, J; NHMRC, 2000; NHMRC, 2005):

The exact framework is slightly more complex with a number of designs arguable for levels three through five and also that some sources may indicate RCT to be more focused on research into therapeutic interventions as opposed to epidemiological issues and this is discussed further down in the current report.

Information Table 1: Medical Evidence Hierarchy	
Level I	Systematic Review of Level II RCT Evidence
Level II	RCT (Randomized Controlled Trial) Evidence
Level III	Cohort Study Design
Level IV	Case-control, case series study (or, audit)
Level V	Specialist opinion

The studies to date have been mainly the lowest (or, lower level) form of medical evidence revolving around case series, case-control and to some extent cohort studies. There is a lack of Randomized Controlled Trials (RCT) or systematic review of RCTs to support the claims of the research implicating mobile phone technology as a cause of brain cancer. As a means to validate the above we can analyze experiential and observational evidence. At this stage there appears no firm correlation between the incidence of brain cancer and the increasing use of mobile phone technology (Cardis et. al., 2007; IARC, 2013; Inskip et. al., 2010; ITSG, 2010; Johansen, 2001; NIH, 2016). As the 'overall' usage of mobile phone technology has increased over the years, the rate and incidence of brain cancer has not increased in the line with this to an extent of statistical significance (Cardis et. al., 2007; IARC, 2013; Inskip et. al., 2010; ITSG, 2010; Johansen, 2001; NIH, 2016). That being said, given the concerns and development of new and more powerful technology as time continues, it would not seem unreasonable to continue to monitor the situation. One argument against the findings of this report is that with hazardous entities (whether it be

chemicals, radiation or other) it is not ethical to conduct RCTs as this could mean randomly assigning persons to potentially dangerous exposure (Gordis, 2013). In this situation, however, mobile phone technology is widely in use (commonly everyday use) and has been for quite some time and therefore it would not seem unreasonable to consider RCTs in which participants provide voluntary consent. It is an issue that obviously could be considered by an approved ethics committee prior to any implementation.

Some of the studies have commented, in support of the notion that mobile phone technology is not linked causally to brain cancer, on scientific principles revolving around the wavelength and frequency of the radiation emitted by mobile phones and the fact that it represents a form of "non-ionizing radiation." Such principles are useful in that they can be used in delineation of a scientific model that assists conceptualization of the scientific processes underlying the applicable reality demonstrated by the results obtained. However, the principle foundation of the evidence still resides in the actual construction of the research, which needs to adhere to the formal EBM principles (Raymond, 2006). In fact, if the principles are adhered to correctly then a scientific question can be answered without needing to know the mechanism of action of the entity being investigated. For instance, whether a particular medication works or not for a given condition can be tested through implementation of a formal RCT regardless of whether the mode of action of the medication is known or not. The reason for this is that the results are based on subjects being completely randomized to group allocation and the only explainable difference therefore being the controllable variable (whether that be a medication, mobile phone technology or other) (Raymond, 2006). The analysis then further refined, for instance whether any difference identified was statistically significant.

One issue here not to be mistaken on would be that construction of an RCT to test safety of mobile phone technology would have to be constructed carefully to ensure it is a true RCT and not simply a cohort study which implements random selection of subjects.

The importance of research being conducted correctly should be reiterated. Low-level research consistently overestimates the effect of the entity under investigation (Altman, 1994; Juni, et. al., 2001; May, et. al., 1981; Moher, et. al., 2001; Raymond et. al., 2009). Non-blinding of researchers in RCTs alone causes significant bias of approximately 30% (Raymond et. al., 2009).

SUMMARY AND CONCLUSION

There has been research and increasing media attention in respect of mobile phones as a cause of brain cancer in recent years. Review of the issue would seem to indicate that the research conducted does not adequately address the issue. This is based on the following two key findings:

1. There is a lack of RCTs or systematic review of RCTs to support the claims of the research implicating mobile phone technology as a cause of brain cancer.
2. Experiential and observational evidence appears to demonstrate no firm correlation between the incidence of brain cancer and the increasing use of mobile phone technology. As the 'overall' usage of mobile phone technology has increased over the years, the rate and incidence of brain cancer has not increased in line with this to an extent of statistical significance. It would not seem that an adequate link has been proven in respect of mobile phone technology as a cause of brain cancer.

That being said, given the concerns and development of new and more powerful technology as time continues, it would not seem unreasonable to continue to monitor the situation.

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BIOGRAPHICAL DATA

The author (researcher) of the current report, Dr Simon Raymond MPH, is a consultant (specialising in medical and scientific research) and an Alumni of Melbourne University (Rank of Number 1 in Australia and Number 33 in the World). The above stated researcher is also qualified as a statistical analyst (qualitative and quantitative), has acted as a reviewer for the respected Medical Journal of Australia, has received invitations internationally to review from prestigious medical journals including JAMA (Journal of American Medical Association) Network, received award in recognition of his research by Royal Australasian College of Surgeons (PSC, 2006) and invited to conferences internationally as an official delegate and researcher. Dr Simon Raymond has acted as the principle researcher in the highest powered form of medical trial-Randomised Controlled Trial (RCT). The above stated researcher is also a member of the Golden Key International Society for honoured and outstanding academics and has been cited as a notable global leader.

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