Are FCC standards sufficiently protective?

The Federal Communication Commission's (FCC) exposure limits for radio-frequency exposures protect against adverse effects that result from tissue heating. The basis for the FCC rule is traceable to behavioral operant conditioning studies conducted in the 1980s. The authors of a 2003 review of this research in *Bioelectromagnetics*, including the original principal investigator, Dr. John de Lorge, concluded:(*1*)

"The phenomenon of behavioral disruption by microwave exposure, an operationally defined rate decrease (or rate increase), has served as the basis for human exposure guidelines since the early 1980s and still appears to be a very sensitive RF bioeffect. Nearly all evidence relates this phenomenon to the generation of heat in the tissues and reinforces the conclusion that behavioral changes observed in RF exposed animals are thermally mediated. Such behavioral alteration has been demonstrated in a variety of animal species and under several different conditions of RF exposure. Thermally based effects can clearly be hazardous to the organism and continue to be the best predictor of hazard for homosapiens." It is noteworthy that thermally based biological effects of RF are not only the best predictor of hazard but, also, the most sensitive indicator. This is particularly relevant since so-called non-thermal effects have not been found to be useful in setting of exposure limits.

Since this time several reviews and assessments have been published to address the RF health effects literature and whether thresholds or dose-response curves for adverse effects from RF exposure can be specified. In a 2008 review in Health Physics, Sheppard et al. exhaustively reviewed all biophysical mechanisms that have been proposed as possible explanations for interactions of RF exposure with cells and tissue.(*2*) They concluded: "An examination of all generally accepted and proposed mechanisms open to quantitative analysis shows that in the frequency range from several megahertz to a few hundred gigahertz, the focus of this paper, the principal mechanism for biological effects, and the only well-established mechanism, is the heating of tissues by dielectric and resistive loss."

The highest priority health endpoint associated with RF exposure has been brain cancer because of the brain's exposure to the emissions from cell phones and the widespread use of cellular technology. In 2009, Ahlbom et al. published a review in *Epidemiology* that reviewed the epidemiologic literature on mobile phones and tumor risk.(*3*) They state the following qualifying statement in describing their methodology: "A widely expressed view has been that it is therefore too soon to know whether mobile phones have an effect on cancer risk. However, the important issue is not how long it takes for maximum risk to occur, but how long before detectable risk is present. Even for asbestos, a carcinogen that has a notoriously long induction period, detectable elevations in risk occur 10–14 years after first exposure." They conclude as follows: "Despite these methodologic shortcomings [described in the paper] and the still limited data on long latency and long-

term use, the available data do not suggest a causal association between mobile phone use and fast-growing tumors such as malignant glioma in adults, at least those tumors with short induction periods. For slow-growing tumors such as meningioma and acoustic neuroma, as well as for glioma among long-term users, the absence of associations reported thus far is less conclusive because the current observation period is still too short. Currently data are completely lacking on the potential carcinogenic effect of exposures in childhood and adolescence."

In July 2010 a review of EMF health research was published by the European Health Risk Assessment Network on Electromagnetic Fields Exposure for input to the European Commission and European Union.(*4*) The report concluded: "For none of the diseases is there sufficient evidence for a causal association between exposure and the risk of the disease, and the strength of evidence for many outcomes remains as inadequate." The diseases with inadequate evidence for definitive conclusions included: childhood leukemia and brain tumors, adult brain tumors and breast cancer, and all other cancers: Alzheimer's disease, ALS and other neurodegenerative diseases; reproductive outcomes; cardiovascular diseases; decrements in well being, for which there was a lack of effects for electromagnetic hypersensitivity. This conclusion is consistent with those of other international reviews including those of the International Commission on Non-Ionizing Radiation Protection (*5*) and Scientific Committee on Emerging and Newly Identified Health Risks.(*6*)

FCC exposure limits are set at energy absorption rates that are a significant safety factor less than the threshold for observed behavioral effects. Therefore, given the expert consensus on mechanisms and health effects, plus the fact that exposures from Smart Meters are far below FCC limits,(*7*) and that Smart Meter exposure levels are much less than those from cell phones, it is reasonable to conclude that the FCC limits provide an adequate margin of protection.

<u>Are additional technology standards needed?</u>

There is no distinguishing feature with which to differentiate the fundamental quality of the physical exposure from Smart Meters from those of cellular telephones, base stations or other sources in this frequency range such as VHF TV stations. A major difference, however, is that the Smart Meters are transmitting for an extremely small fraction of the time, compared to the others which are transmitting so long as a call is in progress or the source transmitting antennas are activated. Without any further information that would cast a Smart Meter as a unique emitter, it would be difficult to conceive of an altered basis for a standard.

References

1. J. A. D'Andrea, E. R. Adair and J. O. de Lorge, Behavioral and cognitive effects of microwave exposure. *Bioelectromagnetics* **Suppl 6**, S39-62 (2003).
2. A. R. Sheppard, M. L. Swicord and Q. Balzano, Quantitative evaluations of mechanisms of radiofrequency interactions with biological molecules and processes. *Health Phys* **95**, 365-96 (2008).
3. A. Ahlbom, M. Feychting, A. Green, L. Kheifets, D. A. Savitz and A. J. Swerdlow, Epidemiologic evidence on mobile phones and tumor risk: a review. *Epidemiology* **20**, 639-52 (2009).
4. EFHRAN, European Health Risk Assessment Network on Electromagnetic Fields Exposure, *Risk analysis of human exposure to electromagnetic fields*, (2010). http://efhran.polimi.it/docs/EFHRAN_D2_final.pdf
5. ICNIRP, International Commission on Non-Ionizing Radiation Protection, *Exposure to high frequency electromagnetic fields, biological effects and health consequences (100 kHz-300 GHz)*, (2009). www.icnirp.org
6. SCENIHR, Scientific Committee on Emerging and Newly Identified Health Risks, *Health Effects of Exposure to EMF*, European Commission, Directorate-General for Health & Consumers, (2009). http://ec.europa.eu/health/ph_risk/risk_en.htm
7. EPRI, Electric Power Research Institute, *A Perspective on Radio-Frequency Exposure Associated With Residential Automatic Meter Reading Technology*, Palo Alto, CA, (2010).