



Advancing Sound Public Health Policy  
on the Use of Electromagnetic Radiation (EMR)  
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January 24, 2011

Non-Discrimination on the Basis of Disability: Accessibility of Web Information  
and Services of State and Local Government Entities and Public  
Accommodations (Document ID DOJ-CRT-2010-0005-0001)

Advanced Notice of Proposed Rulemaking

Comment on DOJ CRT Docket No. 110 - Web Information and Services  
and DOJ CRT Docket No. 113 – Equipment and Furniture

In additional to this electronic submittal, The EMR Policy Institute is mailing a  
hard copy in order to include complete texts of several reference documents.  
Please assure that both submittals are combined as one.

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January 24, 2011

Comment of The EMR Policy Institute on:

DOJ CRT Docket No. 110 - Web Information and Services

DOJ CRT Docket No. 113 – Equipment and Furniture

The EMR Policy Institute (EMRPI) is a national advocacy organization established in 2003 whose goal is to create better cooperation between public health regulatory agencies in order to mitigate unnecessary hazardous electromagnetic radiation (EMR) exposures. We educate policy makers on the need for sound, biologically-based human safety policy that protects public health regarding EMR exposures across the electromagnetic spectrum.

Our comment today provides background information for the regulatory assessment needed in order for the Department of Justice (DOJ) to revise its disability rights regulations.

DOJ **must ensure not only** that equipment and furniture used in programs and services provided by public entities and public accommodations are accessible to individuals with vision, hearing and speech disabilities. **It must also ensure** that individuals with Implanted Medical Devices (IMDs) or with the EMR functional impairments of Electrohypersensitivity (EHS) and Radiofrequency Sickness **avoid injury** in their daily living and **continue to have access** to Web Information and Services through hard-wired communications equipment.

EMRPI continues to challenge the inadequacy of the US safety policy on electromagnetic and RF radiation exposures by submitting official comment to key federal agencies. Our record of formal comment as individuals and through our organization dates back to 1997. It includes official comment to key federal agencies such as the NAS, FCC, FDA, GAO, NIOSH and now the DOJ.

The directors of EMRPI have participated in taking three cases to the US Supreme Court challenging the FCC's RF safety policy as **inadequate to protect all members of the public**. In each case the Court denied certiorari.

Since 1997 the FCC has resisted all calls to address these inadequacies, i.e., to develop biologically-based safety limits for human exposure to RF radiation that protect all members of the public.

EMRPI requests that a result of this ANPRM proceeding will be DOJ recognition of wireless exposure as an accessibility and civil rights issue for individuals with Implanted Medical Devices (IMDs) and for those who suffer from the EMR functional impairments of Electrohypersensitivity (EHS) and Radiofrequency Sickness.

Currently there are three U.S. federal mandates that promote wireless technologies that can adversely effect the health and well being of Americans with IMDs as well as those who suffer from the functional impairments of EHS and Radiofrequency Sickness. These population subgroups warrant protection by the DOJ under Americans with Disabilities Act provisions. There is no federal agency coordination to enforce these provisions. The mandates are:

- Wireless broadband
- SmartGrid and Smart Meters (wireless utility meters)
- Unlicensed commercial use of TV White Spaces spectrum.

Involuntary exposure to Electromagnetic Interference (EMI) with IMDs from these sources as well as from the plethora of wireless consumer devices now on the market presents the greatest potential for harm for Americans with IMDs. The FCC's focus on EMI and "safety" continues to protect devices rather than members of the public as found in its 2009 announcement of its International TV White Spaces Fellowship and Training Initiative:

*. . . by building on a proven concept: the safe deployment of new, intelligent devices in the unused spectrum that exists between television channels **without***

***causing undue interference to adjacent users.*** (Emphasis added.)

“Adjacent users” refers to commercial communications devices rather than to humans with IMDs.

This was the first glaring omission in the discussions carried on by the panels at the July 26 –27, 2010 FDA / FCC joint public meeting on, “Enabling the Convergence of Communications and Medical Systems.” Even the last panel discussion, Electromagnetic Compatibility – How to Promote EMC, made no mention of compatibility with implanted electronic medical devices such as Deep Brain Stimulators that treat Parkinson’s patients, or insulin pumps for diabetics, for example.

The comment of geophysics professor Gary Olhoeft PhD describing his personal experience with the critical EMI problems he encounters daily with his Medtronic Deep Brain Stimulator (DBS) was read at the first Public Comment period at the July 26, 2010 session. Despite Dr. Olhoeft’s insightful analysis and account of this one example of EMI between wireless systems and his DBS, neither the FCC moderator nor the FDA moderator of the following day’s panel on Electromagnetic Compatibility (EMC) raised one question on this EMI topic so critical to the life, health and well being of millions of Americans.

Professor Olhoeft has submitted his written Comment in this DOJ ANPRM proceeding. See also the video of his presentation at the 2009 EMRPI scientific conference, “Electromagnetic Radiation Impacts on Human Health,” at:

[www.youtube.com/watch?v=jo-B6LWfVzw&feature=related](http://www.youtube.com/watch?v=jo-B6LWfVzw&feature=related)

Adequacy of the existing FCC RF human exposure safety guidelines to protect all members of the American public was the second glaring omission in the discussion agenda of the FCC / FDA joint public meeting. The existing FCC RF safety limits do not sufficiently protect the able-bodied, let alone those facing health challenges. EPA’s 1993 Comments on the FCC’s revision of US RF safety regulations emphasize that (link to document provided below):

p. 2 Since the ANSI/IEEE hazard level is an SAR [Specific Absorption Rate]

associated with an effect resulting from a known mechanism of interaction (RF heating) that is associated with an increase in body temperature (as is the NCRP hazard level), **the ANSI/IEEE C95.1-1992 standard is based on a thermal effect of RF radiation and, by extension, is protective of effects arising from a thermal mechanism, but not from all possible mechanisms. Therefore, the generalization that 1992 ANSI/IEEE guidelines protect human beings from harm by any mechanism is not justified.** (Emphasis added.)

p. 3 **ANSI/IEEE does not allow for any variation in sensitivity to RF radiation. It states that there is no reliable evidence that certain subgroups of the population** [such as infants, aged, ill and disabled, persons dependant on medication, persons in adverse environmental conditions (excessive heat and/or humidity), voluntary vs. involuntary exposure] **are more at risk than others.** (Emphasis added.)

Included in this EMRPI comment (with emphasis added) are the statements of W. Ross Adey MD contained in his July 31, 2002 letter to Dr. Rick Jostes, Senior Program Officer of the National Academies of Science (NAS) Board on Radiation Effects Research. Dr. Adey was the Distinguished Professor of Physiology at the Loma Linda University School of Medicine as well as an elected Fellow of IEEE for his contributions in the field of radiotelemetry. His coherent detection system pioneered techniques recognized by authorities at the NASA Jet Propulsion Laboratory as the forerunner of modern broadband detection techniques.

This background uniquely qualified Dr. Adey to analyze the implications of non-thermal RF and EMR exposures on human physiology in relation to the NAS's study of the US Air Force's PAVE PAWS radar installations. Even after his death in 2005, Dr. Adey continues to be recognized internationally as a leading expert in the field of bioelectromagnetics.

The key questions posed by Dr. Adey in his NAS letter target the second critical topic left out of the discussion of all of the expert panels during the July 2010 FCC / FDA public meetings:

***If, in the eyes of the USAF, nonthermal interactions with environmental electromagnetic fields can be the basis of therapeutic interventions, why might they not occur as the result of exposure to pulsed radar fields? And what might be the health effects in consequence, for better or worse?***

These questions apply as well to the pulsed, i.e. digital, EMR and RF radiation that are and will continue to be encountered by all in the US public as wireless communications and medical systems expand throughout America's everyday environments.

NAS's 2008 Report - **Identification of Research Needs Relating to Adverse Health Effects of Wireless Communication** - explicitly identifies the holes in the RF research record upon which FCC RF safety policy is based. This Report is incorporated herein in its entirety by reference and is found at: [www.nap.edu/catalog.php?record\\_id=12036](http://www.nap.edu/catalog.php?record_id=12036)

1. Lack of models of several heights for men, women, and children of various ages for exposure to various wireless communications devices – ***cell phones, wireless PCs, and base stations.***
2. Need to characterize **complex radiation from base station antennas for the highest radiated power conditions conducted during peak hours of the day at locations close to the antennas as well as at ground.**
3. **Recognition of population subgroups with specific sensitivities** – To quantify the radiation absorption close to metal rim glasses, **and various medical prostheses** (e.g., hearing aids, cochlear implants, cardiac pacemakers).

Current US RF limits certainly do not protect those with medical implants or who require critical care equipment that is subject to malfunction in the presence of wireless signals from outside sources. Since 1997 FCC has resisted repeated efforts by EMRPI and others to address the inadequate protection provided to subgroups of the US population.

No federal agency is keeping track of cumulative wireless power density, nor identifying critical levels and locations where individuals who require IMDs may be at risk.

The FCC continues to issue compliance statements for new wireless devices and systems without regard for existing RF levels. Those most seriously threatened are the NIH-estimated 20 million Americans who require IMDs. These 20 million Americans account for 8-10% of the US population. The most serious threat to them is from Smart Meters and wireless broadband because of their ubiquitous deployment throughout the public's living and working environments and now throughout medical treatment settings.

To date the only comprehensive technical analysis of Smart Meter radiation exposure is the Sage Associates (Santa Barbara, CA), "Assessment of Radiofrequency Microwave Radiation Emissions from Smart Meters," issued on January 1, 2011. The complete text of the Report along with its Tables of modeled emissions levels is incorporated herein by reference in its entirety and is available at: <http://sagereports.com/smart-meter-rf/> . The Report's authors characterize it in these terms:

*This Report uses computer modeling to predict power density levels that may be present where smart meters are in operation. **The methodology used in this assessment is consistent with FCC OET 65 equations for prediction of RF power density levels.** Many scenarios are modeled, to bracket the range of reasonably predictable RF exposures in typical living conditions. Many variables must be considered (installation very close to occupied space, how many meters are installed on a single wall, how frequently they will transmit an RF pulse, how powerful the RF radiation pulses will be, how far inside a home they will penetrate and at what intensities, how much 'piggybacking' of RF signals will occur from neighboring wireless meters, reflections that may increase RF levels, and what amount of RF wireless exposure may already be present beforehand, etc.)*

*To date, California's electric utilities have told the California Public Utilities Commission only that they will comply with applicable federal safety limits. **However, there are substantial discrepancies in what the FCC compliance testing says is needed for wireless meters to comply with its safety limits, and the manner in which many meters are being installed and are operating.** (Emphasis added.)*

In stark contrast to the lack of public health concern in key US federal agencies, The European Parliament, in its April 2009 Resolution approved by a vote of 559-22, calls for: [www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2009-0216+0+DOC+XML+V0//EN](http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2009-0216+0+DOC+XML+V0//EN)

- **Particular consideration of biological effects**, especially given that some studies have found the most harmful effects at lowest levels;
- **Evaluation of potential long-term adverse effects of mobile telephony radio frequencies;**
- Increased investigation of **harmful effects of multiple exposures to different EMF sources**, particularly for children;
- **Member States to follow the example of Sweden and to recognize persons that suffer from electrohypersensitivity as being disabled so as to grant them adequate protection as well as equal opportunities;**

(Emphasis added).

Americans with electronic IMDs and EMR functional impairments are inherently sensitive to RF and EMR exposures. Under provisions of the ADA they are entitled to adequate protection from environmental threats to their lives and well-being and equal access to the opportunity to succeed in their lives. Equal opportunity demands equal access to healthcare in treatment settings that do not compromise their safety and well-being as well as equal access to public services and private accommodations.

EMRPI requests that a result of this proceeding will be DOJ recognition of wireless exposure as an accessibility and civil rights issue for individuals with IMDs or with EMR functional impairments.

We request that the DOJ Disability Rights Division take action on universal design measures in relation to that recognition such as:

- To require hard-wired rather than wireless internet connections in public buildings such as schools and libraries.
- To require Smart Grid / Smart Meter options that employ fiber optic and land-line data transmission rather than wireless transmitting Smart Meters.

- To require signage in public and private accommodations such as schools, libraries, hospitals, stores, hotels, restaurants, airports, and public transportation facilities alerting the public to the presence of wireless communications systems.

References:

**Comment of Gary R. Olhoeft, PhD**, submitted in FCC Docket No. ET 10-120 and FDA Docket No. FDA-2010-N-0291, August 12, 2010. (Document attached here.)

**Environmental Protection Agency (EPA) Comment to the Federal Communications Commission (FCC)** on FCC 93-142, April 1993, Notice of Proposed Rulemaking; Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation.

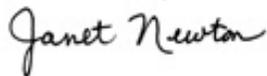
Found at: [www.emrpolicy.org/litigation/case\\_law/docs/epa\\_to\\_fcc\\_3nov\\_93.pdf](http://www.emrpolicy.org/litigation/case_law/docs/epa_to_fcc_3nov_93.pdf)

**Letter of W. Ross Adey M.D., Distinguished Professor of Physiology, Loma Linda University School of Medicine** to Dr. Rick Jostes, Senior Program Officer, Board on Radiation Effects Research, National Academies of Sciences, July 31, 2002. (Document attached here.)

**National Academies of Science Report - Identification of Research Needs Relating to Adverse Health Effects of Wireless Communication**, January 2008. Found at: [www.nap.edu/catalog.php?record\\_id=12036](http://www.nap.edu/catalog.php?record_id=12036) Complete text provided in hard copy sent by US Postal Service.

**Sage Associates Report (Santa Barbara, CA), "Assessment of Radiofrequency Microwave Radiation Emissions from Smart Meters,"** issued on January 1, 2011, is found at: <http://sagereports.com/smart-meter-rf/> Complete text without the Tables provided in hard copy sent by US Postal Service.

Respectfully submitted by  
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agenda comment 25 June 2010  
revised and resubmitted 15 July 2010

Comment on FCC Docket No. ET 10-120 FDA-2010-N-0291

I am a Professor of Geophysics who makes sensitive electromagnetic measurements to study the Earth's properties and processes, and I deal with EMI/RFI all the time. I also have a Deep Brain Stimulator (DBS) for Parkinson's Disease. It completely replaces the medicines, which after 15 years were causing very unpleasant side effects. The DBS contains 2 unshielded cables, each with 4 unshielded wires approximately 60 cm long going from an implanted pulse generator (IPG) in my left upper chest, up my neck, behind my skull to a connector on top, then each cable takes 4 wires into my skull to 4 electrodes in my brain (roughly behind each eye). Current returns from the electrodes to the IPG through my body making the metal wires electrical antennas and the current loop a magnetic loop antenna. Any piece of metal can be an electrical antenna, though not an efficient one without the right size, shape and geometry (and embedding materials) for a given frequency, and any current carrying loop will be a similarly inefficient magnetic antenna. I thus have both, and I worry about EMI/RFI/EMC with implanted medical devices (IMD).

The first such FDA worries about interference occurred for microwave ovens and cardiac pacemakers, leading to FDA regulation in 1971 [21CFR1030]. In the 1990's, first reports started to appear of interference from metal detector security gates commonly used at airports and many other public buildings (including courts, libraries, hospitals and more), and from retail anti-theft and inventory control devices, but more recently from interference between two or more IMD's, and from cell phones and other common household (such as the light dimmers, heating pads, rechargeable toothbrushes, or Smart Grid devices) or medical investigatory devices (such as MRI's). I have also experienced interference with the operation and programming of my DBS from external sources of EMI, and I have gone through my home with a spectrum analyzer to map and minimize interference.

(The Medtronic manual for my DBS lists more than 16 pages of EMI concerns and still only partially lists potential interfering devices such as diathermy, arc welders and MRI's, <http://www.MRIsafety.com>.)

Blomstedt, P., Jabre, M., Bejjani, B-P., and Koskinen, L-O.D., 2006, Electromagnetic environmental influences on implanted deep brain stimulators: *Neuromod.*, v.9, n.4, p.262-269.  
Francis, J. and Niehaus, M., 2006, Interference between cellular telephones and implantable rhythm devices: a review on recent papers: *Indian Pacing and Electrophysiology J.*, v.6, n.4, p.226-233.  
Hocking, B. and Mild. K.J., 2008, Guidance note: risk management of workers with medical electronic devices and metallic implants in electromagnetic fields: *Int'l J Occupational Safety and Ergonomics*, v.14, p.217-222.(updated PowerPoint available from author)  
Hondu, T., Ueda, T., Sakata, Y. and 4 others, 2006, Passive exposure to mobile phones: enhancement of intensity by reflection: *J. Phys. Soc. Japan*, v.75, n.8, p.08401-1 to -5.  
Jun, X., Luming, L., Hongwei, H., 2009, Primary experimental study on safety of deep brain stimulation in RF electromagnetic field: 31<sup>st</sup> Int'l. Conf. Of the IEEE EMBS, Minneapolis, MN, p.3091-3094.  
Weick-Brady, M., 2009, Medical devices in the home: new ideas, new risks: FDA CDRH, 7 June 2009 PPT, <http://www.fda.gov/CDRH>  
Olhoeft, G.R., 2009, Electromagnetic interference with medical implants: presented to EMR Policy Institute Conf., 8 Nov 2009, CSM, Golden, CO (PPT available from author and video from: [http://www.youtube.com/results?search\\_query=olhoeft&aq=f](http://www.youtube.com/results?search_query=olhoeft&aq=f)).

However that concern has broadened with reports in the press and literature that hackers are trying to access medical devices:

<http://nwoobserver.wordpress.com/2010/05/26/rfid-chip-implanted-into-man-gets-computer-virus/>  
Sutter, J.D., 2010, Scientists work to keep hackers out of implanted medical devices: CNN, 16 April 2010.

Halperin, D., Heydt-Benjamin, T.S., Ransford, B. and 6 others, 2008, Pacemakers and implantable cardiac defibrillators: software radio attacks and zero-power defenses: *Proc. 2008 IEEE Symp. on Security and Privacy*, 14p.  
Halperin, D., Heydt-Benjamin, T.S., Fu, K., Kohno, T., and Maisel W.H., 2008, Security and privacy for implantable medical devices: *IEEE Computer Society Pervasive Computing*, v. 7, n.1, p.30-39.

and of reports about “RFID Wars”:

<http://www.engadget.com/2009/12/24/rfiddler-zapper-kills-rfid-tags-dead-the-hard-way/>

or what appear to be completely unregulated “nonlethal weapons” such as TASER's and the Active Denial System (<http://www.jnlwp.com>; <http://www.nap.edu/catalog/10538.html>)

or microwave “car stoppers” (<http://www.eurekaerospace.com>), which are sought by civilian police as well as military, none of which even mention their impact on people with implanted medical devices.

I gave a talk to the local DBS support group here in June, 2010, and asked how many people had had a problem with Walmart or Best Buy stores retail theft detection systems like myself, and every hand in the group (about 50 people) went up. The FCC's regulatory authority extends from 9 kHz up and doesn't include many lower frequency sources of potential and actual interference such as this, and their interpretation of "harmful interference" seems to stop at interference with communications. The FDA CDRH website says they have the authority to regulate EMI/RFI/EMC for potential radiation emitting devices (as demonstrated by microwave oven regulations), defining "The different forms of EM energy that can cause EMI are conducted, radiated, and electrostatic discharge (ESD)." but they should also include "induced", and they need to regulate over all frequencies, including a broader definition of "harmful interference" to not just communications but also medical devices where people can be harmed by EMI/RFI caused malfunction. Initially, the awareness of the public needs to be broadened about the vulnerability of such devices, but ultimately it needs regulation. Such regulation should include environmental electromagnetic limits for anthropogenic sources as well as medical device EMC hardening to minimize malfunction during common events (nearby powerlines, WiFi), and device protective default or "circuit breaker" safe hardening for extraordinary events (TASERs, defibrillators, lightning or solar storms). Security and privacy regulations need to be in place to prevent interference by intentional hacker attempts at device re-programming or data access. Lastly, the EMI/RFI vulnerability of medical devices needs regulatory limits and independent testing.

Sincerely,

/s GRO

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July 31, 2002

Dr. Rick Jostes, Senior Program Officer  
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Re: NAS/NRC PAVE PAWS Committee Meeting, Woods Hole, Sept 9, 2002

Dear Dr. Jostes:

The PAVE PAWS situation is an exemplar of major long-term problems in the US Air Force's continuing failure to acknowledge the existence of a significant body of biological and biomedical knowledge relevant to radar emissions of the PAVE PAWS type. Moreover, as I shall explain, it is not inappropriate to say that, in recent times, the USAF speaks with a forked tongue in the unquestionable duplicity of its medical research policies. The concerned public may well ask, "Will the real US Air Force please stand up?"

PAVE PAWS is a pulsed radar system, transmitting packets of intense microwave energy at a low rate (approximately 19/sec, if my information is correct). The signal is intermittent, with silent periods between the signal bursts. Intensity of the emitted field remains below thresholds for tissue heating at all areas in the local environment surrounding the transmitter site. These facts must be central to any analysis of potential health risks.

**For more than 20 years, the USAF has aggressively asserted that microwave fields have only one mode of biological interaction - through tissue heating. There has been a consistent denial of nonthermal interactions, and as a corollary, that tissues have no capacity to demodulate pulse- or amplitude-modulated microwave fields.**

**To ensure interservice conformity with this policy, a decade ago the USAF sought and obtained Pentagon approval to physically uproot the separate microwave medical research facilities of the US Army at Walter Reed Army Institute of**

Dr. R. Jostes, Nat. Acad. Sci., 7/31/02  
Re: NRC PAVE PAWS Panel  
(page2)

**Research in Washington DC and the US Navy's facility at the Aeromedical Laboratory at Pensacola, FL. Their personnel and facilities were transferred to Brooks AFB in San Antonio TX.**

**At the same time, Brooks personnel heavily indoctrinated NATO member countries with their thermal doctrine in a series of military conferences.** This may be attributed to their operation of high-powered radars at overseas locations and the pragmatic political imperative of assuring foreign governments and their populations that, on the basis of thermal models, these operations did not pose a health threat.

**Brooks AFB personnel have been equally aggressive in dominating development of the US civilian safety guidelines.** IEEE Subcommittee 28 is charged with preparing draft guidelines for submission to the American National Standards Institute (ANSI).

After a long career in thermoregulatory physiology at Yale University, Dr. Eleanor Adair was appointed Chief Scientist at Brooks AFB. Her views on nonthermal interactions, stated 13 years ago, have remained unchanged: *"I've never seen one bit of scientific evidence that ELF or microwave radiation has any nonthermal biological effects. These findings are will-o'-the-wisp."*  
(Discover Magazine, December, 1989).

Dr. Adair became chairperson of IEEE Subcommittee 28, and appointed a significant number of like-minded scientists and engineers to the committee. **During her tenure, the committee developed position papers preliminary to completion of a draft proposal for ANSI that are dismissive of all aspects of nonthermal interactions and modulation-dependent effects, nor do they address problems of intermittent exposure or cumulative dose.**

The confirmed existence of nonthermal ELF and microwave interactions has become clear, in observations ranging from human cognitive performance and human EEG sleep records, to cell and molecular effects on gene expression, enzyme activity, and permeability of the blood brain barrier. **Though not yet conclusive, there is strong but not yet unequivocal evidence supporting modulation-dependent interactions, including alterations in human sleep EEG power spectra by pulse modulated mobile phone fields, and an absence of effects of unmodulated (CW) fields of the same average incident power.**

**The USAF position on nonthermal effects is entrenched and of long standing. But the recent announcement from Brooks AFB of its plans for the Third International Electromed 2003 Conference has therefore occasioned deep surprise and mistrust of**

Dr. R. Jostes, Nat. Acad. Sci., 7/31/02  
Re: NRC PAVE PAWS Panel  
(page 3)

**any statements that the USAF may make re the PAVE PAWS operation. There has been a complete about-face.** The Meeting Announcement reads:

**Third International Symposium on Nonthermal Medical/Biological  
Treatments Using Electromagnetic Fields and Ionized Gases**

**Hosted**

**By**

**USAF Research Laboratory, Radio Frequency Radiation Branch,  
Brooks AFB, Texas, June 11-13, 2003**

In historic words, offered in another context, this is an incident that will live in infamy. How stupid does the USAF think that the American public must be? **If, in the eyes of the USAF, nonthermal interactions with environmental electromagnetic fields can be the basis of therapeutic interventions, why might they not occur as the result of exposure to pulsed radar fields? And what might be the health effects in consequence, for better or worse?** And what does it say about the professional integrity of the NRC Panel that it is apparently prepared to negotiate seriously with those responsible for such scientific inconsistency?

You mentioned that Dr. Roti Roti from Washington University is to be one of the invited speakers, presumably about data from an as yet unpublished long-term rat tumor study which he presented at the recent Bioelectromagnetics Society 24th Annual Meeting in Quebec City.

Biologically, that study may be flawed. Microwave exposures began in adult animals. There is a wealth of evidence that susceptibility of Fischer 344 rats to a range of chemical and physical agents capable of modifying postnatal tumor incidence, particularly of the central nervous system, is maximal in late fetal life and declines after birth.

Neither of the two types of microwave fields that he tested in this study bears the slightest relationship to the pulse modulation pattern of the PAVE PAWS field. One was a continuous wave (CW) field, with no pulse- or amplitude modulation of any kind. The other was a CDMA mobile phone field. CDMA fields employ spread spectrum techniques, occupying a large spectral bandwidth with frequency hopping across that spectrum. Their amplitude-modulation components are variable and a recent industry dosimetry report concluded that, for dosimetry purposes, a CDMA signal may also be treated as a CW signal.

It is not a parenthesis that our team has conducted in Fischer 344 rats two life-term studies correctly designed to compare effects of a true pulse-modulated mobile phone field (Adey et al., Rad. Res. 152:295-302, 1999) with a frequency-modulated (FM or analog) field (Adey et al., Cancer Res. 60:1857-1863, 2000) on the incidence of both

Dr. R. Jostes, Nat. Acad. Sci., 7/31/02  
Re: NRC PAVE PAWS Panel  
(page 4)

spontaneous and chemically initiated brain tumors. Our animals began exposures during fetal life and continued into old age. Our pulse-modulated field used the North American Digital Cellular (NADC) standard, modulated at 50 Hz in Time Division Multiple Access (TDMA) modulation. The FM field used a balanced audio modulation with +12.5 KHz deviation, at the same average intensity as the digital field.

In animals receiving a single dose of the neurocarcinogen ethylnitrosourea (ENU) *in utero* (active time 8 minutes), exposed thereafter to the TDMA field and dying of a primary brain tumor before the termination of the experiment at 709 days, there was a significant reduction in the number of brain tumors when compared with animals receiving the ENU carcinogen alone ( $P < 0.015$ , single-tailed).

Since we are dealing here with epigenetic actions of the fields at the cusp of the complex balance between DNA damage and DNA repair, the important conclusion is not whether tumor numbers were increased or decreased, but that there was clearly a tissue interaction with the fields. Dr. Roti Roti's study appears to have no relevance to PAVE PAWS exposures.

**At this point, it may be relevant to briefly summarize my qualifications in the fields of radio physics and radio engineering. I am an elected Fellow of IEEE for my contributions in the field of radiotelemetry.** Essentially unaided, I designed, built and successfully operated at my home a coherent radar system sufficiently sensitive to detect echoes of my signals from the surface of the moon (Adey, 1969). The antenna involved a 180-element steerable, multibay Yagi-phased array. The coherent detection system pioneered techniques recognized by authorities at the NASA Jet Propulsion Laboratory as the forerunner of modern broadband detection techniques.

I have responded at considerable length, because I believe deeply that your Panel has a unique obligation to science and to the public to examine competently and in detail all aspects of the PAVE PAWS situation, thereby establishing an historic benchmark. This would be in distinct contrast to the flimsy whitewashing by two recent NRC Panels dealing with comparable problems, as in the review of the NIEHS Rapid program.

With my best wishes for the success of your undertaking,

Sincerely,

Ross Adey  
Distinguished Professor of Physiology  
Loma Linda University School of Medicine