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A Report on Non-Ionizing Radiation

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Are There Nonthermal Effects? Are They Thermal? Does It Matter?

Can microwave radiation cause nonthermal effects? This long-standing question is losing its urgency as more and more experiments are documenting biological effects at such low energy levels that temperature changes are difficult to measure—if they can be detected at all.

Rather, the focus is now on whether biological effects are reproducible in different laboratories. While biophysicists continue to seek a mechanism of interaction, most ongoing research targets the possible effects of radiofrequency and microwave (RF/MW) radiation from mobile phones and their towers. If low-level effects are verified, they would drive risk assessment, standard setting and, no doubt, legal actions.

"It does not matter whether an effect is thermal or nonthermal. We should be talking about *effects*," argued Dr. Dariusz Leszczynski of Finland's Radiation and Nuclear Safety Authority at a meeting on subtle temperature effects held in London in mid-November. The meeting was organized by COST281, the European mobile phone research committee.

Dr. Roland Glaser of Humboldt University in Berlin counters that it does matter. "If it is only a small temperature change, we can forget about it," he told *Microwave News*. "Subtle temperature effects are all around us."

But under certain very specialized circumstances, Glaser allows that biological systems can be acutely sensitive to minuscule temperature changes. He reminded the COST gathering that a rattlesnake can find its prey in total dark-

(continued on p.9)

McDonald's Commissions NCRP Report on Safety of Wireless Towers

The National Council on Radiation Protection and Measurements (NCRP) is preparing a report on the safety of mobile phone radiation to help building owners and managers address potential health risks.

McDonald's, the fast-food giant, requested and is paying for the NCRP report. This is the first time a corporation has sponsored an NCRP report on radiation safety.

An October 29 draft of the report, which is circulating for review and was obtained by *Microwave News*, does not mention McDonald's role or give the names of those who wrote the report.

Microwave News has learned that Dr. Tom Tenforde, the recently installed president of the NCRP, is himself chairing the five-member committee that wrote the draft.

(continued on p.6)

« Power Line Talk »

The National Institute of Environmental Health Sciences (NIEHS) has issued an updated version of *Questions and Answers About EMF: Electric and Magnetic Fields Associated with the Use of Electric Power*. The 64-page booklet introduces the uninitiated to the basics of ELF EMFs—sources, research findings, reviews and standards. The original booklet, issued in 1995 as part of the EMF RAPID program, did not offer an overall assessment of health risks; the new one does. The potential impacts are portrayed as being close to negligible—a view that stands in sharp contrast to that of the new California report (see box at right). “For most health outcomes, there is no evidence that EMF exposures have adverse effects,” the NIEHS concludes. With respect to childhood leukemia, the institute allows that “there is some evidence from epidemiology studies” of an association with EMFs, but then adds the following qualifications: “This association is difficult to interpret in the absence of reproducible laboratory evidence or a scientific explanation that links magnetic fields with childhood leukemia.” The only step the booklet recommends to reduce exposures is “continued education”—though what this would involve is not spelled out. The institute has backed off its earlier endorsement of prudent avoidance. Three years ago in his report to Congress at the close of the EMF RAPID program, NIEHS Director Dr. Kenneth Olden recommended that electric utilities and appliance manufacturers seek low-cost ways to reduce exposures (see *MWN*, J/A99). Now the NIEHS appears to be more concerned that the public may adopt dangerous strategies to mitigate exposures, warning: “For your own safety, it is important that any steps you take to reduce your exposures do not increase other obvious hazards such as those from electrocution or fire.” **Naomi Bernheim**, Dr. **Gary Boorman**, Dr. **Christopher Portier** and Dr. **Mary Wolfe** led the editorial team that revised the booklet. It is available on the Internet at www.niehs.nih.gov/emfrapid. The NIEHS also has a limited supply of printed copies; contact: Central Data Management, MD EC-03, NIEHS, PO Box 12233, Research Triangle Park, NC 27709, E-mail: cdm@niehs.nih.gov.

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The **U.K. Childhood Cancer Study** (UKCCS) has found no connection between exposures to power-frequency **electric fields** and childhood leukemia, central nervous system tumors or other types of cancer. Writing in the November 18 issue of the *British Journal of Cancer* (*BJC*, 87, pp.1257-1266, 2002), Dr. **Nick Day** of the University of Cambridge and coworkers write that their pilot study “can exclude electric field exposure as a cause of a substantial proportion of leukemia or other childhood malignancies.” They go on to argue that, “Efforts to uncover the causes of childhood malignancy appear better targeted in other directions.” **Alasdair Philips**, a consultant based in Ely, Cambridgeshire, does not think they should give up quite yet. “The UKCCS dataset should now be analyzed with the combined electric and magnetic field metric used by Dr. **Anthony Miller** to investigate occupational exposures,” he told *Microwave News*. Philips had strong-

California Report Released

In early October, the California Department of Health Services released the EMF program’s final report, containing the strongest warning to date on the possible health risks of power-frequency EMFs.

After working eight years and spending more than \$7 million studying EMF health effects, the research staff came to believe that EMFs are a likely cause of childhood leukemia, adult brain cancer, ALS and miscarriages (see *MWN*, J/A02).

The report was issued without a press release and, except for a couple of California newspapers, was largely ignored by the U.S. media. (It received more coverage in the U.K.) Nevertheless, power-line activists have been quick to cite the report to support their concerns (see, for example, p.3).

As of late November, the California Public Utilities Commission (PUC) had not decided whether to hold hearings to consider possible policy changes, PUC spokesperson Sheri Inouye told *Microwave News*. The report itself makes no recommendations.

The full text of the report is available on the Internet at www.dhs.cahwnet.gov/ps/deodc/ehib/emf. Print copies can be purchased for \$35.00 each, plus shipping, from the City Copy Center in Oakland; call (510) 763-0193.

ly urged the UKCCS group to investigate the possible role of electric fields (see, for instance, *MWN*, N/D96). Miller, who retired from the University of Toronto and now does research in Germany, has found much higher risks of leukemia among utility workers exposed to electric fields over long periods of time (see *MWN*, M/J00; also p.3). Miller had previously reported that leukemia rates can be up to 11 times higher for workers exposed to magnetic *and* electric fields (see *MWN*, J/A96). Three years ago, Day’s team found no link between magnetic fields and childhood cancer (see *MWN*, N/D99 and J/F00). Later, Day contributed his magnetic field data to the meta-analysis led by Dr. **Anders Ahlbom** of the Karolinska Institute in Stockholm. Using the U.K. data together with those of other investigators, Ahlbom found an EMF–cancer association (see *MWN*, S/O00). Day’s magnetic field study has been sharply criticized by Dr. **Denis Henshaw** of the University of Bristol, who argues that electric fields can influence the movement of pollutants and the way they are absorbed by those nearby (see *MWN*, J/F00 and M/A00; also p.3 and p.12). The UKCCS project appears to attract controversy. In the November 9 issue of the *Lancet*, two American researchers dispute the UKCCS’s findings that have also exonerated any possible role of radon or gamma radiation (these studies were published in the *BJC* earlier this year). Concerns over the exposure assessments used by the UKCCS prompted the Americans to caution that there remains “doubt as to whether or not radon and gamma radiation have been adequately studied.”

Power Line Concerns Put School on Hold in Canada

Construction of a Catholic school in Edmonton, Canada, has been halted after a local planning board concluded that it would be too close to a 240 kV transmission line.

Officials of Edmonton Catholic Schools (ECS), which runs more than 80 local schools, contend that there is no health risk. "Every expert we talked with and studies we researched did *not* find a link to EMFs and childhood leukemia," Superintendent Dale Ripley stressed in a November 21 letter to parents. ECS is planning to challenge the planning board's decision in court.

The proposed site, 108 m from the line, "would not provide a safe environment" for children, the Edmonton Subdivision and Development Appeal Board (SDAB) ruled on November 8, overturning a zoning permit issued last summer. The available evidence "does establish" that exposures "in the range of 2 mG or greater are associated with higher levels of childhood leukemia," according to the SDAB.

According to the SDAB, magnetic fields of up to 2 mG were measured at the proposed site. ECS estimates that the levels are between 1 and 2 mG.

The SDAB said its decision was influenced by IARC's designation of EMFs as possible carcinogens, as well as by the conclusion of three California EMF Program scientists that they are inclined to believe that EMFs can cause childhood leukemia. In addition, a senior Edmonton health official has called for prudent avoidance in view of the scientific uncertainties.

Lisa Amyotte, the mother of three children who would attend the school, is leading the opposition. At an October 24 SDAB hearing, she argued that magnetic fields in schools should not exceed 1 mG, pointing to survey data indicating that EMFs in most homes are below this level. She noted that, since the early 1990s, Swedish officials have advised against siting schools near power lines (see *MWN*, M/J94, N/D95 and M/J01).

Amyotte introduced a letter advocating prudent avoidance from Dr. Gerald Predy, a physician at Capital Health, which operates Edmonton's public health care system. At Amyotte's request, Drs. David Carpenter, Denis Henshaw, Anthony Miller and Daniel Wartenberg have written to city officials warning against siting a school near a power line (see box at right).

Mary McBride of the British Columbia Cancer Agency in Vancouver is serving as ECS' EMF consultant. She told the SDAB that siting the school near the power line poses no health risk and that such a plan is consistent with prudent avoidance as defined by Dr. Michael Repacholi's WHO International EMF Project.

In an interview with *Microwave News*, McBride said that, in her opinion, the scientific evidence does not justify any policy of prudent avoidance for EMFs. Not enough is yet known about the type of exposures that present a health risk to devise an appropriate policy, she maintains.

McBride's outlook appears to be inconsistent with the policies of the WHO project, however. While Repacholi has argued strongly against the use of precautionary limits, he and the project have endorsed prudent avoidance. In a fact sheet issued last year,

the WHO stated that officials "should consider ways to reduce people's exposures" when siting power lines (see *MWN*, S/O01).

McBride is also downplaying the California report's conclusion that EMFs present a broad range of health risks (see p.2). In an interview with the *Edmonton Journal* (October 29), she stated that it had not been peer-reviewed.

Dr. Raymond Neutra, the director of the program, strongly disputed this view. The report underwent "far more extensive and open" review than did other recent assessments of EMF health risks, Neutra told *Microwave News*.

The land for the school, which is adjacent to the power-line corridor, was given to Edmonton Catholic Schools by the city. An earlier plan for the site placed the school 70 m from the line, but it was revised after the city-owned utility, EPCOR, measured magnetic fields of 4.5 mG at this distance. Several more schools, as well as play and sports areas, are planned.

Over the course of the controversy, the *Edmonton Journal* reversed its editorial opinion. On May 25, the editors wrote that "available evidence does not support any concern" for children's safety, but on October 15, they argued that "until we know more about the health effects, power lines should be separated from new developments by sufficient distance" to minimize exposures to "possibly dangerous EMFs."

While the parents' appeal of the zoning permit was pending, ECS began work on the school, which is planned for 400 children at an estimated cost of Can\$6.6 million (US\$4.5 million).

Prudent Avoidance Endorsed

"It is rarely possible to provide 100% proof for any particular human health outcome as a function of exposure, and proof at this level of certainty certainly does not exist here. However, the evidence that magnetic fields cause leukemia in children is sufficiently strong that, in my judgment, any jurisdiction which knowingly subjects children to this hazard is irresponsible and legally liable for the outcome."

—Dr. **David Carpenter**, School of Public Health, State University of New York, Albany, October 1 letter to the SDAB

"Basically, new buildings, especially schools, should not be built anywhere near high-voltage power lines."

—Dr. **Denis Henshaw**, University of Bristol, U.K., October 3 letter to the SDAB

"I...urge you to take every step possible to ensure that school construction is not close to power lines."

—Dr. **Anthony Miller**, professor emeritus, University of Toronto, Canada (now at the German Cancer Research Center in Heidelberg), December 3 letter to Edmonton officials

"I can make a strong case, based on the data and the studies, that power lines do increase the risk of childhood leukemia.... Are you willing to assume the risk that choosing this site may result in several cases of cancer that otherwise would not occur?"

—Dr. **Daniel Wartenberg**, Environmental and Occupational Health Sciences Institute, Piscataway, NJ, October 24 letter to the SDAB

No Increase in Cardiac Risk in Second Utility Worker Study

Male electric utility workers with high EMF exposures did not have a greater risk of dying from sudden heart failure, according to a new epidemiological study led by Dr. Jack Sahl of Southern California Edison (SCE) in Los Angeles.

“Our results provide no support for the hypothesis linking AMI [acute myocardial infarction] mortality to occupational magnetic field exposure,” Sahl and coauthors conclude in the November 15 *American Journal of Epidemiology* (156, pp. 913-918, 2002).

Dr. Antonio Sastre of the Midwest Research Institute (MRI) in Kansas City, MO, first proposed the EMF-cardiac link four years ago, based on his finding that 200 mG EMFs could lead to lower heart rate variability (HRV), a common indicator of cardiac risk (see *MWN*, J/A98). Dr. David Savitz found support for this theory using data on 140,000 workers at five U.S. utilities from a previous study (see *MWN*, S/O98).

EPRI commissioned Sahl to do a follow-up with data from his earlier epidemiological study of SCE employees (see *MWN*, M/A93 and J/A93). Looking at roughly the same occupations as those for which Savitz found the highest risks—electricians, line repairmen and power plant operators—Sahl sees no greater AMI mortality in comparison to managers and others whose jobs entail less exposure.

Cumulative exposures, estimated through measurements and job descriptions, were not related to cardiac risk except among those with high exposures in their last five years of work. The trend of increased risk with higher exposures was statistically significant. But Sahl maintains that these higher risks reflect the healthier lifestyles of those who move into managerial positions compared to those who remain in jobs such as line repair, and are not due to differences in EMF exposures.

“We did this analysis to see if we should gear up for a major study on cardiac risk,” Sahl told *Microwave News*. “I don’t think the results warrant that.” Last summer, after working as a consultant for several years, Sahl returned to SCE, California’s second-largest private electric utility, as director of health and safety for its power transmission and distribution unit.

Savitz said that it is hard to account for the disparity in the results of the two studies. “There are many reasons either or both studies could have gone astray,” said Savitz, who is at the University of North Carolina, Chapel Hill.

For his part, Sastre points to the smaller size of Sahl’s cohort compared to that of Savitz: “One does not negate the statistical weight of over 100,000 subjects with a study of 35,000 workers,” he told *Microwave News*. Sastre, who is a coauthor of the Sahl paper, would like to do more experiments to better understand the EMF-HRV effect, but he has been unable to find funding. “At this point,” he said, “we don’t have clear answers from epidemiology or from the lab.”

Dr. Birgitta Floderus of the Karolinska Institute in Stockholm is also investigating the link between EMFs and cardiac risk, using data on Swedish twins. Floderus said that her study has been submitted for publication.

IEEE’s New EMF Standard Faces Multiple Challenges

The ink is barely dry on its new ELF-EMF safety standard, but the IEEE is already facing challenges. Three formal appeals have been filed contending that the guidelines are flawed.

Ten years after it began its work, ICES (formerly SCC-28) Subcommittee 3 (SC-3) voted in July to adopt the standard, and the IEEE Standards Board approved it two months later (see *MWN*, S/O02). Designated C95.6, the guidelines protect only against acute hazards in the 0-3 kHz frequency range.

In a complaint filed on October 13, David Fichtenberg contends that the standard violates IEEE ethics rules by ignoring evidence of possible long-term effects of EMFs, such as cancer. “The standard should detail the evidence pointing to long-term risks and then explain why there is no need to protect against such risks,” Fichtenberg, a resident of Seattle, told *Microwave News*.

Fichtenberg also argues that IEEE’s 5 kV/m electric field limit for the public is inadequate because it is known that such fields can cause painful shocks. Fichtenberg previously helped organize an unsuccessful legal campaign to overturn the FCC’s RF/MW exposure limits, which are based in part on an IEEE standard (see *MWN*, J/F01).

In a point-by-point rebuttal, Dr. Eleanor Adair, the chair of ICES, states that Fichtenberg’s arguments are “disingenuous,” “false” and “without merit.” She and other members of the committee “strongly disagree” with the charge that ethical rules were breached.

Bob Ashley submitted his own appeal on October 7 disputing the validity of the standard’s separate limits for “controlled” and “uncontrolled” environments—a concern also raised by Fichtenberg. Ashley, currently at St. Cloud State University in St. Cloud, MN, has long been involved in the EMF debate and holds patents for power-line configurations to reduce magnetic fields (see *MWN*, J/F92 and J/A00).

Both Ashley and Fichtenberg contend that their concerns about the standard were ignored in discussions within SC-3.

The third complaint was filed by John Bergeron, formerly with General Electric and now a part-time consultant in Schenectady, NY. “I am opposed to concepts that are occult rather than explicit in setting this standard,” he told *Microwave News*.

A three-member panel will review the appeals at the December 9 meeting of the IEEE Standards Board, to be held in Coconut Point, FL. The panel then has 30 days to offer a recommendation to the board.

Kent Jaffa of PacifiCorp, the chair of ICES’ SC-3, declined to comment, explaining that he did not want to say anything that might compromise the appeal process.

CORRECTION

In our last issue (p.3), we cited the incorrect limit for exposures of arms and legs to 50/60 Hz fields in the IEEE’s new C95.6 EMF standard. The maximum permissible exposure levels are 758 G at 50 Hz and 631.7 G at 60 Hz.

«Eye on Europe»

Sir **William Stewart** is no longer watching over the U.K. Mobile Telecommunications and Health Research (MTHR) Program. At the close of a seminar held in London on November 11 (see p.9), Sir William announced that he is stepping down as the chair of the committee that manages the program because of time constraints—he has been selected to head the newly created Health Protection Agency. Dr. **Lawrie Challis**, the former vice chair of the panel, has replaced Stewart. Challis, an emeritus professor of physics at the University of Nottingham, is also a member of the Advisory Group on Non-Ionizing Radiation (AG-NIR) of the National Radiological Protection Board (NRPB).



SIR WILLIAM
STEWART RESIGNS

In May 2000, a committee chaired by Stewart, with Challis as vice chair, issued what would become a highly influential report. The Stewart report recommended the MTHR research effort, as well as a precautionary approach to mobile phone risks (for instance, it discourages children from using cell phones; see *MWN*, M/J00). One of the report's other recommendations is that the state of knowledge on the possible health effects be reviewed again within three years. That evaluation, which will be written by AGNIR and is due next year, is in preparation.



LAWRIE CHALLIS
STEPS IN

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Meanwhile, the MTHR program is planning to issue its third call for research **proposals**. At the London meeting, the program management committee announced that two areas now have the highest priority: the impact of the precautionary approach to mobile phone health risks on people's risk perception and behavior and an evaluation of past efforts to provide information about such risks. A discussion paper is at: <www.mthr.org.uk>.

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The **French** government report on mobile phones, known as the **Zmirou report**, is also being updated. Like the Stewart committee, the Zmirou panel advocated precautionary policies (see *MWN*, J/F01 and J/A02). The new version is due out in February....At least one member of the committee is still recommending a cautious approach. Dr. **Pierre Aubineau** of the University of Bordeaux advises those who use mobile phones to limit their calls and to try to use phones where communication with the base station can be done at low power. "Personally, I think there is a risk," Aubineau said in an interview on French television (France 2) aired on October 20—at the same time he acknowledged that there is no proof of a health risk. Last year, Aubineau reported that he could see microwave-induced leakage through blood vessels in the brain and suggested that this could explain the headaches reported by users of mobile phones (see *MWN*, N/D01)....Aubineau's research was part of the national research

U.K. To Study Cancer Rates near Phone Towers—COST Disagrees

The U.K. mobile phone research program will go forward with an epidemiological study of cancer among children living within 500 meters of mobile phone base stations. Although no official announcement has yet been made, *Microwave News* has learned that Dr. Paul Elliott of the Imperial College of Science, Technology and Medicine in London will lead the new study.

The two-year, case-control study will focus on leukemia and lymphoma among children aged four or younger. It will also include brain tumors and other types of cancer.

At the same time that the Stewart panel was endorsing the new study, the COST281 committee on wireless health risks was working on a "scientific comment" explaining why such a study is a bad idea.

"At present, there is insufficient basis for performing scientifically sound epidemiological studies of the health impact of mobile telecommunication base stations," according to a draft of the comment. In fact, such a study "could be expected to raise rather than lower existing concerns," it contends. The comment, which is being prepared at the request of the Swiss government, is due to be completed soon.

"From a scientific point of view, there is no need for such a study," said Dr. Norbert Leitgeb of Austria's Graz University of Technology, the chair of COST281, during a COST management meeting. "There is a greater need to reassure the public."

The weakest point is the selection of health outcomes for such an epidemiological study, the draft comment states.

For instance, Dr. Tom McManus of Ireland's Department of Public Enterprise, a member of the COST panel, said that the study of sleep problems among those living near the shortwave transmitter in Schwarzenburg, Switzerland, had sensitized the public to this particular endpoint (see *MWN*, J/F96). "I did not sleep well last night, but I blame it on wine, not on a phone mast," McManus said during the COST committee's discussion.

program known as **COMOBIO** (short for Communications Mobiles et Biologie) and there has long been an expectation that the program would be renewed. Speaking at the London MTHR workshop, Dr. **Bernard Veyret** said that he hoped that COMOBIO+, as the follow-on effort is known, would get under way next year. "Everyone agrees that it should be done, but they still have to find the money," he later told *Microwave News*. Nevertheless, Veyret is optimistic. "It is very likely," he said.

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ETH, the Federal Institute of Technology in Zurich, and mobile phone service providers Orange, Sunrise and Swisscom have

HIGHLIGHTS

launched the **Swiss Research Foundation on Mobile Communication**. Projects on a broad range of topics—including health and environmental effects and risk management—will be eligible for funding from its research budget of SFr550,000 (US \$380,000). A scientific committee chaired by Dr. Heinz Gutscher of the University of Zurich will select the projects. ETH's Dr. Gregor Dürrenberger is also on the committee and will serve as the executive director of the foundation. The president of the board of directors is ETH's Dr. Werner Bächtold, with Dr. Mirjana Moser of the Federal Health Office serving as vice president. Other board members include Dr. Bernhard Aufderreggen of Physicians for Environmental Protection and ETH's Dr. Niels Kuster. The foundation is a continuation of an earlier effort launched in 1999 by ETH and diAx, a service provider that later merged with Sunrise. Ten research projects are ongoing: Results will be presented at the Zurich EMC meeting in February (see p.12). The next deadline for proposals is September 1, 2003. For further details, go to <www.ifh.ee.ethz.ch/Microwave/reco>....Orange, Sunrise and Swisscom are also bankrolling a new **Ombudsman for Mobile Communication and the Environment**, which seeks "constructive solutions" to disputes over the siting of base station antennas, among other problems, as an alternative to lengthy

court battles. The ombudsman's office, located in Bern, is staffed by the Swiss Interior Ministry under the direction of Erika Forster-Vannini, a member of the Council of the States, one of the country's two legislative chambers. She is responsible to a board composed of four legislators and a representative of the wireless industry. The office's Web site is <www.omk.ch>.

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More than 200 **physicians in Germany** have endorsed a call for stricter RF/MW exposure limits and a ban on the use of mobile phones by children. The signers of the "**Freiburg Appeal**," published by the Interdisciplinary Society for Environmental Medicine (known as IGUMED) on October 9, contend that radiation from mobile phones and base stations, as well as DECT digital cordless phones, is to blame for a "dramatic rise" in health problems among their patients, including cancer, cardiac disorders, neurodegenerative diseases. The text of the appeal is available in German at the society's Web site, <www.igumed.de>, along with a list of the 59 charter signers. A complete list of signers is at <www.elektrosmognews.de>. The EMR Network has posted English, French and Italian translations of the appeal at <emrnetwork.org/news>.

McDonald's NCRP Report (continued from p.1)

Tenforde declined to name the other members of the committee. William Beckner, the executive director, did not respond to phone calls.

McDonald's declined to comment or be interviewed.

In a written statement to *Microwave News*, Tenforde said that the report will be made available "upon written request once the [NCRP's] board of directors has approved the report and it is finalized." He anticipates that the report will be ready "reasonably soon."

Tenforde also wrote that, "The report has been subjected to a rigorous peer review and the NCRP committee that drafted the report is in the process of responding to a number of constructive comments and suggestions made by the reviewers."

In October, the U.K. arm of McDonald's confirmed to the British press that 120 of its restaurants are now being used as antenna sites. "There have been 450 medical research studies into mobile phones, none of which has found a link between antennas and ill health," a McDonald's spokesperson told the *London Times* (October 9). The *Sun* (October 8), a tabloid, reported that the company would not reveal how much it is being paid to house the antennas.

The draft NCRP report endorses the RF/MW exposure standards adopted by the Federal Communications Commission (FCC):

Available evidence and research to date indicate that adherence to the FCC guidelines will avoid adverse effects of RF exposure on the nervous system and animal behavior, effects on vision and the neuroendocrine system, cardiovascular and hematological effects, immune system effects and effects on potentially sensitive tissues involved in reproduction, embryonic development and post-natal development.

The report goes on to state that "recent reviews of the epidemiological literature, including extensive studies on humans exposed to modulated RF signals from wireless communications systems, have not given any indication of carcinogenic effects." Two reviews are cited in support of this view: one published in 1999 by a team led by Dr. John Moulder (see *MWN*, M/J99) and one by Drs. John Boice and Joseph McLaughlin written for the Swedish Radiation Protection Authority, which was released in September (see *MWN*, S/O02).

"Based on the body of current evidence from laboratory and human studies, there is no basis on which to modify the current FCC guidelines," the draft NCRP report concludes.

The draft notes that some countries follow ICNIRP guidelines, but makes no mention of those that have adopted stricter limits for wireless facilities—Italy and Switzerland, for example.

McDonald's, which has its headquarters in Oakbrook, IL, operates over 30,000 fast-food restaurants in 120 countries.

The NCRP is chartered by the U.S. Congress. Most of its work is done under contract to federal agencies. Corporate sponsors typically support the council with donations of \$5,000 per year.

In recent years, the NCRP's handling of non-ionizing radiation (NIR) has repeatedly met with controversy. In the summer of 1999, then-president Charles Meinhold pledged to release a draft of a long-delayed report on EMF health risks by the end of the year (see *MWN*, J/A99). But it has yet to appear. Not long afterward, the council laid off its only NIR staff scientist (see *MWN*, J/F00). Then last year, the committee revising the NCRP's RF/MW exposure guidelines was disbanded—it was later revived, but work has not yet resumed (see *MWN*, S/O01 and J/A02). A report on modulation effects, begun eight years ago, is still under review (see *MWN*, M/J95).

German Veterans Sue in U.S. over Ionizing Radiation from Radar

German veterans are suing the manufacturers of U.S. military radar systems, claiming that they were exposed to potentially harmful X rays from the radars' electronic components.

The class-action lawsuit filed in Texas state court in El Paso on October 8 also seeks compensation for a similarly exposed U.S. veteran. The plaintiffs could potentially include anyone—of any nationality—who worked near military radars made by Lucent, Raytheon or the other defendants (see box below).

GE, Lucent and Raytheon declined to comment.

Several hundred German veterans have long been seeking compensation for a host of ailments that they believe resulted from working close to radars. Last year, a report commissioned by the German government found that X rays from high-power radar transmitters were responsible for at least some of the cancers among the veterans (see *MWN*, S/O01).

At that time, the German defense ministry stated that it would give "prompt, nonbureaucratic" compensation to those who were injured, but last spring, after only a few claims had been approved, a veterans' group took the ministry to court (see *MWN*, M/A02).

(In November, a Danish workers compensation agency approved a radar repairman's claim that X-ray exposures he received while serving in the air force caused his cancer, according to Danish press reports.)

Reiner Geulen, a Berlin lawyer who is representing the veterans, maintains that the American radar manufacturers share responsibility for their injuries. Prof. Anthony Sebok of Brooklyn Law School in New York City, who is advising Geulen, told *Microwave News* that the U.S. courts are the "appropriate" place for a lawsuit because "the radars were made here and the plaintiffs were trained to use them here."

The lead attorney in the U.S. lawsuit, Jonathan Auerbach of Berger & Montague in Philadelphia, explained that the suit's focus on ionizing radiation is a direct result of last year's report for the German government. "That's the starting point for us in making a case we can win," he said in an interview.

The high-power—greater than 5 kV—transmitter tubes emit X rays and these "were not adequately protected by shields," according to Auerbach's complaint. It also contends that personnel were never warned about X-ray hazards or given protective clothing and that maintenance was routinely carried out while radars were "fully operational."

The potential health risks of X rays from unshielded klystron microwave tubes have been known for decades. In 1960, nine technicians at the Lockport Air Force Station near Buffalo, NY,

Defendants in U.S. Radar Lawsuit

Company	Selected System(s)
General Electric	AN/FPS-7
Honeywell (Bendix)	Ajax Hercules
ITT Industries/ITT Gilfillan	radar components
Lucent (Western Electric)	Nike Ajax & Nike Hercules
Raytheon Co.	Hawk & Patriot

Litigation Roundup

On November 27, lawyers for Dr. **Christopher Newman** notified Judge **Catherine Blake** of the U.S. District Court in Baltimore that they will appeal her dismissal of Newman's suit against **Motorola** and many others in the wireless industry. Newman, represented by **Russell Smouse** and **John Angelos** of the Peter Angelos law firm in Baltimore, alleges that the use of mobile phones caused his brain tumor. Blake dismissed the suit on October 31, a month after rejecting the entire slate of expert witnesses who were prepared to testify on Newman's behalf. She found that the evidence linking mobile phones to cancer has not "gained general acceptance in the scientific community" (see *MWN*, S/O02). The U.S. Court of Appeals for the Fourth Circuit in Richmond, VA, will now review the case.

««« »»»

Following oral arguments held on November 1, Judge **Blake** is preparing to rule on a motion to dismiss the five class-action lawsuits that would force wireless companies to include a **headset** with every mobile phone. In a shift in strategy, plaintiffs' attorneys, led by the **Peter Angelos** firm, are now playing down the argument that mobile phones are defective because they expose users to potentially harmful radiation—a key claim in the original filings (see *MWN*, M/J 01). All but one of the complaints were amended in September to argue that the wireless industry's assurances of safety violate state laws against false advertising and marketing. Blake might have prompted the move with a June ruling stating that the FCC has the authority to set safety guidelines for mobile phones and that it had "considered and rejected a headset requirement" (see *MWN*, J/A02). Only **Michael Allweiss** of Lowe, Stein in New Orleans is standing firm. In January 2001, a federal judge in Louisiana ruled that his suit, *Naquin et al. v. Nokia et al.*, is not preempted by federal phone safety rules.

««« »»»

Chicago lawyer **Ben Barnow** has suffered another setback in his lawsuit on behalf of mobile phone users whose privacy, he claims, was invaded by an industry-sponsored epidemiological study. On October 9, an Illinois state court in Chicago once again dismissed *Busse et al. v. Motorola et al.* Judge **Stephen Schiller**'s handwritten, one-page order gave no explanation for the decision. Barnow has notified the court that he will appeal, according to defense attorneys. Barnow did not return calls for comment. The lawsuit was filed in 1995 when Barnow, on behalf of Jerald Busse and others, contended that Epidemiology Resources Inc. (**ERI**) had used confidential billing records without obtaining the plaintiffs' consent for what was in effect a test of phone safety. The study was commissioned by Wireless Technology Research (**WTR**), the now-defunct industry research effort led by Dr. **George Carlo** (see *MWN*, J/F96). The human testing claim was dismissed in 1997. Last year, WTR's insurance company settled, giving \$1 million to Barnow and \$400,000 to Carlo (see *MWN*, J/A01, N/D01 and M/A02).

HIGHLIGHTS

became seriously ill following X-ray exposure during the installation and testing of a high-power FPS-7 search radar.

The new suit seeks compensation for those who worked close to any of a large number of radars any time between 1958 and 1994. Until a class is authorized, the plaintiffs consist of nine veterans who were trained at a radar school run jointly by the U.S. and German military at Fort Bliss, near El Paso.

Five developed leukemia and skin, bladder and pharyngeal cancer, among other ailments. The other four are healthy but want the defendants to pay for medical surveillance. The German Association To Support the Radar-Injured, which represents nearly 500 radar operators, technicians and mechanics who believe that their health problems are due to X rays or other harmful expo-

sure, is also a plaintiff in the suit.

Auerbach believes that many military personnel from the U.S. and other NATO countries were also exposed to X-ray radiation from radar. A statement posted at <www.bergermontague.com> advises veterans who think that they might have been injured to contact the firm.

In the early 1980s, the U.S. military settled a number of claims brought by servicemen who blamed radar radiation for cataracts and other health problems (see *MWN*, D82).

In September, a new commission requested by the Bundestag, the German parliament, began looking into the dispute under the direction of Wolfram König, the president of the Federal Office for Radiation Protection (see also *MWN*, J/A01).

GSM Modulation Is Key to Nonthermal, Neurological Effects

Two new studies, one with humans and one with birds, show that RF/MW radiation, when modulated, can cause nonthermal, neurological effects.

Drs. Peter Achermann and Alexander Borbély of the University of Zurich have confirmed and extended their previous work showing that mobile phone radiation can affect sleep (see *MWN*, N/D99 and N/D00). In their latest experiment,* they found that a 30-minute exposure to a 900 MHz, 1 W/Kg GSM signal altered electrical activity, both before and after sleep onset, in the brains of 16 young men who served as test subjects. But the Swiss researchers saw no changes when they used continuous-wave (CW)—that is, unmodulated—900 MHz radiation.

Achermann and Borbély report what they call a “striking” finding—that the digital signal affected the brain’s electrical activity for hours after the 30-minute exposure. “Surprisingly,” they write, the EEG changes “appeared to increase in the course of the night.”

In a second study, with 13 subjects exposed to the same GSM radiation, the Swiss team found that blood flow increased in the parts of the brain that were closest to the simulated handset.

The changes in blood flow, which were demonstrated with PET scans, occurred in the region of the brain that plays a major role in working memory, according to the Swiss researchers.

“Borbély’s EEG result can only be interpreted as a nonthermal effect, because it disappears with a CW exposure,” said Dr. Niels Kuster. “Even though the digital signal has a greater peak power than the CW signal, the difference in temperature is inconsequential and cannot explain the different effects.” Kuster, the director of the Zurich-based Foundation for Research on Information Technologies in Society, is a member of the Borbély study team.

Drs. Robert Beason and Peter Semm, working with avian brains, have shown that GSM radiation increased the rate of neural activity by an average of 3.5-fold, though the rate decreased

in some cells. Here again, unmodulated signals had no effect.

“We found a generalized response, not one that is specific to a single type of receptor,” Beason told *Microwave News*. “The power was just too low for it to have been a thermal response.”

In their paper,† Beason and Semm estimate the SAR to be 0.05 W/Kg in the brains of exposed zebra finches.

Beason joined the U.S. Department of Agriculture’s National Wildlife Research Center in Sandusky, OH, on December 1. Semm, who is at the Goethe University in Frankfurt, could not be reached for comment.

Mobile Phone Industry Panel: Nonthermal Effects Impossible

Nonthermal mechanisms are highly unlikely and most likely impossible. That is the consensus of a seminar sponsored by the mobile phone industry at the end of October.

While the meeting was modeled after the Gordon conferences, where discussions are all off-the-record, Dr. Mays Swicord of Motorola offered the following sense of the participants’ outlook: “Some mechanisms are impossible and some have inherent limits—that is, they occur at certain field strengths or in certain frequency ranges. In communication bands, none of the nonthermal mechanisms are applicable.” Swicord and Dr. Asher Sheppard, a consultant in Redlands, CA, organized the seminar.

Yale University physicist Dr. Robert Adair, who attended the seminar, told *Microwave News* that he would put the odds of finding a nonthermal RF effect at a hundred to one. At power frequencies, the odds are a million to one. “The idea that 3-4 mG power-line fields can have effects is just crazy,” he said. (For similar and opposite views from two other physicists, see p.14 and p.11, respectively.)

The six speakers at the meeting were: Drs. Dean Astumian, University of Maine; Q. Balzano, consultant, Annapolis, MD; Frank Barnes, University of Colorado; Kenneth Foster, University of Pennsylvania; Earl Prohofsky, Purdue University; and James Weaver, MIT.

The meeting was closed to the press (see p.12).

*R. Huber et al., “Electromagnetic Fields, Such As Those From Mobile Phones, Alter Regional Cerebral Blood Flow and Sleep and Waking EEG,” *Journal of Sleep Research*, 11, pp.289-295, December 2002. A discussion of the findings with many details is at <www.unizh.ch/phar/sleep/handy>.

†R. Beason and P. Semm, “Responses of Neurons to an Amplitude Modulated Microwave Stimulus,” *Neuroscience Letters*, 333, pp.175-178, 2002.

ness by sensing a temperature difference of only 0.002°C—this fact is in every zoology textbook, he said. “A very, very small temperature change can have an enormous effect on the nervous system.”

On a practical level, discarding the nonthermal label can make a researcher’s life much easier—as Leszczynski has himself learned. “Often when you talk about finding a nonthermal effect, it’s like a death sentence,” he remarked.

In a set of widely publicized experiments, which have become a lightning rod for those who don’t believe in nonthermal effects, Leszczynski has reported that mobile phone radiation can activate heat shock proteins (hsp)—also known as stress proteins—at levels that are not associated with heating (see *MWN*, J/A01, M/J02 and J/A02; also p.13).

At the London meeting, Dr. Theodoros Samaras of Greece’s Aristotle University of Thessaloniki provided experimental support for Leszczynski’s claim. Samaras said that his calculations and measurements carried out by Jürgen Schuderer of the Foundation for Research on Information Technologies in Society in Zurich showed that the maximum temperature change in Leszczynski’s cells is between 0.033°C and 0.045°C. “There are no hot spots,” Samaras said, in the cells exposed to 1800MHz at a maximum specific absorption rate (SAR) of 2W/Kg.

Moments earlier, Dr. Eleanor Adair, in an invited talk, had pointed out that a temperature change of 0.03°C is too small to be detected in the brain of live mammals, including humans, “by any instrument currently available.” Adair recently retired from Brooks Air Force Base in San Antonio and is now back home in New Haven, CT.

Yet, here again, models show that a simple biological system can detect this small temperature difference. Adair said that Dr. Robert Adair, the Yale University physicist and her husband, has recently reported that as few as 100 axons can sense a temperature change of 0.03°C.*

Is There One Reproducible Effect?

At the close of a seminar on the U.K. mobile phone research program,[†] held the day before the COST workshop,[‡] Dr. Edward Grant, a physicist and a former longtime member of the NRPB’s Advisory Group on Non-Ionizing Radiation, made it clear that he is willing to “consider novel mechanisms of interaction” to explain a low-level effect. But, he said, “Most scientists agree that before it can be accepted, it must be verified by an indepen-

* R.K. Adair, “Simple Neural Networks for the Amplification and Utilization of Small Changes in Neuron Firing Rates,” *Proceedings of the National Academy of Sciences*, 98, pp.7253-7258, June 19, 2001.

† *Mobile Telecommunications and Health Research Program (MTHR): Research Seminar*, London, U.K., November 11-12, 2002. See also p.5. Abstracts of most of the presentations are at <www.mthr.org.uk/meetings>.

‡ *Subtle Temperature Effects of RF-EMF*, a COST281 Workshop, London, U.K., November 12-13, 2002. Many of the talks will soon be posted at <www.cost281.org>.



“We can forget small temperature effects”
— Roland Glaser

dent lab.”

Dr. James Metcalfe of the University of Cambridge then asked everyone whether there is a single low-level RF/MW effect which is reproducible and widely accepted. No one accepted the challenge.

But two days later at the end of the COST meeting, a senior European researcher—who wishes to remain anonymous—pointed to the hsp effect as the answer to Metcalfe’s question.

Researchers from Denmark, the U.K. and the U.S., in addition to Finland’s Leszczynski, all reported activation of hsp by nonthermal levels of microwaves at the meeting.

Dr. David de Pomerai of the University of Nottingham in the U.K. said that he had eliminated a temperature increase of greater than 0.2°C in his hsp experiments with worms (*C. elegans*).

“We continue to see a big gap between the action of microwaves and heat alone,” de Pomerai said in an interview. When asked whether it mattered if a nonthermal effect was later found to be due to heating, de Pomerai responded, “There would be less public concern, but I am not sure you can dismiss it entirely.”

Dr. Sianette Kwee of Denmark’s University of Aarhus said that she had found that in order to detect elevated hsp in cells without EMF exposure, they must be heated by 5-8°C.

France’s Dr. Florence Poulletier de Gannes, a member of Dr. Bernard Veyret’s lab at the University of Bordeaux, was the only speaker who failed to see an hsp effect. She said that she had not observed changes in the production of hsp in any of the cell models tested. She will soon try again with cells provided by Leszczynski.

Even in the face of the conflicting French data, Dr. Reba Goodman of Columbia University in New York City voiced her frustration that the hsp work was not getting the respect it deserved. “You cannot ignore all these studies anymore,” she said.

Goodman distributed a letter she had written to the WHO with Dr. Martin Blank, also of Columbia, which states that the hsp work “certainly suggests that the old safety standards based on thermal responses alone make no biological sense.”

De Pomerai closed by offering a positive outlook on the hsp experiments. “Even if our work is confirmed, it is not necessarily a bad thing.” He reminded the COST meeting that seven years ago a team at the University of Colorado reported that worms that experienced environmentally induced stress actually lived longer.[¶]

¶ G.J. Lithgow et al., “Thermotolerance and Extended Life-Span Conferred by Single-Gene Mutations and Induced by Thermal Stress,” *Proceedings of the National Academy of Sciences*, 92, pp.7540-7544, August 1995.



Reporting a non-thermal effect is “like a death sentence.”
— Dariusz Leszczynski



“We see a big gap between microwaves and heat alone.”
— David de Pomerai

« Standards Watch »

• The **Australian Communications Authority (ACA)** is moving to adopt **ICNIRP's** limit for exposures from **mobile phones**. The maximum SAR will increase to 2.0 W/Kg, averaged over 10 g, from 1.6 W/Kg over 1 g under regulations to be introduced early next year. ACA's Stephen Jones in Canberra told *Microwave News*. The new ACA rules will not treat the ear (pinna) as an "extremity" with a higher allowable SAR, an approach taken by the IEEE but not by ICNIRP (see below and *MWN*, J/F01). The ACA is also planning to follow the ICNIRP guidelines in regulating telecom transmitters. Last May, the Australian Radiation Protection and Nuclear Safety Agency (**ARPANSA**) adopted a new set of RF/MW radiation exposure standards based on those of ICNIRP (see *MWN*, M/J02). Until the ACA promulgates its new rules, the long-standing, frequency-independent, or "flat," limit of 200 $\mu\text{W}/\text{cm}^2$ for public exposures—originally adopted by Standards Australia in 1985—will continue to be in effect. The new rules for mobile phones were scheduled to be posted on the ACA's Web site, <www.aca.gov.au>, by early October, but at press time in early December they have yet to be made public. The ACA did announce in October that the base station siting code, *Deployment of Radiocommunications Infrastructure*, originally developed by the Australian Communica-

tions Industry Forum, was now official (it is on the ACA Web site; see *MWN*, M/J02). It requires wireless network operators to minimize unnecessary exposures and consider alternatives to siting antennas near "sensitive" locations such as schools.

• The Council of the European Union (**EU**) is developing guidelines for **occupational exposures** to power-frequency EMFs and RF/MW radiation. At an October 8 meeting in Luxembourg, health and labor ministers from the 15 member states agreed that minimum requirements are needed to prevent "a number of potentially acute health effects." The Danish ministers who are the current presidents of the council hope to have a draft ready when their Greek counterparts take the helm at the beginning of 2003, EU spokesperson Luís Amorim told *Microwave News*. The decision to write a standard followed a seminar hosted by the council in Luxembourg on September 20, at which representatives of ICNIRP made the case for using their guidelines. The Danish delegation concluded that the ICNIRP standard "could form the basis" for exposure limits, and recommended that the EU also draft measurement procedures in cooperation with CENELEC, the European standard-setting group. Three years ago, the EU council adopted ICNIRP-based guidelines for exposures of members of the general public (see *MWN*, J/A99).

FROM THE FIELD

Hot New Papers

J. Lass et al., "Effects of 7Hz-Modulated 450MHz Electromagnetic Radiation on Human Performance in Visual Memory Tasks," *International Journal of Radiation Biology*, 78, pp.937-944, September 10, 2002.

"A homogeneous group of 100 subjects (37 female, 63 male) were randomly assigned to either the exposed ([7Hz-modulated 450MHz] 10-20 min, 0.158 mW/cm² [0.0095 W/Kg]) or the sham-exposed group. A battery of three different tests measured attention and short-term memory....The results suggest that low-level 7Hz-modulated microwave radiation has different effects on the cognitive tasks of different complexity levels. These effects might cause a decrease in the number of errors for less complicated neuropsychological tasks and an increase in the errors for more complicated ones."

Reprints: Jaanus Lass, Tallinn Technical University, Tallinn, Estonia, E-mail: <jaanus@cb.ttu.ee>.

Christoffer Johansen, Maria Feychting, Mogens Møller, Per Arnsbo, Anders Ahlbom and Jørgen Olsen, "Risk of Severe Cardiac Arrhythmia in Male Utility Workers: A Nationwide Danish Cohort Study," *American Journal of Epidemiology*, 156, pp.857-861, November 1, 2002.

"The cohort of 24,056 men employed at utility companies between 1900 and 1993 was linked to the nationwide, population-based Danish Pacemaker Register, and the numbers of persons who had undergone pacemaker implantation between 1982 and 2000 were compared with corresponding numbers in the general population. In addition, the data on the utility workers were fitted to a multiplicative Poisson regression

model in relation to estimated levels of exposure to 50Hz electromagnetic fields. Overall, based on 135 men with pacemakers (140 expected), there was no increased risk of severe cardiac arrhythmia among the utility employees; the risk estimate was 0.96 (95% confidence interval=0.81-1.14). No clear dose-response pattern emerged with increasing levels of exposure to electromagnetic fields or with duration of employment. These results are largely reassuring, since they do not support the hypothesis of a link between occupational exposure to electromagnetic fields and an excess risk of severe cardiovascular arrhythmia leading to permanent implantation of a pacemaker."

Reprints: Dr. Christoffer Johansen, Institute of Cancer Epidemiology, Danish Cancer Society, Copenhagen, E-mail: <christof@cancer.dk>.

Margaret Wrensch et al., "Epidemiology of Primary Brain Tumors: Current Concepts and Review of the Literature," *Neuro-Oncology*, 4, pp.278-299, October 2002.

"Primary malignant brain tumors clearly represent a heterogeneous group of diseases. Therefore, a workable consensus on classification and increased use of molecular tumor markers in concert with improved surveillance and registration are necessary to characterize homogeneous subgroups of the many heterogeneous categories of primary brain tumors....This concept and others reinforce the notion that [glioblastoma multiforme] is not one but probably many diseases that must be distinguished if progress is to be made in determining etiology....The descriptive epidemiology of brain tumors suggests that a major unaccomplished

task is to formulate and evaluate explanations for the consistently observed sex and ethnic differences for glioma and meningioma. Among the most provocative clues to the etiology of primary brain tumors in adults is the characteristic sex difference, with gliomas being more prevalent among men and meningiomas among women....Further analytic studies of environmental factors (viruses, radiation and carcinogenic or protective chemical exposures through diet, workplace or other sources), when combined with incorporation of potentially relevant polymorphisms that might influence susceptibility, may help us understand this devastating collection of diseases....To conclude, primary brain tumors probably stem from multiple exogenous and endogenous events. To date, the few proven causes (inherited genetic syndromes, therapeutic ionizing radiation and immunosuppression giving rise to brain lymphomas) account for only a small proportion of cases."

Reprints: Dr. Margaret Wrensch, University of California, San Francisco, E-mail: <wrensch@itsa.ucsf.edu>.

J.B. Burch et al., "Melatonin Metabolite Excretion Among Cellular Telephone Users," *International Journal of Radiation Biology*, 78, pp.1029-1036, November 1, 2002.

"The relationship between cellular telephone use and excretion of the melatonin metabolite 6-hydroxymelatonin sulfate (6-OHMS) was eval-

uated in two populations of male electric utility workers (Study 1, n=149; Study 2, n=77)....No change in 6-OHMS excretion was observed among those with daily cellular telephone use >25 min in Study 1 (5 worker-days). Study 2 workers with >25 min cellular telephone use per day (13 worker-days) had lower...mean nocturnal 6-OHMS concentrations (p=0.05) and overnight 6-OHMS excretion (p=0.03) compared with those without cellular telephone use. There was also a linear trend of decreasing mean nocturnal 6-OHMS/creatinine concentrations (p=0.02) and overnight 6-OHMS excretion (p=0.08) across categories of increasing cellular telephone use. A combined effect of cellular telephone use and occupational 60 Hz MF exposure in reducing 6-OHMS excretion was also observed in Study 2....Prolonged use of cellular telephones may lead to reduced melatonin production, and elevated 60 Hz MF exposures may potentiate the effect."

Reprints: Dr. James Burch, Colorado State University, Ft. Collins, E-mail: <james.burch@colostate.edu>.

Ivancica Trosic et al., "Micronucleus Induction After Whole-Body Microwave Irradiation of Rats," *Mutation Research, Genetic Toxicology*, 521, pp.73-79, November 26, 2002.

"Adult male Wistar rats were exposed for 2h a day, 7 days a week for up to 30 days to continuous 2450 MHz...radiation at a power density of 5-10 mW/cm²....Peripheral blood smears were examined for the extent of genotoxicity, as indicated by the presence of micronuclei in polychromatic erythrocytes (PCEs). The results for the time-course of PCEs indicated significant differences (p<0.05) for the 2nd, the 8th and the 15th day between control and treated subgroups of animals....In conclusion, an increased micronucleus frequency was seen in peripheral immature erythrocytes of exposed rats, peaking on the 8th day of our experiment, along with a significantly elevated number of PCEs, which peaked on the second experimental day and declined thereafter, to reach control values at the end of the experiment. Such findings are indicators of radiation effects on bone-marrow erythropoiesis and their consequent reflection in the peripheral circulation. The significant elevation of micronucleus frequency on the 8th irradiation day indicates that an adaptive or recovery mechanism in rats appeared during the subchronic irradiation experiment. Inasmuch as micronuclei result from chromosome breakage as well as from spindle disruption, our observations do not provide information concerning the mechanism responsible for their origin."

Reprints: Dr. Ivancica Trosic, Institute for Medical and Occupational Health, Zagreb, Croatia, E-mail: <itrosic@imi.hr>.

Bernhard Liesenkötter, "Analysis of Alleged Harm Due to Digitally Modulated Mobile Phone Radiation," *Zeitschrift für Medizinische Physik*, 12, pp. 198-203, 2002 [paper in German with English abstract].

"In the public discussion regarding the health risks of mobile phone system radiation, it is emphasized that the pulse slope of digital modulation, as defined in the GSM standard, will cause biological effects.... This paper compares quantitatively the slope of the digital GSM pulses with that of the synchronizing pulse of the television signal. The result shows clearly that the pulse spectrum of the television signal contains that of the GSM signal; in addition, the synchronizing impulse of television exhibits a much steeper slope. Considering the countrywide normal radiation intensities of television and mobile phone systems, it can be stated that the worldwide exposure to the common television signals over more than 50 years can disprove the contention of adverse biological health effects of the pulse slope of digitally modulated radiofrequency."

Reprints: Dr. Bernhard Liesenkötter, University of Applied Sciences Augsburg, Germany, E-mail: <liese@rz.fh-augsburg.de>.

Thermal Noise Limit May Not Be a Limit at All

W.T. Kaune, "Thermal Noise Limit on the Sensitivity of Cellular Membranes to Power-Frequency Electric and Magnetic Fields," *Bioelectromagnetics*, 23, pp.622-628, December 2002.

"Several authors [Weaver & Astumian, Adair and Bennet] have concluded that thermal electromagnetic noise will be of sufficient magnitude to overwhelm electric and/or magnetic fields induced by environmentally generated, power-frequency [EMFs] in the membranes of living cells located in the bodies of humans. Yet, there are research reports [Harland & Liburdy, Blackman et al., Ahlbom et al. and Greenland et al.] that indicate that living cells may respond to power-frequency electric and/or magnetic field levels well below the limits set by these thermal noise arguments. The purpose of this study is to suggest that published thermal arguments may not make a full accounting of all membrane force fields of thermal origin, and that when such an accounting is made, the net thermal noise fields may be smaller in the power-frequency range than previously thought....[T]he induced membrane field estimates developed in this study are sufficiently large, when compared to the estimated thermal noise fields, to render unwarranted any such suggestion of a thermal noise problem. If the calculations presented in the study are at least approximately correct, there may be no thermal limit on the response of cellular membranes to exposures to environmental levels of [EMFs]. However, this does not mean that these cells will actually respond to such an external exposure....The final determination of whether such responses do occur is a matter for experimental study."

Reprints: Dr. William Kaune, Richland, WA, E-mail: <wtkaune@yahoo.com>.

2003 Conference Calendar (Part I)

Part II will appear in our next issue.

January 7-10: **Progress in Electromagnetics Research Symposium (PIERS)**, Singapore. Contact: PIERS Secretariat, 451 Race Course Rd., Singapore 218695, Republic of Singapore, (65) 6299-8992, Fax: (65) 6299-8983, E-mail: <ctmapl@singnet.com.sg>, Web: <www.ece.nus.edu.sg/piers03>.

February 4-6: **DistribUTECH 2003**, Convention Center, Las Vegas, NV. Contact: Jennifer Lindsey, 1421 S. Sheridan Rd., Tulsa, OK 74112, (918) 832-9313, Fax: (918) 831-9875, E-mail: <dtechconference@pennwell.com>, Web: <dt2003.events.pennnet.com>.

February 18-20: **15th International Zurich Symposium and Technical Exhibition on Electromagnetic Compatibility (EMC Zurich)**, Zurich, Switzerland. Contact: Dr. Gabriel Meyer, ETH Zentrum, IKT-ETF, Zurich CH-8092, Switzerland, (41+1) 632-2793, Fax: (41+1) 632-1209, E-mail: <gmeyer@nari.ee.ethz.ch>, Web: <www.emc-zurich.ch>.

February 24-26: **Applying the Precautionary Principle to EMFs**, Luxembourg. Contact: Dr. Leeka Kheifets, International EMF Project, World Health Organization, CH-1211 Geneva 27, Switzerland, (41+22) 791-4976, Fax: (41+22) 791-4123, E-mail: <kheifetsl@who.int>, Web: <www.who.int/peh-emf/en>.

February 27-28: **RF Interactions with Humans: Mechanisms, Exposure and Medical Applications**, Institute of Physics (IOP), London, U.K. Contact: Jasmina Bolfek-Radovani, IOP, 76 Portland Pl., London W1B 1NT, U.K., (44+20) 7470-4800, Fax: (44+20) 7470-4900, E-mail: <registrations@iop.org>, Web: <physics.iop.org/IOP/Confs/ENV>.

March 9-13: **42nd Annual Meeting of the Society of Toxicology (SOT)**, Convention Center, Salt Lake City, UT. Contact: SOT, 1767 Business Center Dr., Ste.302, Reston, VA 20190, (703) 438-3115, Fax: (703) 438-3113, E-mail: <sothq@toxicology.org>, Web: <www.toxicology.org>.

March 17-19: **Wireless 2003**, Convention Center, New Orleans, LA. Contact: Michele Solomon, CTIA, 1250 Connecticut Ave., NW, Ste. 800, Washington, DC 20036, (202) 785-2842, E-mail: <msolomon@ctia.org>, Web: <www.ctiashow.com>.

March 30-April 3: **International Magnetics Conference**, Boston, MA. Contact: Courtesy Associates, (202) 973-8668, Fax: (202) 973-8722, E-mail: <magnetism@courtesyassoc.com>, Web: <www.intermagconference.com>.

March 31-April 3: **12th International Conference on Antennas and Propagation (ICAP)**, University of Exeter, U.K. Contact: ICAP, IEE, Savoy Pl., London WC2R 0BL, U.K., (44+207) 344-5422, Fax: (44+207) 497-3633, E-mail: <icap@iee.org.uk>, Web: <conferences.iee.org/ICAP2003/main.htm>.

April 5-10: **National Association of Broadcasters Annual Convention (NAB)**, Las Vegas, NV. Contact: Kristie Morris, NAB, 1771 N St., NW, Washington, DC 20036, (800) 342-2460, E-mail: <kmorris@nab.org>, Web: <www.nab.org>.

April 9-10: **39th Annual Meeting of the National Council on Radiation Protection and Measurements (NCRP)**, Crystal City Marriott, Arlington, VA. Contact: Laura Atwell, 7910 Woodmont Ave., Ste. 800, Bethesda, MD 20814, (301) 657-2652, Fax: (301) 907-8768, E-mail: <atwell@ncrp.com>, Web: <www.ncrp.com>.

April 14-16: **American Power Conference**, Palmer House Hilton, Chicago, IL. Contact: Jennifer Lindsey, 1421 S. Sheridan Rd., Tulsa, OK 74112, (918) 832-9313, Fax: (918) 831-9875, E-mail: <apconference@pennwell.com>, Web: <www.apc-pennwell.com>.

April 14-17: **International Conference on Non-Ionizing Radiation (ICNIR)**, University of Tenaga National, Malaysia. Contact: Halil Hussain, College of Engineering, University of Tenaga National, Km7 Jalan Kajang-Puchong, 43009 Kajang, Selangor DE, Malaysia, (60+3) 8928-7212, Fax: (60+3) 8926-3506, E-mail: <icnir2003@uniten.edu.my>, Web: <www.uniten.edu.my/go/icnir2003>.

April 18-22: **3rd International EMF Seminar in China: EMFs and Biological Effects**, Guilin, China. Contact: Zeng Qunli, Bioelectromagnetics Lab, Zhejiang University, 353 Yanan Rd., Hangzhou 310031, China, (86+571) 8721-

Meeting Notes

• The *Review of Progress in Research on Interaction Mechanisms for RF Energy and Biological Systems* was billed as a WHO seminar to be held at the U.S. FDA in Rockville, MD, October 30-31. We asked whether we could attend and FDA's **Abiy Desta** immediately invited us. But a number of the invited speakers—Drs. **Dean Astumian**, **Frank Barnes**, **Kenneth Foster**, **Earl Prohofsky** and **James Weaver**, all university professors—balked because, as FDA's Dr. **Howard Cyr** told us, their work was unpublished and they wanted it off-limits to the press. A week before the meeting, the FDA bowed out as the host, because, as Desta explained, the law does not allow the government to close such a meeting. Before you could say "Mobile Manufacturers Forum," the MMF had taken over: The seminar was moved across the street to the Doubletree Hotel and our invitation was revoked. According to Motorola's (and MMF's) Dr. **Mays Swicord**, he and Dr. **Asher Sheppard** had drawn up the agenda and then passed it by Cyr and Dr. **Michael Repacholi** for their approval. Why were the WHO and the FDA involved? we asked. "There was a suggestion from the contractors to meet in a neutral environment, so it would not look like a closed-door industry meeting," Swicord replied. Each of the five professors has an MMF contract, Swicord confirmed. Cyr said the FDA was simply responding to a request from the WHO. As for Repacholi, he told us that this was not a WHO meeting, only that WHO was invited to attend (see also p.8).

• On December 5, the **NRPB** is holding an open meeting in Birmingham, U.K.—*Power Lines and Health: Public Concerns about the Distribution and Use of Electricity*. The session will be chaired by Lord Robert Winston and those attending will include Sir Richard Doll, Dr. Alastair McKinlay and Dr. Michael Repacholi. Half an hour after this meeting ends, the Trentham Environmental Action Campaign, a power line activist group based in Stoke-on-Trent, is having its own meeting at the same conference center with the support of Children with Leukemia, a charity. Profs. Denis Henshaw of the University of Bristol and Mike O'Carroll, of REVOLT, another activist group, will speak at this counter-session, titled *Addressing the Public Concerns*.

• There will be a session on *Base Stations and Non-Ionizing Radiation* on February 18 at the *Zurich EMC Symposium*—on the same day as a planned forum on *Exposure to GSM Radiation*. This latter open meeting is being organized by ETH's Dr. Gregor Dürrenberger, and will feature the results of research projects supported by the Swiss Research Foundation on Mobile Communication (see p.6).

• Only one day (February 24) of the WHO's three-day workshop on the **precautionary principle** will be open to the public. Dr. Leeka Kheifets said that the meeting will address both ELF and RF/MW radiation. It "will be one of the most significant we have held," added Dr. Michael Repacholi.

7094, Fax: (86+571) 8721-7410, E-mail: <zengql@cmm.zju.edu.cn>.

May 2-9: **Annual American Occupational Health Conference**, World Congress Center, Atlanta, GA. Contact: Nancy Olson, AOHC, 1114 N. Arlington Heights Rd., Arlington Heights, IL 60004, (847) 818-1800, ext.366, Fax: (847) 818-9266, E-mail: <nolson@acoem.org>, Web: <www.slackinc.com/exhibits/aohc>.

May 4-7: **35th National Conference on Radiation Control**, Hyatt Regency, Anaheim, CA. Contact: Lin Carigan, Conference of Radiation Control Program Directors, 205 Capital Ave., Frankfort, KY 40601, (502) 227-4543, Fax: (502) 227-4928, E-mail: <lcarigan@rcrpd.org>, Web: <www.rcrpd.org>.

May 10-15: **American Industrial Hygiene Association Conference and Exposition**, Dallas, TX. Contact: Carol Tobin, AIHA, 2700 Prosperity Ave., Fairfax, VA 22031, (703) 849-8888, Fax: (703) 207-3561, E-mail: <ctobin@aiha.org>, Web: <www.aiha.org>.

May 10-15: **Annual Meeting of the Environmental Mutagen Society (EMS)**, Fountainbleau Hilton, Miami Beach, FL. Contact: David Eastmond, University of California, Riverside, 5429 Boyce Hall, Riverside, CA 92521, (909) 787-4497, Fax: (909) 787-3087, E-mail: <david.eastmond@ucr.edu>, Web: <www.ems-us.org>.

May 10-16: **11th Scientific Meeting and Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM)**, Toronto, Canada. Contact: Roberta Kravitz, ISMRM, 2118 Milvia St., Berkeley, CA 94704, (510)

841-1899, Fax: (510) 841-2340, E-mail: <roberta@ismrm.org>, Web: <www.ismrm.org/smrt>.

May 11-16: **IEEE International Symposium on Electromagnetic Compatibility (EMC)**, Istanbul, Turkey. Contact: Symposium Secretariat, Ortra Ltd., 1 Nirim St., PO Box 9352, Tel-Aviv 61092, Israel, (972+3) 638-4444, Fax: (972+3) 638-4455, E-mail: <emc2003@ortra.co.il>, Web: <www.ortra.com/emc2003>.

May 13-14: **2nd European Symposium on Nonlethal Weapons**, Stadthalle, Ettlingen, Germany. Contact: Manuela Wolff, Fraunhofer Institut für Chemische Technologie, PO Box 1240, D-76318 Pfinztal (Berghausen), Germany, (49+721) 464-0121, Fax: (49+721) 464-0120, Web: <www.ict.fhg.de/english/events/nlw.html>.

May 15-16: **COST281 Workshop: Mobile Communication Base Stations and Health**, Dublin, Ireland. Contact: Gerd Friedrich, FGF, Rathausgasse 11a, D-53111 Bonn, Germany, (49+228) 726220, Fax: (49+228) 7262211 E-mail: <info@fgf.de>, Web: <www.cost281.org>.

May 17-20: **RF and Thermal Physiology: A Joint Workshop of COST281 and ICES**, Dublin, Ireland. Contact: Gerd Friedrich, see May 15-16 above.

May 20-22: **IEEE Instrumentation and Measurement Technology Conference (IMTC)**, Vail, CO. Contact: Robert Myers, 799 N. Beverly Glen, Los Angeles, CA 90077, (310) 446-8280, Fax: (310) 446-8390, E-mail: <bob.myers@ieee.org>, Web: <www.ieee-imtc.org>.

Letter to the Editor

Prato, BEMS President, Calls for Unfettered Debate

October 15, 2002

To the Editor:

Your recent editorial ("Motorola's Junkyard Dog," J/A02) took a "shot" at:

1. Motorola's Dr. Joe Morrissey for a question he asked Dr. Dariusz Leszczynski at the Quebec City Bioelectromagnetics Society's (BEMS) meeting.
2. The BEMS' publications with respect to Motorola's influence on our official peer-reviewed journal and newsletter.

I believe that scientific debate, even passionate debate, fuels our science and quickens discovery. The questions being debated by Drs. Morrissey and Leszczynski are extremely important. A great need within our community is to demonstrate a reproducible biological effect. The discoveries of Dr. Leszczynski are important and must be validated by various forms of replication and, if repeated successfully, the consequences in organisms would need study. To achieve this both scientists need to be free to exchange ideas. I fear that your comments could perhaps interfere with this exchange by creating an interpersonal barrier.

It is not true that Motorola "has a big say about what papers are published," or to any other degree interferes with the editorial practices of the independently edited, peer-reviewed journal *Bioelectromagnetics* or the *Bioelectromagnetics Society Newsletter*. Dr. Mays Swicord, a Motorola scientist and former president of BEMS, is our present newsletter editor, having taken over that position after many years of service by Dr. Mary Ellen O'Connor. One of the five *Bioelectromagnetics* associate editors is Motorola scientist Dr. C.K. Chou, who, at the specific request of the society, has continued in that post since the time he was affiliated with one of the United States' premier cancer centers. The editor-in-chief of *Bioelectromagnetics* is Dr. Ben Greenebaum of the University of Wisconsin and the other four associate editors are affiliated with academic and governmental institutions. Scientific activities of

the BEMS journal are conducted under carefully drawn editorial policies carried out with dedication by editor-in-chief Ben Greenebaum and the associate editors, all of whom are overseen by an editorial board, an intersociety journal committee, a publications committee and the board of directors. The newsletter operates under similar BEMS policy guidelines and is likewise subject to society oversight.

In all fields I can think of it is common to have industry scientists working beside scientists from research institutions. (In fact, if you really want a biomedical discovery to be developed for the benefit of society you patent the discovery and then work with industry to further develop it.)

I have just looked at the sponsorship listed in the acknowledgments of the articles in the July and September issues of *Bioelectromagnetics* and compared them to those in the same months in the journal *Magnetic Resonance in Medicine (MRM)*. There seemed to be two major differences: 1) a lot more grant money for MR research from peer review agencies like the NIH (U.S.), and 2) in MR research a lot of combined industry-academia authorship of articles. Dr. Slesin, my impression from this and a number of other observations is that there is too little money in the science of bioelectromagnetics both from industry and from peer review funding agencies. Motorola, through its scientists, is making a contribution. But we need more such contributions, not fewer. We need excellence in our science and this is hard to achieve without significant funding. Yes, industrial scientists and academic scientists often will have different biases and different pressures. In scientific discussions and in scientific publications, all of our community must be involved; all valid sides must be heard. Dr. Slesin, please encourage the debate among peers rather than help foment barriers to communication.

Frank Prato, PhD, President, Bioelectromagnetics Society
Department of Medical Biophysics, University of Western Ontario,
London, E-mail: <prato@lri.sjhc.london.on.ca>

Across the Spectrum

I was surprised when a communications officer at the FDA's Center for Devices and Radiological Health told me flatly that "there are no known health effects from appliance EMFs" and then refused to let me talk to an FDA doctor to confirm or deny this statement.

—Joyce Slaton, "The Body Electric: Are Electrical Appliances Dangerous to Your Health?" (on the California EMF report; see p.2 and MWN, J/A02), *SF Gate* (CA), October 17, 2002 (<www.sfgate.com>)

"The animal studies were prone to falsely exonerate the EMFs. [As for physicists,] they're making assumptions about (human) cell behavior that aren't necessarily true."

—Dr. Raymond Neutra, California Department of Health Services and Director, California EMF Program, quoted by Chris Bowman, "Study Bucks EMF Views: Electromagnetic Fields a Danger, Scientists Say," *Sacramento Bee* (CA), October 18, 2002

"We take this issue extremely seriously, and nobody is trying to hide any of the facts. But exaggerated claims that are not supported by the evidence do not help. After 20 years and £300 million of research, scientists across the world are increasingly coming to the view that there is no major public health risk from exposure to EMFs."

—Dr. John Swanson, EMF science adviser, Electricity Association, London, U.K., quoted in "Statement: California Department of Health Services Research," Electricity Association (U.K.), October 6, 2002

"People who drink more than four units of alcohol a day are probably not doing themselves any good, but we don't want to discourage people from having a few drinks a day if they enjoy it. It does carry a small risk of breast cancer, but there are small risks with everything enjoyable."

—Sir Richard Doll, chair, Advisory Group on Non-Ionizing Radiation, U.K. National Radiological Protection Board, quoted by David Firn in "Alcohol, Not Smoking, Linked to Breast Cancer," *Financial Times* (U.K.), p.4, November 13, 2002

Physicist Park Is Right, and The Epidemiology Is Wrong

"All known cancer-inducing agents, including radiation, certain chemicals and a few viruses, act by breaking chemical bonds to produce mutant strands of DNA. Photons with wavelengths longer than the near-ultraviolet do not have enough energy to break a chemical bond in DNA. Case closed. If epidemiology comes up with a different answer, the study is simply wrong."

—Dr. Robert Park, American Physical Society, Washington, "What's New by Bob Park," October 4, 2002, on the Internet at <www.aps.org/WN/WN02/wn100402.html>

Perhaps the better things to be fretting about are not the EMP weapons but the people trying to scare us about them.

—Lee Gomes, "Despite Rising Alarm, New Zapper Weapons Are Unlikely Threat," *Wall Street Journal*, p.B1, October 21, 2002

"My mom said that mobiles make your brain bad."

—Charlotta Bergius, Helsinki, Finland, explaining why her mother, Heli, has forbidden her to have a mobile phone until she is 12, quoted by Sarah Lyall, "Jacks? Dolls? Yo-Yos? No, They Want Cell Phones," *New York Times*, p.A4, October 24, 2002

"We believe it's irresponsible for a large company even to allude to the effects of using a mobile phone."

—Michael Milligan, secretary-general, Mobile Manufacturers Forum, quoted by George Cole, "A Pocketful of Protection: Specially Developed Clothing Could Shield Mobile Phone Users," *Financial Times*, p.10, November 5, 2002

"MICROWAVE NEWS" FLASHBACK

Years 20 Ago

- NIOSH may soon begin a large-scale study on the possible effects of VDT work on pregnant women, the agency discloses.
- The broadcast industry contends that Massachusetts health officials have yielded to "irrational" public fears by proposing "unnecessarily stringent" RF guidelines.
- The U.S. Navy's Gregory Lotz finds that 225 MHz radiation can cause "severe" hyperthermia in monkeys at SARs of greater than 2.3 W/Kg.

Years 10 Ago

- There is "no convincing evidence" that EMFs are hazardous, and increased funding for research is unwarranted, according to an interagency report prepared for President George Bush.
- Though initially skeptical of a power line-leukemia link, Sweden's

Anders Ahlbom says that David Savitz's study changed his mind—an outlook reinforced by his and Maria Feychting's new epi study.

- A workers compensation panel rules that workplace EMFs caused an electrician's brain tumor—the first time such a claim has been accepted in Sweden.

Years 5 Ago

- Exposure to weak residential magnetic fields can reduce nighttime melatonin production in women, reports Scott Davis of the Fred Hutchinson Cancer Research Center in Seattle.
- WTR, the wireless industry's research program, cancels plans for long-term animal studies, bypassing the FDA's advice that such studies "should be given highest priority."
- The expected end of research funding dampens the mood at the Department of Energy's annual EMF review in San Diego. "It's like a wake," observes Charles Graham of the MRI in Kansas City.

BABY MONITORS

Radiation Hazard?...The German consumer magazine *Öko-Test* continues to take a great deal of interest in sources of non-ionizing radiation in the home. Previously, it tested mobile phone headsets and DECT digital cordless phones and advised against using them (see *MWN*, S/O00 and S/O02). In its November issue, *Öko-Test* investigates baby monitors. Radiation measurements for 18 models—most of which use a 40MHz signal—found levels ranging from 70 to 650mV/m one meter away. Six of the monitors are rated “subpar” and two “unsatisfactory.” These units “have no place in a baby’s bedroom,” *Öko-Test* states. The magazine finds a Philips model (SBC SC 475 Digital) to be “especially problematic” because its signal is pulsed and because it is always on. This unit, which operates at 1.9GHz (the same as DECT phones), is transmitting even when the baby is asleep, rather than being sound-activated. Noting that this is the only such monitor on the market, the magazine warns that it would be “a scandal” if this “controversial” technology were to find wider use in nurseries....In an effort to calm public concern over the installation of mobile phone transmitters at its restaurants (see p.1), McDonald’s noted that the radiation from such antennas is much weaker than that from baby monitors.

LEGISLATION

Amending the 1996 Telecom Law...Critics of federal tower siting policies have once again renewed their legislative campaign (see *MWN*, N/D97, S/O98 and S/O99). On October 10, Sen. Patrick Leahy (D-VT) introduced two bills, which, if passed, would end the 1996 federal preemption of state and local rules on radiation from telecom antennas. S.3102 addresses broadcast facilities, while S.3103 covers mobile phone base stations. Sens. Jim Jeffords (Ind-VT) and Patty Murray (D-WA) are cosponsors. The same day in the House of Representatives, Rep. Bernie Sanders (Ind-VT) introduced HR.5631 and HR.5632, with essentially the same provisions as their senate counterparts, joined by Reps. Danny Davis (D-IL), Christopher Shays (R-CT) and Tom Tancredo (R-CO). The legislative push was originally planned for last year (see *MWN*, J/A01), but was postponed in the aftermath of September 11. In the meantime, Republicans have taken control of the Senate, putting Sen. John McCain (R-AZ) back in charge of the Commerce Committee, where he has thwarted previous attempts to reduce federal authority. The EMR Network, a supporter of the legislation, has posted all four bills on its Web site, <www.emrnetwork.org>, along with Leahy’s statement to the Senate calling for greater local control. You can also download the bills, as well as follow their progress, on Congress’s Web site, <thomas.loc.gov>.

MICROWAVE WEAPONS

Nonthermal Weapons...As the RF community debates whether nonthermal effects are real (see p.1), the U.S. military is planning to exploit them in its next generation of “nonlethal” weapons. “Leap-ahead” technologies will “probably be based on more subtle human/RF interactions in which the signal information

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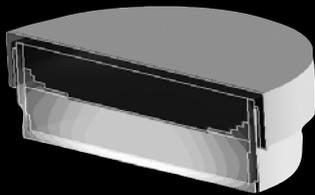
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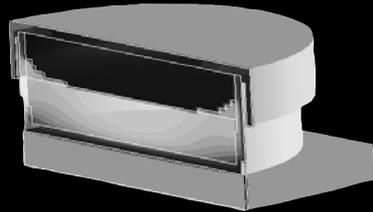
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within the RF exposure causes an effect other than simply heating," predicts a report released by the National Academy of Sciences–National Research Council (NAS–NRC) on November 4. Potential effects include "stun, seizure, startle and decreased spontaneous activity," it continues, calling for research on "useful susceptibilities" to ultrashort, ultrawideband and very high peak power signals. The NAS–NRC panel, commissioned by the Joint Nonlethal Weapons Directorate, is chaired by Dr. Miriam John of Sandia National Labs in Livermore, CA, and includes Dr. Clay Easterly of Oak Ridge National Lab in Tennessee. The report also addresses existing applications, including the "active denial" millimeter-wave weapon officially introduced last year by the U.S. Air Force for crowd control (see *MWN*, M/A01). The panel points to the danger of eye injury and "inadvertent exposure of targets at close range" leading to "severe burns or other injuries" as an "area of concern" with the technology. The full text of *An Assessment of Nonlethal Weapons Science and Technology* is available free of charge at <www.nap.edu/catalog/10538.html>. Print copies of the 158-page report are not yet available, but can be ordered for \$50 each, or \$60 outside the U.S., from the National Academies Press, 500 Fifth St., NW, Lockbox 285, Washington, DC 20055, (800) 624-6242, or on the Web at <www.nap.edu>.

OCCUPATIONAL EXPOSURES

NRPB Measurements... Levels of non-ionizing radiation in many U.K. workplaces exceed the ICNIRP limits, according to a new report from the National Radiological Protection Board (NRPB). In response to a request from the Health and Safety Executive, the NRPB analyzed data from previous surveys and found that "reference levels or basic restrictions may be approached or exceeded" near power-generation equipment, magnetic tape erasers, antitheft systems, and telecommunications antennas, among other sources. "Further work may be required to investigate compliance with the guidelines," the NRPB added in an October 28 announcement accompanying the report. The NRPB is currently considering whether to revise its exposure limits—among the world's highest—to bring them in line with those of ICNIRP. The 60-page report, *Occupational Exposure to Electric and Magnetic Fields in the Context of the ICNIRP Guidelines*, is available free on the Internet at <www.nrpb.org/publications/w_series_reports/index.htm>. Print copies may be purchased for £15 each (US\$23), not including shipping, from the NRPB, Chilton, Didcot, Oxon OX11 0RQ, U.K., (44+1235) 822742, Fax: (44+1235) 822746, E-mail: <information@nrpb.org>.

PEOPLE

Prof. **Zhengping Xu** is the new director of the Bioelectromagnetics Lab at Zhejiang University in Hangzhou, China. Prof. **Huai Chiang**, the previous director, will continue to direct two research projects at the lab until they are completed in 2005. Xu, who was trained at Harvard medical school, uses genomic and proteomic techniques to study the biological effects of ELF EMFs and modulated high-frequency radiation. He is also the director

of the Bioelectromagnetics Commission of the Chinese Biomedical Engineering Association.

PRECAUTIONARY PRINCIPLE

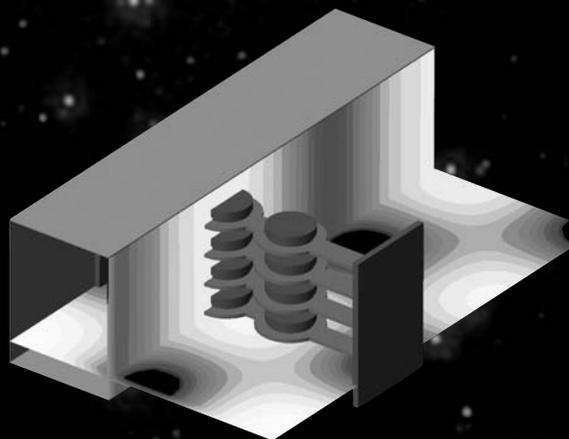
The Decline and Fall of Modern Society...Two longtime members of the RF community have written a scalding attack on the precautionary principle, predicting that unless reformulated it will lead to nothing less than the end of Western civilization. Drs. Q. Balzano and Asher Sheppard characterize the precautionary principle as “illogical, irrational and rife with arbitrariness” and describe its application by the U.K. panel on mobile phones chaired by Sir William Stewart as an “egregious” example of how policy decisions can go awry “in a stormy sea of choices.” Balzano and Sheppard, who are both consultants to Motorola, are especially distressed that the Stewart committee advised that children should be discouraged from using cell phones. “Because the [panel] misunderstood key scientific knowledge and lacked definitive research data on outstanding questions, fears of unknown risks were amplified unrealistically to generate speculations about the health of children,” they write. Balzano and Sheppard call the application of ALARA-like rules to RF exposures from wireless technology an “absurdity,” and argue that “ALARA is likely to fan public fears without demonstrable effects on disease risks.” (ALARA stands for “as low as reasonably achievable.”) Instead, they favor the creation of “scientific fire brigades” that would respond to public concerns under the guidance of government science agencies and funded by the involved industry. They cite with approval the example of the cooperative agreement, or CRADA, between the CTIA and FDA to investigate mobile phone health effects (see *MWN*, N/D99 and M/J01). Balzano and Sheppard conclude their argument, which appears in the *Journal of Risk Research* (5, pp.351-369, 2002), with this dire warning: “Unless current efforts lead to its successful reformulation, the precautionary principle could institutionalize excessive caution and thus deepen rather than alleviate alarm from the doom-laden hypothetical risks called ‘perceived threats.’ The resulting suppression of innovation and technological progress would inevitably have disastrous effects on society, leaving it susceptible to the decay that over time turns great civilizations into antique ruins.”

RISK MANAGEMENT

WHO on Establishing a Dialog...How do you talk about EMF risks? To whom? When? And what do you say? In a new booklet, available free on the Internet, the WHO International EMF project offers some practical advice “to improve the decision-making process by reducing misunderstandings and improving trust through better dialog.” It predicts that, “Community dialog, if implemented successfully, helps to establish a decision-making process that is open, consistent, fair and predictable. It can also help achieve the timely approval of new facilities while protecting the health and safety of the community.” The project describes possible risks as small, if they exist at all. For instance: “The balance of evidence to date suggests that exposure to low-level RF fields (such as those emitted by mobile phones and

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their base stations) does not cause adverse health effects. Some scientists have reported minor effects of mobile phone use, including changes in brain activity, reaction times and sleep patterns. In so far as these effects have been confirmed, they appear to lie within the normal bounds of human variation." With respect to ELF EMFs, though classified as a possible human carcinogen by IARC last year, the WHO adds the following perspective: "An example of a well-known agent classified in the same category is coffee, which may increase the risk of kidney cancer, while at the same time be protective against bowel cancer." One of the project's goals is to harmonize national exposure standards. The booklet warns that adopting precautionary limits "undermines the credibility of the science and the exposure limits." The 66-page booklet, *Establishing a Dialog on Risks from Electromagnetic Fields*, can be downloaded from the project's Web site, <www.who.int/emf>. Copies may also be ordered from: Marketing and Dissemination, WHO, 20 Ave. Appia, 1211 Geneva 27, Switzerland, (41+22) 791-2476, Fax: (41+22) 791-4857, E-mail: <bookorders@who.int>.

TOWERS

Planning Rules...The U.K. government has issued a new set of planning rules for the siting of mobile phone base stations. The *Code of Practice* is designed to balance environmental protection and public concerns with the need for increased network capacity, according to a November 11 statement from the deputy prime minister. It noted the Stewart report's call for a precautionary approach but not its recommendation that base station radiation be kept to "the lowest practical levels" in public areas (see *MWN*, M/J00; also M/A01). The new code is available at <www.planning.odpm.gov.uk/telecomms/index.htm>.

Keeping Current: Follow-Up on the News

◆ In her presentation at the London MTHR meeting (see p.5 and p.9) Dr. Leeka Kheifets left no doubt that the WHO EMF project—run by Dr. Michael Repacholi—shares the already widespread skepticism over the recent Australian results that are purported to refute Repacholi's own cancer study (see *MWN*, M/J97 and S/O02). Instead of beginning with the expected overview of the project, Kheifets flashed a slide challenging the reliability of the new results reported by Drs. Tammy Utteridge and Tim Kuchel in *Radiation Research*. Later, Kheifets told *Microwave News* that the project had been no more successful than anyone else in getting the Australian researchers to clarify any of the many outstanding questions and inconsistencies.

◆ The French parliament has issued a report from its Office of Technology Assessment that analyzes the potential health risks associated with mobile phones and towers. The full text of the report, which is only available in French, is at <www.senat.fr/rap/r02-052/r02-052.html>.

◆ On November 18, the U.S. FCC proposed fining A-O Broadcasting Inc. \$28,000 for allowing its radio station, KTMN, in

Cloudcroft, NM, to violate its RF exposure limits. KTMN's FM antenna is mounted on an observation tower used by the U.S. Forest Service to watch for wildfires. A survey showed that when operating at only 40% of its authorized power, the antenna caused the RF levels on the tower to exceed the FCC limits by 300%. This is the first time the commission has proposed a monetary fine for a violation of its RF rules. A-O has 30 days to appeal.

◆ Prosecutors in Kiel, Germany, have indicted the former head of Hagenuk, the first company to market low-SAR mobile phones, the German Press Agency reported on November 8 (see *MWN*, S/O97 and N/D97). Manfred Schmitt is charged with accounting fraud and other crimes. The company, which he bought in 1995, declared bankruptcy in 1997—and again two years later. Schmitt, now a fugitive, is believed to have left Germany.

◆ *IEEE Transactions on Electromagnetic Compatibility* has issued a call for papers for a special issue on intentional EMI from high-power sources. For more information, contact Dr. William Radasky of Metatech Corp. at <wradasky@aol.com>. The papers are due next June and the issue will be out in May 2004.

VIEWS ON THE NEWS

The Coffee Manifesto

Being exposed to EMFs is no more hazardous to your health than drinking a cup of coffee. That's the message from the World Health Organization (WHO).

After the International Agency for Research on Cancer (IARC) classified power-frequency EMFs as possible human carcinogens last summer, we began to wonder how this ratcheting up of the health risk would play among the skeptics.

We found the answer in a new booklet on communicating EMF risks (see p.17). Inside, the WHO EMF project cites only one other agent designated as a possible carcinogen by IARC—coffee.

WHO's Mike Repacholi and Leeka Kheifets could pick from among 232 IARC possible carcinogens, including carbon tetrachloride, DDT and lead. But most of these appear less benign than coffee and might have prompted some public alarm.

To further cushion the blow, the WHO adds that coffee may be good for you: While acknowledging that it might increase the risk of kidney cancer, the WHO also tells the reader that coffee might protect against colon cancer. And, of course, many of us could not start the day without a good jolt of coffee.

EMFs are famously linked to childhood leukemia. But we had never before considered the possibility that EMF exposure could actually benefit children. Yet, soon afterwards, we came across a fact sheet from the Catholic school system in Edmonton that said just that. Children exposed to EMFs have *lower* rates of cancer, according to the fact sheet. (For the record, that is not our added emphasis.) This is the same school system that reported, "Every expert we talked with and studies we researched did *not* find a link to EMFs and childhood leukemia."

Who on earth have these Canadian Catholics been talking to? The most likely source is Mary McBride (see p.3). She says that the plan to site a new school next to a power line—which she endorses—is consistent with WHO's recommendations.

In its own newly revised EMF booklet, the National Institute of Environmental Health Sciences (NIEHS) thankfully steers clear of the coffee paradigm but still takes a dismissive view of the potential health risks (see p.2).

Four years ago, a panel convened by the NIEHS also designated EMFs as possible carcinogens. Rather than seeing the IARC decision as reaffirmation, the institute's resolve appears to have weakened and it is no longer promoting strategies that would reduce unnecessary EMF exposures.

Chris Portier, who helped draft both the NIEHS and the WHO booklets, seems to have changed his outlook. At last summer's IARC meeting, he was the one who forcefully argued that the animal data, not just the epidemiology, suggest a cancer association (see *MWN*, J/A01). Had he convinced three more of the 21 panel members to join him, IARC would have classified EMFs as *probable* human carcinogens, putting them in a class with benzopyrene, PCBs and UV radiation.

Portier, the associate director of the U.S. National Toxicology Program and the director of NIEHS' Environmental Toxicology Program, has a lot of clout. We wonder why he changed his mind—clearly, he is not impressed by the new California report (see p.2)—and why he now chooses not to give the American public fair warning about EMF health risks.

In the past, both the WHO and the NIEHS have endorsed prudent avoidance, or taking low-cost steps to reduce EMF exposures. That now seems to be history. Today's message is "Don't worry, be happy, have another espresso."

Our Wish List for 2003

Next year, we would like to see:

- A commitment from the U.S. federal government to sponsor ELF EMF and RF/MW radiation research.
- A new editor for papers on non-ionizing radiation at *Radiation Research*—someone who is not a consultant for the electric utility and cell phone industries.
- A moratorium on claims that the Utteridge–Kuchel mouse study is a replication or a refutation of the Repacholi cancer experiment. A little icing on this cake would be an investigation on how the study passed peer review at *Radiation Research*.
- Another moratorium on the well-worn arguments that the epidemiology linking childhood leukemia and power-frequency EMFs has no support from laboratory studies—after all, we now have six labs showing DNA breaks at 50/60Hz and six others have shown that these fields can inhibit the cancer-controlling action of melatonin. And while we are at it, we should also ask for—
- A commitment by the Edison Electric Institute, American Public Power Association and EPRI, as well as the rest of the electric utility industry, that they will no longer dismiss and ignore the existence of EMF health risks.

• A serious attempt to settle the controversy over microwave-induced leakage through the blood-brain barrier. This is the third year in a row for this particular wish. *Hello!* Is anyone paying attention?

• And under our Christmas tree, we hope Santa will leave us a taste of whatever Q. Balzano and Asher Sheppard were smoking when they penned their over-the-top assault on the precautionary principle (see p.17).

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