MICRO WAVE NEWS

Our 20th Year

Vol. XX No. 6 A Report on Non-Ionizing Radiation November/December 2000

INSIDE...

Weak EMFs Alter Gene Expression, Implicated in Tumor Promotion

An extremely-low-frequency electromagnetic field (ELF EMF) can alter gene expression at levels as low as 40-50 mG and, in some ways, act like a tumor promoter, according to a new study from Dr. James Trosko's lab at Michigan State University (MSU) in East Lansing, MI.

"I went into this with some skepticism," Trosko told *Microwave News.* "Initially, we did not believe it....We repeated the experiment 25 times."

"ELF EMF fields mimic some of the properties of known chemical tumor promoters such as TPA," Trosko and coworkers report in the October issue of *Environmental Health Perspectives (108,* pp.967-972, 2000). He stressed that more work needs to be done before it is clear whether EMFs have *all* the properties of a cancer promoter (see p.10 for an interview with Trosko).

Nevertheless, Trosko has shown an ELF EMF effect on gene expression. If replicated, it would go a long way towards settling a controversy that has raged for many years (see, for example, *MWN*, J/A94 and M/J95).

The new results caught many observers by surprise and have already prompted much interest—both because the effects occurred at very low levels and because of the international reputations of members of the research team. Trosko, a well-known cancer investigator, is the former chief of research at the Radiation Effects Research Foundation in Hiroshima, Japan. Dr. Hiroshi Yamasaki of Kwansei Gakuin University in Nishinomiya, Japan, one of his

(continued on p.9)

Mega-Lawyer Peter Angelos Joins Mobile Phone–Cancer Fray

Peter Angelos, who has won billions of dollars in damages from the tobacco and asbestos industries, is set to play a leading role in litigation alleging that cellular phones cause brain cancer. This marks the first time that the wireless industry will face an attorney with substantial resources. Angelos's firm, based in Baltimore, has 110 lawyers and offices in six states.

On December 6, Angelos signed an agreement to work with Joanne Suder of Baltimore, the attorney who filed suit last August on behalf of Dr. Christopher Newman, a physician with brain cancer (see *MWN,* S/O00). Angelos will become cocounsel on the Newman case. "We will file no less than ten other cell phone lawsuits," a member of the firm told *Microwave News.* "We have been researching this issue for over a year," he said.

Suder had already agreed to work with Michael Weinstock of Weinstock & Scavo in Atlanta as well as with Michael Allweiss of Lowe, Stein in New Orleans (see p.7). These collaborations will continue.

Last summer Angelos told *Business Week* (August 14) that he was looking "very intensively" at wireless phone litigation. He stressed that he would not get involved unless he was "90% sure" he could win.

Citing Criticisms and Overwork, Repacholi Steps Back from WHO EMF Project

Dr. Michael Repacholi is relinquishing day-to-day management of the World Health Organization's (WHO) International EMF Project.

"The main reason for the change is to put the criticisms to rest," Repacholi told *Microwave News.* "I don't want the program to be tainted and so it's better to let someone else run it." He also cited the demands on his time. "I have been trying to do two jobs and it just isn't working," he said.

The four-year-old project has attracted more than a bit of controversy. Repacholi's critics argue that he downplays low-level effects and favors standards that are based only on thermal effects. These advocates say that the EMF project has too many ties to corporate and military interests.

Its admirers, on the other hand, say that the project has succeeded in writing a viable research agenda and in coordinating the various national agencies that sponsor EMF and radiofrequency and microwave (RF/MW) health studies.

Dr. Christopher Portier, the acting director of the Environmental Toxicology Program at the National Institute of Environmental Health Sciences (NIEHS) in Research Triangle Park, NC, gave the WHO EMF project high marks. "It's a good program," he said in an interview, noting that the main problem from his point of view is that it deserves more financial support.

Repacholi's organizational accomplishments have not been matched by comparable success in gaining support for the worldwide adoption of the ICNIRP exposure standards under the banner of "harmonization." Recently, he has been at the center of a new controversy over the proper use of the precautionary principle. He has lobbied against the strict Swiss and Italian precautionary exposure limits and, as a member of the U.K.'s Stewart panel on mobile phones, he argued against the recommendation that children be discouraged from using mobile phones (see p.8 and *MWN*, J/F00 and M/J00).

When asked to name his critics, Repacholi pointed to New Zealand's Dr. Neil Cherry, who has long campaigned for strict exposure standards (see *MWN*, M/A97 and M/A00), the Swiss group that is seeking his ouster (see *MWN*, S/O00) and *Microwave News*, which has run editorials questioning the project's ties to the wireless industry and the U.S. Air Force (see *MWN*, M/A97 and N/D98).

Cherry, of Lincoln University in Canterbury, has emerged as Repacholi's most outspoken adversary. For example, in testimony to a committee of the Australian senate in September, Cherry accused Repacholi of "misrepresentation and deliberate misinformation" of bioeffect research results. Repacholi responded that Cherry's accusations are "so ludicrous that they are not worth the time to debate."

With respect to some of the funding issues raised by *Microwave News*, Repacholi said that "under certain circumstances" he has accepted contributions from industry associations and professional societies, "but only as long as any single contributor did not have too much influence." On the $50,000 a year the project has received from Motorola through the Royal Adelaide Hospital in Australia (see *MWN*, J/A99), Repacholi noted that the money came from the Mobile Manufacturers Forum, known as the MMF, of which Motorola is a member.

Repacholi said that his project has won praise from Dr. Ken Olden, the NIEHS director. He said that Olden met with WHO Director-General Dr. Gro Harlem Brundtland in Geneva about a year ago and told her that, "The EMF project is a model that the WHO should use for other programs" (see also *MWN*, S/O00).

In October 1999, Repacholi took over as the coordinator of WHO's Occupational and Environmental Health program. He has continued to run the EMF project, which is part of that broader program. When appointed, the new manager of the EMF project will report to Repacholi and also work on ionizing radiation issues. He expects that his replacement will be on the job by February or March.

"The real hard work of the EMF project has been done," Repacholi said. "It's a management job now, with the WHO setting the policy."

Repacholi set up the EMF project in January 1997 with support from the governments of Australia, Ireland and the U.K. The project currently has a budget of $600,000 a year, all from sources outside the WHO except for some funds for secretarial and administrative support.

One of Repacholi's first priorities for the future will be to build up WHO's ionizing radiation program, but his new duties go beyond radiation issues. Repacholi also oversees WHO's work on air pollution and climate change as well as occupational health in general. "I have a lot on my plate," he said. "There is a lot of reorganizing that needs to be done."

The WHO posted a vacancy notice for a manager of its radiation programs on November 3. While this is for a two-year position, Repacholi said that the appointment is renewable. The deadline for applications was December 1.

U.S. Withdrew Funding for EMF Research "Too Early"

"The Americans poured water on the [EMF] issue too early," WHO's Dr. Michael Repacholi told *Microwave News.* The epidemiological results are "serious" and "have to be addressed," he said.

Repacholi explained that he was swayed by the two new analyses pooling data from past epidemiological studies, which show a consistent link between childhood leukemia and EMFs from power lines (see p.13 and *MWN*, S/O00).

Turning to RF/MW radiation, Repacholi reiterated his view that his lymphoma-mouse experiment showed that cell phone radiation "can exert a significant carcinogenic effect" (see *MWN*, M/J97 and J/A00). He added that, "We did everything we could do to make sure it was done right," and said that in his view, "If it is repeated, it would be a major development."

Radiation from Hands-Free Sets: Standoff Continues in the U.K.

The U.K. Consumers' Association (CA) continues to advise against the use of hands-free sets with mobile phones, arguing that use of an earpiece can magnify radiation exposures. Meanwhile, manufacturers and other test labs maintain that the CA's tests are flawed.

"It's clear that consumers can't rely on hands-free kits to reduce radiation emissions at the brain," said Helen Parker, the editor of CA's magazine, *Which?* Her comments came on the release of the latest results from the CA's test lab, ERA Technology Ltd. (see *MWN*, M/J00). In August, the U.K. Department of Trade and Industry (DTI) publicized measurements by the SARTest lab which showed large reductions in radiation exposures with the use of the hands-free sets (see *MWN*, S/O00).

Dr. Mike Manning of SARTest in the U.K. and Chris Zombolas of EMC Technologies in Australia believe that ERA used the wrong probe to measure electric fields. "The *Which?*–ERA methodology is fundamentally flawed," said Zombolas. Manning explained that if he uses the same probe as ERA he can also see higher radiation exposures. But the "funny things they found" go away with the appropriate measuring equipment, he said.

Dr. C.K. Chou of Motorola and Veli Santomaa of Nokia each told *Microwave News* that they too believed that ERA had used the wrong measurement probe.

The DTI hosted a meeting on November 29 to try and work out the differences in results between the CA–ERA and the other test labs. While the CA did attend, ERA engineers did not. The CA did not respond to requests for comment. Manning said that he thinks the DTI will continue to work to resolve the controversy. "The DTI wants consensus," he said, "It's a top priority."

A summary of the CA's latest test results are at: <www.which.net/whatsnew/pr/nov00/general/handsfree.html>.

SAR Search

• IEEE subcommittee **SCC-34/SC-2** approved a **protocol** for testing radiation exposure from mobile phones in voting that ended November 29. Thirty-two members voted in favor (15 with comments), while three voted against it and four others abstained. The group will meet December 7-8 at Motorola's offices in Plantation, FL, to resolve the issues raised in the comments and by those who voted "no".

• A **10g** SAR of 2 W/Kg is equivalent to a **1g** SAR of 4-6 W/Kg, according to Dr. **James Lin** of the University of Illinois, Chicago. In his first published statement on the desirability of averaging over 1g rather than 10g, Lin states, "Simply put, the absorbed energy averaged over a defined tissue volume of 10g is artificially low, compared to a 1g SAR. The 1g SAR is a more precise representation of localized microwave energy absorption, and a better measure of SAR distribution inside the head" (see *MWN*, J/A00). Lin's comments appear in the October issue of *IEEE Antennas and Propagation Magazine*.

Dutch Panel Advises Against Precautionary Limits for Towers

The precautionary principle should not be used as a basis for RF/MW exposure limits that protect against possible nonthermal effects, the Health Council of the Netherlands advises in a recent report.

Any precautionary measures must be based on a "reasonable suspicion" of health risks, argues a 12-member panel appointed by the council. Such health risks would be "virtually impossible" at the levels found near base stations, concludes the panel, chaired by Dr. Eric Roubos of the University of Nijmegen.

The report came in response to a September 1999 request from the Dutch ministers for housing and for health, which was prompted by public concerns about radiation from cellular towers. The council measured radiation levels near a GSM antenna and found them to be "far below" the 49 V/m limit (636 $\mu W/cm^2$) recommended by the council in 1997 (see *MWN*, M/J97).

GSM Base Stations is available in English and in Dutch on the Internet as PDF files, at: <www.gr.nl>.

Sweden's TCO To Set SAR Guidelines for Mobile Phones

Sweden's union of white-collar workers, known as TCO, will soon propose radiation limits for mobile phones.

TCO is known around the world for its strict EMF emission standards for video display terminals (VDTs). It plans to use the same approach for mobile phones, according to Jan Rudling, the head of TCO Development in Stockholm.

TCO has not disclosed what SAR limit it will adopt, but it will probably be below the U.S. standard of 1.6 W/Kg averaged over 1g of tissue and the ICNIRP limit of 2.0 W/Kg averaged over 10g of tissue. "You can get radiation a lot lower" than the U.S. or European limits, asserted Clare Hobby of TCO's information center in Chicago, pointing to the large range of SARs among phones now on the market.

An important difference between VDT and mobile phone radiation is that a VDT's emissions are an unnecessary by-product and could in principle be reduced to zero, while a wireless phone cannot function without radiating a signal. Although TCO wants the standard "to be tough," Hobby stressed in an interview, "we don't want to jeopardize performance."

TCO will also specify the procedure for measuring SARs. Both CENELEC and the IEEE are working on standardized procedures for testing wireless phones (see box at left and *MWN*, J/A00 and S/O00). Whatever protocol is used, an independent laboratory will conduct all testing of phones for TCO certification, according to Hobby.

TCO's standards for VDTs were first issued in 1992, amid widespread concern and considerable scientific uncertainty about possible health effects of radiation from computer terminals. They were the brainchild of Per Erik Boivie, Rudling's predecessor at

TCO. Boivie had previously played a central role in the development of MPR2, the Swedish VDT guidelines issued in 1990, which became the *de facto* worldwide standard.

Working closely with manufacturers on MPR2, Boivie pushed for limits based on what was technically feasible rather than on what would be "safe." Boivie was convinced, however, that emissions could be reduced even further, which led to the TCO standards that were significantly stricter than MPR2 (see *MWN*, M/A95). TCO issued revised standards in 1995 and 1999.

Although MPR2 and the TCO limits were voluntary, manufacturers could not afford to ignore them. The union's one-and-a-half million members, many employed by the Swedish government, constitute a large portion of the country's market for VDTs. Today, 50-60% of the VDTs sold in Europe and 35-40% of those purchased in the U.S. are TCO-certified, Rudling told *Microwave News.* Most others comply with MPR2.

The new phone guidelines could be "as great a success as the TCO certification of VDTs," said Boivie, who is now an occupational health consultant based in Stockholm.

TCO Development expects to complete a draft of the new standard in early December, which it will circulate for comment to interested parties, including phone manufacturers. It hopes to complete its work on the guidelines in February or March, in time for a public launch at CeBIT, an information technology trade show in Hannover, Germany, March 22-28.

Like TCO's standards for VDTs, the phone standard will also include requirements for energy efficiency, ergonomic performance and recyclability.

TCO's interest in a phone standard was prompted, Rudling said, by the explosion of mobile phone use in the workplace: "Many employees now have mobile phones as a working tool and the number is rapidly increasing."

Wireless Signal Said To Inhibit Growth of Breast Cancer; Researchers Mum But Follow-Up Studies Are Under Way

A GSM mobile phone signal inhibited chemically-induced mammary tumors in rats in a German experiment completed over eighteen months ago.

The Deutsche Telekom–funded study has not yet been published, and the researchers, Drs. Christian and Hella Bartsch of the University of Tübingen, have declined to speak publicly about their results or even the experiment's design.

But their findings are taken very seriously by the wireless industry: The Bartsch study and parallel research by Dr. Bernard Veyret (see *MWN*, J/A99) are now the subject of industry-funded follow-up studies in Austria and China. A related study is being sponsored by a Japanese trade group.

The Bartsches themselves have twice repeated their original experiment, but no information has been available on these results. A paper based on the first experiment alone had been accepted for publication in *Radiation Research*—but was withdrawn this fall so that the two replication studies could be included.

Microwave News first asked Christian Bartsch about his study in July of 1999. In June of this year, he said that he expected a paper to be accepted for publication "within the next few days," and that he would then provide a copy. But this did not happen.

Details of the Bartsches' original experiment have leaked out via the Web site of the WHO International EMF Project (see box at right). "Mean latency time for detection of the first tumor in each [RF/MW-] exposed animal was significantly elevated compared to sham-exposed animals," the WHO stated. *Microwave News* has confirmed this independently from another source.

"We are currently requesting the WHO...to remove their information about us from their Web site," Christian Bartsch told *Microwave News* on November 10. Bartsch explained that he and Hella Bartsch do not want to discuss their experiments until their new paper is reviewed and accepted for publication.

"A publication of all results is on the way," promised Dr. Torsten Gailus of Deutsche Telekom in Darmstadt. In an interview, Gailus said that Deutsche Telekom provided the funding for all three of the Bartsches' experiments.

German Results Posted by WHO

Some months ago, the WHO International EMF Project's Web site posted a description of the first DMBA-mobile phone experiment by Drs. Christian and Hella Bartsch, at <www-nt.who.int/peh-emf/database.htm>. It is reprinted below. The sentence with the results was deleted from the site in late November after Microwave News *asked the German team to confirm its accuracy.*

Christian Bartsch was sharply critical of the WHO for making this information public. He told Microwave News *that these "preliminary" findings were "partly confidential." Bartsch stated that some figures were "incorrectly cited," and that they should not be relied on.*

Mean latency times for malignant tumors alone are apparently listed in reverse order in the WHO summary. Microwave News *asked Dr. Ken Foster, then working for the EMF Project in Geneva, about the discrepancy last summer. After three weeks he suggested that we contact the Bartsches directly, citing the press of his other work.*

900 MHz (GSM) EXPOSURE IN DMBA–INDUCED RAT MAMMARY TUMOR BIOASSAY

Sprague Dawley (female) rats given a single i.g. [intragastric] dose of DMBA (50 mg/kg) at day 51 and exposed (non-restrained in plastic cages) to a 900 MHz (GSM) signal at 18 to 75 mW/cm^2 from day 51 until day 400. Weekly mammary tumor palpation beginning 7 weeks after DMBA administration continued for 1 year. Mean latency time for detection of the first tumor in each exposed animal (n=60) was significantly elevated compared to sham-exposed animals (n=60) for benign+malignant tumors (218 days vs. 137 days, p=0.019) as well as for malignant tumors only (137 days vs. 279 days, p=0.015). A final report and manuscript are in preparation.

Industry To Sponsor Replication of DMBA Experiment in China

Dr. Huai Chiang of Zhejiang University in Hangzhou, China, is also planning a replication study of the effects of mobile phone signals on DMBA-induced breast cancer in rodents. The study will be jointly funded by the MMF and the GSM Association.

"We will do the same experiment as the ARCS," Chiang told *Microwave News.*

Dr. Mays Swicord, of Motorola in Ft. Lauderdale, FL, which is an MMF member, said that the Chinese study would cost about $500,000. Planning began when Swicord visited Chiang's lab last February with Drs. Larry Anderson of the Battelle Pacific National Labs in Richland, WA, Niels Kuster of IT'IS in Zurich and Sakari Lang of Nokia in Helsinki.

Kuster's lab will provide the exposure system and collaborate with Chiang's group on engineering issues, Swicord said, while ARCS works with them on the biology. "Kuster already has a Chinese grad student from that lab working with him," he noted.

Both Chiang and Swicord said that they hoped to have a contract signed by the end of the year, and that experimental work should begin sometime in 2001. "Key to the timing will be the delivery of the exposure system," said Swicord, noting the multiple demands on Kuster's lab.

Bartsch did say that the results from *all* animal studies—his own and others—give him "the impression that...solid tumors may not be stimulated" by weak, athermal RF signals. It remains to be seen, he added, whether this applies to humans or to "leukemia and lymphoma, which may indeed be different and by far more relevant."

But might RF/MW exposure *inhibit* solid tumor development in animals? When asked, Bartsch declined to comment.

Bartsch's initial experiment is not the first to show that a mobile phone signal may inhibit tumor development. Dr. Ross Adey had a similar result with his 1996 study of chemically-induced brain tumors in rats (see *MWN,* M/J96, J/A96 and S/O99).

In one of the two DMBA experiments by Veyret's group at France's University of Bordeaux, the number of mammary tumors declined significantly as RF/MW exposure increased, in three groups of rats subjected to GSM signals of different strengths (see *MWN,* J/A99). In Veyret's other experiment, conducted at higher exposure levels, there was a small, nonsignificant increase among RF/MW-exposed animals as a whole.

Bartsch's work began prior to Veyret's, but Veyret told *Microwave News* that he started independently. His group had completed an RF/MW cancer promotion study with the chemical benzo(a)pyrene, which found no effect, and in a November interview Veyret said that a DMBA study was the next logical step. Veyret's group presented their DMBA results at the 1999 meeting of the Bioelectromagnetics Society in Long Beach, CA; he said that after double-checking their histopathology, they are now submitting this work for publication.

The need to repeat these DMBA experiments was first identified by the Mobile Manufacturers Forum (MMF), which listed DMBA work under "replication studies" in its December 1998 list of priority research projects (see *MWN,* J/F99). This aroused some curiosity among other researchers, since most did not know that such experiments had been conducted (see *MWN,* J/A99).

In May 1999, the MMF selected Dr. Robert Hruby of the Austrian Research Center in Siebersdorf (ARCS) to conduct this first replication effort, and in March 2000 the European Commission announced that it would provide partial funding (see *MWN,* M/A00). The rest will come from the MMF and the GSM Association.

The two industry groups have now agreed to fund a second DMBA replication study, this one in China (see box at left).

Yet another DMBA study is under way in Japan, this one on promotion of skin cancer. Japan's Association of Radio Industry and Business (ARIB) is funding a $255,000 experiment by Dr. Tomoyuki Shirai of Nagoya City University Medical School, in which mice are exposed to a 1.5 GHz "personal digital cellular" signal. Shirai told *Microwave News* that he began work in October 1999, and expects to have results by the end of this year.

The RF/MW exposure system for the Austrian and Chinese labs will be designed and built by Dr. Niels Kuster of IT'IS in Zurich (see also p.6). Kuster said that the animals will receive whole-body exposures while running free in their cages, as was the case in the Bartsch study.

China To Adopt ANSI/IEEE SAR Limit for Mobile Phones

China's Ministry of Health plans to set an SAR standard of 1.6 W/Kg for radiation exposures from mobile phones. Like the ANSI/IEEE limit, SARs would be measured over 1 g of tissue.

"The final draft is under discussion and it will probably be adopted in 2001," Professor Zhao-Jin Cao told *Microwave News.* Cao, who is with the Institute of Environmental Health Monitoring within China's Ministry of Health, is the chair of the working group that is developing the mobile phone standard.

China currently has one of the strictest RF/MW standards in the world. The health ministry limits long-term exposures to less than 10 $\mu W/cm^2$ above 300 MHz (see *MWN,* S/O99). This is 20-100 times more stringent than the ANSI/IEEE exposure limit.

Asked to reconcile the planned adoption of the IEEE SAR limit for cell phones with the strict exposure standard for all sources, Cao replied that it was at least partially "a concession to international trade." "We want to trade mobile phones," he said.

China is a huge market for cellular phones. There will be more than 155 million users by 2002 according to estimates cited by the *New York Times* (November 24). The newspaper also noted that Motorola derived $3 billion, or 10%, of its 1999 revenues from sales of phones and other products in China.

Dr. Huai Chiang of Zhejiang University Medical College in Hangzhou added that, "The SAR standard does not contradict our national standard because cell phone exposures are very short."

Cao said that China would follow either the IEEE or the CENELEC measurement protocol, both of which are expected to be completed in 2001 (see p.3).

Mobile Phone Radiation Can Have Persistent Effect; Swiss Team Says Effects Occur Deep Inside the Brain

For the first time, researchers have shown that mobile phone radiation can cause changes in brain function that persist for some time after exposure. "The present results demonstrate that exposure during waking modifies the electroencephalogram [EEG] during subsequent sleep," write Dr. Peter Achermann and colleagues at the University of Zurich.

The structure responsible for this effect appears to be "deep inside the brain," Achermann told *Microwave News*.

The Swiss scientists observed significant changes in the EEG readings of sleeping volunteers who had been exposed to a GSM signal for half an hour immediately before they went to bed. Writing in the October 20 issue of *NeuroReport (11*, pp.3321-3325, 2000), they conclude that this finding "lends support to previous reports on effects...on physiological and psychological variables" such as "sleep and cognitive function, as well as blood pressure and heart rate" (see *MWN*, J/A98, M/A00, M/J00 and J/A00).

This point was underlined by a *NeuroReport* editorial, which appears in the same issue. "These results show that even a short exposure to the electromagnetic fields emitted by cellular telephones can affect brain physiology," writes Dr. Michael Petrides of the Montreal Neurological Institute at McGill University in Canada.

The part of the brain which produces this effect does not appear to be in the "gray matter" or cortex—the outer part of the brain which controls most "higher-level" mental activity. Instead, Achermann said, the radiofrequency and microwave (RF/MW) signal appears to affect deeper structures such as the thalamus. The thalamus, the brain stem and other structures beneath the cortex are several centimeters below the skull, and control heartbeat and other less conscious functions. The Zurich results suggest that "subcortical regions may contain the most sensitive structures to EMF."

Despite this apparent sensitivity, it is not at all clear that a mobile phone in normal use would produce the same effect: The RF/MW field used in this experiment was designed to expose the interior of the brain to more radiation than would normally be the case (see box at right).

The study was carried out by Dr. Alexander Borbély's group at the University of Zurich, whose members are widely regarded as among the world's top experts on sleep research. The EEG changes they observed were much the same as those observed in their previous study, in which subjects were exposed to a GSM signal *during* sleep (see *MWN*, N/D99).

While the effect seen in the latest study occurred after RF/MW exposure, they note that it is "transitory": The increase in EEG power was gone by the end of the study's three-hour sleep period. There were no changes in the amount of time needed to fall asleep, in subjective assessments of sleep quality, or in the normal progression of the stages of sleep (such as "REM sleep," with the "rapid eye movement" that characterizes dreaming).

"It is difficult to assess whether our findings have broader implications for users of mobile phones," said Achermann. "Conclusions about possible adverse effects on human health are premature because the underlying mechanisms are unknown," his paper states.

In their previous experiment, the Swiss researchers had applied the GSM signal at the top of the head, giving equal exposure to both left and right sides of the brain. In the new study they centered the field just above one ear. Since the RF/MW radiation was focused on the side of the head closest to the antenna, they expected to see EEG effects on one side of the brain but not the other.

To their surprise, Achermann and colleagues found that the EEG changes were equal on both sides of the brain, no matter which side was exposed. This "symmetrical" effect suggested that structures in the middle of the brain, below the cortex, might be involved.

This was supported by the type of changes seen in volunteers' EEGs. In both this study and the previous one, RF/MW exposure increased EEG power in a frequency range characterized by "sleep spindles"—a type of EEG signal produced during a particular stage of deep sleep. "Since the thalamus is centrally involved in the generation of sleep spindles," the researchers point out, "it represents a prime candidate for an EMF-sensitive subcortical structure."

While not discussed in the *NeuroReport* paper, data from the study's exposure assessment also strengthen this hypothesis. Ex-

SARs in Swiss Sleep Study

"The specific absorption rates [SARs] in the thalamus were close to 1 W/Kg," said Dr. Niels Kuster, who designed the exposure system for the University of Zurich study. "This is at least 10 and probably closer to 100 times higher than would be normal with a mobile phone," Kuster told *Microwave News*.

Kuster noted that the exposure system was configured to give a relatively uniform exposure to one half of the cortex. The Zurich sleep researchers expected that any EEG changes would be centered in that side of the head, but this was not the case. "Initially we were not concerned about exposure of the thalamus," Kuster said. "But when they saw the results they started to speculate about deep brain effects, since the thalamus region is exposed to about the same SARs as the cortex."

Kuster explained that a more uniform exposure of the cortex was achieved with a planar antenna 11 cm away from the head, resulting in a field that penetrated more deeply without exceeding 1 W/Kg anywhere in the brain. The relatively high exposures deep within the brain were due to the fact that the head is curved, Kuster stated. "When you move the source farther away, the energy that penetrates the head is slightly directed towards the center," he said.

Kuster is director of the Foundation for Research on Information Technologies in Society (IT'IS) in Zurich.

posure measurements conducted with a model head "revealed a high level of absorption in subcortical structures, which may even exceed the level at the cortex," Achermann told *Microwave News* (see box p.6).

There are thus three separate pieces of evidence pointing to this region of the brain as the source of the effect: the bilateral nature of changes in EEG, the type of changes observed, and the fact that this region received high radiation exposures from the signal used in this experiment.

Achermann and colleagues suggest further studies to define the parameters that control the EEG effect, in particular field strength, frequency and modulation. More broadly, Achermann said that more research is needed "to investigate the mechanism of action." He added that animal studies might be useful in this regard.

A mild sleep-promoting effect observed in the previous study (with less time spent awake after volunteers initially fell asleep) was not observed in the more recent experiment. The researchers had hypothesized that this effect may have been dependent on a "slight sleep disturbance" due to volunteers being in an unfamiliar setting. This was minimized in the latest experiment by changes in the protocol, including restricting sleep the night before to four hours so that subjects would fall asleep rapidly.

The full text of the *NeuroReport* article is available as a PDF file at: <www.neuroreport.com>. (Choose "tables of contents," then select vol.11, no.15.) In addition, the Borbély group has a Web site with a summary of both studies and a comparison of their results: <www.unizh.ch/phar/sleep/handy/index.htm>.

« Wireless Notes »

Interference from a mobile phone may have caused the pilot of a plane carrying **Joschka Fischer**, **Germany**'s foreign minister, to abort a landing at Tegel airport in Berlin. The Airbus A310 was making its final approach when its instrument landing system failed, according to reports in the German press. Because visibility was limited, the pilot pulled the plane out of its descent at an altitude of 500 meters and circled around. On the second approach the instruments worked without any glitches and the plane landed safely. A check of the navigation system after the passengers left the plane in Berlin found no problems, and the aircraft then returned to its base near Cologne without incident. The *Berliner Morgenpost* (September 20) reported that an autopilot malfunction "typical of disturbances caused by mobile phones" occurred shortly after the flight began, prompting the crew to ask passengers to make sure that all electronic devices were turned off. But according to the German air force, which operates the plane, "there is no proof" that a phone was at fault for the aborted landing. "The incident has been investigated thoroughly," a spokesperson for the Luftwaffe told *Microwave News.* "The cause could not be determined." In the U.S. and the U.K., the use of wireless phones is restricted on board commercial airliners once they have left the gate (see *MWN*, S/O96, S/O99 and J/A00).

Swiss Phone Radiation Rules: From Emission to Exposure Limit

Switzerland is moving toward a 4 V/m public exposure standard for RF/MW radiation from wireless phone base stations.

A federal ordinance that took effect last February set a precautionary limit of 4 V/m (4 $\mu W/cm^2$) for 900 MHz radiation from each mobile phone site—one of the strictest standards in the world (see *MWN*, J/F00). It defines a site as all antennas "attached to the same mast or located in close proximity, e.g., on the roof of the same building."

But now, local government officials responsible for enforcing the law are defining "close proximity" in a way that further increases the area within which base stations are handled as one site. In Zurich, antennas are treated as a single site if they are within 100 meters of each other, according to the Zurich daily, *Tages-Anzeiger* (November 8).

This approach "effectively turns the source limit into an exposure standard," said Dr. Michael Burkhardt, who follows regulatory affairs for the Zurich-based mobile phone carrier diAx.

The Federal Agency for Environment, Forests and Landscape (known as BUWAL) is working on an advisory statement on how to determine whether antennas comply with the ordinance. In an interview, the agency's Dr. Stefan Joss said it will be issued in early 2001. There is some speculation that BUWAL will endorse Zurich's approach for the entire nation, but Joss declined to comment on what the advisory would say.

An English translation of the *Ordinance Relating to Protection from Non-Ionizing Radiation* is now available as a PDF file at BUWAL's Web site. Go to: <www.buwal-recht.ch/index-en.htm>.

«« »»

A class action **mobile phone lawsuit** filed in Louisiana state court last May has been removed to federal court. The suit names 21 manufacturers and service providers as defendants. It is not a personal injury case but rather asks that the cellular phone industry be required to pay for a headset and medical monitoring for every user, as well as damages for emotional distress from "the use of the cell phone in its unprotected and unsafe condition." Plaintiffs' attorney **Michael Allweiss** of Lowe, Stein, Hoffman, Allweiss & Hauver in New Orleans told *Microwave News* that the first hearing is scheduled for January. Allweiss is collaborating with **Joanne Suder** of Baltimore, whose law firm has now teamed up with the mega-firm of Peter Angelos (see p.1). In other litigation, the *Busse* case—a mobile phone suit now stripped of all claims except invasion of privacy—was briefly one of the largest class actions in the U.S. An Illinois judge certified the proposed class of virtually all Americans who have ever owned a cellular phone, but wireless industry defendants obtained an emergency stay of that order from the Illinois Su-

preme Court, said Norm Sandler of Motorola in Washington.

«« »»

Could teenagers be substituting mobile phones for cigarettes? Clive Bates, director of the U.K.'s **Action on Smoking and Health**, and Dr. Anne Charlton, an epidemiologist at the University of Manchester, think so. "We argue that the mobile phone is an effective competitor to cigarettes in the market for products that offer teenagers adult style, individuality, sociability, rebellion, peer group bonding and adult aspiration," they write in the November 4 issue of the ***British Medical Journal***. Among 15-year-old boys and girls in Britain, the proportion who smoked at least weekly fell from 30% in 1996 to 23% in 1999. Bates and Charlton link this to the dramatic rise in mobile phone ownership, which among Britons aged 15-24 has roughly doubled each year since 1997 and now exceeds 70%. Dr. Gerard Hastings, director of the **Center for Tobacco Control Research** in Glasgow, believes that the idea "is pure speculation," but "quite plausible" nonetheless. "You've got to recognize that kids use mobile phones in much the same way they use tobacco—for social reasons," Hastings told BBC-TV on November 3. Both products can be used "to look hip and cool," he said.

Mickey Mouse Will No Longer Be Used To Market Cell Phones

The Walt Disney Co. has stopped licensing its characters for use on cellular phones. In a November 22 statement, Disney stated that "the well-being of our customers is our first priority" and that this new policy would remain in effect "until there is reliable evidence establishing the absence of any [health] risks."

The Disney announcement came a day before the airing of *Cell Phones and Kids* on national television by ABC News. (Disney owns the ABC television network.)

Dr. Colin Blakemore of the U.K.'s Oxford University told ABC that it is "irresponsible" to use images of Mickey Mouse to sell mobile phones to children. Such marketing campaigns have stirred controversy in Australia and in the U.S. (see *MWN*, N/D99). Blakemore was a member of the Stewart panel in the U.K., which recommended that children be discouraged from using mobile phones (see *MWN*, M/J00).

Dr. John Moulder, of the Medical College of Wisconsin in Milwaukee and a frequent industry consultant, told ABC that he does not know of any evidence that children are at any greater risk from cell phones.

EMF NEWS

Sensitivity to Low-Level EMFs Is Real, Swiss Researchers Say

People can tell when they are being exposed to weak EMFs, according to researchers in Switzerland. But those who claim to be electrosensitive are no more able to detect such exposures than are "normal" controls.

Although many people complain that they experience distressing symptoms when close to EMF sources, most previous studies have found that under controlled conditions electrosensitive subjects cannot discern whether or not they are being exposed (see *MWN*, M/J00). These results are cited to support the view that electrosensitivity is a psychological—not physical—condition.

Researchers at the Institute for Hygiene and Applied Physiology at the Federal Institute of Technology (ETH) in Zurich disagree. "A purely psychosomatic reaction or placebo effect can be dismissed," concluded Dr. Helmut Krueger, Christopher Müller and Dr. Christoph Schierz in a paper presented at the Bioelectromagnetics Society's (BEMS) annual meeting in Munich last June. They provided further details of their work at an October 20 seminar at the ETH.

The team intermittently exposed 49 electrosensitive volunteers and 14 controls to 50 Hz EMFs at levels ranging from 40 mG to 60 mG. Neither the volunteers, who were awake, nor the researchers knew when the fields were switched on.

Both the electrosensitive and the control groups could tell when the field was on more often than would have been expected by chance—a finding with a high degree of statistical significance ($p=0.007$).

In each group, some volunteers had scores well above average. But the researchers stressed that these results do not support a difference between the two, since roughly the same fraction of each group discerned the fields. They cautioned that there were some inconsistencies. "Subjects could detect the fields at one time and not another," Müller told *Microwave News.*

In the second experiment, electrosensitive volunteers were exposed to 20-60 mG EMFs while sleeping in their own homes. The intermittent exposures lasted for roughly three weeks, and subjects did not know when the fields were switched on. Subjects awoke feeling significantly better and more alert when they had been exposed than when not. The exposures had no effect on sleep quality or the subjects' sense of well-being during the day.

In the third part of the project, the ETH team monitored 35 electrosensitive volunteers exposed to 20-60 mG fields while asleep at home, and found that six of them consistently moved away from the field when it was switched on. This result is also statistically significant. These findings suggest EMFs can be detected "either consciously or unconsciously," the researchers argued in a paper presented at the *3rd International Conference on Bioelectromagnetism* in Bled, Slovenia, in early October.

In this last experiment, Müller and colleagues also monitored heart rate and heart rate variability (HRV) and found no change during exposure.

The Swiss researchers have submitted a paper on the results with awake subjects to *Bioelectromagnetics.* Papers describing the sleep experiments and synthesizing all the project results are in progress, Müller said.

Childhood Cancer, Distance from Power Lines Not Linked in U.K.

Childhood leukemia is not related to distance from power lines in the U.K., according to the latest paper from the U.K. Childhood Cancer Study (UKCCS).

As in their previous report on measured magnetic fields (see *MWN*, N/D99 and J/F00), the investigators found no link between childhood leukemia and calculated magnetic field levels. The authors acknowledge, however, that the statistical power of the new analysis is "limited." For proximity alone, they also report no increase in risk.

Only 102 of the 6,770 children in the study lived within 50 meters of an overhead line of 11 kV or greater. Eighteen children had calculated magnetic field exposures of 2 mG or more from power lines or other sources outside their homes.

"We have now taken a hard look at whether the distance a child lives from power lines could be associated with cancer, and we find this not to be the case," said the study's lead investigator, Dr. Nicholas Day of the University of Cambridge.

One part of the paper attempts to address the theory advanced by Dr. Denis Henshaw of the University of Bristol, who holds that electric fields around power lines ionize molecules in the atmosphere and thus make cancer-causing pollutants more likely to adhere to human tissue (see *MWN*, M/A96, N/D99 and S/O 00). The new UKCCS analysis reports an odds ratio of 1.42 for acute lymphoblastic leukemia (ALL) among the 95 children who lived within 400 m of a 275 kV or 400 kV line (CI = 0.85-2.37). The researchers acknowledge that they did not "consider the direction of the prevailing wind," an important part of Henshaw's hypothesis.

Henshaw told *Microwave News* that while this was only "a partial test" of his theory, the new data are quite consistent with it. Henshaw called the UKCCS finding "extremely interesting," and asserted that the risk was "just short of statistical significance."

The new UKCCS paper appears in the December issue of the *British Journal of Cancer (83*, pp.1573-1580, 2000); a paper on the UKCCS's overall methodology appeared in the March 2000 issue *(82*, pp.1073-1102, 2000).

The UKCCS data on measured magnetic fields were included in the pooled analysis of nine different studies led by Dr. Anders Ahlbom of the Karolinksa institute in Stockholm, which found a significant increase in risk at exposures above 4 mG (see *MWN*, S/O00).

IARC Cancer Review Set for June 2001 in Lyon

The International Agency for Research on Cancer (IARC) will assemble a working group to evaluate the cancer risk posed by static and extremely low frequency (ELF) EMFs in Lyon, France, June 19-26.

A group of 20-25 experts has been invited to review published work on exposure, dosimetry, epidemiology and animal experiments as well as other relevant data and to prepare a first draft of what will be an IARC *Monograph on the Evaluation of Carcinogenic Risks to Humans* of such fields. During the Lyon meeting, the document will be discussed and revised until an agreement is reached on the final contents of the monograph.

The National Institute of Environmental Health Sciences (NIEHS) followed a similar process for its EMF review in 1998. Using IARC's criteria, an NIEHS working group concluded that ELF EMFs are "possible human carcinogens" (see *MWN*, J/A98).

"Representatives of governments, regulatory agencies and other organizations are welcome to attend and participate in the discussions," IARC's Dr. Robert Baan, based in Lyon, told *Microwave News*. A summary will be posted on the IARC Web site soon after the meeting, Baan stated.

The World Health Organization is planning to set up a task group to evaluate noncancer health effects of static and ELF EMFs in 2002.

Weak EMFs Implicated in Tumor Promotion *(continued from p.1)*

coauthors, is a former chief of IARC's Unit of Multistage Carcinogenesis in Lyon, France.

"It's a serious study and we want to get confirmation," said Dr. Michael Repacholi, the head of the WHO's EMF project (see p.2). "You have to get an equally prestigious lab to replicate it," he said, adding that such a replication attempt needs to be completed by June when an IARC panel meets to consider the cancer risk posed by EMFs (see box above).

Some were quick to express their doubts, however. Even before the Trosko paper was published, Dr. Johnathan Kiel of the RF/MW team at Brooks Air Force Base in San Antonio cited it as a possible example of "phantom phenomena" in an opinion piece published in the July/August issue of the *Bioelectromagnetics Society Newsletter.*

The Trosko study was sponsored by EPRI in Palo Alto, CA. "We are in the process of trying to find another good and independent lab to see if we can replicate the results," said a spokesperson for Dr. Leeka Kheifets, who runs the EMF program for the electric utility research group.

Repacholi said that he is actively encouraging EPRI to repeat the study. But if EPRI does not, it is not clear who will. "Right now we are not doing any ELF studies," said Dr. Russell Owen, the chief of the radiation biology branch at the Food and Drug Administration in Rockville, MD. Nor is the National Institute of Environmental Health Sciences currently planning any follow-up work, according to Dr. Christopher Portier, the acting director of the NIEHS' Environmental Toxicology Program in Research Triangle Park, NC.

Trosko's group exposed an abnormal type of immature red blood cells to 60 Hz magnetic fields ranging from 10 mG to 10 G for four days and monitored how many cells differentiated—that is, how many evolved into a more mature, developed state. One of the hallmarks of a tumor promoter is the ability to block differentiation.

For exposures at 50 mG and higher, the EMFs caused a statistically significant ($p<0.001$) inhibition of differentiation. The MSU team found that the effect was dose-dependent with a maximum inhibition at approximately 50 mG.

Yamasaki told *Microwave News* that it is difficult to compare the action of EMFs to chemical promoters "because we have no clue for the mechanisms of action of EMFs."

Trosko said that he had been sufficiently confident that there would be no EMF response that he was reluctant to put one of his students on this project, explaining that no-effect studies do not help them find jobs.

This new experimental result is not the first to show an effect *in vitro* at very low magnetic field levels. In 1992, Dr. Robert Liburdy reported that EMFs can block the anti-cancer action of melatonin at 12 mG, a finding that has been repeated in four other labs (see *MWN*, J/A92, M/A96, J/A98 and J/A99).

Dr. James Trosko Talks with Microwave News

***MWN*:** Is it correct to interpret your new results as indicating that 60 Hz EMFs can act as a tumor promoter?

JT: Our results indicate that 60 Hz EMFs have some properties of known chemical tumor promoters, in that they can block cell differentiation. Whether they can actually act as tumor promoters would depend on whether they meet all the other criteria needed to actually be able to promote a preexisting initiated cell. Remember, our studies were not designed to test whether or not EMFs could be carcinogenic, but whether EMF exposure could induce a biological effect. Our results showed it could have a biological effect, but I stress that this does not necessarily mean that it would cause health effects, such as cancer.

***MWN*:** Were you surprised by the findings?

JT: Yes, indeed. I was surprised because our initial expectation was that there would be no biological effect. We ran the initial experiment 19 times and used several different endpoints—and then did several additional different kinds of experiments—just to convince ourselves that the results were reliable.

***MWN*:** Epidemiological studies have long pointed to the possibility that EMFs can act as cancer promoters. So, why were you skeptical that EMFs can have biological effects?

JT: The epidemiological studies did not convince me that there is a biological basis for ELF EMFs to influence human cancers. I believed that ELF EMFs could not induce DNA damage or cause mutations to initiate the cancer process. If ELF EMFs could have an influence anywhere in the complex process of carcinogenesis—that is, initiation, promotion and progression—it was most likely to affect promotion. Promotion involves the alteration of gene expression, but studies on the effects of ELF EMFs on gene expression have had mixed results.

***MWN*:** Why do you think you succeeded when so many others have failed to see anything at the 25-50 milligauss level?

JT: Promotion is a very complex process and not all promoting agents act the same way. The conditions have to be just right. The timing and duration of the exposures are very important. Another key factor is that one must exceed certain thresholds to overcome the natural suppression of uncontrolled cell proliferation. Lastly, the alteration of gene expression is not easily tested. There are as many reasons for failure as there are different experiments. I cannot say why others succeeded or failed. In our case, I guess we just chose the right biological system.

***MWN*:** How hard do you think it will be to determine the mechanism of EMF interactions?

JT: That, of course, is the next step. Since there are many signaling pathways—mechanisms by which a cell can be stimulated to proliferate, differentiate or die—it will take a stroke of genius or just a lot of hard work to uncover the one that ELF EMFs might affect.

***MWN*:** You found a fairly clean dose-response relationship. Did this help convince you that this was a real effect?

JT: Yes, of course! With other agents, such as chemicals, one normally looks for a dose relationship. In this case, the dose effect is really an exposure effect. That is, there is an exposure below which there seem to be no biological effects but above which there can be an effect.

***MWN*:** The EMF effect reached a maximum inhibition of cell differentiation at about 50 mG, which is quite low. What does that tell us?

JT: Quite frankly, I'm not sure because I still do not know the underlying mechanism by which the magnetic field can interfere with gene expression. It simply might be the minimum magnetic field exposure needed to induce an ionic current that could interfere with the signaling that occurs at the cell membrane.

***MWN*:** Have you asked EPRI, which sponsored your EMF study, to renew your grant?

JT: It was made clear last year, when EPRI renewed my grant, that it was very unusual for anyone to be supported for more than two years. I received funding for three years. Since the ELF EMF issue was taken off the "radar screen" last year after the National Academy of Sciences and RAPID reports, it is highly unlikely the National Institutes of Health [NIH] or the National Science Foundation [NSF] would fund this kind of research. I must move on to other areas of research.

***MWN*:** One of your conclusions is that more work needs to be done to find out whether ELF EMFs can act as a tumor promoter in humans. If you were a program manager at the NIH or the NSF, would you fund such studies?

JT: Putting our and other EMF findings in perspective, I would not support many more studies given the relative risks posed by many other potentially hazardous agents to which humans are exposed. Any such studies would have to be based on hypothesis-driven, biologically based, mechanistic ideas.

***MWN*:** So, do you think these EMF studies will get done?

JT: No.

How Telstra's Lawyers Quashed Medical Inquiry Into Mobile Phones and Headaches in Australia

In January 1995, Dr. Bruce Hocking, then the chief medical officer (CMO) of Telstra, Australia's state-controlled telecommunications company, set up neurological examinations for four employees who complained that they suffered headaches while using mobile phones. Soon afterwards, Hocking learned that Telstra's legal department had cancelled the appointments without informing him. On February 10, Hocking was told that his position had been abolished. He left Telstra, then known as Telecom Australia, in April 1995 after 18 years as its CMO. Three years later, Hocking raised his concerns about the company's conduct in a letter to Senator Richard Alston, the government minister in charge of the Department of Communications and the Arts. Alston's department was responsible for safeguarding the public against harmful effects of RF/MW radiation until July 1998, when the Department of Health assumed that responsibility. Alston has been an outspoken skeptic on possible health hazards of mobile phone radiation (see MWN, *M/A97 and M/J97). On September 22 of this year, Hocking, who is now an occupational health consultant based in Melbourne, cited the 1995 episode in testimony before the Australian senate's Committee on the Environment, Communications, Information Technology and the Arts, which is conducting a formal inquiry on mobile phones and health (see, most recently,* MWN, *S/O00). On October 3, Hocking sent the committee copies of his 1995 exchange with the Telstra legal department and his 1998 correspondence with Alston's ministry. These documents are excerpted below.*

March 1, 1998

Dear Minister,

I wish to raise with you an ethical issue that concerns Telstra.

I was previously the CMO to Telstra. I received several inquiries from people, including staff, who said they were experiencing adverse health effects when using mobile phones. I referred a group of such staff for an independent opinion by a professor of neurology. The appointments were cancelled by Telstra's legal department. I protested this action, as per the attached [memo dated February 27, 1995], but was ignored.

I have much thought about the correctness of Telstra's actions and have now decided to seek your views.

Yours sincerely,
Bruce Hocking

Hocking sent Alston a copy of his February 1995 memo to Jane Slatter, the head of Telstra's legal department, questioning the cancellation of the neurological exams, as well as Slatter's response, dated March 9.

February 27, 1995

To: Jane Slatter, Group General Counsel

Following the phone conversation of Tuesday 14th February, I note the following regarding the four staff who have recently complained of headaches/facial symptoms after using mobile phones.

1. These kinds of symptoms were first noted two years ago by three other staff. A neurologist did not find consistency in relation to phones.

2. Subsequently I have spoken to about four customers with similar complaints and have been impressed at their sincerity and cohesive history. I am persuaded there may be an effect which warrants investigation. I disagree that headaches are "nebulous" symptoms. Whilst they are common, good history taking can reveal diagnostic patterns.

3. The four staff have produced written statements which give rise for concern and in my view should be taken seriously. I believe referral to a neurologist, as with the first three cases, is appropriate.

4. Any protocol for managing complaints should be employee/customer centered, not phone centered, as the best way of managing risk for the individual and the company.

5. I sense a strong conflict of interest in these matters between our duties to the shareholder, the employees and our customers. I believe this is an appropriate matter to refer to the Telstra ethics committee.

Please discuss further.

Dr. Bruce Hocking, Chief Medical Officer

March 9, 1995

To: Dr. Bruce Hocking, CMO

...I hope to be able to address the issues set out in your memorandum by early next week.

Regards,
Jane Slatter, Group General Counsel

Hocking did not supply the senate committee with any further correspondence from Slatter in response to his memo. In July 1998, Hocking received a reply to the letter that he had sent Alston that March.

July 13, 1998

Dear Dr. Hocking,

I refer to your letter of March 1, 1998....The minister has asked me to respond on his behalf. I apologize for the delay in responding....

Telstra has advised that in early February 1995 the Telstra Electromagnetic Radiation (EMR) Steering Committee endorsed a strategy for handling complaints about headaches related to the use of mobile phones, which involved referral to the Manager, National Health, Safety and Environment Branch for assessment by appropriate experts, such as an ergonomist. The strategy then required that information arising from that assessment was to be provided to the CMO who would, if appropriate, arrange for a medical examination.

Telstra has further advised that appointments were made for four staff to attend a neurologist in mid-February but they were cancelled following intervention by the Legal Directorate on the basis that the referral to a neurologist at that point was inconsistent with the endorsed strategy....

While the information supplied by you (and supported by Telstra's records) makes it clear that there was some dispute between you and other Telstra employees about the appropriate handling of these cases, it is not obvious that the other employees were seeking to avoid a proper examination of the health issues raised by the employee complaints....

Yours sincerely,
John Neil, Assistant Secretary
Enterprise and Radiocommunications Branch
Department of Communications and the Arts

July 25, 1998

Dear Mr. Neil,

Thank you for your letter (July 13, 1998)....I would like to make the following comments....

Medical Matters. The Telstra procedure for having health complaints assessed to see if they should be referred to the chief medical officer is absurd. Only a doctor can properly assess health complaints, not an ergonomist or lawyer etc. I was not consulted about such a procedure allegedly developed in February 1995 when I was CMO (and would not have agreed to it).

Process. It is acknowledged by Telstra that the appointments for four staff to attend a neurologist were cancelled by the Legal Directorate on the grounds of process. However since the CMO had already determined that there was reason to send the staff for expert opinion this should have outweighed the views of other nonmedical staff and the referrals proceeded. Did the four staff eventually see a neurologist? If not, I do not consider the Department should accept that Telstra has good processes in place to monitor health issues associated with RFR.

I would be interested in the Minister's views on the above and would be pleased to discuss it further if you wish.

Yours sincerely,
Bruce Hocking

This time, Neil's reply was more direct.

August 17, 1998

Dear Dr. Hocking,

....Comcare Australia reviewed Telstra's handling of the health complaints from staff in 1995, as raised in your letter, and concluded that Telstra appeared to have met its obligations under the Occupational Health and Safety (Commonwealth Employment) Act....

Yours sincerely,
John Neil

Very recently, Hocking offered his view of the episode in a letter to the Australian Senate committee investigating mobile phone safety. The letter accompanied the documents excerpted above.

October 3, 2000

...I consider it irrational to claim the appointments I made in early January 1995 were cancelled because of failure to follow an "endorsed strategy" since such a process did not then exist and was only being drafted in March....Moreover, line management has the legal duty of care with regard to [occupational health and safety] of staff and the referrals had been approved by their [human resources] manager, so a proper process had been followed....

Yours sincerely,
Bruce Hocking

Hocking was one of the first to draw attention to reports of headaches among mobile phone users, along with researchers in the U.K. and Sweden (see MWN, *N/D95). Since then, he has collected and analyzed more than 40 such reports (see* MWN, *M/J97)—not including the four Telstra employees. In his testimony on September 22, 2000, Hocking stated that government agencies are having "great difficulty" getting reports of health problems among phone users. He added that he is "not aware of companies having detailed investigation procedures" for such complaints. Transcripts of hearings from the senate inquiry on mobile phones and health, including Hocking's testimony, are available as PDF files at: <www.aph.gov.au/hansard/senate/commttee/s-ecita.htm>.*

In addition to Hocking's paper, reports linking mobile phone use to headaches include an epidemiological study in Norway and Sweden (see MWN, *M/J98 and J/A00), clinical case studies from the U.K. (see* MWN, *J/A00) and survey data from Singapore (see p.13 and* MWN, *J/A00).*

Across the Spectrum

"Wherever we go, we will be immersed in a sea of low-level, pulsed microwave signals."

—Dr. Ross Adey, professor of neurology, Loma Linda University School of Medicine, CA, quoted by David Kirkpatrick in "Q: 5, 10, 25 Years Out—What Impact Will Broadband Technology Have on Business, on Society, on the Way We Live?" *Fortune,* Special Issue on the Future of the Internet, p.266, October 9, 2000

"I, too, tell my son that he should not hold his cell phone next to his head for so long."

—The unnamed CEO of a large Swiss telecom company, quoted by André Kienzle in "Mobile Phone Antennas: A Rift Runs Through the Country" (in German), *Cash* (Switzerland), November 3, 2000

"A lot of new towers will be built in core markets."

—Steven Dodge, CEO, American Tower Corp., Boston, at the *3rd Annual Tower Summit and Trade Show,* October 29-November 1, Las Vegas. He expects at least three broadband tenants on each of his company's towers by 2005. Quoted by Hilary Smith in "Tower Companies Sitting on Top of Mountain," *RCR Wireless News,* p.1, November 6, 2000

"A result of [the] phenomenal growth [in the complexity of microprocessor chips] has been the steadily decreasing power at which electronic devices are susceptible to severe disruption and damage. This steadily lowering threshold brings tears of joy to HPM-weapon designers."

—Fred Levien, "Directed Energy," *Journal of Electronic Defense,* p.44, November 2000 (see p.16)

Mobile Phones and Health: Three U.S. News Magazines Weigh In

Get an earpiece. Make sure the antenna is outside your car. Hang up when signal strength is bad.

—Claudia Kalb and Karen Springen in "Is Your Cell Really Safe? Worries About a Link Between Cell Phone Radiation and Brain Cancer Still Can't Be Dismissed, Says a New Study," *Newsweek,* p.63, August 7, 2000

Quit worrying. Scientists familiar with the research—even some of those responsible for the disturbing findings—generally say users can rest easy.

—Stacey Schultz and Kenneth Terrell in "Could Your Phone Cause Cancer? Don't Get Hung Up on It," *U.S. News & World Report,* p.54, August 28, 2000

Can your cell phone really give you cancer? The best answer science can offer so far is maybe. Researchers have discovered that cell-phone radiation can cause subtle, short-term biological effects in humans...but their full significance remains to be determined.

—John Greenwald in "Do Cell Phones Need Warnings?" *Time,* p.67, October 9, 2000

Hot New Papers

Sin-Eng Chia, Hwee-Pin Chia and Jit-Seng Tan, "Prevalence of Headache Among Hand-Held Cellular Telephone [HP] Users in Singapore: A Community Study," *Environmental Health Perspectives, 108,* pp.1059-1062, November 2000.

"Headache was the most prevalent symptom among HP users compared to non-HP users, with an adjusted prevalence rate ratio of 1.31 (CI=1.00-1.70). There is a significant increase in the prevalence of headache with increasing duration of usage (in minutes/day). Prevalence of headache was reduced by more than 20% among those who used hands-free equipment for their cellular telephones as compared to those who never use the equipment. The use of HPs is not associated with a significant increase of CNS symptoms other than headache." (These authors also have a letter on headaches in the November 4 *British Medical Journal, 321,* p.1155-1156, 2000; see also p.11 and *MWN,* J/A00.)

Sander Greenland et al., "A Pooled Analysis of Magnetic Fields, Wire Codes and Childhood Leukemia," *Epidemiology, 11,* pp.624-634, November 2000.

"We obtained original individual data from 15 studies of magnetic fields or wire codes and childhood leukemia....[I]f an effect exists below 0.2 μT [2 mG], it is probably too small to reach consensus about it via epidemiologic investigation alone. In contrast, both our categorical and trend analyses indicate that there is some association comparing fields above 0.3 μT [3 mG] to lower exposures, although there are as yet insufficient data to provide more than a vague sense of its form and its possible sources. We believe individual-level studies that focus on highly exposed populations would be needed to clarify this association." (See *MWN,* S/O99 and S/O00.)

Glen Reeves, "Review of Extensive Workups of 34 Patients Overexposed to Radiofrequency Radiation," *Aviation, Space and Environmental Medicine, 71,* pp.206-215, March 2000.

"Our extensive psychological evaluation and psychometric testing of patients found several patients who complained of fatigue, generalized weakness, irritability, decreased memory and concentration, and weight changes. However, these seem to reflect a personal 'coping style' of long duration or else manifestation of pre-exposure organic dysfunction, rather than an acute change attributable to RFR overexposure. The Soviet and East European studies were concerned with chronic exposures at low levels of RFR, while our study focused on people with documented single [permissible exposure level] excesses."

Joyce Nicholas et al., "Flight Deck Magnetic Fields in Commercial Aircraft," *American Journal of Industrial Medicine, 38,* pp.548-554, November 2000.

"Magnetic fields measured on the flight decks of four aircraft types during normal commercial operation varied with type of aircraft, stage of flight and pilot location. The similarity between broadband [40-800 Hz] and harmonic [100-800 Hz] resultant values suggests that the fields being measured lay in the harmonic range. The higher harmonic frequencies could have biological significance in that higher frequencies

Spotlight on Mobile Phone Dosimetry in IEEE Collection

Research groups from around the world working on mobile phone SARs have contributed papers for a special issue of the *IEEE Transactions on Microwave Theory and Techniques.*

The journal's November issue has two parts: One features 29 papers on the "Medical Application and Biological Effects of RF/MW." The other has 15 papers on "RF/MW Applications in Medicine."

In addition to the papers on mobile phone dosimetry, the biomedical collection also includes new details of the U.K.'s Dr. David de Pomerai's studies on nonthermal heat shock responses in worms and some preliminary results on 60 GHz effects on mice by France's Dr. André Bellossi.

The tables of contents for both parts are at: <www.ieee.org/organizations/pubs/pub_preview/mtt_toc.html>.

"Microwave News" Flashback

Years 15 Ago

• A Texas jury orders Houston Lighting & Power Co. to pay Klein Independent School District more than $25 million for "reckless disregard" of children's health in siting a 345 kV power line across school property.

• The Centers for Disease Control recommend an "intensive examination" of the elevated rate of Down's Syndrome in Vernon, NJ—home to a large number of satellite uplink stations.

• Researchers at the New York State Department of Health Laboratories in Albany find that 9 weeks of exposure to 60 Hz EMFs alters the balance of neurotransmitters in monkeys.

Years 10 Ago

• The U.S. government delays the public release of the EPA's draft assessment on EMFs and cancers. Commenting on the draft, the Air Force states that it remains "convinced" that EMFs do not induce or promote cancer.

• Two separate $25 million lawsuits are filed in New York by an electrician and a former U.S. Navy radar technician who claim they developed cancer from on-the-job exposure to RF/MW radiation.

• California's Public Utilities Commission instructs Southern California Edison Co. to follow a policy of prudent avoidance and limit EMFs from 220 kV power lines in the Mojave Desert.

Years 5 Ago

• Gerald Corcoran, lead defense attorney for Atlantic Electric Co. in NJ in an EMF cancer lawsuit, drops out of the case after receiving death threats, which the utility alleges came from plaintiff John Altoonian.

• Sweden becomes the first country to adopt a national policy of prudent avoidance to limit human exposure to EMFs.

• Scientists in Australia, Sweden and the U.K. report that an increasing number of people are complaining about getting headaches while using mobile phones for short periods of time (see p.11).

induce stronger currents in human tissues. Total block time [the time from when the plane leaves the gate before takeoff until the plane returns to the gate after landing] exposure to the pilots, including time spent in bunks, lavatories or passenger compartments, varies in terms of geometric harmonic mean as follows: Boeing 737/200 (analog technology), 12.7 mG; Boeing 747/400 (CRT technology), 11.0 mG; Airbus 320 (CRT technology), 8.1 mG; and Boeing 767/300ER (mixed analog and CRT), 6.7 mG."

Kari Jokela, "Restricting Exposure to Pulsed and Broadband Magnetic Fields," *Health Physics, 79,* pp.373-388, October 2000.

"The exposures measured inside the magnetic-type anti-theft gates were also relatively high. The peak limits for the general public, and in some cases even the occupational limits, were exceeded. High exposures were also measured outside the gate, because in most cases there is no shield that prevents the spreading of the field outside. For the general public, the exposure is short and incidental, but a permanent exposure close to the occupational reference levels is possible when the cash desk is located within 1 m of the gate, which is not an uncommon situation. In the case of metal detector gates, the measured peak magnetic fields inside the gate exceeded the general public reference levels, but remained below the occupational levels."

R. Eveson, G. Timmel, B. Brocklehurst, P. Hore and K. McLauchlan, "The Effects of Weak Magnetic Fields on Radical Recombination Reactions in Micelles," *International Journal of Radiation Biology, 76,* pp.1509-1522, November 2000.

"In some cases, weak magnetic fields (less than about 1 mT [10 G]) have been shown to influence the concentrations of the radicals that escape geminate [pair] recombination within the micelle and become free radicals in the surrounding medium....It is clear that the effect of a modest applied magnetic field is strongly dependent on the structure, dynamics and volume of the space in which the radicals are confined....It is barely conceivable that biological systems in general are so finely balanced that a small change in radical concentration might have a direct effect. However in the presence of an efficient amplification mechanism, the situation could change, as it might if a field was applied to a system in which the defense mechanism was already severely challenged."

World Health Organization Working Group, "Evaluation and Use of Epidemiological Evidence for Environmental Health Risk Assessment: WHO Guideline Document," *Environmental Health Perspectives, 108,* pp.997-1002, October 2000.

"These guidelines identify a set of processes and general approaches to assess available epidemiological information in a clear, consistent and explicit manner. The guidelines should also help in the evaluation of epidemiological studies with respect to their ability to support risk assessment and, consequently, risk management."

Sandra Cecconi et al., "Evaluation of the Effects of Extremely Low Frequency Electromagnetic Fields on Mammalian Follicle Development," *Human Reproduction, 15,* pp.2319-2325, November 2000.

"Pre-antral follicles were cultured for five days and exposed to [15 G, square-wave] ELF EMFs at...33 or 50 Hz. ELF EMF application did not affect follicular growth over a three-day culture period, but on day five the growth of 33 Hz-exposed follicles was significantly reduced when compared with controls, while the 50 Hz-exposed follicles were not significantly affected. However, ELF EMFs severely impaired antrum formation at both frequencies....These results suggest that ELF EMF exposure might impair mammalian female reproductive potentiality by reducing the capacity of the follicles to reach a developmental stage that is an essential prerequisite for reproductive success."

Letters to the Editor

Johns Hopkins Attorney Clarifies Suder Law Firm Award

October 18, 2000

To the Editor:

I am quite disturbed by the last sentence in "Baltimore Doctor Files Cell Phone–Brain Cancer Lawsuit" *(MWN,* S/O00), which states that the plaintiff's attorney, Joanne Suder, "won a $2.5 million judgment against Johns Hopkins Hospital" in an unrelated case. You omitted several important facts which I stated when I was interviewed.

First, the $2.5 million was not a judgment. A jury returned a verdict for that amount. We have filed post-trial motions asking that the verdict be set aside or reduced. The judge has not yet ruled on those motions, but she must reduce the verdict to $350,000 to reflect the cap on non-economic damages as required by Maryland law.

Second, Joanne Suder did not win the verdict because she did not try the case herself. Another attorney employed by her firm handled the trial from start to finish.

I do not see the purpose in your having to include the sentence about the Hopkins case at all, unless you are attempting to legitimize Ms. Suder's law practice. Whether that be the motivation or not, you should at least get the facts straight if you put otherwise irrelevant information into the article in your publication.

Richard Kidwell
Managing Attorney, Claims/Litigation
Johns Hopkins Health System Corp.
600 N. Wolfe St., Baltimore, MD 21287
(410) 955-7949

An earlier draft of the article included the facts noted by Mr. Kidwell, but space limitations forced us to edit the story for length. As Suder's firm launches a set of cell phone lawsuits, some of which may be tried before juries in other states (see p.7), we believe that the firm's record in other personal injury cases is relevant.

Australia's Bruce Hocking on Mobile Phone Case Report

October 21, 2000

To the Editor:

The "Wireless Note" in *Microwave News* (S/O00) re our paper* on permanent dysaesthesiae in a mobile phone user misses the critical point that we found associated neurological changes in two anatomically separate nerve root distributions (trigeminal and cervical) on the scalp on the affected side in the area exposed to fields from the phone. Therefore the unpleasant feelings he felt were not "all in the mind," and the phone was likely causal.

Bruce Hocking, MD
9 Tyrone St., Camberwell, VIC 3124, Australia
(61+3) 9809-1096; E-mail: <bruhoc@connexus.net.au>

*Bruce Hocking and Rod Westerman, "Neurological Abnormalities Associated with Mobile Phone Use," *Occupational Medicine, 50,* pp.366-368, July 2000.

2001 Conference Calendar (Part I)

Part II will appear in our next issue.

January 8-11: **International Union of Radio Science (URSI) National Radio Science Meeting,** University of Colorado, Boulder, CO. Contact for Commission K, Electromagnetics in Biology and Medicine: Dr. Frank Barnes, University of Colorado, Boulder, CO 80303, (303) 492-8225, E-mail: <frank.barnes@colorado.edu>, Web: <cires.colorado.edu/ursi>.

January 10-14: **20th Annual Meeting of the Society for Physical Regulation in Biology and Medicine (SPRBM),** Embassy Suites Hotel, Charleston, SC. Contact: Gloria Parsley, 2412 Cobblestone Way, Frederick, MD 21702, (301) 663-4556, Fax: (301) 694-4948, E-mail: <gloriaparsley@aol.com>, Web: <www.SPRBM.org>.

January 15-17: **WHO/Israel Government Seminar: Bioeffects and EMF Standards Harmonization,** Contact: Dr. Ehud Ne'eman, Sacker Medical School (7th fl.), Tel Aviv University, Ramat-Aviv 69978, Tel Aviv, Israel, (972+3) 641-4807, Fax: (972+3) 642-9883, E-mail: <env_rad@netvision.net.il> or <shaiela_k@yahoo.com>, Web: <www.who.int/peh-emf/meetings.htm>.

January 28-February 1: **2001 IEEE Power Engineering Society (PES) Winter Meeting,** Hyatt Regency, Columbus, OH. Contact: Dr. Tai Wong, AEP, 700 Morrison Ave., Gahanna, OH 43230, (614) 883-7235, Fax: (614) 883-7222, E-mail: <twong@aep.com>.

February 9: **Extremely Low Frequency Electromagnetic Fields Interactions with Living Matter.** Workshop organized by the Bioelectromagnetics Society (BEMS), Catholic University of America, Washington, DC. Contact: Dr. Ewa Czerska, (301) 594-1212, ext.119, E-mail: <emc@cdrh.fda.gov> or Dr. Lee Rosen, (301) 435-1171, E-mail: <lu2@cu.nih.gov>.

February 20-22: **14th International Zurich Symposium & Technical Exhibition on Electromagnetic Compatibility (EMC Zurich '01),** Federal Institute of Technology, Zurich, Switzerland. Contact: Dr. Gabriel Meyer, ETH Zentrum, IKT-ETF, CH-8092 Zurich, Switzerland, (41+1) 632-2790, Fax: (41+1) 632-1209, E-mail: <gmeyer@nari.ee.ethz.ch>, Web: <www.emc-zurich.ch>.

March 7-9: **WHO/Peru Government: Americas Regional Seminar on Bioeffects and EMF Standards Harmonization,** Lima, Peru. Contact: Dr. Michael Repacholi, WHO, Avenue Appia 20, 1211 Geneva 27, Switzerland, Fax: (41+22) 791-4123, E-mail:<repacholim@who.int>, Web: <www.who.int/peh-emf/meetings.htm>.

March 16-21: **2001 Annual Meeting of the Environmental Mutagen Society (EMS),** Paradise Point Resort, San Diego, CA. Contact: David DeMarini, U.S. EPA, 86 Alexander Dr., MD-68, Research Triangle Park, NC 27711, (919) 541-1510, Fax: (919) 541-0694, E-mail: <demarini.david@epa.gov>, Web: <www.ems-us.org/meetings>.

March 22-23: **The Radio Frequency Spectrum: Managing Community Issues,** Coogee Beach Holiday Inn, Sydney, Australia. Contact: Prof. Marcela Bilek or Prof. David McKenzie, Dept. of Applied Physics, University of Sydney, Australia, (61+2) 9351-2351, Fax: (61+2) 9524-1744, E-mail: <M.Bilek@Physics.usyd.edu.au> or <rfspectrum@magicdatabases.com>, Web: <www.cfi.unsw.edu.au/rfconference.html>.

March 26-28: **40th Annual Meeting of the Society of Toxicology (SOT),** Moscone Center, San Francisco, CA. Contact: SOT, 1767 Business Center Dr., Ste. 302, Reston, VA 20190, (703) 438-3115, ext.326, Fax: (703) 438-3113, E-mail: <clarissa@toxicology.org>, Web: <www.toxicology.org>.

April 2-4: **International Symposium on Electromagnetics in Biology and Medicine,** sponsored by URSI Commission K, Electromagnetics in Biology and Medicine, University of Tokyo, Japan. Contact: Dr. Shoogo Ueno, Dept. of Biomedical Engineering, Graduate School of Medicine, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan, (81+3) 5841-3563, Fax: (81+3) 5689-7215, E-mail: <ueno@medes.m.u-tokyo.ac.jp>.

April 9-11: **American Power Conference 2001,** Marriott Downtown, Chicago, IL. Contact: Conference Coordinator, 1421 S. Sheridan Rd., Tulsa, OK 74112, (918) 831-9160, Fax: (918) 831-9161, E-mail: <apcconf@pennwell.com>, Web: <www.apc-pennwell.com>.

April 17-20: **11th International Conference on Antennas and Propagation (ICAP 2001),** University of Manchester Institute of Science and Technology, Manchester, U.K. Contact: ICAP Secretariat, Institution of Electrical Engineers (IEE), Savoy Pl., London WCR2 OBL, U.K., (44+207) 344-8425, Fax: (44+207) 240-8830, E-mail: <icap@iee.org.uk>, Web: <www.iee.org.uk/Conf/ICAP>.

April 20-27: **2001 American Occupational Health Conference (AOHC),** Moscone Convention Center, San Francisco, CA. Contact: Betty Kehler, c/o SLACK Inc., 6900 Grove Rd., Thorofare, NJ 08086, (856) 848-1000, ext.381, Fax: (856) 848-3522, E-mail: <bkehler@slackinc.com>, Web: <www.slackinc.com/exhibits/aohc>.

April 21-26: **National Association of Broadcasters Annual Convention (NAB 2001),** Las Vegas, NV. Contact: Ann Marie Cumming, 1771 N St., NW, Washington, DC 20036, (202) 429-5476, Fax: (202) 429-4199, E-mail: <irc@nab.org>, Web: <www.nab.org>.

April 21-27: **9th Scientific Meeting and Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM)** and **18th Annual Meeting of the European Society for Magnetic Resonance in Medicine and Biology (ESMRMB),** Glasgow, Scotland, U.K. Contact: ISMRM, 2118 Milvia St., Ste. 201, Berkeley, CA 94704, (510) 841-1899, E-mail: <info@ismrm.org>, Fax: (510) 841-2340, Web: <www.ismrm.org>, <www.esmrmb.org>.

April 29-May 2: **33rd National Conference on Radiation Control,** Anchorage, AK. Contact: Lin Carigan, Conference of Radiation Control Program Directors, 205 Capital Ave., Frankfort, KY 40601, (502) 227-4543, Fax: (502) 227-7862, E-mail: <pgorman@crcpd.org>, Web: <www.crcpd.org>.

April 30-May 4: **1st International Seminar: Measurements and Criteria for Standards Harmonization in the Field of EMF Exposure,** Varna, Bulgaria. Contact: Dr. Michel Israel, National Center of Hygiene, 15 Dimiter Nestorov St., Sofia 1431, Bulgaria, (359+2) 596-154, Fax: (359+2) 958-1277, E-mail: <M.Israel@nch.aster.net>, Web: <www.who.int/peh-emf/meetings.htm>.

May 1-3: **2001 IEEE Radar Conference,** Westin at Perimeter, Atlanta, GA. Contact: Dr. Mark Richards, Georgia Tech Research Institute, SEAL, 7220 Richardson Rd., Smyrna, GA 30080, (770) 528-7758, Fax: (770) 528-7728, E-mail: <mark.richards@gtri.gatech.edu>, Web: <www.atlaessgrss.org/radarcon2001>.

May 13-17: **2001 URSI International Symposium on Electromagnetic Theory,** Victoria, Canada. Contact: Pierre Lamoureux, National Research Council, 1500 Montréal Rd., Bldg. M-19, Ottawa, Ontario K1A 0R6, Canada, (613) 993-9431, Fax: (613) 993-7250, E-mail: <URSI-B2001@nrc.ca>, Web: <www.nrc.ca/confserv/URSI-B2001>.

May 20-23: **2nd International Symposium on Nonthermal Medical/Biological Treatments Using Electromagnetic Fields and Ionized Gases (ElectroMed 2001),** Renaissance Portsmouth Hotel, Portsmouth, VA. Contact: Nell Reece, Eastern Virginia Medical School, (757) 668-6406, Fax: (757) 668-6476, E-mail: <electromed2001@ece.odu.edu>, Web: <www.ece.odu.edu/electromed2001>.

May 20-25: **IEEE Microwave Theory and Techniques Society (MTT-S) International Microwave Symposium (IMS2001),** Phoenix, AZ. Contact: Prof. Samir El-Ghazaly, Dept. of Electrical Engineering, Arizona State University, PO Box 877206, Tempe, AZ 85287, (480) 965-5322, Fax: (408) 965-8325, E-mail: <sme@asu.edu>.

June 2-7: **American Industrial Hygiene Conference & Expo,** New Orleans, LA. Contact: Carol Tobin, AIHA, 2700 Prosperity Ave., Ste. 250, Fairfax, VA 22031, (703) 849-8888, Fax: (703) 207-3561, E-mail: <ctobin@ aiha.org>, Web: <www.aiha.org/constaff.html>.

June 4-9: **4th International Kharkov Symposium on Physics and Engineering of Millimeter and Submillimeter Waves,** Kharkov, Ukraine. Contact: MSMW 2001, c/o IRE NASU, 12 Ac. Proskura St., Kharkov 61085, Ukraine, (380+572) 441-105, E-mail: <msmw2001@ire.kharkov.ua>, Web: <ire.kharkov.ua/MSMW2001/msmw.htm>.

June 10-14: **23rd Annual Meeting of the Bioelectromagnetics Society (BEMS),** Radisson Hotel, St. Paul, MN. Contact: Dr. John Male, 2412 Cobblestone Way, Frederick, MD 21702, (301) 663-4252, Fax: (301) 694-4948, E-mail: <BEMSoffice@aol.com> and <bems@delasallecenter.org>, Web: <www.bioelectromagnetics.org>.

UPDATES

EMI FROM ANTI-THEFT SYSTEMS

FDA Asks for Posting of Signs... The FDA is recommending that retailers post signs advising customers if they are near an electronic anti-theft system. Such security systems, often hidden from view, have been reported to cause electromagnetic interference (EMI) with implanted medical devices (see *MWN*, S/O 97 and N/D98). "The FDA believes that implant wearers should be notified whenever and wherever electronic anti-theft systems are in use," the FDA's Center for Devices and Radiological Health in Rockville, MD, stated in a letter to manufacturers. It asked the companies to provide retailers with signs or labels not only when new systems are installed, but also to all those with anti-theft systems already in operation. The agency's advice, which is not binding, called for language such as ELECTRONIC ANTI-THEFT SYSTEM IN USE, with signs to be visible "before an individual enters the monitored area." This will help implant wearers to "avoid lingering around or leaning on such systems," both of which increase the risk of EMI, the FDA said. "We endorse this recommendation," said Lee Pernice, spokesperson for Sensormatic in Boca Raton, FL, a leading maker of anti-theft devices. This stand represents a turnaround for Sensormatic, which had not supported earlier proposals from cardiologists such as Drs. Michael McIvor and Peter Santucci for the posting of signs (see *MWN*, S/O98 and N/D98). Sensormatic consultant Dr. Warren Harthorne told an FDA committee in 1998 that, "If you start placing signs in stores, you're going to have a rash of hysterical patients who will then have symptoms that they never would have had otherwise." But this November Pernice told *Microwave News* that the company's opposition had not been to signs *per se*, but only to "putting up *warning* signs." McIvor, whose practice is in St. Petersburg, FL, told *Microwave News* he was pleased by the FDA's statement: "It's definitely a step in the right direction." He said his most recent research has shown that "the pulsing of the signal is the key variable" in the likelihood of interference. The FDA letter, issued August 15, cited past reports of anti-theft systems causing EMI with pacemakers, neurological stimulators and implantable defibrillators, with consequences that included serious pain and even unconsciousness. The FDA noted, however, that the chance of interference is very low and that most interactions have "little or no significant effect on implant wearers." The agency's letter is available on the Web at <www.fda.gov/cdrh/comp/guidance/1170.pdf>, or by calling (800) 899-0381 and asking for document shelf number 1170.

EMP WEAPONS

Concerns over EMP Attack... The U.S. Congress wants a new assessment of the risks posed by electromagnetic pulse (EMP) weapons. In the defense appropriations bill signed into law on October 30, the Department of Defense and the Federal Emergency Management Agency are directed to set up a nine-member commission to evaluate the threat to military and civilian electronics of an EMP attack by Russia, China, North Korea or other potentially hostile states. Last year, Reps. Roscoe Bartlett (R-MD) and Curt Weldon (R-PA) each held hearings on U.S. vulnerability to EMP weapons (see *MWN*, N/D99). "A member of the Russian Duma recently told me, 'You know if we really

wanted to hurt you, we would set off an atomic weapon at high altitude above your country and produce an EMP that would destroy your entire electrical power grid, computers and telecommunications infrastructure including satellites','' Bartlett said at his hearing in June 1999. Bartlett was the lead author of the provision establishing the commission. Worries about EMP were widespread during the 1980s, and during those years the military spent billions of dollars "hardening" its systems against EMP. In 1984, the National Academy of Sciences issued a detailed assessment of the EMP threat (see *MWN*, S84). The new commission's report is due in early 2002.

MEDICAL APPLICATIONS

Warning on Microwave Prostate Shrinker... Devices like the Prostatron, which use microwaves to shrink an enlarged prostate gland, can cause serious thermal injuries, according to the FDA. In an October 11 "Public Health Notification," FDA's Center for Devices and Radiological Health (CDRH) outlines 16 reports of microwave-related burns: ten cases of intestinal damage, some requiring a colostomy, and six cases of "clinically significant tissue damage to the penis," leading in at least one instance to "partial amputation." Enlargement of the prostate, or benign prostatic hyperplasia, becomes increasingly common with advancing age. It occurs in 10% of 40-year-old men, but in 80% of 80-year-olds. Since 1996, some 25,000 treatments have been performed in the U.S. with the Prostatron, made by EDAP Technomed Inc. in Burlington, MA (see *MWN*, M/J96), and a similar device also approved by the FDA. An antenna contained in a urethral catheter irradiates the prostate, heating it to temperatures greater than 113˚F (45˚C) and eliminating excess tissue (see *MWN*, N/D95). Among the factors the CDRH identifies as contributing to injuries are incorrect placement of the device and overuse of anesthesia, which limits the patient's "ability to communicate pain." In its recommendations, the CDRH stresses that the doctor should remain with the patient throughout the 30- to 60-minute procedure and reduce or interrupt the radiation if "the patient complains of excessive pain or anything unusual occurs." The full text of the CDRH advisory is on the Internet at <www.fda.gov/cdrh/safety/bph.html>.

PEOPLE

Dr. **Charles Polk** died on November 6 at the age of 80. Born in Austria, Polk taught at the University of Rhode Island, Kingston, for over 40 years. He was chair of its department of electrical engineering from 1959 to 1979. During that time, he also served as acting director of the engineering division at the National Science Foundation in Washington. A former president of the Bioelectromagnetics Society, Polk was a member of the 1998 NIEHS Working Group on EMFs and had been invited to play a similar role for IARC next summer (see p.9). He is perhaps best known as the coeditor of the *CRC Handbook of Biological Effects of Electromagnetic Fields*, now in its second edition. The family has requested that donations in his memory be sent to the Center for Victims of Torture, located in Minneapolis. Charles Polk was a good friend to *Microwave News* and we join the many others who mourn his passing.

As We Go to Press

German Tower Study Inconclusive

A two-year study of the effects of mobile phone radiation on dairy cattle in Germany has yielded no conclusive findings, according to a report released at the end of November.

University researchers compared the behavior, milk output and reproductive health of herds at 38 farms, some near wireless base stations and some not (see *MWN*, J/A98). A review panel agreed that the study failed to control for possible confounders, including variations in breeds and the impact of a viral infection.

In August, a national TV news program described the study's findings as "explosive," a claim that was denied by the state government of Bavaria, which directed the study (see *MWN*, S/O00).

Australian Phone–DNA Study Flap

The Australian government will not pursue findings suggesting that mobile phone radiation promotes DNA repair, according to press reports. Dr. Pamela Sykes of Flinders University in Adelaide found that mice exposed to 900 MHz radiation for 30 minutes daily for 25 days had less DNA damage, the *Sydney Morning Herald* reported on November 29.

A spokesperson for the National Health and Medical Research Council (NHMRC) told the *Herald* that the study was discontinued because the results did not support Sykes's original hypothesis—that radiation exposure would *increase* DNA changes.

Sykes's research was sponsored under the government's five-year, Aus$4.5 million investigation of phone safety (see *MWN*, N/D 96 and J/A98; for more on apparent beneficial effects, see p.4).

Keeping Current: Follow-Up on the News

◆ On December 8, the U.K. Department of Health announced that it will sponsor £7 million (about $10 million) of research on the possible health effects of mobile phone radiation. On the same day, it released two leaflets. *Mobile Phones and Health* highlights the uncertainties about health risks of mobile phones and discourages their use by children. The second leaflet addresses base stations. The leaflets are at: <www.doh.gov.uk/mobilephones/index.htm>.

◆ Results of the NCI's epidemiological study of wireless phone use and brain cancer are expected "by the end of this year or early next year," according to the September 20 *Journal of the National Cancer Institute.* NCI's Dr. Peter Inskip noted that it may still be too early to assess long-term risks of cellular phone use.

◆ The California EMF Program will stop responding to telephone inquiries about EMFs next year. Staff at the Department of Health Services has been spending an estimated 10-20 hours a week on questions from the public.

◆ Rep. Edward Markey (D-MA) has asked for an advance copy of the report on mobile phones and health that the General Accounting Office is preparing for Sen. Joseph Lieberman (D-CT). Markey did not ask for any changes in the report's objectives, an aide told *Microwave News.*

◆ COST 244bis, the European program on "Biomedical Effects of EMFs," came to a close on November 20. Dr. Dina Simunic of Zagreb University in Croatia, who administered the program, said that she is now setting up a dosimetry lab for mobile phones. A final report on the eight-year COST effort is due soon.

◆ The November 25 issue of the *Lancet* features two "seminars" on mobile phones: The U.S.'s Dr. Kenneth Rothman addresses the epidemiological evidence on health effects and the U.K.'s Dr. Gerard Hyland addresses the physical and biological issues. For the same issue, Dr. Philip Dendy, a medical physicist in Cambridge, U.K., provides a commentary titled, "Mobile Phones and the Illusory Pursuit of Safety."

◆ *Tesla: Master of Lightning,* a new documentary, is scheduled to be aired on public television in mid-December.

◆ CTIA has a new name. The "I" no longer stands for industry. It's now the Cellular Telecommunications *and Internet* Association.

◆ At the end of November, Dr. George Carlo's book, *Cell Phones: Invisible Hazards in the Wireless Age: An Insider's Alarming Discoveries About Cancer and Genetic Damage,* was available through BarnesandNoble.com, though the site's synopsis inexplicably read: "This is a biography of the French novelist."

VIEWS ON THE NEWS

The Politics of Information: Public Health vs. Private Control

There's an old saying that, "Information is power." That's certainly true for mobile phone health research.

Suppose wireless phone radiation were shown conclusively to cause cancer. Just to delay the news by six months could be worth billions of dollars. And as the tobacco and global warming debates show, corporations are not inclined to passively accept the findings of science when it hurts their bottom line.

What's good for the balance sheet is not always good for public health. And that's a conflict that is played out every day—in small increments, in slow motion, in ways that may not be dramatic but are still corrosive in their effects.

Let's take the example of the work of Drs. Christian and Hella Bartsch, funded by Deutsche Telekom (DT) (see p.4). Their first experiment yielded important results and made waves among wireless industry insiders. It was identified as a key topic for industry-funded replication, worthy of no fewer than four follow-up studies—two in the Bartsch lab and two elsewhere. But few people were allowed to know what the original study found.

The public was excluded, as was the scientific community at large. Only DT had access to the data, and they shared it with few others. Though the experiment was completed nearly two years ago, both DT and the Drs. Bartsch have refused to say anything about its results or even describe the study protocol. If a summary had not temporarily appeared on the WHO's Web site, we would still have no idea what they found.

There was no good reason to keep this information secret. We have now lost a year and a half in which other researchers could have used this knowledge to sharpen their own investigations. And clearly, the question of wireless health effects is too complex to be resolved by one lab working alone.

But when industry has advance knowledge of research results, it has more power to define what comes next. PR departments have time to figure out how to spin the results and shape public opinion. (Remember Motorola's memo on "war-gaming Lai-Singh"? See *MWN*, J/F97.) This in turn affects political decisions about the pace and funding of research.

Corporate spin sometimes extends into the wording of a published paper. In 1998 Dr. Michael McIvor told *Microwave News*, "When Sensormatic saw an advance copy of the abstract, they wanted me to change the wording" (see p.16 and *MWN*, N/D98).

Like the Bartsches, Dr. Ross Adey has observed a tumor-inhibiting effect from a digital phone signal. Motorola's attempt to limit Adey's discussion of this finding was the talk of the 1996 BEMS meeting (see *MWN*, J/A96).

Did DT play a role in delaying the publication of the Bartsch study? Unfortunately, the company does not have a record of openness and transparency—so we may never know. DT has been one of the most secretive firms in the mobile phone industry, perhaps exceeded only by France Telecom. The inevitable consequence is that journalists and the public are not sure when the company's statements can be trusted.

An account of the conflicts of interest in this case would not be complete without mentioning the role of Dr. John Moulder. The journal to which the Bartsch study was submitted is *Radiation Research*, one of the principal journals for RF/MW health studies, and Moulder is the associate editor with primary responsibility for non-ionizing radiation. Yet Moulder is also a paid consultant to the wireless industry in several different countries.

This is conflict of interest, "squared." It's bad enough that Moulder gets payments from the mobile phone industry while acting as a gatekeeper of scientific information. It's worse that this adds to the industry's advantage. Does anyone think that Moulder does not draw on his privileged access to research when he acts as a corporate consultant? Does he somehow "forget" the findings of a study which the rest of us may not read for another year? We doubt it.

Medical and scientific journals have strict standards about disclosing potential conflicts of interest for authors of research papers. *Radiation Research* should at least apply the same principle to its editors. We would suggest going further. Notice of conflicts of interest is good. Not to have them is better.

Cellular phone companies and their consultants should not have advance knowledge of research results. We need a level playing field in access to information. Until we have it, private interests will continue to have an unhealthy advantage.

Our Wish List for 2001

- No more attempts to dismiss concerns about the safety of mobile phones or power lines by saying, "It's impossible to prove a negative." The same goes for the "absence of conclusive proof" of ill effects. These sound bites ignore the very real evidence of health risks from non-ionizing radiation. When you hear these words, you are being scammed.
- Mobile phone SARs to be displayed on the box. Not inside the box. *On the box.*
- A serious, detailed epidemiological study of radar workers, carried out by civilian public health professionals.
- For the 12 mG EMF effect on melatonin, first shown by Dr. Robert Liburdy and replicated in four other labs, to get the attention it deserves.
- Final agreement on a protocol for measuring cell phone radiation exposures. This one had better come true!

MICROWAVE NEWS is published bimonthly. • ISSN 0275-6595 • PO Box 1799, Grand Central Station, New York, NY 10163 • (212) 517-2800; Fax: (212) 734-0316; E-mail: <mwn@pobox.com>; Web: <www.microwavenews.com> • Editor and Publisher: Louis Slesin, PhD; Senior Editor: Peter Hogness; Managing Editor: Douglas Barnes, PhD; Copy Editor: Roy Thomas Jr.; Intern: Danielle Catalano • Subscriptions: $325.00 per year ($350.00 Canada & Foreign, U.S. funds only); Single copies: $60.00 •