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A Report on Non-Ionizing Radiation

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IARC Finds ELF EMFs Are Possible Human Carcinogens

A working group assembled by the International Agency for Research on Cancer (IARC) has unanimously concluded that power-frequency magnetic fields are possible human carcinogens. This finding, announced on June 27 in Lyon, France, is based on the consistent association between childhood leukemia and residential exposure to extremely-low-frequency electromagnetic fields (ELF EMFs).

The makeup of the IARC panel spanned all sides of the EMF controversy

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—from those who openly believe that EMFs promote cancer to industry consultants who are skeptical of any such connection. "We all agreed," said Dr. Larry Anderson. EMFs have now been formally designated "2B Possible Carcinogens." (For a list of the members of the working group and their affiliations, and examples of each type of IARC carcinogens, see p.2.)

"There was a unanimous feeling about it," said Dr. Jan Stolwijk. Dr. Maria

(continued on p.2)

Germans Withdraw Mobile Phone Effect on Blood Pressure

A German neurologist has withdrawn a report stating that mobile phone radiation can raise the blood pressure of the phone user. "The original result had nothing to do with electromagnetic fields," Dr. Stefan Braune told *Micro-wave News*.

In a research letter published in the June 20, 1998, issue of the *Lancet*, Braune and coworkers at the University Neurological Clinic in Freiburg and at Deutsche Telekom announced that digital signals from a GSM phone could significantly increase the blood pressure of healthy human volunteers (see *MWN*, J/A98). The effect was reported in newspapers around the world.

"There is no evidence that EMFs can influence the central nervous system, blood vessels or any other structure," Braune said in an interview this July. He said that he has repeated the experiment and found the same change in blood pressure, but he now believes that the effect is due to the subjects' physical change in position during the experiment, not to some external stimulus.

A manuscript with his new experimental findings and a reinterpretation of the old data has been submitted for publication and is currently under review.

(continued on p.12)

Special Report: IARC Classifies EMFs as Possible Carcinogens

Stuchly, who remains unconvinced that magnetic fields are responsible for promoting leukemia in children, nevertheless joined the others in voting for the 2B designation. "The epidemiological data are there and it is hard to dismiss them," she said.

Dr. Vincent DelPizzo believes that the cancer evidence is stronger than do any of the other panelists. He cast the only vote that there is "sufficient" human evidence for childhood leukemia, which implies that EMFs are *known* human carcinogens. "I am sure that the childhood leukemia finding cannot be attributed to chance, bias or confounding," he said. (See table below for definitions of "sufficient," "limited" and "inadequate"; for more on DelPizzo's views, see p.5.)

The IARC decision follows similar reviews by panels in the U.S. and the U.K. In 1998, a working group of the National Institute of Environmental Health Sciences (NIEHS), using the same IARC criteria, also classified EMFs as 2B possible human carcinogens, a view that NIEHS Director Kenneth Olden later endorsed in his report to Congress (see *MWN*, J/A98 and J/A99). Earlier this year, an advisory committee to the U.K. National Radiological Protection Board chaired by Sir Richard Doll, also acknowledged the possible link between EMFs and cancer (see *MWN*, M/A01).

The childhood leukemia studies have had a major impact on all of these prior assessments. The Doll report was heavily influenced by the two recent pooled analyses: one led by Dr. Anders Ahlbom and the other by Dr. Sander Greenland (see *MWN*, S/O99 and S/O00). The IARC panel was similarly swayed, according to both Stolwijk and Dr. Elizabeth Hatch. "The Ahlbom analysis was found to be most impressive," noted Stolwijk.

Much more surprising was the IARC panel members' view of the animal data. They came close to finding "limited" support for a cancer association based on the animal exposure experiments. Seven members voted that there was "limited" evidence of a cancer risk, with 12 voting that the evidence was "insufficient" to back up that designation.

On one side, Dr. Christopher Portier argued that an increase

IARC Panel and Observers

MEMBERS: **Larry Anderson**, Battelle Pacific Northwest National Laboratory, Richland, WA; **William Bailey**, Exponent, New York City; **Carl Blackman**, Environmental Protection Agency (EPA), Research Triangle Park, NC; **Nick Day**, University of Cambridge, U.K.; **Vincent DelPizzo**, California EMF Program, Oakland; **Pascal Guénel**, National Hospital, Saint-Maurice, France; **Elizabeth Hatch**, Boston University School of Public Health; **Jukka Juutilainen**, University of Kuopio, Finland; **Lee-ka Kheifets**, EPRI, Palo Alto, CA; **Abraham Liboff**, Oakland University, Rochester, MI; **David McCormick**, IIT Research Institute, Chicago; **Meike Mevissen**, University of Bern, Switzerland; **Kjell Hansson Mild**, National Institute for Working Life, Umeå, Sweden; **Junji Miyakoshi**, Kyoto University, Japan; **Jørgen Olsen**, Danish Cancer Society, Copenhagen, Denmark; **Christopher Portier**, National Institute of Environmental Health Sciences, Research Triangle Park; **Richard Saunders**, National Radiological Protection Board, Chilton, U.K.; **Joachim Schüz**, University of Mainz, Germany; **Jan Stolwijk**, Yale University School of Medicine, New Haven, CT; **Maria Stuchly**, University of Victoria, Canada; and **Bernard Veyret**, University of Bordeaux, France. **OBSERVERS (nonvoting):** **Norbert Hankin**, EPA, Washington; **Michael Repacholi**, World Health Organization, Geneva, Switzerland; **Dr. Morando Sof-fritti**, Ramazzini Foundation, Bologna, Italy; and **Dr. John Swanson**, National Grid Co., Leatherhead, U.K.

in C-cell thyroid cancers observed in a series of two-year bioassays of male rats could not be dismissed. On the other side, Dr. David McCormick, who ran the bioassays for the National Toxicology Program (NTP)—a program that Portier now helps administer—finds these data less than convincing.

"When we have one finding in one sex of one species, it is likely to be spurious," McCormick said. He stressed that there was no suggestion of cancer in mice or female rats. "My interpretation is that the animal work is negative."

IARC Carcinogens: Definitions and Examples

Category	Evidence*	Chemical and physical agents
1: CARCINOGEN	Sufficient† in humans	Asbestos, benzene, dioxin, hepatitis C virus, radon, vinyl chloride. Total number of agents: 87.
2A: PROBABLE CARCINOGEN	Limited‡ in humans and sufficient in animals	Benzo[a]pyrene, formaldehyde, PCBs, ultraviolet (A,B&C) radiation. Total number of agents: 63.
2B: POSSIBLE CARCINOGEN	Limited‡ in humans and less than sufficient in animals	Carbon tetrachloride, chloroform, coffee, DDT, ELF EMFs, lead, PBBs. Total number of agents: 236.
3: UNCLASSIFIABLE	Inadequate§ in humans and limited‡ or inadequate in animals	Coal dust, fluorescent lighting, mercury, parathion, phenol, saccharin, tea, xylene. Total number of agents: 483.
4: PROBABLE NONCARCINOGEN	Suggests lack of carcinogenicity in humans	Caprolactam (only one).

*Primary criteria; for full definitions, see: <<http://193.51.164.11/Monoeval/Eval.html>>.

†Defined as: A positive relationship has been observed and chance, bias and confounding can be ruled out with reasonable confidence.

‡Defined as: A positive relationship has been observed, but chance, bias and confounding cannot be ruled out.

§Defined as: Available studies are of insufficient quality, consistency or statistical power, or no data on carcinogenicity in humans are available.

Sources: For lists of agents in each category: <<http://193.51.164.11/monoeval/crthall.html>>. For more on IARC, see: <www.iarc.fr>; also *MWN*, J/A98.

IARC's Main Conclusions on EMFs

A working group of 21 scientific experts from ten countries met in Lyon to evaluate possible carcinogenic hazards to human beings from exposures to static and extremely-low-frequency (ELF) electric and magnetic fields. This volume is the first in a planned series of two IARC Monograph volumes on various kinds of non-ionizing radiation in the frequency range below that of visible light.

ELF magnetic field exposures result from proximity to electric power transmission lines, household wiring and electric appliances and are in addition to the exposure that results from the earth's magnetic field. Magnetic fields are measured in units of microTesla (μT); the earth's static magnetic field varies from 25 μT at the equator to 65 μT at the poles.

Since the first report suggesting an association between residential electric and magnetic fields and childhood cancer, notably leukemia, was published in 1979, dozens of studies have examined this association. Overall, for the vast majority of children who are exposed to residential ELF magnetic fields less than 0.4 μT , there is little evidence of any increased risk for leukemia. There is no evidence that electric fields are associated with childhood leukemia, and there is no consistent relationship between childhood brain tumors or other childhood solid tumors and residential ELF electric and magnetic fields. However, pooled analyses of data from a number of well-conducted studies show a fairly consistent statistical association between childhood leukemia and power-frequency residential magnetic field strengths above 0.4 μT , with an approximately twofold increase in risk. This is unlikely to be due to chance, but may be affected by selection bias. Therefore this association between childhood leukemia and high residential magnetic field strengths was judged limited evidence for excess cancer risk in exposed humans.

There is no consistent evidence that residential or occupational exposures of adults are related to excess risks of cancer at any site,

although in one Swedish study combined residential and occupational exposures were associated with a significantly increased risk for all leukemia subtypes except chronic lymphocytic leukemia. Evidence for excess cancer risks of all other kinds, in children and in adults, as a result of exposure to ELF electric and magnetic fields was considered inadequate.

Numerous studies to investigate carcinogenicity of magnetic fields have been conducted in experimental animals. These have included long-term bioassays of exposures to magnetic fields alone, and exposures of rats and mice to magnetic fields in combination with known carcinogens. Bioassays of magnetic fields alone generally were negative, although one study that was conducted in both mice and rats of both sexes showed non-exposure related increases in thyroid C-cell tumors in male rats only. Multistage carcinogenesis studies showed no consistent enhancement of chemically initiated mammary tumors in rats or of skin tumors in mice. Magnetic fields had no effects on the incidence of chemically initiated liver tumors in rats or of leukemia/lymphoma in mice or rats. Overall, evidence for carcinogenicity of ELF magnetic fields in experimental animals was judged inadequate. No data on carcinogenicity to animals of static magnetic fields, or of static or ELF electric fields, were available to the working group.

Although many hypotheses have been put forward to explain possible carcinogenic effects of ELF electric or magnetic fields, no scientific explanation for carcinogenicity of these fields has been established.

Overall, ELF magnetic fields were evaluated as possibly carcinogenic to humans (Group 2B), based on the statistical association of higher-level residential ELF magnetic fields and increased risk for childhood leukemia. Static magnetic fields and static and ELF electric fields could not be classified as to carcinogenicity to humans (Group 3).

"My personal conclusion is that the C-cell cancers are not a random observation," countered Portier. The NTP study found that male rats had significantly higher rates of C-cell thyroid cancer at two different dose levels (20 mG and 2G), and at a third level (10G), the increase was just short of significance ($p=0.055$) (see *MWN*, M/A98).

The IARC vote on the animal data stands in sharp contrast to that of the NIEHS working group three years ago. Both based their evaluations on essentially the same experiments, yet not one of the 30 NIEHS panel members voted for "limited" evidence of carcinogenicity in animals. Indeed, eight voted that they believed there was a *lack* of an effect, with five of them filing a minority statement that any suggestion of an effect on animals was totally insupportable.

When the NTP bioassay results were first announced, they were seen as somewhat suspect because the experiments were the first to use a new animal diet. Some reviewers claimed that the rate of thyroid cancer in the control rats was unnaturally low and that if it had been higher, the excess in the exposed animals would disappear.

"There are now enough historical data to show that the EMF increases were clearly not a random fluke," Portier said. He explained that over the last three years, ten other bioassays have

been completed with the new diet, and the thyroid cancer rates among the controls have been consistent with those in the original series of EMF experiments.

Somewhat surprisingly, there was much less discussion of the German breast cancer studies carried out at the School of Veterinary Medicine in Hannover by Drs. Wolfgang Lüscher and Meike Mevissen. "We agreed to disagree on the significance of the mammary cancer data," said Mevissen. She explained that there was a consensus that both her studies and those by Anderson at Battelle were well done and that there was no simple explanation for the different results (see *MWN*, M/A98 and S/O99).

Reactions and Responses

There have been few public responses to the IARC decision by U.S. government agencies. "The regulatory agencies have to decide what to do about the risks," said NIEHS' Portier. "It's time for the public policy debate."

If so, it will probably get under way at the Environmental Protection Agency (EPA). The agency's Norbert Hankin, who was an observer in Lyon, said that the IARC decision is getting a lot of attention at the EPA. "It's not something the agency can ignore," he said.

Because the IARC decision received little press attention, public reaction was muted. "I was surprised that we did not get any calls on it," said Rick Loughery, director of environmental affairs at the Edison Electric Institute in Washington. He noted that, "EMFs are no longer the hot national public policy issue they were from the late 1980s through the mid-1990s. The issue has been pushed back onto the local level."

The World Health Organization's (WHO) EMF project is working on revising its fact sheet. "All options are being discussed," said WHO's Dr. Michael Repacholi, who was also in Lyon as an observer. A draft will be sent out for review; he expects to release it by the end of August.

In a statement to its members, EPRI in Palo Alto, CA, noted that the IARC panel's conclusions "will help guide the selection of topics for research priorities." The utility group added that, "EPRI work in relevant areas is being planned or is already under way." This analysis was signed by Dr. Leeka Kheifets, an IARC panel member, in one of her last acts before moving to Geneva to work for Repacholi at the EMF project.

A number of observers in Australia and New Zealand said that they were not surprised by the IARC decision. Keith Orchison, the managing director of the Electricity Supply Association of Australia (ESAA), with headquarters in Sydney, commented that the IARC classification is "not new" and is "consistent with the findings of other major scientific reviews." The ESAA was one of the very few organizations anywhere in the world to issue a public comment on the IARC decision.

In a widely circulated e-mail, Dr. Andrew McEwan, the scientific director of New Zealand's National Radiation Laboratory in Christchurch, advised that the "classification is not unexpected." He went on to note that, "The associations are very weak, and the fact that there is no support from laboratory studies to suggest that ELF fields are in any way involved with cancer weighs against the possibility that it is a carcinogen."

The report of the IARC EMF panel will appear as volume 80 of its monograph series on cancer risks next spring, according to IARC's Dr. Robert Baan. For more information, go to <monographs.iarc.fr>.

Liboff: A More Sophisticated View of EMFs Is Needed

On his return from Lyon, Dr. Abraham Liboff of Oakland University, a member of the IARC review panel, offered the following perspective on the panel's deliberations. Liboff is a coeditor of the forthcoming journal Electromagnetic Biology and Medicine (see p.11).

There are a number of reasons to welcome the new IARC designation that recognizes ELF magnetic fields as a possible agent for childhood leukemia. This is certainly not a revelation that comes out of the blue, the question having first been raised some 22 years ago. Nevertheless, IARC is a highly respected organization whose conclusions are important to the media and to regulatory bodies.

As a participant in the process that led to this decision, I was greatly impressed by the leadership of Dr. Jerry Rice and his staff at IARC. It is not easy to keep 20 or so highly opinionated experts on track, to be firm about the deadline yet fair in hearing all sides.

It is ironic that the IARC decision is in part based on data contained in the 1997 report by Linet et al. [see *MWN*, J/A97], arguably the most important single coffin nail in the subsequent cessation of federal funding in this area. To reach its conclusion, IARC relied on a pooled analysis [see *MWN*, S/O00] that included the Linet data. It will be interesting to see whether the mainstream media, which acted in lockstep at the time to (incorrectly) declare that the Linet study "proved" that there was no association between power line magnetic fields and childhood leukemia, will now act to correctly report the facts, namely that the Linet study instead provides evidence for an association for 60Hz mean residential magnetic fields at levels of 0.4 μ T [4 mG] and above.

The IARC decision again illuminates one disturbing aspect of the question of electromagnetism and cancer that the scientific community has recognized over the years but has not been able to come to grips with. This is the catch-22 problem related to the disconnect between epidemiologist and laboratory scientist. On the one hand, the ultimate verdict concerning EMFs and cancer must come out of epidemiology. On the other hand, there will continue to be limited progress in untangling this question if the epidemiologist fails to heed the clues that arise in the laboratory. From what I observed at IARC, it is clear that some epidemiologists still regard EMFs as

merely one more physical agent, different only in name from hazardous chemicals or ionizing radiation. Accordingly, they continue to stick with the traditional paradigm that "more is worse." But, contrary to this view, experimental evidence continues to build showing that ELF magnetic fields can interact in decidedly nonlinear ways with tissue. (Again, this is hardly new information, having first been reported by Adey's group in the mid-1970s.) Many epidemiologists are unaware (or even worse, dismissive) of those reports indicating ELF "windows" or "resonances," a fact reflecting a general lack of awareness as to the extra interactive possibilities attached to EMFs.

This lack of sophistication concerning EMF interactions was fully evident in the IARC deliberations. Consider the fact that no special mention was made of two reports that are very well known to the bioelectromagnetics community—Harland and Liburdy¹ and the replicate study by Blackman et al.²—both of which bear directly on the key question as to whether very weak ELF magnetic fields are implicated in breast cancer. Even though these studies were particularly relevant to the issue of residential magnetic fields, they were indiscriminately grouped with other ELF experiments whose results reflected widely different types of exposure conditions. It is little wonder, therefore, that the laboratory evidence, as a whole, was classified as "inconsistent," leaving the unwarranted impression that no clear conclusion was possible.

A more sophisticated reading of such pertinent experiments might not have changed the overall verdict from "possible" to "probable" human carcinogen, but it would have better served the public in conveying a more complete picture as to the potential hazards connected to ELF magnetic fields.

1) J. Harland and R. Liburdy, "Environmental Magnetic Fields Inhibit the Antiproliferative Action of Tamoxifen and Melatonin in a Human Breast Cancer Cell Line," *Bioelectromagnetics*, 18, pp.555-562, 1997.

2) C. Blackman, S. Benane and D. House, "The Influence of 1.2 μ T, 60Hz Magnetic Fields on Melatonin- and Tamoxifen-Induced Inhibition of MCF-7 Cell Growth," *Bioelectromagnetics*, 22, pp.122-128, 2001.

California Report: EMFs Likely Cause of Cancers, Miscarriages

Power-frequency EMFs are more likely than not to cause childhood leukemia and adult brain cancer, according to three researchers at the California EMF Program. Drs. Raymond Neutra, Vincent DelPizzo and Geraldine Lee also consider it likely that EMFs cause miscarriages, in which case, they estimate, magnetic fields would account for as much as 40% of all spontaneous abortions.

Amyotrophic lateral sclerosis (ALS) is another probable EMF effect, the researchers believe. EMFs may also be responsible for a number of other illnesses—but these outcomes are less likely (see box at right).

In an accompanying analysis of policy options, they conclude that some “inexpensive” measures to reduce exposures could be justified on cost-benefit grounds even if EMFs are responsible for “only a few percent of the annual background California deaths.” Such mitigation measures, including restraining power lines and changing wiring in homes and schools, would cost an estimated \$480 million if implemented in California.

In an interview with *Microwave News*, Neutra cautioned that the state’s Department of Health Services (DHS), which oversees the EMF program, “has decided not to make any policy recommendations at this time.” Rather, it is opting “just to present the possible implications of the research.”

Neutra is the director of the \$7 million EMF research effort, authorized by the state Public Utilities Commission in 1993 (see *MWN*, N/D93). DelPizzo became the research director in 1995, and Lee has run its educational and technical assistance work, and led an epidemiological study on miscarriages (see p.18).

The draft report and policy analysis were made available for

California EMF Program: Assessment of Health Risks

- It is *more than 50% possible* that EMFs at home or at work could cause a very small increased lifetime risk of childhood leukemia, adult brain cancer and ALS.
- It is *more than 50% possible* that EMFs at home or at work could cause a 5-10% added risk of miscarriage.
- It is *10-50% possible* that residential or occupational EMFs could be responsible for a small increased lifetime risk of male breast cancer, childhood brain cancer, suicide, Alzheimer’s disease or sudden cardiac death.
- It is *very unlikely (2-10%) but not impossible* that residential or occupational EMFs could be responsible for even a small fraction of birth defects, low birth weight, neonatal deaths or cancer generally.
- It is at least *10-50% possible* that residential or occupational EMFs could be responsible for a small increased lifetime risk of adult leukemia or female breast cancer, and one [researcher] gave a degree of confidence that was higher.

public comment on July 13, more than two months after the PUC blocked their planned release on May 7 (see *MWN*, M/J01).

In the next few months, Neutra said, the documents will be revised to incorporate public comments and suggestions from the program’s scientific advisory panel, after which they will be submitted to the director of the DHS for approval, “probably sometime early next year.” At that point, the DHS could issue the risk evaluation as an official report. But until it does so, he stressed, “This is the best judgment of three people who have been immersed in this issue for more than ten years.”

The report’s estimates of the chances of various health effects are based on the individual opinions of Neutra, DelPizzo and Lee. They are presented anonymously, but with enough clues to determine who is who. Neutra later confirmed their identities and said that the probabilities will be directly attributed to the individuals in future drafts. “We wanted to depersonalize it,” he said.

For some outcomes, such as childhood leukemia, their estimates of causality were quite different, while for others, such as ALS, the range was tight. DelPizzo’s estimates are well above Lee’s and Neutra’s for several outcomes, and include two that are close to 100 (see table at left). “If environmental EMFs have enough energy to promote childhood leukemia, it follows that other effects are more credible,” DelPizzo explained in an interview.

The California researchers note that, using IARC criteria, they would classify EMFs somewhere between “2B: possible” and “1: human carcinogen” for childhood and adult leukemia (see p.1). They would classify adult brain cancer, miscarriages and ALS as possible (2B) risks.

One of the team’s most striking estimates is that up to 40% of miscarriages may be caused by EMFs. “This is potentially of great public health importance,” Lee told *Microwave News*. “But this is a first-cut estimate and we need to learn a lot more before we can use this in making policy,” said Lee, who is now with the pharmaceutical firm AstraZeneca (see p.17).

Overall, the three researchers contend that the other health

Estimates of “Degree of Confidence”

The risk estimates reported above are the consensus opinions of three DHS scientists. The table below presents the individual researchers’ estimates on which the consensus figures are based.



Reviewer #2: Dr. Raymond Neutra

Confidence of causality (%)

Outcome	Dr. Vincent DelPizzo (#1)	Dr. Raymond Neutra (#2)	Dr. Geraldine Lee (#3)
CHILDHOOD LEUKEMIA	99	55	75
ADULT LEUKEMIA	85	52	40
CHILDHOOD BRAIN CANCER	45	11	20
ADULT BRAIN CANCER	98	52	70
FEMALE BREAST CANCER	51	11	15
MALE BREAST CANCER	45	40	20
MISCARRIAGE	80	52	65
ALS (LOU GEHRIG’S DISEASE)	60	60	55
ALZHEIMER’S DISEASE	40	20	15

risks attributable to EMF exposures are “extremely small,” so that “the vast majority of highly exposed individuals (95-99.9%)” would not develop cancer or ALS as a result.

In California, they write, approximately four children would die from leukemia resulting from EMF exposures each year, and 24,000 pregnancies would end in miscarriages. No estimates are given for EMF-related deaths from adult brain cancer or ALS.

Neutra will chair a session on the report at the ISEE conference in Germany on September 4 (see p.13) and present his team’s findings at the annual meeting of the Society for Risk Analysis in Seattle, December 2-5.

The full text of *An Evaluation of the Possible Risks from Elec-*

tric and Magnetic Fields (EMFs) from Power Lines, Internal Wiring, Electrical Occupations and Appliances is available on the program’s Web site, <www.dhs.ca.gov/ehib/emf>, along with *Policy Options in the Face of Possible Risk from Power Frequency EMFs*. Print copies are available from the City Copy Center in Oakland; call (510) 763-0193 for information on the price and delivery cost. The deadline for comments is September 10. The EMF program will hold a public workshop in Sacramento on August 16 and in Los Angeles on August 21 to answer questions. There will also be a “telephone workshop” on August 22 from 1 pm to 4 pm. Call (510) 622-4434 for details on how to participate.

HIGHLIGHTS

« Wireless Notes »

On July 23, Chicago Judge **Stephen Schiller** gave his blessing to a tentative settlement between **George Carlo**’s WTR and the attorneys for the class of cell phone users in the long-running *Busse vs. Motorola et al.* “human experimentation” lawsuit (see *MWN*, J/F96, N/D97, M/A99 and J/A00). Over the objections of Motorola and the other defendants, which include the **CTIA** and **Epidemiology Resources Inc. (ERI)**, Carlo and his Science and Public Policy Institute will receive \$250,000 to set up a registry of adverse health effects among users of cell phones who wish to voluntarily report “maladies,” such as brain tumors and leukemia. The volunteer nature of the registry is key because the *Busse* litigation centers on the claim that ERI, in the course of doing an epidemiological study for WTR and CTIA, collected information without the informed consent of the phone users. Carlo will also now get access to a \$150,000 fund to cover any future legal expenses. The money will be paid by WTR’s insurance company, which wants to settle. It has already spent \$600,000 of the \$2 million policy defending Carlo, leaving \$1.4 million to be split between Carlo and the plaintiffs’ lawyers at **Barnow & Goldberg**. A proposal to make Carlo’s book on cell phone health risks available at half-price was rejected by the judge. Ben Barnow and Alan Goldberg told *Microwave News* that even if they are awarded the close to \$1 million left after Carlo gets his \$400,000, they will not have recouped the investment they made over the last six years of litigation. Objections to the proposed settlement must be filed by September 26. Schiller will hold a “settlement fairness hearing” on November 13, when the court will also consider Barnow & Goldberg’s petition for legal fees. The text of the draft settlement appeared in *USA Today* on July 26 and is on the Web at <www.bussewtrsettlement.com>. (See also p.19.)

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Telecommunications towers are becoming targets of political protest, leading to violent confrontations. On July 4, an elected representative in **Cyprus** was arrested on a British military base on the island for storming a radio tower that is being built for

intelligence gathering. He climbed onto the 190-meter structure and stayed there for several hours. In the rioting sparked by his arrest, dozens of automobiles were destroyed and a police station was ransacked. According to the July 14 *Irish Times*, the Cypriot legislature later unanimously adopted a resolution that work on the tower be halted in view of “serious concern” about health risks of radiation. On July 14, in **Scotland**, a “gang” knocked down a mobile phone base station near Port Glasgow that had been opposed by people living nearby, the BBC reported (July 16). The attack, which took place in the middle of the night, caused £25,000 (approximately US\$35,000) in damage, according to the wireless carrier Orange. Starting in late July, mobile phone towers in Scotland will be subject to full planning control.

German Radiation Official: Kids Should Not Use Phones

The head of the Federal Radiation Protection Office in Germany says that children should not use mobile phones and recommends that others minimize their use.

“Parents should keep their children away from this technology as much as possible,” Wolfram König told the *Berliner Zeitung* (July 31). While there is no evidence of harmful effects, he said, questions about health “urgently” need to be answered (see p.10).

König, a member of Germany’s Green Party, called for restrictions on base station antennas near kindergartens, schools and hospitals. He also suggested labeling phones with SAR information, echoing a recent proposal from the German environment ministry.

At the end of last year, the German Academy of Pediatrics made a similar recommendation, as did the British Medical Association this spring (see *MWN*, J/F01 and M/J01). The U.K.’s Stewart panel was the first to call for limiting children’s use of phones, in May 2000 (see *MWN*, M/J00).

Last year, anger over cellular towers near Haifa, **Israel**, prompted local residents to hurl rocks at Motorola maintenance workers (see *MWN*, M/A00).

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Sen. **Joe Lieberman** (D-CT) and Rep. **Ed Markey** (D-MA) have asked the General Accounting Office (**GAO**) to continue to watch over how the federal government deals with the potential health risks posed by mobile phones. After the GAO report was released in May, the two legislators wrote to the FCC, FDA and NIH urging them to implement GAO's "sensible" recommendations "expeditiously" (see *MWN*, M/J01). The agencies replied—in very general terms—that they would continue their efforts. But Lieberman and Markey are not satisfied. In a July 30 letter, they asked the GAO to monitor the agencies' progress. The responses "raise our concern that the recommendations made by the GAO have not yet been fully addressed and will require some follow-up," they wrote. (On July 20, the **FDA** posted a revised *Consumer Update on Wireless Phones* on its Web site, <www.fda.gov/cdrh/ocd/mobilphone.html>; it is little changed from previous editions.)

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The siting of cellular towers in the U.S. is decided at the local level on a case-by-case basis because the **FCC** usually grants automatic approval. Now, two large environmental groups want the FCC to look at the overall impact of the towers. It is "beyond dispute" that telecom towers "create significant environmental impacts at the local, regional and national level," state the **Friends of the Earth** (FOE) and the **Forest Conservation Council** in a series of petitions they have filed since March. The petitions call for a programmatic environmental impact statement (EIS) "addressing the direct, indirect and cumulative impacts" of the FCC's tower-siting policies. In addition to effects on wildlife and water quality, the groups want the FCC to assess "adverse public health and safety concerns resulting from increased human exposure to RF radiation." Brian Dunkiel of FOE in Burlington, VT, told *Microwave News* that the legal arguments may be stronger for a review of effects on wildlife but insisted that his organization places equal emphasis on health. (FOE Scotland has long advocated stricter controls on the placement of cellular towers; see p.6 and *MWN*, M/J99.) To put pressure on the FCC, the forest council and FOE are also challenging more than 30 separate tower applications, which, they contend, provide "entirely inadequate" information on potential environmental effects. The approval of the disputed towers is on hold, an FCC spokesperson said, while the commission decides how to respond to the groups' demands. John Talberth of the forest council explained that blocking specific applications is necessary because others who have asked the FCC to look into the environmental effects of telecom towers in general have been ignored. "This is the only way to get the FCC to pay attention," Talberth said in an interview from his office in Santa Fe, NM. He added that the forest council will continue to object to tower applications until the FCC responds. The commission has not been anxious to address this issue. In November 1999, Jamie Clark of the U.S. **Fish and Wildlife Service** asked the FCC to prepare an EIS, contending that tower con-

Angelos's Experts in Mobile Phone-Brain Cancer Suit

Peter Angelos's law firm in Baltimore will call seven experts to testify on behalf of Dr. Christopher Newman, who claims that his brain tumor was caused by mobile phone radiation (see *MWN* S/O00 and J/F01). The dates currently scheduled for their depositions are given in parentheses.

Dr. Neil Cherry EMF research (August 1-2)	Lincoln University Canterbury, New Zealand
Dr. John Conomy Neurology (August 16)	Health Systems Design Chagrin Falls, OH
Dr. Gunnar Heuser Neurology (August 20-21)	NeuroMed and NeuroTox Associates, Agoura Hills, CA
Dr. Henry Lai Biology (August 14-15)	University of Washington Seattle, WA
Dr. Andrew Marino Biology (July 20-21)	Louisiana State University Medical Center, Shreveport, LA
Dr. Jerry Phillips Biology (August 23-24)	Biological Sciences Curriculum Study, Colorado Springs, CO
Dr. Elihu Richter Epidemiology (August 8-9)	Hebrew University Jerusalem, Israel
Dr. Barry Singer Oncology (August 3-4)	Norristown, PA

struction had "almost no environmental oversight" on possible effects on migratory birds. The FCC turned her down.

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Opponents of federal tower-siting policies are gearing up for another legislative campaign. At a July 12 briefing in Washington, congressional staffers heard reports on public concerns about the proliferation of wireless antennas from **Janet Newton** of the EMR Network in Cabot, VT, **Deb Carney** of Golden, CO, and **Libby Kelley** of the Council on Wireless Technology Impacts in Novato, CA. Dr. **Theodore Litovitz** of the Catholic University of America presented an overview of RF/MW health effects research. In September, after Congress' summer recess, Rep. **Thomas Tancredo** (R-CO) will join the three members of the Vermont delegation in seeking to repeal the preemption clause of the 1996 Telecommunications Act. They will also move to protect local authority on digital television (DTV) antenna siting and to sponsor safety research. Vermont's Rep. **Bernie Sanders** (Ind) and Sens. **Patrick Leahy** (D) and **James Jeffords** (Ind) have mounted similar efforts in the past—all of which have failed (see *MWN*, N/D97, S/O98 and S/O99).

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In a lawsuit now before a federal judge in California, **Gibb Brower** of San Diego contends that radiation from his mobile phone caused his brain cancer. His attorney **Carl Hilliard** quietly filed the suit on April 19 to beat a statute of limitations deadline. In a revised complaint, filed on August 2, Hilliard points out that **Ericsson**, **Nokia** and **Motorola**, among others, have obtained a num-

HIGHLIGHTS

ber of patents for phones designed to reduce radiation exposures. These patents have not been much of a secret (see *MWN*, N/D96 and S/O99), but Hilliard believes that they are indicative of the manufacturers' bad faith. "The patents speak for themselves. These folks have the ability to protect consumers from being radiated and they're unwilling to spend a couple of bucks to do so. It's outrageous," he told *RCR Wireless News* (June 4). The **British press**, never shy to play up the latest news pointing to the health dangers of mobile phones, quickly spread the word. **MOBILE FIRMS PATENT CANCER SHIELDS** ran the headline on the front page of the June 11 *Times*. The same day, the BBC quoted Nokia patent applications, filed in 1995 and 1998, which acknowledged that "uncertainty" about phone safety was affecting the "speed of growth" of the market. The companies sought to limit the PR damage. Motorola's patents "were not motivated by concerns about potential health issues," the company told the BBC. A Nokia spokesperson explained to a British television audience that, "A third of our employees are engaged in research and development and it is a natural course of business that they file for patents." Meanwhile, Hilliard is fighting a Motorola motion to move the Brower case to federal court.

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Radiation from mobile phone **towers** is being blamed for a variety of health problems in a lawsuit filed in Indiana state court on July 27. Attorney **John Hamilton** filed the complaint on behalf of four families whose homes in South Bend are near three towers owned by local telecom companies. The families claim that

the radiation has caused maladies ranging from sleep disturbances and memory loss to "multiple tumors" and a miscarriage. In addition to monetary damages, they want one of the towers to be removed and the radiation from the antennas to be reduced to background levels on each of their properties. The families also allege that the value of their homes has been diminished by "the public's growing concern" about possible health effects, and by the towers' unsightly appearance. Adverse impacts on property values have been alleged—with support from tax assessors—in litigation over phone towers in Illinois and Texas (see *MWN*, M/A99).

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Stealth aircraft can be detected with mobile phone **towers**, claims Roke Manor Research, a U.K. engineering firm in Romsey, west of London. Signals transmitted by towers and reflected by the flat undersides of the planes, which are invisible to conventional radar, can be picked up with an antenna array and a laptop, all from the back of a Land Rover. The location can be pinpointed within 10 meters, according to the June 11 *Daily Telegraph*. The U.S. military begs to differ. On July 2, *Aviation Week*, known for its access to Pentagon sources, reported that "U.S. Air Force specialists" predict the system would have a limited range and be plagued with false alarms. And even if the technology could perform as claimed, an official said, the Air Force could disable such location detection systems with a **directed-energy weapon** that produces a "squirt" of high-power microwaves from an air-launched cruise missile. So don't expect your hand-held phone to work if the country goes to war.

Proteomics: Finns Find RF Has Major Impact on Gene Expression

The gene research revolution may soon settle some very old arguments about the health effects of electromagnetic radiation.

In the first application of the powerful new techniques of proteomics to RF biological effects, Dr. Dariusz Leszczynski has found that relatively weak mobile phone radiation altered the production of numerous proteins in cultured human cells. About 15% of the proteins were affected, he said.

Leszczynski and his research group* are with the Finnish Radiation and Nuclear Safety Authority, known as STUK, in Helsinki.

"This is a pretty dramatic change," Leszczynski told *Microwave News* during a break at the Bioelectromagnetics Society's annual meeting in St. Paul, MN, in mid-June. "It suggests that a large number of systems are responding to a nonthermal radiation exposure."

The expression of nine genes was changed by 6- to 13-fold and that of some 20-30 other genes changed by a factor of two, Leszczynski said.

Leszczynski cautioned that "the physiological relevance of these changes is unknown" and that "we have repeated the experiment three times but we need to do it again three more times."

* Sakari Joenväärä, Jukka Reivinen, Pia Kontturi and Hanna Tammio.

But, he added, "I believe that the effects we see on the expression of proteins and also the fact that there was a threefold increase in protein phosphorylation are real responses to mobile phone radiation."

The Finnish research team exposed human endothelial cells, EA.hy926, for one hour to a 900 MHz GSM signal at an average SAR of 1.8-2.5 W/Kg and then compared the expression of 2,400 genes in exposed and sham cells.

The exposure system was built by Dr. Kari Jokela of STUK and later checked by Dr. Niels Kuster of IT'IS in Zurich. Leszczynski noted that with an average SAR of 2 W/Kg and a cooling system for the cell culture dishes, there is no temperature increase—at least on a macro-scale. While allowing that some heating cannot be excluded, Leszczynski believes that it would be very small and localized—as well as undetectable with present technology.

"I am convinced that the changes that we are observing are nonthermal effects of RF/MW radiation," he said.

The Finnish work is part of the REFLEX project, a set of *in vitro* experiments sponsored by the European Commission research program on mobile phones and health (see *MWN*, M/A00).

The ability to monitor changes in so many different genes simultaneously is a radical departure from past methods in which specific genes must be selected at the outset of the experiment. This genomic technique is a powerful new addition to the developing science of proteomics[†]—the systematic cataloguing and study of the proteins produced by the genes within a cell.

“A lot of the past controversies will be put to rest using these new genetic techniques,” commented Dr. Jerry Phillips, a staff biologist at the Biological Sciences Curriculum Study in Colorado Springs, CO. Phillips’s own studies on gene expression, carried out in Dr. Ross Adey’s lab in Loma Linda, CA, were part of the ongoing debate on the effects of power-frequency EMFs.

The most contentious of these EMF disputes concerned the work of Drs. Reba Goodman of Columbia University and Ann Henderson of Hunter College, both in New York City, which was challenged by Dr. Jeffrey Saffer of the Battelle labs in Richland, WA, and Adam Lacy-Hulbert of the U.K.’s University of Cambridge (see *MWN*, J/A94, J/F95 and M/J95). Both sides maintained their positions and the issue remains unresolved.

Now the U.K.’s EMF Biological Research Trust may break the deadlock. Last spring the trust, which is funded by the National Grid, requested proposals to use proteomics to shed light on possible mechanisms of interaction (see *Nature*, March 1).

In late July, Dr. John Male, the administrator of the trust in South Croydon, south of London, said that no funding decisions had yet been made.

†To learn more, see *The Promise of Proteomics: Leading the Way to 21st Century Medicine*, published earlier this year by the New York Academy of Sciences. A copy can be downloaded from <www.nyas.org>.

Latest Swedish Brain Tumor Study Points to Long-Term Risk

The longer one uses a mobile phone, the greater the risk of developing a brain tumor, according to the latest epidemiological analysis by Drs. Lennart Hardell and Kjell Hansson Mild of Örebro University in Sweden.

Hardell and Mild found a 26% increase in benign brain tumors among those who had used an analog phone for more than a year before diagnosis. The risk rose to 35% after five years and to 77% after ten years. All these estimates are statistically significant.

“The increasing risk with tumor induction period—or latency—and the number of hours of use are in agreement with carcinogenesis,” Hardell told *Microwave News*. “These findings do certainly strengthen the result.”

Mild agrees. “There is a consistency to our results,” he said in an interview. Mild is also with the National Institute for Working Life in Umeå.

No increased risk was observed for hand-held digital phones. But Hardell and Mild point out that these phones have not been in use long enough for such risks to be ruled out. There was no excess risk associated with cordless phones that have a power output of 10mW.

Of the 2,561 cases of brain tumors identified in four regions of Sweden, 540 had died and 35 were too sick to contact. Of the 1,617 patients included in the study, 88% of the cases and 91% of the controls completed the 21-page questionnaire.

There was also an increased risk of malignant tumors, Hardell said, but it was not significant. He pointed to a 40-60% split between malignant and benign brain tumors among the cases.

“We did not include the deceased because we did not think

Acoustic Neuromas and Cell Phones: Differing Results

The new Swedish study by Hardell and Mild found more than three times the expected number of acoustic neuromas, benign tumors of the eighth cranial nerve—it connects the brain to the inner ear.

But, soon afterwards, Dr. Joshua Muscat of the American Health Foundation in Valhalla, NY, announced that his study did not show a greater risk of this.

In a paper presented at the annual meeting of the Society for Epidemiologic Research in Toronto, June 13-16, Muscat said that among users of cell phones for three years or more the odds ratio for acoustic neuromas was 1.6, but with a confidence interval (CI) that was far short of significance (0.5-4.3). For those who had used mobile phones for less than three years, the risk was lower than expected.

“There is no real association with short-term exposures,” Muscat told *Microwave News*. He said that he will soon submit these results for publication. Muscat’s findings for brain tumors, which are part of the same cell phone study, were published in the *Journal of the American Medical Association* last December (see *MWN*, J/F01).

Hardell and Mild’s odds ratio for acoustic neuromas is 3.27 (CI=1.67-6.43)—it increases to 3.50 (CI=0.73-16.9) for those who used a phone for ten years or more prior to diagnosis.

Mild noted that the first sign of an acoustic neuroma is hearing loss or tinnitus and that, “We found an excess of hearing loss in our study of subjective symptoms among mobile phone users” (see *MWN*, M/J98 and J/A00).

And Muscat pointed out that in his study the acoustic neuromas occurred more often on the side opposite the one used for the phone. But, he explained, this may be because hearing loss prompted moving the phone to the other ear.

the relatives could give us good answers on the use of phones,” Mild said, adding that they might analyze the data on those who had died in a separate, follow-up study.

This is the third mobile phone paper by Hardell and Mild and the first to point to a general increased incidence of brain tumors. Previously, they had shown that there is a greater chance of developing a tumor on the side of the head the phone was used (see *MWN*, M/J99 and M/J00).

The new study once again supports the hypothesis that there is a greater chance of developing a tumor on the side of the head where the phone is used. The risk is two-and-a-half times that of controls, a statistically significant increase. This is approximately the same level of risk as reported by the Örebro team last year.

The new study covers brain tumors that were diagnosed between 1997 and June 30, 2000. The earlier papers investigated tumors reported between 1994 and 1996.

Mild said that the new results, which he and Hardell first presented at a mobile phone conference in London on June 6, have been submitted to the *Lancet*.

Germany Eyes Precautionary RF/MW Limits for Cell Towers

Germany may soon follow Italy and Switzerland in adopting strict exposure limits for radiation from mobile phone base stations. The Green Party wing of the federal government wants tighter standards but is facing resistance from the wireless industry and radiation control officials.

"We want a change in philosophy—namely, to establish the precautionary principle in the area of EMFs," said Simone Probst, a deputy environment minister and Green Party member, at a June 21 conference on mobile phones and health. This change, Probst continued, entails keeping emissions from towers "as low as possible" in places where people spend time, supporting more research on health effects (see box at right) and making information on phone SARs more available to the public.

On July 1, the Federal Environment Ministry issued a press release confirming that it is "currently considering whether to adopt precautionary limits to supplement the existing guidelines," possibly based on the current Swiss standard. But the ministry stressed that, "Deliberations have not yet ended, decisions have not been made."

The wireless industry is already on record as opposing more stringent standards. Precautionary limits below those now in force are "not supported by science," contended T-Mobil, a Darmstadt-based wireless carrier that was formerly part of Deutsche Telekom, in a statement released in May (see *MWN*, M/J01).

The ministry noted that the Radiation Protection Commission (known by its German acronym, SSK), an expert panel that advises the government, will offer its own recommendations. The SSK's principal expert on non-ionizing radiation is Dr. Jürgen Bernhardt, who is also the current vice chair and a past chair of ICNIRP. Bernhardt declined a request for comment from *Microwave News*, but he is likely to oppose any change that would undermine the existing limits, which are based on ICNIRP's guidelines (see *MWN*, S/O97).

Although the environment ministry has stated that its decision will be based "in part" on the SSK's recommendations, their relations have been strained. The commission's chair, Dr. Maria Blettner, an epidemiologist at the University of Bielefeld, resigned in May because the ministry had ignored the SSK's advice, according to the newspaper *Tageszeitung* (June 11).

Some of Blettner's work has concerned the question of mobile phone safety (see *MWN*, N/D99), but according to the *Tageszeitung* (May 17) her break with the environment ministry was primarily over its insistence that depleted-uranium munitions used by NATO forces in the former Yugoslavia could pose a major health hazard. Blettner declined to comment.

Other members of the SSK may be open to lower limits. One panelist, Christian Küppers of the environmental advocacy group Öko-Institut in Darmstadt, told *Microwave News* that stricter limits based on the Swiss model "would be appropriate for Germany." But he noted that his group favors "protected areas" around hospitals, kindergartens and schools (see also p.14).

Others want still tougher limits. In a report prepared for T-Mobil, the Ecolog Institute in Hannover called for a $1 \mu\text{W}/\text{cm}^2$

(2 V/m) maximum exposure level, citing evidence of potentially harmful effects at levels as low as $20 \mu\text{W}/\text{cm}^2$ (8.7 V/m).

Switzerland's precautionary limit for 900MHz radiation from mobile phone towers is $4 \mu\text{W}/\text{cm}^2$ (4 V/m), more than 100 times lower than ICNIRP (see *MWN*, J/F00). Similar rules for RF/MW radiation have been adopted in Italy and in other parts of Europe (see *MWN*, J/F00, J/A00 and S/O00).

The Social Democrats (in German, SPD), the dominant member of the governing coalition, have long advocated minimizing exposures to non-ionizing radiation and basing standards on the precautionary principle (see *MWN*, S/O97).

If Germany should adopt stricter limits, it would mark a sea change in policy. In 1999, Germany voted for a resolution of the European Union Council of Ministers that endorsed the much looser ICNIRP guidelines as the basis for harmonizing member states' limits (see *MWN*, J/A99).

The environment ministry has been working for some time on revising the 1997 exposure ordinance, but it initially focused on closing gaps and resolving ambiguities. To explain the new openness to more sweeping changes, Probst cited "strong public concerns" and "scientific uncertainties" created by research findings of physiological and psychological effects from low-level exposures.

The Greens' support for precautionary measures is not limited to exposure limits. The environment ministry is also looking for ways to make more information on phone users' radiation exposures available to the public.

Phone makers announced in May that, starting later this year, they will include SAR information in the user instructions inside the box (see p.11). The environment ministry suggested that a "low radiation" label for phones whose SARs do not exceed 25% of the 2.0 W/Kg ICNIRP limit would be more "consumer-friendly." A Nokia spokesperson said that labels would be "unfair," according to the May 14 *Stuttgarter Nachrichten*.

Germany Set To Launch Mobile Phone Research Effort

Germany will soon begin a three-to-four-year research effort on mobile phone safety with a total cost of approximately 8.5 million euros (US\$7.4 million).

"The federal government wants to intensify its research activities because in the years ahead we will face great challenges in this area," said Simone Probst, a senior environmental official, at a conference hosted by the Federal Radiation Protection Office in Salzgitter on June 21.

On June 13, the German cabinet increased the environment ministry's budget for research on non-ionizing radiation to 2.2 million euros (US\$1.7 million) for 2002. A similar level of support is anticipated for each of the following three years. The budget proposal now goes to the Bundestag, Germany's parliament, where approval is considered likely.

The radiation protection office will administer the program with oversight by the environment ministry. The emphasis will be placed on mechanisms of interaction, epidemiology and dosimetry, according to the ministry.

CENELEC Okays SAR Protocols; IEEE, FCC Move Forward

Test protocols for measuring specific absorption rates (SARs) from mobile phones have finally been completed in Europe and will soon be finished in the U.S.

On July 3, the technical board of CENELEC gave final approval for its SAR standards*—both the test method and the 2 W/Kg limit originally specified when the European Council of Ministers adopted the ICNIRP standard in 1999 (see *MWN*, J/A99). The 19 member countries must now publicize the standards by September 1 and formally adopt them by March 1, 2002.

With this test standard in place, Ericsson, Motorola and Nokia have announced that they will make SAR information more readily available. For instance, Ericsson stated that all new phones will have “easy-to-read and up-to-date SAR information in the packaging” after October 1.

In the U.S., the IEEE SCC-34 subcommittee 2 on SAR measurement techniques is on the verge of finishing its protocol. “The previous draft was approved, but there were over 1,000 comments,” Howard Bassen of the FDA’s Center for Devices and Radiological Health in Rockville, MD, told *Microwave News*. “We’ve addressed the vast majority of the objections and I think we should finalize it at our next meeting, in Ottawa.” A final ballot will be completed before the subcommittee meets September 17-19, he said.

On June 29, the Federal Communications Commission (FCC) issued its own interim measurement guidelines† for mobile phones. The commission, which has been under intense pressure to adopt an SAR test method to facilitate monitoring compliance with its 1.6 W/Kg SAR limit, decided not to wait until the SCC-34 standard was completed.

“We do plan to use the SCC-34 standard when it is finalized,” said Dr. Robert Cleveland of the FCC’s Office of Engineering and Technology (OET) in Washington. But, he added, “It will still take at least six months for the IEEE to approve the standard, and there is always the chance that will someone object.”

Until the FCC adopts the final SCC-34 standard, manufacturers are being advised to use the interim test method. “For standard equipment, we recommend applicants follow the new procedures to expedite the approval process,” Kwok Chan of the FCC OET told *Microwave News*. Otherwise, he said, they will be evaluated on a case-by-case basis, which will take more time.

The CENELEC and IEEE SCC-34 test protocols are essentially the same, with only a few differences. Dr. C.K. Chou of Motorola in Plantation, FL, explained that a working group, with members from both committees, harmonized the two standards.

* CENELEC is the European Committee for Electrotechnical Standardization. It is composed of the 15 member states of the European Union, as well as the Czech Republic, Iceland, Norway and Switzerland. There are two standards: EN50360 and EN50361. EN50360 specifies the ICNIRP SAR limit of 2 W/Kg averaged over 10g; and EN50361 defines the measurement method. CENELEC standards can be ordered from the secretariat in Brussels at (32+2) 519-6871, Fax: (32+2) 519-6919 or from <www.cenelec.org>.

† The test method is in Supplement C of the FCC’s OET Bulletin 65, which is on the Web as a pdf file at <www.fcc.gov/oet>.

Coming in 2002: “Electromagnetic Biology and Medicine”

Electro- and Magnetobiology is being revamped with a new name, new editors and a new mission.

Beginning next year, the journal will be called *Electromagnetic Biology and Medicine* and will be edited by Drs. Abe Liboff and Boris Pasche. The current editor, Dr. Stephen Smith of the University of Kentucky, is retiring but will remain on the editorial board.

“There will be a new emphasis on electromedicine,” said Liboff, an emeritus professor of physics at Oakland University in Rochester, MI. “We will publish more clinical studies and add clinicians to the editorial board.”

“We will strive to cover medical and clinical developments with scientific rigor,” Pasche said. “But we also want to make the journal a center of lively discussion.”

Pasche, who has both an MD and a PhD, recently set up a lab at the Northwestern University Medical School in Chicago to do cancer research. For nearly 20 years, Pasche has worked on the use of low levels of amplitude-modulated 27.12 MHz radiation to treat insomnia and anxiety disorders (see *MWN*, M/J96).

This is the third title for the journal, which was founded by Dr. Andrew Marino of Louisiana State University Medical Center in 1982 as the *Journal of Bioelectricity*.

Marcel Dekker will continue to publish the journal. There will be three issues in 2002 and four in 2003.

New Book: Using Mobile Phones Like Russian Roulette

You pick up the phone, once, twice, ten times a day—or only a few times a month. But each and every time you’re gambling that “this time” won’t be the occasion when the radiation causes irreparable damage to your brain. It only takes a seemingly small trauma at a very small location to result in tissue damage, DNA damage or chromosome mutations....

It is cellular telephone Russian roulette. Go ahead and make the call. Do you feel lucky today?

These are the closing paragraphs of Robert Kane’s new book, *Cellular Telephone Russian Roulette: A Historical and Scientific Perspective*. Apart from this rather dramatic ending, most of the 235-page book is a sober analysis of dosimetric and biological issues related to mobile phones. There is also a detailed discussion of radiation exposure standards. In all, Kane includes 195 footnotes.

Kane is not a disinterested party. He is a former Motorola research engineer who in December 1993 sued the company, alleging that he had developed a brain tumor from testing a prototype cellular phone (see *MWN*, J/F94). The case continues today. Last year, the case was dismissed by a Chicago court (see *MWN*, J/A 00), but Kane’s lawyers at Barnow & Goldberg in Chicago will soon file papers in their appeal.

Kane’s book is available for \$12.95 from Vantage Press. To order call: (800) 882-3273.

Braune is now practicing medicine in Prien, not far from Munich.

Dr. Torsten Gailus of Deutsche Telekom in Darmstadt, a co-author of the original *Lancet* report, told *Microwave News* that he “fully agrees” with Braune’s new interpretation and conclusions. Gailus added that he is now a project manager for network technologies and no longer works on radiation health issues.

Even before the retraction, researchers at the Federal Institute for Occupational Safety and Health (FIOSH) in Berlin had raised concerns that blood pressure monitors might be susceptible to electromagnetic interference (EMI).

At a workshop held in Berlin last November, Dr. Peter Ullsperger and FIOSH coworkers reported that mobile phone radiation can “definitively alter” the measurement of blood pressure by a Finapres monitor—the same instrument that was used by Braune. Ullsperger noted that Braune’s experimental design did not allow a 2-meter separation between the mobile phone and the Finapres blood pressure monitor. (At a distance of 2 meters, the radiation signal from the phone would be sufficiently attenuated to make EMI very unlikely.)

Dr. Alan Preece of the U.K.’s University of Bristol, who at-

tended the Berlin workshop and who works on mobile phone cognitive effects (see *MWN*, M/A99), said that he has found that many types of medical equipment are susceptible to EMI. “Our ultrasound monitor was badly upset by GSM radiation,” he said, pointing out that analog signals pose much less of a problem.

Preece is not surprised by the withdrawal of the Braune results. “I was skeptical when I first read the study because of the small sample size and the fact that the tests were not run blind,” he said in an interview.

Meanwhile, a team working under Dr. Maila Hietanen at the Finnish Institute of Occupational Health in Helsinki is investigating whether 900 and 1800 MHz mobile phone radiation can affect the blood pressure and cardiac function of human volunteers. Tests on the first 20 of 60 planned subjects have been completed, according to the institute’s Anna-Maija Hämäläinen, but the results are not yet available.

The proceedings of the Berlin workshop, *Is Central Nervous Information Processing Influenced by Electromagnetic Fields of Mobile Phones?*, will be published as a FIOSH report later this year. For details, check FIOSH’s Web site, <www.baua.de>.

FROM THE FIELD

Hot New Papers

V. Keetley et al., “Neuropsychological Sequelae of 50 Hz Magnetic Fields,” *International Journal of Radiation Biology*, 77, pp.735-742, June 2001.

“The effects of occupational levels of [28 μ T (280 mG) circularly polarized] 50 Hz magnetic fields on cognitive function were studied on 30 human volunteers....Subjects sat at a desk within the coils where they undertook a series of verbal and written tests of cognitive function. After these tests were concluded (~30 min) subjects were either exposed or sham-exposed to fields (double-blinded) for 50 min. A second set of tests...was administered 20 min from the start of this period. Each subject returned after seven days to repeat the sequence, but with the opposite field/sham status....In summary, the data are suggestive of detrimental effects on cognitive processes, particularly short-term learning and executive functioning. However, larger sample sizes are required to demonstrate statistically a more specific pattern of cognitive effects.”

Hrvoje Lalić, Andrica Lekić and Biserka Radošević-Stašić, “Comparison of Chromosome Aberrations in Peripheral Blood Lymphocytes from People Occupationally Exposed to Ionizing and Radiofrequency Radiation,” *Acta Medica Okayama*, 55, pp.117-127, April 2001.

“The genotoxic effects of occupational exposure to ionizing and non-ionizing radiation were investigated in 25 physicians and nurses working in hospitals and in 20 individuals working at radio-relay stations.... The data showed that total number of chromosome aberrations in people exposed to ionizing and radiofrequency radiation...were almost equally higher than those of non-irradiated subjects....Acentric fragments comprised the most frequently seen type of aberration....A positive correlation between the total number of chromosome aberrations and cumulative 6-years dosage was also found. The data emphasized the dangerous effects of prolonged exposure to both types of radiation and indicated that chromosomal aberration analysis should be obligatory for individuals working at radio-relay stations....The findings in this study are particularly interesting, because both groups of workers

Phone Radiation and Cancer: A Proposed Mechanism

Peter French, Ronald Penny, Jocelyn Laurence and David McKenzie, “Mobile Phones, Heat Shock Proteins and Cancer,” *Differentiation*, 67, pp.93-97, June 2001.

“[T]here is a testable mechanism by which mobile phone exposure could lead to cancer, and that link is via the heat shock response. Mobile phones emit RF energy at levels which are demonstrably potentially capable of triggering the heat shock response. Recurrent exposure through frequent mobile phone use could lead to chronic expression of [heat shock proteins] in the exposed brain tissue of regular mobile phone users. Chronic overexpression of heat shock proteins is reported to be associated with both induction and promotion of cancer....It is therefore critical that the hypothesis that RF energy at mobile phone-relevant SAR levels acts as a cell stress on human brain cells and tissues is tested experimentally as a potential mechanism for cancer development. Such a mechanism provides a solid hypothesis for the observed nonthermal effects of RF radiation on mammalian cells, and would need to be considered in designing future epidemiological studies.” (See also *MWN*, S/O00.)

were exposed to doses of ionizing and non-ionizing radiation that were well below the accepted standards for exposure to radiation....[T]he examinees working in radio-relay stations were exposed to the power and frequency of electromagnetic waves that usually did not exceed the permitted values of 10 W/m². The analysis was made by blind as-

assessment of exposure....However, it should be noted that the present study was conducted on a small sample of examinees and in order to be verified, would need to be replicated, in particular as regards the effect of radiofrequency radiation." (Full text available at: <www.lib.okayama-u.ac.jp/www/acta/acatcontents55_2.htm>.)

Ingrid Nordenson, Kjell Hansson Mild et al., "Chromosomal Aberrations in Peripheral Lymphocytes of Train Engine Drivers," *Bioelectromagnetics*, 22, pp.306-315, July 2001.

"A pilot study of 18 engine drivers indicated a significant difference in the frequency of cells with chromosomal aberrations (gaps included or excluded) in comparison with seven concurrent referents (train dispatchers) and a control group of 16 office workers. The engine drivers had about four times higher frequency of cells with chromosome-type aberrations (excluding gaps) than the office workers ($p < 0.01$) and the dispatchers ($p < 0.05$)....In a follow-up study, another 30 engine drivers showed an increase ($p < 0.05$) in the frequency of cells with chromosome-type aberrations (gaps excluded) as compared with 30 referent policemen....[T]he results of the two studies support the hypothesis that exposure to MF at mean intensities of 2-15 μT [20-150 mG] can induce chromosomal damage." (See also *MWN*, J/F85, S/O88 and J/A96.)

Pascale Fabbro-Peray, Jean-Pierre Dures and Jean-François Rossi, "Environmental Risk Factors for Non-Hodgkin's Lymphoma [NHL]: A Population-Based Case-Control Study in Languedoc-Roussillon, France," *Cancer Causes and Control*, 12, pp.201-212, April 2001.

"The following factors were independently and significantly related to NHL as a result of the multivariate analysis: a previous hematopoietic malignancy ($\text{OR}_a = 11.5$, 95% CI 2.4-55.4), a history of hives ($\text{OR}_a = 1.7$,

95% CI 1.2-2.2), benzene exposure >810 days ($\text{OR}_a = 4.6$, 95% CI 1.1-19.2), daily welding ($\text{OR}_a = 2.5$, 95% CI 1.2-5.0) and activity of radio operator ($\text{OR}_a = 3.1$, 95% CI 1.4-6.6)....Younger age at onset was also associated with an increased risk of NHL. On the other hand, duration of exposure showed a paradoxical and unexplained protective effect.... The odds ratio associated with [radio operator activity] remained increased after adjustment for all other factors. As with welding, younger age at onset increased the risk, while duration of exposure decreased the risk....The paradoxical protective effect of duration of exposure for these two factors could be explained by measures taken in the French industry. Indeed, the mobility of workers is encouraged when their occupations appear to pose a high risk to their health; and welding is considered a high risk activity for the eyes."

P. Boscolo et al., "Effects of Electromagnetic Fields Produced by Radiotelevision Broadcasting Stations on the Immune System of Women," *Science of the Total Environment*, 273, pp.1-10, June 12, 2001.

"The object of this study was to investigate the immune system of 19 women with a mean age of 35 years, for at least two years (mean=13 years) exposed to EMFs induced by radiotelevision broadcasting stations in their residential area. In September 1999, the EMFs (with range 500 kHz-3 GHz) in the balconies of the homes of the women were (mean \pm S.D.) 4.3 ± 1.4 V/m. 47 women of similar age, smoking habits and atopy composed the control group, with a nearby resident EMF exposure of <1.8 V/m....We may conclude that exposure to EMFs induces a modification of immune parameters in humans. EMF exposure inhibits a Th1-like cytotoxic immune response without a dose-response effect, while the enhancement of a Th2-like immune response is not demonstrated."

Meeting Notes

Thermoregulation Workshops

Dr. Joe Elder is helping organize a *Temperature Workshop* for the WHO EMF project to be held in Geneva, October 16-17. Elder, who recently retired from the EPA and joined Motorola's research labs in Plantation, FL, as director of biological research, told *Microwave News* that a small number of biologists will be invited to help define temperature limits for cells, tissues and organs. "These limits are not necessarily RF-induced," he said. One of the objectives will be to produce a WHO report. Dr. Eleanor Adair of Brooks Air Force Base in San Antonio is putting together a second workshop on thermal regulation, which will address RF/MW effects. Members of both ICNIRP and IEEE SCC-28 will attend, she said. That meeting will be held next spring, but other details including title and date have yet to be finalized.

EBEA Meeting in Helsinki

The European Bioelectromagnetics Association (EBEA) is set to meet in Helsinki, September 6-8. The preliminary scientific program is at <www.occuphealth.fi/e/project/ebea2001>.

Radio Vatican, EMFs & Mobile Phones

On September 4, Italian researchers will present the latest epidemiological results of a study on childhood leukemia rates near the Radio Vatican antennas in Cesano outside Rome at the *13th Conference of the International Society for Environmental Epi-*

demiology (ISEE2001). The meeting will be held in Garmisch-Partenkirchen, which is an hour south of Munich. The same day, Dr. Anders Ahlbom will review the EMF-cancer association and WHO's Dr. Michael Repacholi will discuss the role of transients in the development of childhood leukemia. That afternoon, Dr. Raymond Neutra will chair a session on the results of the California EMF Program (see p.5) titled "The Marriage of Epidemiology and Decision Analysis." In a planned poster presentation, Drs. Andreas Stang and Karl-Heinz Jöckel of the University of Essen will give advice on how to deal with the media on a "sensational topic" like the health effects of mobile phones. One tip: "Become immune to unqualified critics, especially from people who have never read the publication." In January, they published a paper on the possible link between mobile phones and eye cancer (see *MWN*, J/F01). A copy of the program and abstracts of the papers are available at the conference's Web site: <www.gsf.de/epi/gap2001/ISEE>. The abstracts are also in the July issue of *Epidemiology*. For more information about the meeting, call: (49+89) 5482340 or fax: (49+89) 54823444.

Olden in Australia

Dr. Kenneth Olden, the director of the U.S. NIEHS, was the special guest speaker at a July 6 workshop sponsored by the Electricity Supply Association of Australia (ESAA) in Melbourne. Olden reviewed the EMF RAPID program and his report to Congress (see *MWN*, J/A99).

Across the Spectrum

I believe, in the ultimate analysis, that it is hubris to think that no phenomenon is valid unless we understand its mechanism of action.

—Dr. T.V. Rajan, chairman, department of pathology, University of Connecticut Health Center, Farmington, noting that digitalis was used for 200 years to treat cardiac problems without any idea of the mechanism of action, and that “billions of human doses” of diethylcarbamazine have been dispensed to treat lymphatic diseases over the last 50 years even though “we have absolutely no idea how the drug works,” in a commentary, “The Myth of Mechanism,” *The Scientist*, p.6, June 25, 2001, also available at <www.the-scientist.com/yr2001/jun/comm_010625.html>

“Physicists in particular have lost a lot of clout, and they’ve even lost a lot of esteem in the public eye, and I think that’s reflected in the fact that they’re now being more ignored in their advice.”

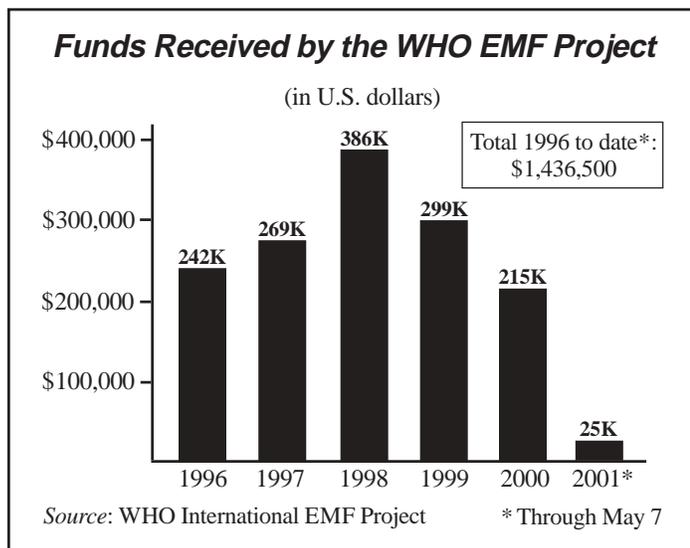
—Dr. David Cassidy, science historian, Hofstra University, Hempstead, NY, quoted by James Glanz, “Sure, It’s Rocket Science, But Who Needs Scientists?” *New York Times*, Week in Review, p.1, June 17, 2001

“The law is very clear. The health factor is not something that a zoning board in New Jersey has jurisdiction over. But we all recognize that the government has done studies and set standards in the past that have come back to haunt us. So that perception of there being a health risk lurking out there makes people uncomfortable, uneasy, and therefore not as prone to purchasing a home and spending the same amount of money they would if the tower wasn’t there.”

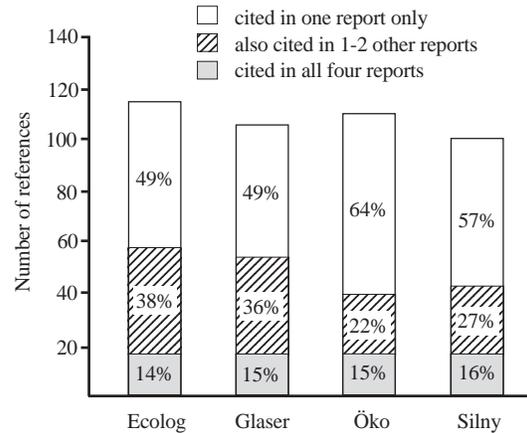
—Bruce Whitaker, lawyer, Ramsey, NJ, who represents homeowners fighting a proposed Verizon and AT&T cellular tower in nearby Ho Ho Kus, quoted by George James, “The Gift of Gab Comes at a Cost—As Cell Phone Use Grows, So Do Battles Over Towers,” *New York Times*, New Jersey, p.10, June 24, 2001

“We understand the technology to a certain extent, but not 100%.”

—Statement of Sony, quoted by Alexandra Harney and Christopher Brown-Humes, “Sony’s Handset Gremlins Spell Trouble for Ericsson Alliance: A String of Recalls Has Hit the Japanese Giant’s Reputation and Shares,” *Financial Times* (U.K.), p.21, July 11, 2001 (see p.18 and *MWN*, J/F99)



Each Singing from a Different Song Book



—Comparison of references to the scientific literature in reports on mobile phone radiation and health completed last year by the Ecolog Institute, Hannover; Dr. Roland Glaser, Humboldt University, Berlin; the Öko-Institut, Darmstadt; and Dr. Jiri Silny, University of Aachen. Adapted from an analysis prepared by the Jülich Research Center for T-Mobil, a Darmstadt-based wireless carrier which also commissioned the four reports. The reports and the Jülich analysis, which was added to the Web on July 5, 2001, are available in German at <www.fz-juelich.de/mut/projekte/pro_emf.html> (see p.10; also *MWN*, M/J01)

“Everyone likes power, but no one likes power generation or delivery.”

—Spencer Abraham, U.S. Secretary of Energy, at the Edison Electric Institute’s annual meeting, on June 5 in New Orleans, quoted by Kathleen Davis, “Gridlock: America’s Regional Transmission Structures Scout for Solutions,” *Electric Light & Power*, p.18, July 2001

“Dangerous? Yes, I definitely think it’s dangerous. Could you hold on? I have another call.”

—Frank Bruno, in his car, Long Island, NY, on using a mobile phone while driving, quoted by Michael Powell, “NY to Motorists: Put the Phone Down and Drive, Buddy,” *Washington Post*, p.A3, June 29, 2001

Michael Persinger, a professor of neuroscience at Laurentian University in Sudbury, Ontario, has been conducting experiments that fit a set of magnets to a helmet-like device. Persinger runs what amounts to a weak electromagnetic signal around the skulls of volunteers. Four in five people, he said, report a “mystical experience, the feeling that there is a sentient being or entity standing behind or near” them. Some weep, some feel God has touched them, others become frightened and talk of demons and evil spirits. “That’s in the laboratory,” Persinger said. “They know they are in the laboratory. Can you imagine what would happen if that happened late at night in a pew or mosque or synagogue?”

—Shankar Vedantam, “Tracing the Synapses of Our Spirituality,” *Washington Post*, p.A1, June 17, 2001

UPDATES

ITALY

A Guide...Italy has been a hotbed for concerns over non-ionizing radiation, as we have reported in our last two issues. *Elletrosmog*, as it is called there, has prompted some of the strictest exposure standards in Europe. Luca Ramacci and Giovanna Mingati have written a detailed guide to the health and regulatory issues. They cover ordinances and judicial decisions at both the national and local levels. *Inquinamento Elettromagnetico (Electromagnetic Pollution)*, 255 pages, costs L.32,000 (approx. US\$15.00) from Sistemi Editoriali, based near Naples. (It is only available in Italian.) To order, call (39+081) 8043920, Fax: (39+081) 8043851, or go to: <www.sistemieditoriali.it>.

MELATONIN

MRI Gives Up on Melatonin Hypothesis...Power-frequency magnetic fields do not depress melatonin levels in humans. So say Drs. Charles Graham and Mary Cook on retiring from the Midwest Research Institute (MRI) in Kansas City, MO. For 20 years, Graham directed MRI's EMF research lab, where volunteers were exposed under carefully controlled conditions to investigate possible impacts on behavior, cardiac function and, most recently, on melatonin. He never saw a consistent melatonin effect, but he had long maintained that it would be premature to dismiss the EMF-melatonin link (see *MWN*, M/A97, N/D99 and J/F00). Now, Graham has changed his mind. "We've looked at both men and women across different age groups, field intensities and exposure durations," he told *Microwave News* in June. "One would expect to see some hint of an effect, but we didn't." In his final melatonin studies, Graham, working with Cook and MRI's Dr. Antonio Sastre, exposed volunteers to a circularly polarized 28.3 μ T (283 mG) 60 Hz field on one of two nights spent at the lab. The field was switched on or off every hour, and during the "on" hours it cycled on and off at 15-second intervals. As a control, each volunteer spent the other night at the lab with

EMF levels no higher than 2 mG. They found no EMF-related changes in melatonin levels in hourly blood samples or in concentrations of the melatonin metabolite 6-OHMS in urine samples taken the following morning. The findings for women aged 19-35 years appear in the May issue of *Environmental Health Perspectives* (109, pp.501-507, 2001), while the results for older women are in press at the *Journal of Pineal Research*. The issue may be settled at MRI—which, in any case, has no money to continue such research—but others are not yet ready to throw in the towel. "While the experimental studies of acute exposure have not shown a suppression, the observational studies in real-world settings generally have," Dr. Richard Stevens of the University of Connecticut, Farmington, told *Microwave News*. (Stevens was the first to formulate the melatonin hypothesis linking breast cancer to EMFs and/or light-at-night; see *MWN*, J/F 87.) One of these observational studies was carried out by Stevens and Dr. Scott Davis of the Fred Hutchinson Cancer Research Center in Seattle, who found melatonin suppression among women exposed to power line fields at home (see *MWN*, N/D97). Their paper will soon appear in the *American Journal of Epidemiology*. Dr. James Burch of Colorado State University, Ft. Collins, who has himself reported melatonin suppression among utility workers (see *MWN*, M/A97 and M/A00), sides with Stevens. "Obviously, there's a big difference between exposures in a lab and in a real-world environment," Burch said in an interview. MRI's Sastre countered that he and Graham and Cook are well aware of such variations. "Could it be harmonics or transients? We cannot rule that out," he told *Microwave News*. But the MRI team argues that such possibilities are speculative and points to the "inherent lack of control over potentially confounding variables in field studies." They contend that their findings are "consistent with a growing body of evidence" indicating that EMFs have "little or no effect" on melatonin. Sastre, who has now assumed the helm at MRI's EMF lab, is willing to live with the remaining uncertainties. "It's time to move on," he said.

"MICROWAVE NEWS" FLASHBACK

Years 20 Ago

- Breaking ranks with ANSI and NIOSH, the EPA considers adopting a frequency-independent RF/MW exposure standard in order to simplify enforcement.
- The Electromagnetic Radiation Management Advisory Council finds that former personnel at the U.S. embassy in Moscow can anticipate no deleterious biological effects from MW exposures.

Years 10 Ago

- Telephone line workers have higher mortality rates from leukemia than other telephone company employees, report Dr. Genevieve Matanoski and colleagues at the Johns Hopkins University public health school in Baltimore.
- Dr. Gilbert Omenn, of the University of Washington, Seattle, the chairman of the Electric Power Research Institute's scientific advisory panel, ranks the public health risks of EMFs as similar to those

associated with "eating peanut butter."

- Michelle and Ted Zuidema sue San Diego Gas & Electric, charging that EMFs caused their daughter to develop kidney cancer and that the utility's power lines lowered the value of their home.

Years 5 Ago

- Exposure to electric fields is a potentially critical factor to understanding cancer risk, says Dr. Tony Miller of the University of Toronto after finding that utility workers exposed to high levels of magnetic and electric fields have 11 times the expected rate of leukemia.
- The FCC adopts final health and safety regulations for exposure to RF/MW radiation similar to those recommended by the NCRP ten years earlier, including a requirement that the SAR of all new cell phones not exceed 1.6W/Kg.
- Taking a cue from fellow TV man Jon Palfreman, John Stossel argues that people get much more radiation from moonlight than power lines. Dr. Charles Polk calls the argument "propaganda."

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NEUROSTIMULATORS

Diathermy Alert...Medtronic has issued a safety alert to warn users of its neurostimulation devices that they risk "severe injury or death" if they are treated with shortwave, microwave or ultrasound diathermy. Energy from the diathermy unit can be transferred to the neurostimulator and cause extensive tissue damage. In its May 18 alert, Medtronic cites two cases of patients with implanted deep brain stimulator systems who received shortwave diathermy therapy and suffered severe brain damage. Both became comatose. The alert is at <www.medtronic.com/neuro/diathermy_alert/alert_patients.html>.

PEOPLE

Dr. **Asher Sheppard**, a consultant based in Redlands, CA, is the new president of the Bioelectromagnetics Society (BEMS). Dr. **Frank Prato**, of the University of Western Ontario in London, Canada, will take over from Sheppard at next year's BEMS meeting, which will be held in Quebec City, Canada, June 23-27. Drs. **Stefan Engstrom**, **Leeka Kheifets**, **Joseph Roti Roti**, **James Ryaby** and **Shoogo Ueno** have been elected to the BEMS board of directors....Dr. **Laurent Bontoux** has moved to the Directorate of Science Strategy of the European Commission's Joint Research Center in Brussels. Previously he was with DGXII on Science, Research and Development. **Callum Searle** of DG Research will now be monitoring the EC mobile phone studies...On July 13, **Ron Petersen** accepted a buyout offer and retired from Lucent Technologies-Bell Labs in Murray Hill, NJ. He will continue to work with numerous standards groups: Petersen is vice president for non-ionizing radiation at the NCRP, chairs IEEE SCC-34 on Electromagnetic Energy Product Performance Safety and is the executive secretary of IEEE SCC-28, the International Committee on Electromagnetic Safety. **Paul Testagrossa** and **Al-ice Fahy-Elwood** remain members of Lucent's RF/MW group. ...Professor **Veli Santomaa**, a principal scientist at Nokia's research center in Helsinki, is retiring on September 1. He has been at Nokia, the world's leading manufacturer of mobile phones, for seven years....Dr. **Gene Sobel** has left the West Coast to become the director of statistics for the NCI gynecologic oncology group at the Roswell Park Cancer Institute in Buffalo, NY....A team led by Dr. **James Burch** of Colorado State University in Ft. Collins has won the Adolph Kammer Merit in Authorship Award from the American College of Occupational and Environmental Medicine (ACOEM) for a paper on the importance of polarization in suppressing melatonin levels in electric utility workers. The award recognizes the most outstanding paper published in ACOEM's *Journal of Occupational and Environmental Medicine*. The paper was the subject of a cover story in *Microwave News* last year (see *MWN*, M/A00; see also p.15)....Dr. **René de Seze** has moved from the University of Montpellier in Nimes to the National Institute for the Industrial Environment and Hazards (INERIS) in Verneuil-en-Halatte, which is north of Paris. De Seze has also recently been appointed an associate editor of *Bioelectromagnetics*.... Dr. **Dean Astumian** has joined the physics department at the University of Maine, Orono. Previously, he was at the University of Chicago. Astumian's article "Making Molecules into Motors" appears in the July issue of *Scientific American*....In our last

issue we reported that Dr. **Gerri Lee**, formerly with the California EMF program (see p.5 and p.18), was now working for Hoffman-LaRoche. She has recently joined AstraZeneca, a large drug company, as a senior epidemiologist. She will be dividing her time between the two coasts....Dr. **David Erwin**, 55, died of cancer on June 1. His career at Brooks Air Force Base (AFB) in San Antonio began in 1977. He worked on microwave health effects for 15 years. At the time of his death, he was the Director of the Air Force Institute for Environment, Safety and Occupational Health Risk Analysis.

STANDARDS

New Chair at SCC-28...Dr. John Osepchuk is retiring as the chair of IEEE SCC-28, the International Committee on Electromagnetic Safety, on September 1. Dr. Eleanor Adair of Brooks AFB, presently the cochair, will take over from Osepchuk. Ron Petersen will continue as executive secretary (see p.16). Osepchuk said that he will be an ex officio member of the SCC-28 Executive Committee. Meanwhile, Dr. John D'Andrea of the Naval Health Research Center at Brooks AFB, the cochair of subcommittee 4 on safety standards for human exposures, said that he expects to have a complete draft of the revised ANSI/IEEE RF/MW exposure standard by the late fall.

THE NETHERLANDS

Health Council: New Report, Same Advice...The Health Council of the Netherlands concludes that power-frequency EMFs are "not likely" to cause childhood leukemia—even though pooled data analyses led by Drs. Anders Ahlbom and Sander Greenland show a "consistent association" (see p.2). In its first annual update on EMFs and RF/MW radiation, a 12-member panel chaired by Dr. Eric Roubos of the University of Nijmegen reviews those studies that have appeared since last year, when the council issued two detailed reports that discounted health risks from EMFs and GSM radiation (see *MWN*, M/J00 and N/D00). The panel states that it finds no reason to alter its earlier conclusions. The full text of *Electromagnetic Fields: Annual Update 2001* is available in Dutch and English at <www.gr.nl>.

VIDEOS

Stray Voltage...Stetzer Electric has produced a video that presents the concerns of Wisconsin farmers over stray voltage. The 20-minute video, *Beyond Coincidence: The Perils of Electrical Pollution*, details what has happened to a number of farm families and their cattle. A copy of the video tape is available for \$12.00 (including shipping) from Stetzer Electric Inc., 520 West Broadway, PO Box 25, Blair, WI 54616, (608) 989-2571, Fax: (608) 989-2570, Web: <www.stetzerelectric.com>.

NRPB on Mobile Phones...The U.K.'s National Radiological Protection Board has produced a 30-minute video, *Mobile Telephony and Health*, on the current state of knowledge on the possible impacts of phones and towers. A copy is available for £6.00 from: Information Services, NRPB, Chilton, Didcot, Oxon OX11 0RQ, U.K., or by phone from Jane True at (44+1235) 822742.

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As We Go To Press

U.K. Panel: TETRA Mobile Radio Safe

It is “unlikely” that radiation from digital mobile radios used by public safety services poses any special health risks, according to a report prepared for the U.K.’s National Radiological Protection Board (NRPB).

The board’s Advisory Group on Non-Ionizing Radiation, chaired by Sir Richard Doll, issued its findings on the terrestrial trunked radio, or TETRA, system on July 31.

The radios have a power output of up to 3W, operating at 400MHz, pulse modulated at 17.6Hz. The review was prompted by last year’s Stewart commission report (see *MWN*, M/J00), which flagged 16Hz as a potentially troublesome modulation frequency, based on evidence of effects on calcium ions.

The Doll panel reached a different conclusion. Calcium ion effects are “much disputed,” its report states, adding that “no associated health risk has been identified.” The panel calls for new studies to resolve the issue.

While acknowledging that experimental data on users’ radiation exposures are “very limited,” Doll’s group predicts that SARs from TETRA handsets will not exceed 10W/Kg—the limit specified by the NRPB for all users of mobile phones and by ICNIRP for occupational exposures only.

Alasdair Philips, a consultant based near Cambridge, lambasted the Doll panel’s conclusions. “They basically still think of people as dead slabs of meat with a cooling system,” he told the BBC (July 31).

The full text of the 40-page report is at <www.nrpb.org.uk>.

Keeping Current: Follow-Up on the News

◆ In our last issue, we highlighted the new epidemiological study on EMF-induced spontaneous abortions by Dr. De-Kun Li of Kaiser Permanente, which will appear in the November issue of *Epidemiology*. Li also wrote a summary of his results for the California Department of Health and it is available now in Appendix 6 of the draft report of the EMF Program (see p.5). Appendix 5 is Dr. Gerri Lee’s companion miscarriage study. Go to: <www.dhs.ca.gov/ehib/emf/RiskEvaluation/riskeval.html>.

◆ Dr. Gerard Hyland’s 40-page report for the European Parliament, *The Physiological and Environmental Effects of Non-Ionizing Electromagnetic Radiation*, can be downloaded from the Web site of Caroline Lucas, a Green Party member of the parliament from the U.K. Go to: <www.carolinelucasmep.org.uk/news/mobilemasts_11072001.asp>.

◆ The July issue of *Epidemiology* (pp.472-473) has a spirited exchange on the pooled analysis of childhood leukemia data by UCLA’s Dr. Sander Greenland and coworkers (see p.2 and *MWN*, S/O99). Kent Jaffa of PacifiCorp in Salt Lake City, UT, writes that the study is “unreliable” because of problems with pooling methods. The Greenland team counters that Jaffa’s arguments are based on “errors of logic, statistics and fact.”

◆ On July 4, Sony pulled 560,000 mobile phones off the Japanese market because a design flaw caused the battery to overheat. The company put the cost of the recall at ¥12 billion, or \$97 million. In 1998, Sony recalled 60,000 phones that could exceed FCC exposure guidelines (see *MWN*, J/F99). (See also p.14.)

◆ Richard Capriola of Weinstock & Scavo in Atlanta filed a class-action lawsuit in Georgia state court on June 8 to ensure that every mobile phone comes with a hands-free kit. The Atlanta firm is working with Peter Angelos’s legal team (see *MWN*, M/J01).

◆ On June 15, Australia’s National Health and Medical Research Council (NHMRC) announced its latest grant for research on mobile phone safety: A\$300,000 (US\$155,000) to Dr. Kathy Rose of the University of Sydney for a two-year study on vision and hearing effects. In Adelaide, exposures have been completed and tumors are being tallied in the NHMRC-funded repeat of the Repacholi mouse study, according to the July 25 *Advertiser* (see *MWN*, M/J97 and M/A01).

◆ At any given daytime moment during the week, about 500,000 drivers of passenger cars are talking on hand-held cell phones, according to a survey by the National Highway Traffic Safety Administration, released on July 23.

VIEWS ON THE NEWS

'EMFs Are Possible Carcinogens' Is Not News—Or Is It?

IARC is the most influential authority on what may cause cancer. So it was surprising that, when its EMF panel classified power-frequency fields as possible carcinogens (see p.1), a lot of journalists chose to look the other way.

A search of the English-language press turned up just one news article, in Australia's *Canberra Times*. Some European papers—for example, France's *Le Figaro* and Sweden's *Svenska Dagbladet*—ran short items. In the U.S., there was only silence.

What are we to make of this utter lack of interest? Could it be that the general and scientific press have a double standard when it comes to covering EMFs?

Two of the IARC panelists, Dr. Nick Day of the U.K. and Dr. Elizabeth Hatch of the U.S., had previously released their own epidemiological studies, both of which were widely reported as showing *no* leukemia risk in children. Yet this summer in Lyon, they agreed with the others that EMFs are possible carcinogens.

The *New Scientist* greeted Day's 1999 study with an editorial headlined *IT'S OFFICIAL. POWER LINES DON'T GIVE CHILDREN LEUKEMIA*. When IARC issued its press release in June, the magazine ignored it.

After Hatch's and Dr. Martha Linet's 1997 NCI study was published, *Science*'s Gary Taubes suggested that it would be the obituary for the EMF-cancer link. At press time, *Science* has yet to announce the resurrection.

Clearly, the IARC decision *is* news—news that should not be ignored. It's time to clear the air of all the disinformation which

has been circulated over the years. It's time to acknowledge that EMFs do pose possible health risks and to find out how great those risks actually are.

BEMS Needs a New Compass

The Bioelectromagnetics Society (BEMS) is in danger of fading into oblivion.

The June annual meeting was a depressing affair. Attendance was down 25% from last year. The long rows of blank poster boards were an ever-present reminder of those who canceled their trips to St. Paul. Who can blame them? Walking the deserted streets near the hotel, one felt the entire local population had decided that they too would rather be somewhere else.

The few interesting papers were all from Europe. Not too surprising, given that there is no money for research in the U.S. Sessions were padded with tutorials and reviews of old controversies. All in all, it was a pretty stale affair.

If BEMS wants to survive it will have to reinvent itself. Hazard research must continue, but the society should also embrace those working on electromedicine. One reason BEMS has kept its distance from this promising field is that some fear that it would be a tacit recognition of more complex—read politically unacceptable—effects.

BEMS has money in the bank to see it through hard times. Those times are here now and the society must invest in its future.

And at the very least, given that annual meetings are big moneymakers, they should be held in places that people might actually want to visit.

Keeping an Eye on the Usual Suspects

• It's breathtaking to watch **George Carlo** rise like a phoenix. Just when we thought he would fade away like his soon-to-be-remaindered book, he's back with money in his pocket. Or almost. If the judge approves the proposed settlement in the *Busse* case, as appears likely (see p.6), Carlo will get a \$250,000 bankroll to continue harassing the cell phone industry and a \$150,000 insurance policy in case he should get into legal trouble again—call it a get-out-of-jail-free card. To be sure, we think that the industry needs more policing, but Carlo's tactics are so self-serving that they have come close to undoing the safety debate. One needs to look no further than the FDA-CTIA research project—known as the CRADA to some, and as an international laughingstock to others—to see how Carlo has managed to maneuver the FDA's only health effort into doing the wrong studies for the wrong reasons. Carlo's latest opening came when his insurance company decided that it had had enough and walked away leaving \$1,400,000 on the table. It didn't take long for the *Busse* lawyers and Carlo to work out a 70-30 split and for the settlement papers to be signed. Unless the complaints get a lot louder, the checks will soon be in the mail.

• **Bob Park**'s most recent (July 13 & 27) ravings about EMFs in

his weekly *What's New* e-mail letter sound as if they were dictated from the post-surgery recovery room. They may well have been. Last summer a tree fell on Park while he was jogging, necessitating a series of major operations. If the tree was a message from above to give his biases a rest, Park didn't get it. His columns are embarrassing to read: The facts are garbled, out-of-date and/or just plain wrong. When the errors are pointed out, he looks the other way. It's time for the leaders of the American Physical Society to take responsibility for Park, their chief lobbyist, and put him out to pasture, where he can froth at the mouth in private.

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