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INSIDE...

Revision of RF/MW Standard Stalls As IEEE Panel Is Split on Key Issues

Disagreements within the IEEE's International Committee on Electromagnetic Safety (ICES) have stalled progress on updating its standard for human exposures to radiofrequency and microwave (RF/MW) radiation.

On one side, representatives of federal agencies have made it clear that they will not support a proposal to substantially relax key sections of the existing standard. On the other side, many members of the committee—especially those working for, or allied with, the Department of Defense—still favor looser limits.

"Everything is open," Dr. Eleanor Adair, the chair of ICES, better known as SCC-28, told *Microwave News*. Adair recently returned to New Haven, CT, after serving as a senior scientist at Brooks Air Force Base in San Antonio.

Last September, the Revision Working Group, a panel within subcommittee 4 (SC-4) of SCC-28, circulated a draft proposal for a more lenient exposure standard (see *MWN*, S/O01). But when the revision group met in Fort Lauderdale, FL, January 10-11, it repudiated many of the central elements of the draft. Then, a week later, SC-4 met in San Antonio and it, in turn, rejected some of the decisions made by its working group.

"It's pretty divided," said Richard Tell, a consultant based in Las Vegas who led the effort to draft the September proposal.

For instance, Tell's September draft stipulates that a single set of standards should cover workers and the general public. In Fort Lauderdale, there was a

(continued on p.7)

Epidemiologists at Odds Over Meaning Of New EMF Exposure Index

Do you have to be exposed to a magnetic field above some threshold level before it can cause a miscarriage? And if so, for how long?

Some leading epidemiologists are asking these questions in one of the liveliest debates on electromagnetic field (EMF) health effects in years.

International standards for power-frequency EMFs allow a pregnant woman to be exposed to as much as 1,000 mG, but in a paper published in the January issue of *Epidemiology*, a team led by Dr. De-Kun Li of Kaiser Permanente in Oakland, CA, shows that exposures to 16 mG or higher can result in significantly elevated rates of miscarriage (see *MWN*, M/J01).

"We don't know the mechanism, but there could be a switch that is activated above a certain threshold," Li told *Microwave News*. "If that is the case, I think that it makes more sense to look at the maximum rather than the average field exposures."

(continued on p.3)

« Power Line Talk »

In 1994, researchers on both sides of the Atlantic found strong power-frequency magnetic fields in hospital **incubators** used to nurture premature babies. **Gert Anger** of the Swedish Radiation Protection Authority in Stockholm reported levels as high as 48 mG, while in the U.S. the late Dr. **Charles Polk** of the University of Rhode Island, Kingston, found a peak reading of 289 mG using a different measurement protocol (see *MWN*, M/A94). These relatively brief and intense exposures do not appear to increase the risk of **childhood leukemia**, according to a new epidemiological study led by Dr. **Maria Feychting** of the Karolinska Institute in Stockholm, which appears in the January issue of ***Epidemiology*** *(13,* pp.45-49, 2002). Feychting's team, which includes Anger and Karin Söderberg, a doctoral candidate at the Karolinska, used hospital records of 619 Swedish children with leukemia and an equal number of controls, together with measurement data, to estimate EMF exposures. There were 53 children with leukemia and 57 controls who had been in incubators (some hospital records for other children were missing). The time spent in an incubator was "often less than 24 hours," according to the paper, but some stays were much longer—up to 28 days, Feychting told *Microwave News.* Measured fields were consistent with those Anger had found in 1994: The highest was 44 mG, with an average of 11 mG. Factoring in the time in an incubator, the Swedish researchers estimated that the maximum cumulative exposure was 6,136 mG-hours. Not only was leukemia risk no higher among the children who had been in incubators, there was also no increased risk for the high-exposure groups—that is, above either 6 mG or 10 mG—or those with cumulative exposures above 100 mG-hours. The new study did find elevated risks for acute lymphoblastic leukemia among those diagnosed between the ages of five and nine and for acute myeloid leukemia, the less common type, in all children, but these two estimates are based on small numbers of cases and are not statistically significant. Feychting believes that they are probably chance findings. She cautions, however, that there is no contradiction between these new results and previous studies (including her own) pointing to a link between childhood leukemia and residential EMF exposures. "Incubator exposures are profoundly different from those in the home," she said.

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ICNIRP has concluded that EMFs may be a risk factor for childhood leukemia. This is not too surprising since the chair of ICNIRP's epidemiology subcommittee is Dr. **Anders Ahlbom** of the Karolinska Institute in Stockholm, who also led the meta-analysis which persuaded the IARC EMF panel to designate EMFs as possible human carcinogens last summer (see *MWN*, S/O00 and J/A01). A doubling of the risk among children with average exposures above 4 mG is "unlikely to be due to chance," Ahlbom's subcommittee writes in a detailed review of the entire body of the EMF epidemiological literature—it appears in ***Environmental Health Perspectives*** *(109,* Supplement 6, pp.911-933, December 2001). Evidence linking EMF exposures to cancer in adults—specifically, brain tumors or leukemia—is "weak" according to the subcommittee, which also includes Drs. **Elisabeth Cardis** of IARC, **Martha Linet** of the U.S. NCI, **David Savitz** (see p.3) and **Anthony Swerdlow** (see p.10). For ALS, however, they write that the data are "intriguing and point toward a possible risk increase," especially among workers in electrical occupations, while noting that the association could also be due to electric shocks (see p.12, also *MWN*, N/D01).

Utility Industry Speaks Loudly On California Risk Analysis

The California EMF Program received 75 sets of comments on the draft assessment of EMF health risks, released last July. Those offering assessments—a veritable *Who's Who* of the EMF world—include many whose comments were solicited by the electric utility industry.

In their draft, Drs. Raymond Neutra, Vincent DelPizzo and Geraldine Lee of the EMF program concluded that EMFs are more likely than not to cause childhood leukemia, adult brain cancer, ALS and miscarriages (see *MWN*, J/A01).

The industry-sponsored submissions are for the most part quite critical. "Most scientists today would probably not agree" with the report's conclusions, wrote Dr. Abdelmonem Afifi of the University of California, Los Angeles (UCLA). Afifi, a long-time consultant to EPRI, was hired by Southern California Edison, Pacific Gas & Electric and four other utilities. These same utilities also paid for comments by Drs. Sander Greenland of UCLA and consultants Drs. Jack Sahl and Peter Valberg. They also sponsored a review by Dr. Lisa Croen of Kaiser Permanente—she agreed with the report's conclusion on miscarriages.

Attorney Tom Watson of Watson & Renner in Washington, DC, who represents the Utility Health Sciences Group, assembled a team featuring Drs. John Boice of the International Epidemiology Institute, Mark Israel of Dartmouth Medical School and Robert Tarone of the National Cancer Institute, each of whom filed separate critical comments.

The Edison Electric Institute in Washington turned to the Exponent Health Group, which points to the "strong possibility that there is no risk at all" (see also p.8). EPRI's Dr. Rob Kavet wrote his own comments.

Many others, however, filed positive comments. Dr. Herbert Needleman of the University of Pittsburgh called the report an "extremely valuable and sound analysis." Dr. Anders Ahlbom (see below) congratulated the authors for their "most comprehensive and ambitious risk evaluation." Among the others who supported the report are: EPA's Dr. Carl Blackman, NIOSH's Joseph Bowman, Dr. David Savitz (see p.3) and Dr. Gilles Thériault of McGill University.

All the comments, along with the EMF program's responses, will be posted on the Internet in late February. Print copies are also available from the City Copy Center in Oakland; call (510) 763-0193 for price information.

Health Canada Review: Transport EMFs Present Little Hazard

The prospect of a significant health threat from the EMFs generated by electrical transportation systems is "rather speculative and remote," according to a new report prepared for Health Canada by Dr. Tony Muc of Radiation Health and Safety Consulting in Toronto. He notes, however, that exposures over 1G are common and that "relatively little scientific investigation of transportation system EMFs has been carried out to date."

Muc analyzed EMF exposures of the public and workers associated with a number of currently used or projected technologies, including high-speed rail, Maglev, electrified railways, subways, trolleys and electric cars. In his view, the complexity and variability of transportation EMF exposures "far exceed the complexity addressed by present standards and guidelines."

Dr. Aviva Brecher of the U.S. Department of Transportation in Cambridge, MA, told *Microwave News* that the report "reinforces our conclusion that transportation EMF exposures are unique in their high degree of variability." Much of the data on EMF exposures presented by Muc is adapted from measurement surveys initiated by Brecher some years ago (see *MWN*, J/A93 and M/J99).

Muc also includes information from ongoing projects and yet-to-be-published research. For instance, measurements inside Washington Metro subway cars found fields ranging from 100 G to 1,000 G at floor level, generated by currents of up to 600 A.

Muc closes on a quirky note. He quotes, with approval, the view, written in Italian, of two obscure researchers that there are no demonstrable health risks. Their paper, presented at the 1996 annual meeting of the Automobile Club of Italy, "can hardly be claimed" to have been peer reviewed, Muc acknowledges.

The report was submitted to Health Canada last May. Muc only recently posted it on his Web site, <www.rhsc.ca>. Print copies can be purchased from RHSC for C$60 (US$40) each by writing to TransEMF, 64 Donlea Dr., Toronto, ON M4G 2M4, Canada, or faxing (416) 425-4233.

Debate Over Miscarriages and Exposure Index *(continued from p.1)*

Dr. Raymond Neutra of the California Department of Health Services in Oakland, whose EMF Program helped sponsor Li's study, uses an analogy to noise pollution to explain the significance of what Li calls maximum magnetic field (MMF) exposure. "One is not really interested in the cumulative amount of noise," he said in an interview, "but rather in the loud noise that wakes you up at night."

Dr. David Savitz is skeptical that Li's new exposure index has much meaning. In an editorial accompanying Li's paper, Savitz argues that the MMF index is probably little more than a random indicator.

In his prospective study, Li found no increased risk of miscarriage for time-weighted average (TWA) magnetic field exposures, but the risk of a spontaneous abortion almost doubled for those women who were exposed to a magnetic field of 16 mG or more for at least ten seconds. For those women exposed to 16 mG or more who said that the 24-hour magnetic field measurements were taken on a "typical day," the risk was three times that expected and close to six times higher for those women who had a miscarriage less than ten weeks into their pregnancies (see table at right for Li's results). "Our results are very coherent and provide strong evidence of a miscarriage risk," Li said.

"It's very comforting to me that, after our study found the association with MMFs, Raymond Neutra and Gerri Lee went back and looked at their own data and found a similar link," Li said. The Lee and Neutra miscarriage study appears in the same issue of *Epidemiology*.

"We are not saying that a single short exposure during the whole pregnancy is enough to lead to miscarriage," Li said. "We are saying that, if the measurement was taken on a typical day, then a woman was probably exposed to 16 mG almost every day. Our study could not answer how long or how often a woman had to be exposed to affect the pregnancy."

Nor did Li's study shed much light on the sources of the women's magnetic field exposures, though he notes that fields above 16 mG are routinely found near electrical appliances in the home and electrical equipment in the workplace, on electrically powered transit systems (see story above) and under some power lines.

Savitz, who is at the University of North Carolina, Chapel Hill, ascribes the different MMF exposures to behavioral differences between those who are and those who are not pregnant. He writes that Li's results really show that pregnant women limit their mobility due to bouts of nausea or to their increased girth. "Women who have lost or will soon lose their pregnancies are less likely to be nauseated and more likely to be mobile and thus will tend to have higher peaks and more variability in exposure," according to Savitz.

Not so, respond Li and Neutra in a letter that will appear in the March issue of *Epidemiology*. "We tested 30 different poten-

MMF and Risk of Miscarriage

Women Exposed ≥16 mG	Risk Ratio*	95% CI
All miscarriage	1.8	1.2-2.7
Early miscarriage†	2.2	1.2-4.0
Susceptible women‡	3.1	1.3-7.7
Measurement on typical day	2.9	1.6-5.3
Typical day/susceptible women‡	4.0	1.4-11.5
Typical day/early miscarriage†	5.7	2.1-15.7

* MMF ≥ 16 mG vs. MMF < 16 mG.
† Less than ten weeks of gestation.
‡ With multiple prior fetal losses or subfertility.

De-Kun Li et al., "A Population-Based Prospective Cohort Study of Personal Exposure to Magnetic Fields During Pregnancy and the Risk of Miscarriage," *Epidemiology, 13,* pp.9-20, January 2002.

tial confounders, including nausea, and none of them made the EMF association go away," Li said.

"I am not totally convinced," Savitz told *Microwave News*. He has written a second response to the journal, which prompted a further reply from Li and Neutra. (See box below for excerpts from their exchange.)

Other epidemiologists who are watching from the sidelines approve of the public debate, which spans three issues of the journal.

"The dialogue is healthy," said Dr. Kenneth Rothman of Boston University. "I am sure Li's findings will make a lot of people uncomfortable." He added: "By delving into other methodological explanations, Savitz is making a very important contribution." Rothman is the former editor of *Epidemiology*.

Similarly, Dr. Anders Ahlbom of the Karolinska Institute in Stockholm said that Savitz's commentary is an "excellent demonstration on how to write a good editorial."

Dr. Nancy Wertheimer in Boulder, CO, commented that she was pleased that Li had looked beyond TWAs, but, she noted, "I would like to know more about what these exposures above 16 mG indicate. The question is whether going over 16 mG points to some other aspect of electromagnetic exposures which could be responsible for the miscarriages."

Savitz said that Li's study is much better than the past EMF–miscarriage studies. He stressed that, putting aside the question of the MMF index, "The lack of an association with TWAs in Li's study is striking and that should not be ignored."

Despite all his skepticism, Savitz concludes his first commentary by stating that the new exposure index "deserves further scrutiny and is likely to get it." But, like Wertheimer, Savitz believes money would be best spent understanding the sources of 16 mG exposures.

What Does Maximum Magnetic Field (MMF) Mean? Li & Neutra and Savitz on Nausea, Mobility and Random Motion

"...Perhaps the investigators have pinpointed biologically important indices, as they suggest. But it seems even more plausible that the results are based on behavioral differences between women with healthy pregnancies and women who either experienced a miscarriage or were destined to have one....All other things being equal, a woman experiencing nausea will be less likely to move around her home or workplace or community, and therefore less likely to experience the diverse magnetic field sources in those places. As a result, she is less likely to encounter high magnetic field peaks and less likely to have substantial magnetic field variability over time. At its extreme, nausea can keep a woman in bed or at least in her home for much of the day. Thus, nausea (a marker of low risk of miscarriage) will be associated with lower peaks and variability in magnetic fields. Women who have lost or will soon lose their pregnancies are less likely to be nauseated and more likely to be mobile and thus will tend to have higher peaks and more variability in exposure. Thus, nausea may explain the association between magnetic field peaks and miscarriage...."

David Savitz, "Magnetic Fields and Miscarriage" (Commentary), ***Epidemiology, 13,*** **pp.1-3, January 2002.**

"...[Li] evaluate[d] this hypothesis directly, [with] information [collected in the in-person interviews] on nausea and related symptoms such as vomiting...As expected, nausea and vomiting themselves were associated with a reduced risk of spontaneous abortion (hazard ratio (HR)=0.3, 95% confidence interval (CI)=0.2-0.4 and HR=0.3, 95%CI=0.2-0.4, respectively). However, the frequency of nausea or vomiting was very similar for women exposed to maximum MF>16 mG (exposed) and to maximum MF<16 mG (unexposed)...After adding the nausea and vomiting variables to [our] model, the hazard ratio for the association of MMF with risk of spontaneous abortion remained essentially the same, if not strengthened...These results do not support the suggestion by Savitz that nausea or vomiting could influence MMF exposure or that adjusting for them might modify the measure of association between MMF exposure and the risk of spontaneous abortion...."

De-Kun Li and Raymond Neutra, Reply to Savitz, ***Epidemiology,*** **March 2002 (in press).**

"...[My original] rationale is that we are surrounded by magnetic field sources, ranging from pencil sharpeners to sewing machines to photocopiers, and that the only difference between someone who encounters such an exposure and someone who does not is the extent of random movement through their otherwise similar environments. If, indeed, moving around were the issue, then there are reasons to believe that nausea of early pregnancy or advanced size of later pregnancy would inhibit such Brownian motion....[T]he virtual lack of correlation between early and late pregnancy for MMF (r=0.09) and rate-of-change metric (r=0.19), far lower than for the time-weighted average [TWA] (r=0.64), would be consistent with a nearly random phenomenon. However, a random event would not be expected to be associated with risk of miscarriage...Putting aside the biological plausibility of an effect of MMF of 16 mG or higher...we are left with the question of what these measures capture about a woman's environment and behavior. Before taking on the extremely challenging goal of replicating the association with magnetic fields, the more modest and readily attainable goal should be to determine what is driving these indices...."

Savitz, Response to Li and Neutra, ***Epidemiology,*** **March 2002 (in press).**

"In his latest response...Savitz considered the measure of MMF untrustworthy because he speculates that measuring MMF is like measuring 'a random event.' An implicit assumption in his speculation is that MMF is highly associated with daily activities and daily activities are essentially random events. While we would agree that MMF is probably more likely than TWA to be related to daily activities, daily activities are by no means 'random events.'...[Our] study also showed that no association was found if the study was restricted to women who were measured on a nontypical day. This suggests that peak exposures need to occur on a daily basis in early pregnancy to have an effect. Of course the ultimate resolution to the reliability of MMF measurement will come from studies that measure MMF on multiple days...[S]tudies are [also] needed to identify the mix of sources that produce these peaks...."

Li and Neutra, Further Response to Savitz, ***Epidemiology,*** **May 2002 (in press).**

Tenforde To Lead NCRP; RF/MW Panel May Be Revived

Dr. Thomas Tenforde is set to become the next president of the National Council on Radiation Protection and Measurements (NCRP) in Bethesda, MD. Currently the senior chief scientist at the Battelle Pacific Northwest Labs in Richland, WA, Tenforde will move to the Washington, DC, area as soon as he is formally elected.

The directors of the NCRP recommended that Tenforde become president at their December 17 board meeting. The next step is for the council's nominating committee to endorse the board's decision. The entire NCRP membership will vote on the nomination at the council's annual meeting on April 11. This process is "usually perfunctory," William Beckner, NCRP's executive director, told *Microwave News*.

The NCRP has always placed the most emphasis on ionizing radiation and this will no doubt continue. Nevertheless, Tenforde will have to address two pieces of unfinished business on non-ionizing radiation: whether to reinstate Dr. James Lin's committee on RF/MW radiation and whether—and in what form—to issue a report on extremely-low-frequency (ELF) EMFs drafted by a committee chaired by Dr. Ross Adey.

Last summer, on the recommendation of Ron Petersen, NCRP vice president for non-ionizing radiation and a member of its board, Lin's committee was disbanded because it was moving too slowly (see *MWN*, S/O01). At their December meeting, the directors of the NCRP asked Tenforde to consult with Lin and Petersen on whether the committee should be revived. Lin's work on updating NCRP's 1986 RF/MW exposure limits began in 1995 (see *MWN*, S/O95). Tenforde is scheduled to report back to the board by the end of February, according to Beckner.

"I hope we can move forward," Tenforde told *Microwave News*. "I am open to a variety of actions to resolve the differences of opinion. It might require adding or replacing some members of the committee. We have a lot of flexibility."

In an interview, Petersen said a key element in reviving Lin's panel is fund-raising, given the council's budget shortfall.

Lin, who is at the University of Illinois, Chicago, is encouraged by the news that his committee might soon be back in business. But at the end of January, as we go to press, Lin said that he had not yet heard anything from Tenforde or the NCRP.

The NCRP began work on the ELF EMF report under a contract from the Environmental Protection Agency in 1983 (see *MWN*, D83). In an 800-page draft completed in 1995, Adey's panel urged that strong action be taken to control EMF exposures (see *MWN*, J/A95). The report has been under review and revision ever since.

In the summer of 1999, NCRP President Charles Meinhold said that the NCRP would post a draft of the report for public comment on its Web site by the end of the year (see *MWN*, J/A99). It was not clear whether the NCRP would include Adey's recommendations. Then last fall, Meinhold reiterated that the report would be released—but, he said, the recommendations would be omitted (see *MWN*, S/O01). Nothing has yet appeared, however. Adey, now semiretired, is based in Redlands, CA.

"I don't have a plan," Tenforde said about the ELF EMF report. "I'm thinking about the options." He called the document a "remarkable resource that contains a wealth of information." But he also wondered whether there was sufficient interest in EMFs to warrant its publication by the NCRP.

Part of Tenforde's hesitation over the EMF report is due to his long-held skepticism that magnetic fields are responsible for the association between childhood leukemia and power lines. "The bulk of the data, especially the laboratory data, do not support the link," he said. "There may be something else we do not understand that can explain the association." (For more on Tenforde's interest in other explanations, see *MWN*, N/D88).

Meinhold, who is with the Brookhaven National Lab in Upton, NY, has led the NCRP since 1990. He has wanted to step down for some time, but the board has had a hard time finding a replacement.

The presidency will continue to be a part-time position. But Tenforde made it clear that he will be devoting a lot of energy to his new job and would place special emphasis on fund-raising. "I plan to spend much of my time working on the NCRP. A lot of things need attention."

Tenforde has had a long association with the NCRP. He was first elected to the council in 1988 and was appointed the scientific vice president for non-ionizing radiation in 1995. He served until 2000, when he was replaced by Ron Petersen, then of Lucent Technologies and now a consultant (see *MWN*, M/J00).

Tenforde has been a member of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) since 1992. He will complete his third and final term in 2004.

Beckner has agreed to continue as executive director for at least a year, but not longer than two. He said that he will soon be 70 and that it is time to move on.

Russia Offers RF Weapons

Russia's arms export agency, Rosoboronexport, is offering two powerful RF electronic warfare weapons—but only qualified buyers with deep pockets need apply.

The weapons, called Ranets-E and Rosa-E, were presented at Malaysia's International Maritime and Aerospace Exhibition (LIMA 2001) in October, and on October 25, Rosoboronexport issued a press release over the *PR Newswire*.

The Ranets-E, a ground-based "cannon," uses 10-20 nanosecond pulses at around 30 GHz with an output power of more than 500 MW, and, according to the release, "is capable of incapacitating an enemy's high-precision weapons in a radius of 10 km." Rosoboronexport claims that it can disable a missile's guidance system. Rosa-E, operating in the same frequency range with an output power of 5-10 kW, can zap radar systems at a distance of 500 km.

Rosoboronexport makes the following qualification:

> Clients may not purchase a finished product or the technical documentation of either model. Potential customers need to clearly define their tactical and technical preferences as well as finance the Russian researchers' and producers' work. After this, their request will be accepted or denied. If accepted, they can receive a model after concluding a special agreement. The model can be tested at a military range.

Standards Watch: German, Spanish and U.S. Developments

The **German** government is sticking with **ICNIRP** and shelving a proposal to adopt a stricter standard for mobile phone antennas. Last July, the Federal Environment Ministry announced that it was weighing the adoption of precautionary limits for RF/MW radiation, citing Switzerland's 4 V/m (4 μW/cm^2) standard as a possible model (see *MWN*, J/A01). But such strict standards are "not scientifically justified at present," the prime minster's office stated on December 7. Instead, the government is calling for voluntary measures—that is, prudent avoidance. Germany's **Radiation Protection Commission**, a panel that advises the government, supported a mix of the ICNIRP limits and prudent avoidance in a report released in September (see *MWN*, S/O01). The commission, whose resident expert on non-ionizing radiation is Dr. **Jürgen Bernhardt**, the vice chair of ICNIRP, called for "minimizing" exposures to both EMFs and RF/MW radiation, especially in places where people spend a significant amount of time. The mobile phone operators oppose precautionary limits and it is widely believed that they made a deal to sponsor health research in order to avoid them (see p.8 and *MWN*, M/J01).

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Spain has also decided to follow **ICNIRP**, with an added helping of precaution. On September 29, the Spanish parliament approved a new law, a Royal Decree, which requires that exposures from all **RF/MW** sources meet ICNIRP's limits for the general population. The Ministry of Health and the Ministry of Science and Technology had drafted the law, based on the advice of an expert panel. The panel's report, issued in August, concluded that the existing scientific evidence supports the ICNIRP guidelines and noted that the EU Council of Ministers had recommended that all member states adopt the ICNIRP limits (see *MWN*, J/A99). The panel, however, also pointed to biological effects that occurred at lower levels and advocated a "precautionary" approach. As a result, the new law requires that SARs be provided with all mobile phones and that base stations be sited to minimize exposures in schools, hospitals and other "sensitive areas." The expert panel also endorsed the ICNIRP limits for **ELF EMFs** with a recommendation that power lines be located to avoid unnecessary exposures. The parliament did adopt the ELF guidelines, but without establishing a mechanism to enforce them and without including any of the precautionary language. Dr. **Alejandro Úbeda**, a research scientist at the Ramón y Cajal Hospital in Madrid who coordinated the panel's work with Dr. Francisco Vargas of the Ministry of Health, told *Microwave News* he is disappointed that his report did not mention IARC's designation of ELF EMFs as possible human carcinogens (see *MWN*, J/A01). He explained that the nine-member panel had already completed its work by the time the IARC committee met for its EMF review last June. The report, *Electromagnetic Fields and Public Health*, is available at <www.msc.es/salud/ambiental/ondas/camposelectromag.htm>. The Ministry of Science and Technology has posted the text of the ordinance, *Real Decreto 1066/2001*, at <www.mcyt.es/notas_prensa/gabinete_mcyt/oct2001/rdemisiones.htm>, along with a summary of its main provisions. These documents are all in Spanish, but an English translation of the expert panel's report will be available soon, according to Úbeda.

SAR Measurement Protocol Almost Completed (Really)

After five years of work, the IEEE's standard for measuring SARs from mobile phones will soon be completed.

"All the issues have been resolved," Ron Petersen, the chair of the IEEE's Committee on Product Safety with Respect to Electromagnetic Energy (SCC-34), told *Microwave News*. A vote by the full committee will take place in April, and the standard could then be forwarded to the IEEE Standards Board for a final okay in September.

"It was much more work than I ever expected," said Howard Bassen of the FDA's Center for Devices and Radiological Health in Rockville, MD, who chaired the SCC-34 subcommittee that wrote the standard. "The manufacturers need a very detailed protocol, which gives very accurate SARs, in order to meet the needs of the regulatory agencies." The standard was originally requested by the FCC in 1997 (see *MWN*, M/A97 and J/F01). The next meeting of Bassen's subcommittee will be in Ottawa, May 2-3.

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Dr. **Ralf Bodemann**, who is responsible for EMF issues at **Siemens**, has been appointed vice chair of the IEEE International Committee on Electromagnetic Safety (**SCC-28**). Bodemann, an active member of the EMF Working Group of the Trans Atlantic Business Dialog, is based in Munich, Germany....Lt. Col. **Bruce Ruscio** of the U.S. **Air Force** has taken over as chair of the panel reviewing the epidemiological literature for the ongoing revision of SCC-28's RF/MW exposure standard (see p.1). Ruscio is much involved in the continuing controversy over the USAF's PAVE PAWS radar on Cape Cod.

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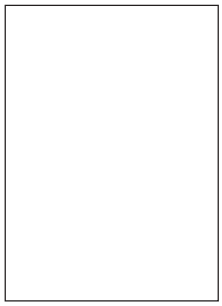
IEEE SCC-28 has threatened to take legal action against the **EMR Network** for posting the September draft revision of the IEEE RF/MW exposure standard on the Internet (see *MWN*, S/O01). The draft is "an internal document" and the property of the IEEE, Dr. **Eleanor Adair**, the chair of SCC-28, wrote in a December 8 e-mail demanding its immediate removal. "If this is not done," Adair warned, IEEE's lawyers "can take appropriate action." Deb Carney, an attorney in Golden, CO, said that the network has no plans to comply with Adair's demand. The issue may now be moot: The SCC-28 subcommittee revising the standard has decided to take a fresh look at key provisions of the proposal (see p.1). At press time, the draft was still in the "news" section of the network's site, <www.emrnetwork.org>.

consensus to return to a two-tier standard, the same way the existing standard is now structured. But in San Antonio, the subcommittee decided to "reconsider the two-tier approach." (A consensus statement of the Fort Lauderdale group, and how it was modified by those in San Antonio, appears below.)

The division within ICES has prompted some members to back away from a full-scale revision of the current standard in favor of making small, incremental changes. "There was a sense in San Antonio that the old standard isn't too bad and that some parts need tuning up," said Ron Petersen, the executive secretary of SCC-28. "I don't see much wrong with what we have now," added Petersen, a consultant based in Bedminster, NJ, who used to work for Lucent Technologies.



"Everything is open."
—Dr. Eleanor Adair

Part of the reason for the different outcomes at the two meetings is that those representing the federal health agencies were present only in Fort Lauderdale, not in San Antonio. "There is a different perspective in the group when the health agencies are present," commented Dr. Gregory Lotz of the National Institute for Occupational Safety and Health (NIOSH) in Cincinnati.

While many members of ICES still want a one-tier standard, the health agencies are unified against it. "A standard that does not recognize the need for safety factors for different members of the population would have little value," said Robert Curtis, the director of the Occupational Safety and Health Administration's (OSHA) Health Response Team in Salt Lake City.

A number of those in Fort Lauderdale were pleased with the progress made at the meeting. "I think we are moving in the right direction toward a scientifically supportable standard," said Dr. Robert Cleveland of the Federal Communications Commission in Washington.

"The earlier draft was based on faulty concepts and we are back to a more acceptable proposal," said Dr. Niels Kuster of IT'IS in Zurich. Neither Kuster nor Cleveland attended the San Antonio meeting.

But not all those at the Florida meeting agreed with the proposed changes, as later became clear in Texas. Some resent the pressure from the federal health agencies. "There were some remarks in Fort Lauderdale that 'if you don't do it our way, we aren't going to play' and people did not like it," said Dr. John Leonowich, a staff scientist at the Battelle Pacific Northwest Labs in Richland, WA. Leonowich did not go to San Antonio.

Some see the split as the health agencies against everyone else. But, in fact, the four Motorola staff members who were at the Fort Lauderdale meeting did not appear to be backing a full-scale relaxation of the existing standard. "Motorola's participation was definitely helpful in revising the proposal drafted by the Revision Working Group," said NIOSH's Lotz.

One of the many unresolved issues is whether the new limit for partial-body exposures should be changed. (The draft had proposed raising it to 10 W/Kg.) Also undecided are the size and shape of the averaging volume.

SCC-28 Working Group: Consensus Statement

At a January 10-11 meeting held at Motorola's offices in Ft. Lauderdale, FL, the Revision Working Group of IEEE's SCC-28 agreed on a consensus statement for revising the IEEE's standard for RF/MW radiation exposures. This statement, reprinted below, was then modified by SCC-28's subcommittee 4 at its meeting in San Antonio, January 19. Text that is struck through below was deleted in San Antonio, and the text that was added is in italics.

Based on our current understanding and pending the conclusion of the review and white paper process, the consensus of the Revision Working Group is as follows:

1. The RF safety standard should be based on science.

2. RF safety standard revision should be derived from peer-reviewed publications and documents that are reviewed by the SC-4.

3. The adverse effect level remains at 4 W/Kg subject to revision following completion of the literature evaluation and white papers.

4. The maximum exposure limits should be based on established adverse effects after inclusion of an appropriate safety factor(s).

5. Safety factor(s) should consider uncertainties in the biological database (e.g., ~~unknown health consequences,~~ measurements, environmental conditions, exposure duration, individual variability, and other factors).

6. Nonthermal RF biological effects have not been established and none of the reported nonthermal effects are proven adverse to health (does not apply to electro-stimulation). Thermal effect is the only established adverse effect.

7. The microwave hearing effect is not adverse and should not be used for setting the peak power limit.

8. The shape and size of the averaging volume and the peak SAR limit ~~will be determined after the WHO temperature workshop in March~~ *are still to be determined*. The important end point is the temperature change.

9. RF standard should be harmonized with other international standards to the extent where scientifically defensible.

10. Rationales must be documented for all changes relative to the current standard.

11. *The editorial committee w*~~W~~ill add *in the informative section a paragraph* dealing with potentially sensitive subpopulations, such as children.

12. *Reconsider* ~~Keep~~ the two-tier approach (whole-body average SAR 0.4 and 0.08 W/Kg), ~~and leave~~ the peak SAR value and averaging volume. ~~blank, which are to be decided after the WHO temperature workshop results become available.~~

The partial-body limits are crucial to Motorola and the rest of the telecom industry because they determine the allowable specific absorption rate (SAR) for mobile phones. Essentially all parties agree that this part of the current standard was set arbitrarily. "We recognize as a group that the partial-body exposure limit is less-than-well-founded on science," said OSHA's Curtis.

Further debate on the partial-body limit has been delayed until after the March thermoregulation workshop being organized by the WHO's EMF project (see p.13). Most of those who will attend—with the exception of Adair and Motorola's Dr. Joe Elder—will be from outside the RF/MW community. WHO's Dr. Leeka Kheifets declined to disclose the invitation list.

At the San Antonio meeting, SC-4 asked members to submit a one-page statement on key elements of the standard—for instance, whether the standard should be one-tier or two-tier and whether the SAR averaging volume should be 1g or 10g. Tell said that these viewpoints are due by March 1 and will be assembled for the next meeting of the Revision Working Group, in Washington, April 8-9.

Dr. C.K. Chou, cochair of SC-4, told *Microwave News* that the subcommittee is not planning to respond directly to the 14 questions raised by the federal health agencies but that they would be addressed in the revised standard (see *MWN*, J/A99).

The goal is to have a first draft of a new standard for the next SC-4 meeting, which will be held in conjunction with the Bioelectromagnetics Society's annual conference in Quebec City, Canada, during the last week of June—and a completed draft for a vote by the full SC-4 at the end of the year.

« Eye on Europe »

Germany's six service providers have agreed to sponsor a four-year health **research program**, with a total budget of €8.5 million ($7.6 million) in exchange for the government's pledge not to tighten exposure limits for mobile phone towers (see p.6). In addition, the companies promised to give local officials and the public a greater role in decisions on siting base station antennas, to avoid the placement of antennas near schools or kindergartens and to install a network of measurement stations to monitor RF/MW radiation from their systems. Government officials welcomed these measures as "an important contribution" and said that they will monitor their implementation by the carriers. The new industry-backed research program would supplement a government-funded effort announced last summer (see box on p.9). According to the environment ministry, an "independent body" will direct the industry program, but a spokesperson for T-Mobil in Darmstadt told *Microwave News* that no decision has yet been reached as to who will run it.

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The fallout continues from the letter by five **Swedish professors** attacking Drs. **Lennart Hardell** and **Olle Johansson** for "talking nonsense" about mobile phones, dioxin and other health risks (see *MWN*, S/O01). The letter was translated into English and republished in the *Bioelectromagnetics Society Newsletter*, which is edited by Dr. **Mays Swicord** of Motorola. In a letter that appeared in the next issue of the newsletter (November/December), Dr. **Kjell Hansson Mild** of the National Institute for Working Life in Umeå, Sweden, wrote that he is "astonished" that he, a past president of BEMS and a collaborator of Hardell's, was not given the opportunity to respond. In an accompanying letter, Dr. **Michael Kundi** of the University of Vienna writes that instead of "muzzling" scientists who don't agree with the majority, a strategy should be devised to convince the public that its concerns are being taken seriously. Then on December 17, the Swedish tabloid *Aftonbladet* ran an exposé on one of the five professors, Dr. **Hans-Olov Adami**, an epidemiologist at the Karolinska Institute in Stockholm. NOBEL PROFESSOR HIRED BY CHEMICAL GIANT ran the headline. (Adami is a member of the selection committee for the Nobel Prize.) At issue is Adami's work for **Exponent** Inc., which does a lot of consulting work for the chemical industry—and specifically on dioxin. Dr. **Jack Mandel**, who runs Exponent's health and envionmental group, did not respond to a request for confirmation of his relationship to Adami. (Mandel has criticized EPA's and IARC's designation of dioxin as a known human carcinogen.) Exponent's Dr. **Michael Kelsh**, based in Menlo Park, CA, told *Microwave News* that Adami had not worked on his study of Motorola workers (see *MWN*, M/A00). Adami told *Aftonbladet* that industry could never make him say anything that he could not defend scientifically.

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Telecommunications antennas and toxic chemicals are being blamed for a **cancer cluster** in the provincial capital city of Valladolid, north of Madrid. The story has drawn widespread attention not only in **Spain** but across Europe. Beginning in December 2000, three children at an elementary school with approximately 450 students have been diagnosed with leukemia—a rate many times greater than the national annual incidence of 4.3 cases per 100,000. In addition, a fourth child at the school was diagnosed with Hodgkin's disease. In October, parents petitioned the courts for an order to turn off the transmitters—operating at 3.5 GHz and 26 GHz—on the roof of a building near the school. A report on a preliminary investigation of the cluster, issued in November, eliminated the antennas as a cause, primarily because they had been operating only a month before the first case was diagnosed. Unconvinced, a municipal judge on December 21 ordered the antennas be turned off. Media coverage of the incident has been so extensive that the **WHO** EMF project was moved to issue a statement to the press on January 23 correcting what it calls a "distortion" of its position on the possible health effects of radiation from mobile phones and base stations. The project managers, Drs. Leeka Kheifets and Michael Repacholi, asked journalists to distinguish between ELF EMFs and microwaves. It is the former, not the latter, that was designated a possible hu-

man carcinogen by IARC last summer, they explained (see *MWN*, J/A01). A full-scale investigation of the Valladolid cluster is now under way, focusing on the children's exposures to toxic chemicals and both ionizing and non-ionizing radiation, according to the January 12 issue of the *Lancet.*

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COST281, **EBEA** and **ICNIRP** have taken their case against precautionary-based exposure limits to the president of the European Parliament—and have posted the letter on the COST281 Web site. In a November 27 letter to Nicole Fontaine, Drs. **Norbert Leitgeb**, **Paolo Vecchia** and **Jürgen Bernhardt**, representing the three organizations, respectively, argued that standards should not be "based on fragmentary scientific evidence or the scientifically unrepresentative opinions of a few individuals." Just in case there is any doubt as to whom they are referring, their letter is posted right above COST281's critique of Dr. **Gerard Hyland**'s report on low-level health effects (see *MWN*, N/D01). Hyland's paper is now available at the COST281 Web site. All three documents are at: <www.cost281.org/activities.php>. The COST281 review of the Hyland report was originally requested by Dr. **Tom McManus**, the chief technical advisor at **Ireland**'s Department of Public Enterprise in Dublin. In mid-January, Pat Cox of Ireland became the new president of the European Parliament.

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Gert Anger of the **Swedish Radiation Protection Authority** (SSI) has issued a new report on **SARs** and **emitted power** from 21 different mobile phones operating at 900 MHz and 1800 MHz. Most of the SAR measurements, carried out by IMST in Kamp-Lintfort, Germany, according to the 1998 CENELEC protocol, were released last year (see *MWN*, M/A01). Emitted power is an indicator of the amount of power used for communication (see *MWN*, J/F01). Anger found that the average phone used only 16% of its available power. The report (2002:01, released January 17), which is in Swedish with an English abstract, is available on the SSI's Web site, <www.ssi.se>. (See also p.2.)

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In a new report, the **Health Council of the Netherlands** has found that radiation from mobile phones "does not constitute a health hazard, according to the present state of scientific knowledge." In contrast to the advice of expert panels in England, France and Germany, the Dutch council "feels there is no need for recommending restrictions on the use of mobile phones by children." The council allows that some biological effects have been documented in experimental studies, but that these are "minimal" and "reversible" and "cannot be considered hazardous to health." The report, released on January 28, was drafted by the council's EMF committee, chaired by Dr. **Eric Roubos**, a professor of zoology at the Catholic University of Nijmegen. A copy of the full 96-page report is available in English on the council's Web site, <www.gr.nl>. A copy may also be ordered from the council by fax: (31+70) 340-7523 or by e-mail: <order@gr.nl>. The council has previously issued reports on GSM radiation and on EMFs (see *MWN*, N/D00 and M/J00, respectively; also J/A01).

Germany Plans Broad Research Program on Mobile Phones

The Federal Radiation Protection Office in Salzgitter, Germany, is considering proposals on 15 different projects in its new research program on mobile phone safety (see *MWN*, J/A01). The four-year effort, which is being administered with the assistance of the Federal Environment Ministry, has a total budget of €8.5 million ($7.6 million).

Among the proposals requested by the radiation office are:

- A repeat of the Australian mouse lymphoma experiment known as the Repacholi study, but with a different type of transgenic mouse: the *AKR/J* strain instead of the *Pim1* strain. In addition, the mice would be exposed to SARs "substantially below," as well as close to, the ICNIRP limits.
- *In vivo* experiments investigating effects of GSM and UMTS (3G) signals on the ears and eyes and looking for genetic and other effects in rats over several generations of exposures.
- Research on effects in isolated pineal glands under various exposure conditions.
- Studies of protein expression, signaling and other functions in various cell types exposed to both pulsed and CW radiation.
- An assessment of the feasibility of a study of health risks among people in occupations with high RF/MW exposures.
- An epidemiological analysis, beginning with a pilot study, of health complaints and radiation from mobile phone base stations, with a study population of approximately 2,000.

The list of proposed projects, posted at <www.bfs.de/forsch/index.html>, also includes a study of lymphoma in mice exposed to 50 Hz EMFs. The deadline for submitting applications was January 5.

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The **U.K.**'s National Radiological Protection Board (**NRPB**) has been folded into a new government agency, whose main mission will be to control infectious diseases. Sir **Liam Donaldson**, the chief medical officer at the Department of Health, announced the reorganization on January 10. The National Infection Control and Health Protection Agency is designed to "provide an integrated approach to protecting the health of the public against infectious diseases as well as chemical and radiological hazards," the department stated. The threat of a terrorist attack was only part of the reason for the shuffle: epidemics of BSE and foot-and-mouth disease have caused huge economic losses across Britain. "We have been assured that the NRPB will remain a distinct entity within the agency," NRPB's Dr. **Michael Clark** told *Microwave News.* Clark said that the NRPB staff—like many observers—were surprised by the changes.

U.K. Mobile Phone Research Under Way; Fifteen Projects Receive $6.4 Million

On January 25, the U.K. Mobile Telecommunications and Health Research Program announced its first 15 projects, with total funding of approximately £4.5 million ($6.4 million). The program, which has a total projected budget of £7.4 million ($10.5 million) and is supported equally by industry and government, was recommended by Sir William Stewart in his May 2000 report (see *MWN*, M/J00).

The big winners are epidemiologist Dr. Anthony Swerdlow, who will receive close to a quarter of all the money awarded, and MCL, formerly called Microwave Consultants Ltd., which also got two grants (and is consulting on a third). Swerdlow is a member of the National Radiological Protection Board's (NRPB) Advisory Group on Non-Ionizing Radiation (AGNIR), as well as of ICNIRP. Dr. Edward Grant, a director of MCL, was a long-time member of the AGNIR who very recently stepped down. NRPB researchers received a total of £731,000 (more than $1 million).

Dr. David de Pomerai, a relative newcomer to RF/MW research, was thrilled at winning a grant. "It will be a change not to run my microwave research on a shoe-string budget," he told *Microwave News.*

Details of each project listed in the table below are available at <www.mthr.org.uk>. The table also lists two additional mobile phone grants which were funded by the U.K. Department of Trade and Industry. A second call for proposals was issued at the end of last year (see *Nature*, December 6).

Name/Institution	Title	Cost/Years	Comments
Dr. Martin Bootman Babraham Institute	Effect of Pulsed RF EMFs on Redox Signaling & Calcium Homeostasis	£500,000 (≈3yr)	Use of new screening technology to monitor changes in cellular calcium and in nitric oxide
Dr. Peter Burns Transport Research Lab	Conversations in Cars: Relative Hazards of Mobile Phones	£75,000 (1yr)	Compare the distraction of use of hands-free phone with other common driver activities
Dr. Ray Cartwright University of Leeds	U.K. Case Control (CC) Study of Adult Brain Tumors	£265,000 (≈2yr)	Supports an extension to U.K. component of IARC Interphone study (see *MWN*, M/A00)
Dr. Philip Chadwick MCL	International EMF Dosimetry Project	£220,000 (3yr)	Coordinating international effort to provide free on-line resource for EMF and RF dosimetry
Dr. Robert Clarke National Physical Lab	"Traceability" for Mobile Telecom and Health Research	≤£97,000 (3yr)	Calibration services for those labs involved in the MTHR projects
Dr. David de Pomerai University of Nottingham	Cellular & Subcellular Effects of MWs in the Nematode	£323,000 (3yr)	Follow-up on stress response and changes in gene expression in roundworms (see p.14)
Dr. Peter Dimbylow NRPB	Assessment of SARs in the Head from TETRA Handsets	£75,000 (1yr)	Computer modeling and experimental measurements of the TETRA helical antenna
Dr. Paul Elliott Imperial College, London	Cohort Study of Mobile Phone Users (Pilot Study)	£202,500 (1yr)	Feasibility study for a long-term effort; Karolinska's Ahlbom is a member of the team
Dr. Camelia Gabriel MCL	Measurement of the Dielectric Properties of Biological Tissue at MW Frequencies	£350,000 (3yr)	Dosimetry for both pig and human tissues, and how dielectric properties change with age
Dr. Linda Luxon National Hospital for Neurology and Neurosurgery	Evaluation of the Effects of Mobile Phone Use on Labyrinthine Function	£180,000 (2yr)	Does RF cause imbalances in the ear, leading to headaches and nausea? (see *MWN*, J/A00); team includes Robin Cox and MCL's Chadwick
Dr. Simon Mann NRPB	Measurement of RF Power Densities near Microcell & Picocell Base Stations	£66,000 (1.5yr)	Further surveys at 20 sites (see *MWN*, J/A00); will work with EC/JRC project (see p.13)
Dr. Riccardo Russo University of Essex	Mobile Phone Radiation and Cognitive Function	£200,000 (2.5yr)	Double-blind studies on effects of GSM and analog signals on memory and attention
Dr. Zenon Sienkiewicz NRPB	Effects of RF Radiation on Brain Physiology and Function	£590,000 (3yr)	Looks for changes in specific areas of the brain, and in learning and memory performance
Dr. Anthony Swerdlow Institute of Cancer Research	CC Study of Leukemia in Relation to Use of Mobile Phones	£880,000 (4yr)	Will enroll 900 cases and 900 controls; ICR's Mel Greaves is on the team
Dr. Anthony Swerdlow Institute of Cancer Research	CC Study of Brain Tumors & Acoustic Neuroma Mobile Phones: SE England	£280,000 (2.5yr)	Will enroll 1,000 cases and 1,000 controls; part of the IARC Interphone study
Dr. Anthony Barker† Royal Hallamshire Hospital	Effects of Mobile Phone Radiation on Blood Pressure	£330,000 (2yr)	Five different signals, including TETRA, will be tested on 120 normal volunteers
Dr. Stuart Porter† University of York	Interactions of Emerging Mobile Telecom Systems with the Human Body	£454,000	Exposure and absorption from phones, hands-free kits, laptops, wearable PCs & base stations

*£1≈$1.42

†Sponsored by the Department of Trade and Industry

« Wireless Notes »

The long-awaited paper by Drs. **Ray Tice** and **Graham Hook** describing their work for Dr. **George Carlo**'s **WTR** on the genotoxic effects of mobile phone radiation appears in the February issue of *Bioelectromagnetics (23*, pp.113-126, 2002). Their experiments at ILS in Research Triangle Park, NC, are the centerpiece of Carlo's passionate claims that cell phone radiation can no longer be considered benign and that follow-up studies are needed (see *MWN*, M/A99 and J/A99). While Tice and Hook did not find any increases in DNA breaks, they did see more micronuclei in cultured human blood cells exposed to four different types of cell phone signals (both analog and digital) at SARs of 5 W/Kg and higher. ILS is repeating these *in vitro* studies under a **CTIA** contract, as is Dr. **Maria Scarfi** of the University of Naples (see *MWN*, M/J01). Carlo has also finally released the March 1999 report written for WTR by Drs. **Henry Lai** and **N.P. Singh** on their 1988 *in vivo* study of DNA breaks following exposure to analog 837 MHz radiation. This study has been the subject of a great deal of controversy (see *MWN*, M/A99 and M/J99). Attorneys at **Kirkland & Ellis**, which is representing Motorola in the ***Newman*** brain tumor lawsuit (see *MWN*, S/O00), have been demanding a copy of the Lai-Singh report for months. Carlo said that he did not want to release the report until it had been peer reviewed. Last fall, Carlo asked Dr. **Jerry Phillips** in Colorado Springs, CO, to do the peer review and the report was made available in December.

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Dr. **Russell Owen** is leaving the **FDA** to join the **EPA**'s National Health and Environmental Effects Research Lab in Research Triangle Park, NC. "I'm very excited about it," he told *Microwave News*. Since 1995, Owen has headed the radiation biology branch at the FDA's Center for Devices and Radiological Health in Rockville, MD, with responsibility for cell phones. At the EPA, Owen will be the chief of the molecular toxicology branch within the environmental carcinogenesis division. He said that he will be setting up his own lab but will not be doing research on the health effects of electromagnetic radiation. Nevertheless, he added, "I plan to stay active as a member of ICNIRP." He was elected to the commission in 1998. Owen is no stranger to the Durham-Chapel Hill area, having completed his undergraduate and graduate studies at Duke University. No word yet as to who will lead the FDA's effort on cell phones after Owen leaves in late February or March.

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Motorola has asked Dr. **Larry Anderson**'s group at the **Battelle** Pacific Northwest Labs in Richland, WA, to follow up on the experimental findings of Dr. **Pierre Aubineau** at the University of Bordeaux. Aubineau's work could explain why some users of cell phones develop headaches (see *MWN*, N/D01). The Battelle group will estimate the SARs in the dura mater, one of the membranes that surround the brain, according to Dr. **Mays Swicord**, Motorola's director of EME programs in Plantation, FL. "It's a small dosimetry contract," he told *Microwave News*.

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The **FCC** has denied the **EMR Network**'s petition that the agency take a fresh look at its RF/MW exposure guidelines—but the network is not giving up. On December 11, the FCC's Office of Engineering and Technology (OET) stated that it would not open an "inquiry," as the network had requested in the fall (see *MWN*, S/O01). Since it is "well established" that the FCC is not an expert health agency, it should not decide whether its RF/MW standard protects the public, OET's **Bruce Franca** told the network of grassroots groups fighting telecommunications towers. Instead, Franca referred the network to the EPA or the FDA, on whose advice the FCC "relied heavily" in developing its guidelines. On January 10, the EMR Network filed a formal appeal asking FCC Chair Michael Powell and the other commissioners to overrule the OET. Franca's argument is "astonishing," wrote **James Hobson** of Miller & Van Eaton in Washington, who is representing the network. The FCC "cannot lawfully avoid" its responsibility to stand behind its rules, he argued. **Janet Newton** of Marshfield, VT, the director of the EMR Network, pointed to the inconsistency in the agency's position. "When we asked the court to overturn the FCC's rules, the commission convinced the court that it *is* competent to decide which standard is appropriate," she told *Microwave News* (see *MWN*, M/A00 and J/F01). If the FCC denies the latest appeal, the network may go back to court. The FCC faces no formal deadline for responding to the appeal, but if it waits too long a judge could be asked to intervene.

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The **Friends of the Earth** (FOE) and the **Forest Conservation Council** have not fared any better than the EMR Network. On January 4, the **FCC**'s Wireless Telecommunications Bureau (**WTB**) dismissed petitions filed by the two groups seeking a single environmental impact statement (**EIS**) for *all* the antenna **towers** it licenses (see *MWN*, J/A01). The FOE and the council contend that the towers kill migratory birds, encroach on wildlife habitat and give off radiation that may be a human health hazard—and that the WTB okays thousands of towers with virtually no environmental review. The WTB ruling clears the way for the approval of more than 30 proposed towers that had been challenged by the environmental groups. The FCC argued that the FOE and the council are not legally qualified to challenge those tower applications—that is, they lack standing—and advised them to raise their concerns through the FCC's rulemaking process. "There may be legitimate issues here, but this is not the right way to raise them," WTB spokesperson Meribeth McCarrick told *Microwave News*. The forest council's John Talberth countered that his group had resorted to blocking the towers because the FCC had ignored earlier requests to open a rulemaking proceeding. "They know that these are important concerns," he said in an interview. "They just don't want to deal with them yet." Both Talberth and FOE's Brian Dunkiel said that they will appeal WTB's decision to FCC Chair Michael Powell and the other commissioners by the February 6 deadline.

FROM THE FIELD

Across the Spectrum

"It's sort of a no-brainer."

—Alex Story, 27, Alexandria, VA, on his decision to save $30 a month by terminating his landline phone service and relying exclusively on his mobile phone, quoted by Yuki Noguchi, "More Cell Phone Users Cut Ties to Traditional Service," *Washington Post,* p.E5, December 28, 2001

[S]hould we be making public health decisions for more than 100 million users of handheld cell phones on the basis of data from 106 patients, particularly when the latency for cancer to appear is typically longer than the latency experienced by these few patients?

—Dr. Allan Frey, Randomline Inc., Potomac, MD, "Hold the (Cell) Phone..." (letter), *Science,* pp.440-441, January 18, 2002. The 106 patients are those with brain tumors included in the Inskip and Muscat epidemiological studies, who had used cell phones for more than a short period of time (see *MWN,* J/F01). Both study teams concluded that they did not find a brain tumor risk. Frey's letter is in response to a November 16 article by Mark Parascandola on the upcoming *Daubert* hearing in the Christopher Newman cell phone–brain tumor lawsuit. Frey is a consultant to Peter Angelos's law firm in Baltimore, which is representing Newman (see also *MWN,* N/D01).

Letter to the Editor

ALS and Electroshock Therapy

December 26, 2001

To the Editor,

In amyotrophic lateral sclerosis [ALS] studies, it has been difficult to separate the relative etiologic contributions of EMFs and electric shocks. Patients receiving electroconvulsive shock therapy receive numerous electric shocks producing unconsciousness without chronic EMF exposures.

If electric shocks cause ALS, they should be a high-risk population.

Samuel Milham, MD
2318 Gravelly Beach Loop, NW
Olympia, WA 98502
E-mail: <smilham2@attbi.com>

In a report released last November 8, the Advisory Group on Non-Ionizing Radiation of the U.K.'s National Radiological Protection Board concluded that work in electrical occupations is associated with an increased risk of ALS (see MWN, *N/D01). The group, which is chaired by Sir Richard Doll, suggested that a large case-control study taking account of employment history, electroshock treatments and transcranial magnetic stimulation, among other factors, could help clarify the possible roles of EMF exposures and electric shock in causing ALS.*

On the Internet

MCL Calculator

Need to know the ICNIRP occupational exposure limit for electric fields at 400 kHz or the ANSI/IEEE "controlled" power density standard at 2.4 GHz? Now the math-challenged have quick, reliable access to such numbers, thanks to MCL in London. The company's Web site, <**www.mcluk.org**>, has a calculator that provides the ICNIRP, IEEE or NRPB limits for any specified frequency. Time-averaged and peak values are included as well as contact currents. If you make a mistake, like asking for a power-density limit below 10 MHz, the computer explains what you did wrong. Especially useful is its ability to compare the limits for the various standards. MCL makes it all very easy. Elsewhere on the site are details of the consulting and research support services offered by MCL's team of experts, which is led by Drs. Philip Chadwick, Camelia Gabriel and Edward Grant (see also p.10). The firm was formerly called Microwave Consultants Ltd.

Germans Talk About EMFs

The Jülich Research Center in Jülich, Germany, has established a site, <**www.emf-risiko.de**>, to address "scientific and social controversies over EMFs," with special emphasis on mobile phones. The center's Group on Humans, Environment and Technology, has posted audio files of an EMF forum featuring former ICNIRP Chair Dr. Jürgen Bernhardt, Dr. Lebrecht von Klitzing of the University of Lübeck and Dr. Roland Glaser of Humboldt University in Berlin. The center's analysis of the four reports on health research commissioned by the wireless carrier T-Mobil (see *MWN,* M/J01 and J/A01) is also on the site, as is *Guidelines for Addressing Problems of Electromagnetic Fields in Communities*, a book written at the request of the German Federal Environment Ministry. General descriptions of the work are available in both German and English, but most of everything else is only in German.

NRPB Revamps Web Site

The U.K.'s National Radiological Protection Board (NRPB) has completely redesigned its Web site, <**www.nrpb.org**>. The home page has a special button for information on electromagnetic radiation and fields. The NRPB's *Radiological Protection Bulletin* can be downloaded from this site—the *Bulletin* is no longer published in print form.

The Frequency Fence

In 2004, extraterrestrials will use the electric power grid, radiation from mobile phone towers and television broadcasts to impose an "electromagnetic-induced form of mind control" on humanity—the "frequency fence." So say Terry and Isha Robinson of the International Sovereignty Alliance (ISA) in a report posted at <**www.abovetopsecret.com**>, a site that covers topics such as the NSA's Echelon surveillance system and that perennial favorite, Area 51, with the aim of "exposing the secrecy that exists within the government and military organizations of the world." "Actually," Terry Robinson told *Microwave News* from ISA's headquarters in Kapaa, HI, "it will probably happen in 2003." For those who wish to protect themselves, the ISA recommends its course on "DNA strand activation," available on six audio cassettes for $99.00 plus shipping and handling. For details, go to ISA's Web site, <**www.dimensionalshift.20m.com**>.

2002 Conference Calendar (Part II)

Part I appeared in our last issue.

March 1: **JRC Collaborative Action: Human Exposure to Radiation from GSM and GPRS/UMTS Base Stations Across Europe,** Joint Research Center (JRC), Ispra, Italy. On March 2, the JRC will host two roundtable discussions: **R&D Issues on Human Exposure EMF Measurements and Protocols** and **EMF Risk Perception & Communication**. Contact: Dr. Demosthenes Papameletiou, EC/JRC, Institute for the Environment and Sustainability, I-21020 Ispra, Italy, (39+0332) 785282, Fax: (39+0332) 786272, E-mail: <demosthenes.papameletiou@jrc.it>.

March 21-22: **Adverse Temperature Levels in the Human Body Workshop,** World Health Organization (WHO), Geneva, Switzerland. Contact: Dr. Leeka Kheifets, Radiation Program, WHO, CH-1211 Geneva 27, Switzerland, (41+22) 791-4976, Fax: (41+22) 791-4976, E-mail: <kheifetsl@who.int>.

May 16-17: **International Conference on Electromagnetic Environments and Health in Buildings,** Royal College of Physicians, London, U.K. Contact: Jill Skinner, Abacus Communications, The Pool House, South Hill, Chislehurst, Kent BR7 5EF, U.K., (44+20) 82952951, Fax: (44+20) 84670145, E-mail: <jill@abacuscom.co.uk>, Web: <www.emr-environments.com>.

June 14-19: **12th Annual Conference of the International Society for the Study of Subtle Energies and Energy Medicine (ISSSEEM),** Boulder, CO. Contact: Penny Hiernu, ISSSEEM, 11005 Ralston Rd., Ste.100D, Arvada, CO 80004, E-mail: <issseem@compuserve.com>, Web: <www.issseem.org>.

June 26-28: **Mediterranean Microwave Symposium,** Cáceres, Spain. Contact: MMS, Secretariat, Escuela Politécnica de Cáceres, Universidad de Extremadura, 10071 Cáceres, Spain, (34+927) 257-443, Fax: (34+927) 257-202, E-mail: <mms2002@tsc.unex.es> or <llandesa@unex.es>, Web: <http://tsc.unex.es/mms2002>.

July 21-25: **2002 IEEE Power Engineering Society (PES) Summer Meeting,** Palmer House Hilton, Chicago, IL. Contact: IEEE PES Executive Office, 445 Hoes Ln., Piscataway, NJ 08855, Web: <www.ieee.org/power>.

August 11-15: **12th Conference of the International Society of Exposure Analysis (ISEA)** and **14th Conference of the International Society for Environmental Epidemiology (ISEE),** University of British Columbia, Vancouver, Canada. Contact: Dr. Michael Brauer, UBC Conference Center, 5961 Student Union Blvd., Vancouver, BC V6T 2C9, Canada, (604) 822-1050, Fax: (604) 822-1069, E-mail: <brauer@interchange.ubc.ca>, Web: <www.conferences.ubc.ca/iseaisee2002>.

August 17-24: **27th General Assembly of the International Union of Radio Science (URSI),** Exhibition and Congress Center, Maastricht, The Netherlands. Contact: Dr. Leon Kamp, Dept. of Applied Physics, Eindhoven University of Technology, PO Box 513, NL-5600 MB Eindhoven, The Netherlands, (31+40) 247-4292, Fax: (31+40) 244-5253, E-mail: <URSI2002@tue.nl>, Web: <www.ursi-ga2002.nl>.

August 18-21: **3rd International Conference on Microwave and Millimeter Wave Technology,** Beijing, China. Contact: Ms. Fang Min, Chinese Institute of Electronics, PO Box 165, Beijing 100036, China, (86+10) 6828 3463, Fax: (86+10) 6828 3458, E-mail: <shaz@sun.ihep.ac.cn>, Web: <www.cie-china.org/icmmt2002>.

August 18-22: **16th International Epidemiological Association World Congress of Epidemiology,** Montreal, Canada. Contact: Congress Secretariat, c/o Events International Meeting Planners, 759 Victoria Sq., Ste. 300, Montreal, PQ H2Y 2J7, Canada, (514) 286-0855, Fax: (514) 286-6066, E-mail: <iea2002@eventsintl.com>, Web: <www.iea2002.com>.

August 19-23: **IEEE International Symposium on Electromagnetic Compatibility,** Minneapolis, MN. Contact: Duane Bagdons, International Certification Services, E-mail: <drbicsi@hutchtel.net>, Web: <www.2002-ieee-emc.org>.

August 25-30: **39th CIGRÉ General Session,** Paris, France. Contact: Liliane Ney, CIGRÉ, 21 rue d'Artois, Paris 75008, France, (33+1) 5389-1290, Fax: (33+1) 5389-1299, E-mail: <secretary-general@cigre.org>, Web: <www.cigre.org/GB/2002/fr2002session.htm>.

September 9-13: **International Symposium on Electromagnetic Compatibility,** Sorrento, Italy. Contact: AEI Central Office, Massimo Iandolo, Piazzale R. Morandi 2, Milan 20121, Italy, (39+02) 7779-0218, Fax: (39+02) 798-817, E-mail: <emceurope2002@aei.it>, Web: <www.aei.it/emceurope2002.html>.

September 11-14: **16th EPICOH Congress on Epidemiology in Occupational Health,** Barcelona, Spain. Contact: EPICOH Technical Secretariat Suport Serveis, Calvet 30, Barcelona 08021, Spain, (34+93) 201-7571, Fax: (34+93) 201-9789, E-mail: <suport@suportserveis.com>, Web: <www.suportserveis.es>.

September 19-22: **19th Annual Meeting of the European Society for Magnetic Resonance in Medicine and Biology (ESMRMB),** Florence, Italy. Contact: ESMRMB, Neutorgasse 9/2A, Vienna A-1010, Austria, (43+1) 535-1306, Fax: (43+1) 535-7041, E-mail: <office@esmrmb.org>, Web: <www.esmrmb.org>.

September 23-24: **3rd International Conference on Electromagnetic Fields and Human Health: Fundamental and Applied Research,** Moscow, Russia. Andrey Vasin, Institute of Biochemical Physics, Russian Academy of Science, Kosigina 4, Moscow 117334, Russia (7+95) 190-5421, E-mail: <yurgrigor@cityline.ru>, Web: <www.pole.com.ru/conf2002>. Following this meeting, on September 25-27, there will be a conference on **Harmonization of EMF Standards in Connection with the Science for East European Countries**. This is the latest in a series organized by the World Health Organization (WHO).

October 6-10: **24th Annual Electrical Overstress/Electrostatic Discharge Symposium,** Convention Center, Charlotte, NC. Contact: Steve Voldman, IBM Microelectronics, MS 972F, 1000 River St., Essex Junction, VT 05452, (802) 769-8368, E-mail: <a108501@us.ibm.com>, Web: <www.esda.org/symposia.html>.

October 7-11: **2nd International Workshop on Biological Effect of EMFs,** Aldemar Paradise Royal Mare Hotel, Rhodes, Greece. Contact: Prof. Panos

Meeting Notes

• The objective of the March 1 **EC/JRC** workshop is to begin drafting a protocol for measuring RF/MW radiation levels associated with mobile phone base stations. The meeting is by invitation only.

• The WHO EMF Project has scheduled three by-invitation-only meetings. On March 21-22, it will host a **Temperature Workshop** in Geneva, which is being organized by Dr. Joe Elder of Motorola and WHO's Dr. Leeka Kheifets. The project's international advisory committee will meet in Geneva, June 6-7. And from October 28 to November 1, the ***WHO Workshop on Finalizing the Framework for Harmonized EMF Standards*** will be held in Guilin, which is in Guangxi Province, China. For more information, contact Kheifets—see March 21-22 listing at left.

• The ***WHO–USAF Asia-Pacific EMF Conference***, scheduled for October 21-27 at the five-star Arcadia Beach Resort on Phuket Island, Thailand, has been postponed. Dr. Jon Klauenberg, of the USAF's RFR branch at Brooks AFB, explained that this was due to limits on overseas travel following the September 11 attacks. Klauenberg said that it may be held next year. He can be reached at (210) 536-4837, Fax: (210) 536-3977, E-mail: <b.jon.klauenberg@brooks.af.mil>.

Kostarakis, (30+1) 650-3129, Fax: (30+1) 653-2910, E-mail: <conf2002@imm.demokritos.gr>, Web: <www.uoi.gr/conf_sem/bioeffects>.

October 15-17: **IEE Radar Conference,** Edinburgh, Scotland, U.K. Contact: IEE Conference and Exhibition Services, Savoy Pl., London WC2R 0BL, U.K., (44+207) 344-5477, Fax: (44+207) 240-8830, E-mail: <radar2002@iee.org.uk>, Web: <www.iee.org.uk/Conf/Radar>.

October 20-24: **1st Asian and Oceanic Congress for Radiation Protection (AOCRP),** Seoul, Korea. Contact: Dr. Myung-Jae Song, R&D Office, Nuclear Environment Technology Institute, KHNP, PO Box 149, Yusung, Daejon 305-600, Korea, (82+42) 870-0202, Fax: (82+42) 870-0269, E-mail: <mjsong@khnp.co.kr>, Web: <www.aocrp-1.com>.

October 24-27: **24th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS)** and **2002 Annual Fall Meeting of the Biomedical Engineering Society (BMES),** Westin Galleria Hotel, Houston, TX. Contact: EMB Executive Office, (732) 981-3433, Fax: (732) 465-6435, E-mail: <emb-exec@ieee.org>, Web: <embs-bmes2002.org>.

November 10-14: **Engineering and Physical Sciences in Medicine,** Convention Center, Rotorua, New Zealand. Contact: Dr. David Black, Enviromedix, Private Bag 24 904, Royal Oak, Auckland, New Zealand, (64+9) 625-0407, Fax: (64+9) 625-2292, E-mail: <david@enviromedix.co.nz>, Web: <www.epsm2002.com>.

November 12-14: **12th International Symposium on Antennas,** Acropolis Convention Center, Nice, France. Contact: Secrétariat JINA 2002, France Télécom R&D, Fort de la Tête de Chien, 06230 La Turbie, France, Fax: (33+492) 106519, E-mail: <jina.cnet@wanadoo.fr>, Web: <www. jina2002.com>.

Hot New Papers

Wolfgang Löscher, "Do Cocarcinogenic Effects of ELF Electromagnetic Fields Require Repeated Long-Term Interaction with Carcinogens? Characteristics of Positive Studies Using the DMBA Breast Cancer Model in Rats," *Bioelectromagnetics, 22,* pp.603-614, December 2001.

"By reviewing the Hannover series of experimental studies on MF effects in the DMBA model, we have identified a number of factors that seem to be critical for the outcome of such laboratory studies: (1) The rat substrain used is possibly the most important factor in determining the results from EMF exposure. We have started to directly compare MF bioeffects in different SD [Sprague-Dawley] substrains in our laboratory...(2) The dose of DMBA is critical because the cocarcinogenic effect of MF increases with decreasing background tumor incidence.... (3) The duration of MF exposure is important, because our data strongly indicate that MF exposure affects tumor growth rather than tumor incidence....(4) The flux density used for MF exposure is important, because the cocarcinogenic effect of MF seems to be lost at high (mT) flux densities, indicating a flux-density window in the μT range. (5) The location of tumors across the mammary gland complexes of the female rat is important, with the cranial thoracic complexes being most sensitive to EMF exposure....Even though the effects of MF exposure seen in our experiments were small, MF effects of similar magnitude in human populations would represent a critical adverse health effect because of the high incidence of female breast cancer. A critical question is whether these results are real or are due to chance or methodological biases. That in our six experiments group tumor incidence in MF-exposed groups was never below sham controls, but above controls in five experiments, argues against chance as an explanation for the findings."

David de Pomerai et al., "Growth and Maturation of the Nematode *Caenorhabditis Elegans* Following Exposure to Weak Microwave [MW] Fields," *Enzyme and Microbial Technology, 30,* pp.73-79, January 2002.

"Prolonged exposure to weak MW fields...at 25˚C induces a heat-shock response in transgenic *C. elegans* strains carrying *hsp16* reporter genes. A comparable response to heat alone requires a substantially higher temperature of 28˚C...Here we investigate two further biological consequences of prolonged MW exposure [750-1000 MHz, SAR 0.001 W/Kg] at 25˚C in synchronized cultures of wild-type worm larvae, namely alterations in (i) growth rate (GR) and (ii) the proportion of worms later maturing into egg-bearing adults (MP). Both of these parameters are significantly increased following MW exposure (GR by 8-11% and MP by 28-40%), whereas both are significantly decreased (GR by 10% and MP almost abolished) after mild heat treatment at 28˚C for the same period. It follows that the biological consequences of MW exposure are opposite to, and therefore incompatible with, those attributable to mild heating. This evidence does not in itself necessitate a non-thermal mechanism, but does eliminate explanations that invoke the bulk heating of tissues by MWs." (See also *MWN*, M/J00.)

New Research Projects

• Dr. **Peter French** of St. Vincent's Hospital in Sydney, **Australia**, is investigating whether long-term, intermittent exposures to mobile phone radiation can modulate the genetic activity of human brain cells. The experiment will test French's hypothesis that phone use can stimulate the expression of **heat shock proteins**, leading to the development of cancer (see *MWN*, J/A01). Telstra, the Australian telecommunications giant, is providing the TEM exposure system. French told *Microwave News* that he expects to announce results by the end of the year.

• An **epidemiological** study of people living near the Lookout Mountain antenna farm outside Denver is under way. Drs. **John Reif** and **James Burch** of Colorado State University in Ft. Collins, the coprincipal investigators, will determine whether broadcast RF/MW radiation affects the production of melatonin and ornithine decarboxylase (ODC), among other biological markers. Past studies suggesting that higher-than-expected rates of brain cancer on Lookout Mountain and a proposal to build new DTV transmitters have added fuel to the long-running controversy over possible health impacts (see *MWN*, M/A99 and J/F00). The new study, which is being sponsored by the National Institute of Environmental Health Sciences (**NIEHS**), is the first epidemiological study of broadcast radiation ever funded by a U.S. government agency. Both Reif and Burch declined to discuss the project with *Microwave News.*

C. Cranfield, A. Wood, V. Anderson and K. Menezes, "Effects of Mobile Phone Type Signals on Calcium Levels Within Human Leukemic T-Cells (Jurkat Cells)," *International Journal of Radiation Biology, 77,* pp.1207-1217, December 2001.

"In an experiment in which SARs in individual human leukemic cells have been accurately determined [915 MHz GSM, 1.5 W/Kg (95% CI: 1.0-2.2W/Kg)], no changes in average calcium level have been de-

tected. In addition, no significant alteration has been shown in either the percentage of cells showing 'spiking' or the height and number of these spikes. The significant change in average frequency derived from the PSD [power spectral density] of the variations in fluorescent intensity was for one combination of experimental conditions only and is difficult to assess in terms of biological sequelae and could be a statistical anomaly."

Päivi Heikkinen et al. (including Sakari Lang and Jukka Juutilainen), "Effects of Mobile Phone Radiation on X-Ray-Induced Tumorigenesis in Mice," *Radiation Research, 156,* pp.775-785, December 2001.

"Two hundred female CBA/S mice were randomized into four equal groups at the age of 3 to 5 weeks. The mice in all groups except the cage-control group were exposed to ionizing radiation at the beginning of the study and then to RF radiation for 1.5 h per day, 5 days a week for 78 weeks. One group was exposed to continuous NMT (Nordic Mobile Telephone)-type frequency-modulated RF radiation at a frequency of 902.5 MHz and a nominal average specific absorption rate (SAR) of 1.5 W/Kg. Another group was exposed to pulsed GSM (Global System for Mobile)-type RF radiation (carrier-wave frequency 902.4 MHz, pulse frequency 217 Hz) at a nominal average SAR of 0.35 W/Kg....The RF radiation exposures did not increase the incidence of any primary neoplasm in the tissues examined significantly. The incidence of glandular polyps in the uterus ($p = 0.011$) was decreased in the group exposed to continuous RF radiation, and the incidence of benign pheochromocytomas in the adrenal glands was lower in both RF radiation–exposed groups ($p = 0.041$ and $p = 0.039$ for the continuous RF and pulsed RF group, respectively). However, the incidence of hyperplasias in the adrenal medulla was not significantly different in those groups... The results of the current study suggest that long-term exposure of mice to low-level RF radiation (902 MHz) at these exposure levels and modulation characteristics does not affect the development of malignant lymphomas induced by ionizing radiation....Chou et al. [1992, known as the Guy study] reported a significant increase in the overall incidence of primary malignancies in rats exposed to 2.45 GHz microwaves at an SAR of 0.15-0.4 W/Kg. There were no differences, however, for any specific type of tumor. In our study, the proportions of animals with primary malignant neoplasms were slightly higher in the two groups exposed to RF radiation (56% and 50%) than in the sham RF radiation–exposed animals (40%), but this difference was not statistically significant, and survival was not changed. Furthermore, the exposures to RF radiation did not significantly increase the incidence of any primary neoplasm considered separately. There was a statistically significant decrease in the incidence of benign pheochromocytomas in RF radiation–exposed groups. It remains to be determined whether this statistically significant difference is a real effect of the exposure to RF radiation or is a consequence of chance....The exposure to RF radiation did not cause any nonneoplastic changes that could be interpreted as promotion of tumor development....The RF radiation exposures apparently did not cause any other harmful effects in the animals."

Paolo Bernardi et al., "Power Absorption and Temperature Elevations Induced in the Human Head by a Dual-Band Monopole-Helix Antenna Phone," *IEEE Transactions on Microwave Theory and Techniques, 49,* pp.2539-2546, December 2001.

"A numerically efficient way to evaluate specific absorption rate (SAR) deposition and temperature elevation inside the head of a user of a cellular phone equipped with a dual-band monopole-helix antenna is proposed. The considered antenna operates at both frequencies (900 and 1800 MHz) [GSM]. The results obtained show that, for a given radiated power, although the maximum SAR value as averaged over 1 g in the brain is higher at 900 MHz than at 1800 MHz, the maximum temperature increase in the brain is higher at 1800 MHz. However, taking into account that the average power levels radiated at the two operating frequencies are different (250 mW at 900 MHz and 125 mW at 1800 MHz), higher temperature elevations are obtained at 900 MHz. In this last case, the temperature increases are on the order of 0.2°C in the ear, and less than 0.1°C in the external brain region close to the phone. When the heating effect due to the contact of the ear and cheek with the phone is also taken into account, it is found that the predominant heating effect in the ear, able to cause temperature increases as high as 1.5°C, is the one due to the phone contact, while SAR deposition plays a significant role only in the heating of the external brain region."

"MICROWAVE NEWS" FLASHBACK

Years 20 Ago

• Two U.S. government advisory panels, ERMAC and FMAC, weigh issuing a statement assuring the public that, "No health hazard can result from total incident radiation lower than 50 $\mu W/cm^2$."

• Exposures at 17 out of 21 workplaces with RF heaters and sealers exceed OSHA's 10 mW/cm^2 limit, a NIOSH survey finds.

• Multnomah County, OR, extends its moratorium on new broadcast transmitters and considers adopting its own RF/MW standard. These actions follow a study by Dr. William Morton linking RF/MW radiation to uterine cancer in parts of Portland.

Years 10 Ago

• The Wisconsin Public Service Commission orders state utilities to use the "best available control technology" to reduce EMFs from new and upgraded transmission lines.

• Over 150 researchers gather in Brussels for the inaugural conference of the European Bioelectromagnetics Association.

• Florida health officials identify a cluster of Hodgkin's disease cases near Patrick Air Force Base. Seven of the eight cases lived within 400 yards of the radar, used by both the USAF and the FAA.

Years 5 Ago

• A memo written by Motorola spokesman Norman Sandler to Burson-Marsteller reveals that they have been "war-gaming" their response to the impending release of a study by Drs. Henry Lai and N.P. Singh showing that microwaves can cause breaks in DNA.

• Living near a broadcast tower carries increased risks of adult leukemia, according to Dr. Helen Dolk in the U.K., and of childhood leukemia, according to Dr. Bruce Hocking in Australia.

• U.S. and Swedish researchers find statistically significant links between EMF exposures at work and Alzheimer's disease.

UPDATES

AT THE MOVIES

Turning Off the Lights... Say you want to rob some casinos and need to cut off the power to the alarms and closed-circuit video cameras. How would you do it? In the 1960 production of *Ocean's Eleven*, Frank Sinatra and the members of his "rat pack" used explosives to topple one of the transmission line towers feeding electricity to Las Vegas. That is too low-tech for Steven Soderbergh's 2001 remake with the same title. Soderbergh must have heard that street lights in Hawaii's Waikiki beach mysteriously went out after a 1962 nuclear test in the Pacific. So, this time around, the gang, led by George Clooney, steals a portable EMP generator from a research lab. When the zapper is activated, Vegas goes dark. Another striking difference between the two movies is that most of the stolen cash goes up in smoke at the end of the 1960 film. But in the remake, Clooney escapes with the loot, as well as the pretty girl (Julia Roberts). Hollywood screen writers are no strangers to the marvels of EMP. In the 1995 James Bond movie, *GoldenEye*, agent 007 battles Russian hoods who harness a satellite that uses EMP to disable electronics. And in *Eraser*, which appeared the following year, Arnold Schwarzenegger contends with corporate and government thugs armed with EMP guns. Also in 1996, EMP weapons were featured in *Broken Arrow* and *Escape from L.A.* (see *MWN*, S/O96).

MILITARY RADAR

Health Concerns in Azerbaijan... Agence France-Presse (AFP) reports that citizens living in the shadow of the Russian missile defense radar in Qabala, in northern Azerbaijan, are complaining of too many birth defects and too many sick children as well as the sudden deaths of apparently healthy adults (January 23). "It's like living next door to Chernobyl," said one local teacher. On its Web site, GlobalSecurity.org states that the radar, completed in 1984, has a projected output power of 350 MW. A joint Russian-Azeri study commission exonerated the radar from any blame for the health complaints, according to the AFP. This is not the first time a Russian radar has been the target of local concern. In the mid-1990s, a number of studies pointed to health and ecological effects in the vicinity of the military radar station in Skrunda, Latvia (see *MWN*, S/O94 and S/O96).

PEOPLE

Dr. **Anders Ahlbom** of the Karolinska Institute in Stockholm has been awarded the International Prize for Tumor Prevention by the Italian Association Against Cancer. Ahlbom is being honored for his epidemiological studies on the cancer risks associated with EMFs. The award, which includes a check for 10 million lire (over €5,000 or $4,600), is presented every four years. Past winners include Dr. **Irving Selikoff** and **Cesare Maltoni** for their work on asbestos and vinyl chloride, respectively. Ahlbom will be feted at a ceremony in Latina, an hour's drive south of Rome, on February 22....On December 31, Dr. **Neil Cherry** was named an Officer of the New Zealand Order of Merit. Cherry, of Lincoln University in Canterbury, was honored for "services to science, education and the community" by Queen Elizabeth II, who also enjoys the title of Queen of New Zealand. "My com-

munity work includes appearing without payment on behalf of over 25 communities in New Zealand and Australia trying to keep cell sites away from their homes and workplaces," Cherry told *Microwave News*. Cherry has long voiced concern that RF/MW radiation exposure standards are too lenient and has been especially critical of ICNIRP's limits (see *MWN*, M/A97 and M/A 00). The award comes as Cherry has been diagnosed with motor neuron disease, a condition in which muscles progressively and irreversibly degenerate over a three-to-five-year period. He plans to continue working: "I will be able to use a computer to write and communicate for a long time in this period," he said....**Mike Silva** of Enertech Consultants in Campbell, CA, has joined EPRI as a half-time consultant to help manage its new RF safety and wireless technology program. Silva declined to discuss his move up from the ELF part of the spectrum, referring calls to EPRI's PR office. He can be reached at <msilva@epri.com>....**Mark Douglas** has left the antenna development group at Sony Ericsson Mobile Communications in Research Triangle Park, NC, to become the engineering manager at Dr. **C.K. Chou**'s EME lab at Motorola in Plantation, FL....Dr. **Marvin Ziskin** of Temple University in Philadelphia is the new chair of IEEE's Committee on Man and Radiation (COMAR). He replaces **Howard Bassen** of FDA's Center for Devices and Radiological Health, who served a two-year term. Ziskin is on the board of directors of the NCRP.

PRECAUTIONARY PRINCIPLE

Assorted Notes... The European Environment Agency (EEA) has published a report (No.22) that examines how the precautionary principle has been applied—or not—over the last hundred years. Based on 14 contributed case studies, *Late Lessons from Early Warnings: The Precautionary Principle 1896-2000* presents 12 lessons for policy makers. These include acknowledging ignorance, uncertainty and risk, identifying gaps in scientific knowledge and following up early warnings. Among the agents studied are ionizing radiation, asbestos, benzene, DES and MTBE, as well as mad cow disease. The 200-page report, released on January 10, is available free on the Internet at: <http://reports.eea.eu.int>. Earthscan Publications Ltd. in London will issue the report in the spring. Tel: (44+207) 278-0433, Fax: (44+207) 278-1142, E-mail: <earthinfo@earthscan.co.uk>, Web: <www.earthscan.co.uk>....More than 75 scientists from 17 countries issued a statement following the *International Summit on Science and the Precautionary Principle*, held in Lowell, MA, September 20-22. They urged governments to "adopt the precautionary principle in environmental and health decision-making under uncertainty when there are potential risks." Among the signers were Drs. Marco Martuzzi of the WHO in Rome and David Ozonoff of Boston University. The full statement and a list of signers are at: <www.uml.edu/centers/lcsp/precaution>....Drs. Ken Foster of the University of Pennsylvania in Philadelphia and Paolo Vecchia of Italy's National Institute of Health in Rome are seeking papers on the precautionary principle for publication in the winter issue of *IEEE Technology and Society Magazine*. Papers are due on April 1. This special issue of the magazine will appear in December. For more information, contact Foster at (215) 898-8534, or <kfoster@seas.upenn.edu>.

As We Go to Press

NAS–NRC Committee on Potential Health Effects of PAVE PAWS Radar

On February 5, the National Academy of Sciences–National Research Council (NAS–NRC) announced the members of its committee to assess the potential health effects of PAVE PAWS radiation (see *MWN*, N/D01).

The provisional members of the committee are:

- Dr. Frank Barnes, University of Colorado, Boulder, chair
- Dr. Robert Hansen, RC Hansen Inc. (consulting engineers), Tarzana, CA, vice chair
- Dr. Larry Anderson, Battelle Pacific Northwest Labs, Richland, WA
- Dr. Graham Colditz, Harvard Medical School and School of Public Health, Boston, MA
- Dr. Francesca Dominici, Johns Hopkins University School of Public Health
- Dr. Kenneth McLeod, State University of New York, Stony Brook
- Dr. Keith Paulsen, Dartmouth Medical Center, Hanover, NH
- Dr. Leslie Robison, University of Minnesota, Minneapolis
- Dr. Susan Santos, University of Medicine & Dentistry of New Jersey, Piscataway
- Dr. Jan Stolwijk, emeritus, Yale University School of Medicine, New Haven, CT

Both Anderson and Hansen have security clearances, according to Dr. Rick Jostes of the NAS–NRC.

The NAS–NRC is inviting comments on these provisional choices for 20 calendar days from February 5. Go to: <http://nationalacademies.org> and search for "PAVE PAWS."

Keeping Current: Follow-Up on the News

◆ Baltimore attorney Peter Angelos, who is heavily involved in cell phone lawsuits, is set to collect $250 million for representing the state of Maryland in tobacco litigation. The state had originally promised to pay him 25% of any award. But when the state won $4 billion, many balked at giving him a ten-figure payday. Angelos has offered to take a 75% cut in return for being paid over six years instead of 20 and avoiding future litigation.

◆ Israel's Ministry of Defense has evaluated dozens of nonlethal weapons, Major General Isaac Ben-Israel, the outgoing chief of military R&D, told *Defense News* (December 17-23). Among these are: EMP and high-powered microwaves. It is not clear whether they have ever been deployed. Ben-Israel also said that his directorate has explored mind-control technologies, but decided that they were not effective.

◆ Narda Safety Test Solutions will hold a three-day seminar on measuring and managing sources of electromagnetic radiation at Narda's headquarters in Hauppauge, NY, April 9-11. Cell phone and radio transmitters as well as radar will be covered. For more information, contact Richard Strickland at (631) 231-1700, ext. 322 or <richard.strickland@narddasts.com>.

◆ U.S. soldiers who served in the 1990-1991 Gulf War are "nearly twice as likely" to develop ALS, according to a study of more than 2.4 million men and women by the VA and the defense department. Forty Gulf veterans with ALS are now eligible for compensation and other benefits, the VA announced in December. (See also p.12.)

◆ The U.K. Electricity Association has posted a revised edition of its 10-page pamphlet, *Electric and Magnetic Fields [The Facts]*, on its Web site, <www.electricity.org.uk>. Also posted is a one-page briefing, *Recent Developments*, dated May 2001.

◆ The Science and Technology Committee of the Knesset, Israel's parliament, has adopted a recommendation that the use of cell phones by children should be kept to a minimum, according to the January 2 *Jerusalem Post.*

◆ The long-delayed DMBA–RF/MW rat studies by Germany's Drs. Hella and Christian Bartsch will appear in the February issue of *Radiation Research (see MWN*, J/A99 and N/D00).

Consumers Betrayed and Abandoned

When shopping for the most reliable washing machine or the best shampoo for the dollar, many Americans depend on *Consumer Reports*, published by the Consumers Union (CU). On the other side of the Atlantic, the British consult *Which?*, the magazine of the U.K. Consumers' Association (CA).

But this strategy is a loser when it comes to learning about the possible risks associated with electromagnetic radiation.

February is cell phone month at *Consumer Reports*. This year, the magazine features 13 pages on how to buy the best phone, find the best service plan and weigh the hazards of driving while on the phone—one full page is on hands-free headsets.

Yet there is not a single word about possible radiation health risks.

Perhaps the CU only addresses phone radiation in odd numbered years. It did devote a single paragraph in its 8-page cover story last February—2000 was another fallow year—but even so, it used wording usually favored by industry. "To date no *conclusive* evidence has demonstrated [a brain tumor] risk," the CU editors wrote [emphasis added].

Of course we agree with that. Everybody does. But it obscures the many uncertainties about what might happen if you put a radio transmitter next to your brain day after day, year after year.

Expert panels in England, France, Germany and Spain have all advised that children should limit their use of mobile phones. The British Medical Association and the German Academy of Pediatrics have made similar recommendations.

Sir William Stewart, the former science advisor to the British prime minister, has been particularly vocal in trying to stop the marketing of phones to children—a message he repeated at the end of January on announcing the 15 new grants for mobile phone research (see p.10).

The CU appears to be apathetic about any long-term risks to children. Or maybe it is simply unaware of what is going on in other parts of the world. We tried to ask the new editor of *Consumer Reports* for the CU's point of view, but she did not respond to our messages.

In 1997 and again in 2001, the CU suggested that concerned readers use a hands-free set. But over in England, the CA has discouraged their use, arguing that these sets can actually increase radiation exposure (see *MWN*, M/J00 and S/O00).

With the exception of ERA Technology, which made the measurements for the CA, none of the many test labs we contacted on three continents thinks that there is any substance to ERA's and CA's claims. But in the ensuing media storm, the CA has made no effort to respond to its naysayers.

Microwave News has learned that one of CA's own technical experts advised the staff not to publish the article on hands-free sets. "I told them there must be something seriously wrong with their tests," said Dr. Alan Preece of the University of Bristol.

When a U.K. government agency scheduled a meeting to bring all the parties together to settle the confusion, the ERA engineers did not show up (see *MWN*, N/D00).

The CA dug in its heels and refused to back down. Given the CA's stature, the U.K. Department of Health decided not to endorse hands-free kits to cut radiation exposure. In its consumer brochure on *Mobile Phones and Health*, issued in 2000, the department waffled and told consumers that "the level of effectiveness of hands-free kits to reduce SAR is still uncertain."

Today, close to two years after the CA sounded the alarm, the issue remains in limbo—though the government has now funded a project to settle the question (see p.10).

The CA deserves credit for having raised a potentially serious problem. But having done so, it has the responsibility to finish what it started. By casting doubt on the only generally recognized way of limiting radiation exposure from mobile phones and then doing nothing to clear up the confusion, the CA has abandoned its public.

The one benefit of CA's botched cell phone crusade is that it has generated a lot of media attention. The U.K. press, unlike its U.S. counterpart, has actively covered every twist and turn in the mobile phone health controversy—some would say it has been *hyper*active. Nevertheless, the media are a reflection of public anxieties, and together they have prompted the new broad-based English research program.

By ignoring the uncertainties about safety and hiding behind mealymouthed truisms, the Consumers Union has done nothing to educate the American consumer about cell phone health risks. It has also encouraged continued government complacency.

Once Again, the TCO Shows the Way

In Sweden, the TCO, the Swedish union of white-collar workers, is showing what can be done. Unwilling to wait until the uncertainties are resolved years from now, it is proposing a sensible technical solution.

The TCO is pushing for a stricter SAR standard and is promoting a new index of performance, the communication efficiency of a mobile phone (see *MWN*, J/F01; also p.9). Consumers and workers all over the world already owe a huge debt to the union for pushing the computer industry into making safer computer monitors—and to Per Erik Boivie, who masterminded TCO's campaign. TCO95 and TCO99 stickers are known the world over as signs of safe computing. The union is now applying the lessons learned with VDTs to mobile phones.

The CU and CA should wake up and catch up. Consumers on both sides of the Atlantic deserve better.

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