

# MICRO WAVE NEWS

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A Report on Non-Ionizing Radiation

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## Cell Phone-Brain Tumor Lawsuit Hangs on a Single Swedish Study Five-Day Hearing on Scientific Evidence

A federal judge will soon decide the future of mobile phone-cancer litigation. Judge Catherine Blake will determine whether there is enough reliable scientific evidence linking cell phones to brain cancer to allow the first of many multimillion-dollar claims to be heard in U.S. courts.

Judge Blake's decision will likely turn on a single unpublished epidemiological study by Sweden's Dr. Lennart Hardell. An oncologist at Örebro Medical Center, Hardell has reported that using an analog phone increases the risk of developing brain cancer.

Dr. Christopher Newman, a 42-year-old Baltimore neurologist, blames Motorola and a number of other cell phone companies for his malignant brain tumor (see *MWN*, S/O00). At a weeklong hearing in Baltimore, attorneys from Peter Angelos's law office presented Hardell and four other experts in support of Newman's complaint. Defense lawyers, in turn, presented their own witnesses to refute the plaintiff's arguments (see p.8 for a list of the experts on both sides).

During that same week in late February, five new brain tumor suits were filed in a Washington, DC, court (see p.9).

On March 1, shortly before the end of the hearing, Blake interrupted the closing argument of Russell Smouse, one of the Angelos attorneys, to ask: "Don't all of your experts really stand or fall on whether...I am persuaded that

(continued on p.7)

## Introducing Brillouin Precursors: Microwave Radiation Runs Deep

When a very fast pulse of radiation enters the human body, it generates a burst of energy that can travel much deeper than predicted by conventional models. This induced radiation pulse, known as a Brillouin precursor, is at the heart of the continuing conflict over the U.S. Air Force's (USAF) PAVE PAWS phased array radar on Cape Cod.

Brillouin precursors can also be formed by ultrawideband radiation (see also p.17) and, in the near future, by high-speed data signals.

Dr. Richard Albanese, a researcher at Brooks Air Force Base in San Antonio, is concerned that the radiation from the PAVE PAWS radar entails widespread human exposure to Brillouin precursors. In a May 23, 2000, letter to the Massachusetts Department of Public Health (MDPH), Albanese warned that this type of phased array radiation has never been tested. He has been

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## EMF Cancer Concerns Take Center Stage in Power Line Fight; Minnesota Health Department Downplays Risk

Two suburbs of Minneapolis–St. Paul have denied Xcel Energy permits to upgrade a 115 kV power line to 230 kV. EMF health risks were a major factor in both decisions.

Despite these setbacks, the utility is convinced that it will prevail and has begun work on the 15-mile project. Xcel is the fourth-largest shareholder-owned utility in the U.S., with headquarters in Minneapolis.

By rebuffing the line, the towns rejected the advice of the Minnesota Department of Health (MDH), which has sought to allay health concerns raised by opponents of the line (see box at right).

Xcel contends that the upgrade would in fact result in lower magnetic field levels and is therefore consistent with a strategy of prudent avoidance. The new power line will have higher towers and a low-EMF configuration.

According to calculations presented by Xcel, after the upgrade, magnetic fields at a distance of 25 feet from the centerline will be reduced from 87 mG to 32 mG during periods of peak demand. There are 24 homes this close to the line. At 100 feet—an area that includes 85 residential buildings—fields will be reduced from 11 mG to less than 2 mG.

The Power Line Task Force (PLTF), which is leading the fight against the line, disputes these projections as unrealistically low. It contends that the line would not be safe either way.

The PLTF's long-range goal is to get rid of the SE Metro line. If the upgrade is blocked, the group believes, Xcel will eventually dismantle the existing line, which was built in 1923. Xcel counters that this will never happen.

On February 5, the city council of Sunfish Lake denied a zoning permit by a margin of 4-1. And on March 7 the Mendota Heights City Council voted 3-2 against the proposal. Last August, the town of South St. Paul approved the upgrade with the stipulation that the line be placed underground—but this requirement was dropped after Xcel filed a lawsuit.

In Mendota Heights, the city council cited “a compelling body of scientific evidence” that the upgraded line could pose a risk. Xcel had tried to preempt the council's vote, but was rebuffed by a state court on December 12. The company is appealing.

The Sunfish Lake council concluded that EMFs generated by the upgraded line would pose “unjustifiable risks” of childhood leukemia and other ailments. Although research to date “has not demonstrated a causal relationship,” it stated, “the linkage and association are significant enough to require avoidance of EMFs at levels above 4 mG.” Xcel is also challenging this decision in state court.

MDH's Charles Stroebel failed to sway the Sunfish Lake council. Epidemiological studies have found only “weak associations,” animal studies have “consistently not shown adverse effects” and *in vitro* research has “failed to establish a plausible biological mechanism,” he told the council before the vote.

Xcel had asked Stroebel to appear at the Sunfish Lake meeting, according to Ed Legge, a company spokesperson. Legge said that Stroebel supports Xcel's position that “there is no basis to deny this permit based on health effects of EMFs.”

### Who Advises the Health Adviser?

MDH's Charles Stroebel says the evidence for health risks from power line EMFs is “extremely weak.” This assessment is the “consensus of a team of scientists” at the MDH and endorsed by Dr. Leslie Robison of the University of Minnesota. Robison worked on the NCI's EMF study and is a known EMF skeptic (see *MWN*, J/A97 and J/A98). He is a member of the NAS–NRC panel on PAVE PAWS (see p.11).

Stroebel told *Microwave News* that he has also sought advice from Dr. John Moulder of the Medical College of Wisconsin, Dr. David Savitz of the University of North Carolina and Naomi Bernheim, an administrative assistant to NIEHS' Dr. Gary Boorman.

Moulder is a consultant to Xcel. According to spokesperson Ed Legge, Moulder testified on behalf of a 345 kV power line between Minnesota and Wisconsin. And last year Moulder worked for Xcel's partner in that project, the Wisconsin Public Service Corp. He testified that IARC's system for classifying carcinogens is “outdated” (see *MWN*, S/O01, also J/A01). In that power line dispute, EMFs have not played a major role.

Stroebel told Sunfish Lake officials that the NIEHS had recently told him there has been no change in its 1999 finding that evidence for EMF health risks is “weak” and that they are best addressed through “passive regulatory action” (see *MWN*, J/A99).

Dr. Roger Conant of Sunfish Lake, who heads the PLTF, is incensed by Stroebel's actions. The MDH “is working to protect Xcel's profits rather than to protect public health,” Conant told *Microwave News*. Conant, who has a doctorate in economics, is a financial consultant.

Conant says that the MDH is “out of touch” in downplaying EMF risks, because it failed to take into account a shift in expert opinion marked by the IARC decision. He also points to the conclusions of the U.K. Doll report (see *MWN*, M/A01) and the recent draft report from the California health department (see *MWN*, J/A01).

Mayor Frank Tiffany of Sunfish Lake, who cast the town's only vote in favor of the upgrade, said that in his opinion opponents are driven by fears that it will reduce property values and ruin scenic views. “EMFs are a surrogate for the real issue,” Tiffany told *Microwave News*.

Dr. Martin Blank of Columbia University in New York City and Dr. Magda Havas of Canada's University of Trent in Peterborough, ON, have spoken on behalf of the PLTF. Dr. Peter Valberg of Gradient Corp. in Cambridge, MA, has supported Xcel's plan.

The MDH's position on EMF health risks is at <[www.health.state.mn.us/divs/eh/emf](http://www.health.state.mn.us/divs/eh/emf)>. The PLTF has posted numerous documents relating to the new line at <[www.powerlinefacts.com](http://www.powerlinefacts.com)>.

## « Power Line Talk »

Magnetic fields are above 250 mG at the **day care center** for the staff of the Royal Women's Hospital in Melbourne, according to **Australian** news reports. Sixteen children aged ten months to four years spend the day at the center, which is located directly above the facility's electrical substation. "The tests showed that the playroom area recorded less than 10 mG, the sleeping room less than 300 mG and the rest of the center recorded less than 250 mG," said **Dale Fisher**, the hospital's general manager. Fisher downplayed fears of potential health risks. She pointed out that the levels in the sleeping room are "well under" Australia's 1,000 mG standard. "This is not really a scientific issue, it's an emotional one," she told *The Age* (March 19). Nevertheless, cots have been removed from the sleeping area. Concerns over high magnetic fields were first raised by measurements made in 1999, and a new survey conducted last year produced similar results. In a letter to *The Age* (March 21), Dr. **Magda Havas** of Canada's Trent University (see p.2 and *MWN*, J/F01) criticized the exposures as "irresponsible" and added that she would "immediately remove" her child if it were in such a high magnetic-field environment. "Haven't these administrators heard of prudent avoidance?" Havas asked.

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Logan, **Australia**, is practicing prudent avoidance with a precaution-based exposure standard. Officials in the Brisbane suburb have agreed with **Energex Ltd.** on a 4 mG limit for magnetic fields from a substation and its associated power lines. The electrical utility will take steps, including burying some lines, to keep average levels below 4 mG "where reasonably practicable." The two parties sat down to resolve their differences after Energex appealed a decision by the Logan city council to deny a zoning permit for a proposed upgrade of the substation due to possible health risks. The settlement "recognizes 4 mG as a reference point when implementing 'prudent avoidance,'" Dr. **Bruce Hocking**, an occupational physician based in Melbourne who provided an expert opinion to attorneys representing the Logan city council, told *Microwave News*. Among the experts who testified for the utility in its appeal were Dr. **Mark Elwood**, the director of the National Cancer Control Initiative, and Dr. **Andrew Wood** of Swinburne University, both in Melbourne. The evidence is "insufficient to justify deviation from current standards," Elwood told the court, in effect endorsing the 1,000 mG national limit. Donna Fisher, who led the local opposition to the upgrade, said she is "very disappointed" that Elwood, a government health adviser, had spoken on behalf of Energex. When asked by *Microwave News* for a copy of his report on the substation upgrade, Elwood replied that the court barred him from releasing it.

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Two **Swedish** researchers have published evidence that suggests that electricians in the construction trades do not have an elevated risk of committing **suicide**. Writing in the March issue of *Occupational & Environmental Medicine* (59, pp.199-200, 2002), Drs. **Bengt Järholm** and **Anita Stenberg** of Umeå University report on a cohort study of 33,719 male electricians that

## **EPRI Planning Workshop on MMF and Miscarriage Risks**

EPRI will host a workshop to review the new epidemiological results that point to an association between miscarriage risks and exposure to magnetic fields above some minimum threshold level. The meeting is scheduled for May 13 at the EPRI campus in Palo Alto, CA.

Dr. Robert Kavet, who heads EPRI's EMF program, refused to discuss the workshop, relaying a message through the press office that it is an "internal business meeting."

In fact, a number of epidemiologists and biostatisticians who work outside EPRI have been invited. Drs. De-Kun Li of Kaiser Permanente and Raymond Neutra of the California Department of Health Services, both in Oakland, and Dr. David Savitz of the University of North Carolina, Chapel Hill, all confirmed to *Microwave News* that they would be at the workshop.

In a recent paper in *Epidemiology*, Li showed that women exposed to magnetic fields of 16 mG and higher have significantly higher rates of miscarriages (see *MWN*, M/J01 and J/F02). In an accompanying editorial, Savitz questioned the meaning of Li's maximum magnetic field (MMF) exposure index. The journal has subsequently featured a series of follow-up letters.

On the basis of the Li study and some additional work, the California EMF program concluded in its draft final report that magnetic fields more likely than not present a miscarriage risk—and, if so, could account for up to 40% of all miscarriages (see *MWN*, J/A01).

The objective of the workshop is to develop a research agenda for future work on EMFs and miscarriages. It is not clear whether EPRI will sponsor a new epidemiological study. In a series of commentaries, Savitz has warned that there is little to be gained from any more EMF epidemiology (see *MWN*, M/J01 and S/O01).

Li commented that his study "definitely needs replication." And Neutra cautioned that, "Those who are inclined to doubt an EMF-miscarriage link should specify ahead of time what type and amount of evidence would be required to convince them."

Among the others who have been invited to the workshop are Drs. Norman Breslow of the University of Washington, Seattle, Gary Shaw of the California Birth Defects Monitoring Program in Oakland and Gail Windham of the California Department of Health Services, also in Oakland.

shows that their suicide risk was less than that of the general population (a statistically significant result) as well as that of glass and wood workers. The researchers explain that the fact that the risk is smaller than that of the general public is not surprising since workers have fewer disabilities and long-term illnesses—that is, this is an example of the healthy worker effect. But, they point out, the same cannot be said for the comparison among the different occupations. Two years ago, a team led by **Edwin van Wijngaarden** of the University of North Carolina, Chapel Hill, found that male electrical workers exposed to EMFs were more

likely to commit suicide (see *MWN*, M/A00). In a letter published electronically on the journal's Web site, <www.oem.bmjournals.com>, van Wijngaarden points out that one would not expect to see an EMF-mediated difference among the three job categories given that, according to a small Swedish survey, all three groups had similar magnetic field exposures. Van Wijngaarden cites with approval one of the conclusions of the Swedish team: "Our study does not contradict the hypothesis that high exposure to EMFs may cause depression and increase the risk of suicide." Järholm told *Microwave News* that he is preparing a reply to van Wijngaarden.

### **No Female Breast Cancer Risk at Low Magnetic Field Exposures**

The melatonin hypothesis, which suggests that power-frequency EMF exposures can increase the risk of breast cancer, has taken a hit from one of its most prominent proponents.

Fifteen years ago, Dr. Richard Stevens put forward the idea that EMFs and/or light-at-night could be responsible for the high rates of breast cancer in industrialized countries (see *MWN*, J/F87). Last fall, Stevens, Dr. Scott Davis and Dana Mirick reported an association between working at night and breast cancer (see *MWN*, N/D01). But they now say that their study of women in the Seattle area shows no association between residential

magnetic field exposures and the risk of breast cancer.

"My opinion is that the study provides evidence against a role for residential magnetic fields in the development of female breast cancer," Stevens told *Microwave News* from his office at the University of Connecticut Health Center in Farmington. But, Stevens added, "This study could not address exposures above 3-4 mG." Davis and Mirick are with the Fred Hutchinson Cancer Research Center in Seattle.

The case-control study of 813 women with breast cancer and 793 controls estimated EMF exposures with an EMDEX II meter that was placed in the women's bedrooms for two consecutive days. No elevated breast cancer risks were found.

Writing in the March 1 issue of the *American Journal of Epidemiology* (155, pp.446-454, 2002), the three researchers report that, "More than 90% of both cases and controls had mean nighttime magnetic field levels of less than 1.6 mG (0.16  $\mu$ T)."

Davis told *Microwave News* that there were 21 cases and 14 controls with exposures of 4 mG or higher and that the odds ratio for this breast cancer risk is 1.4 ( $p=0.30$ ).

In a previous study, Davis and Stevens found lower levels of melatonin among women exposed to weak magnetic fields at home. These results were first reported five years ago but only published last year (see *MWN*, N/D97 and S/O01).

Commenting on these melatonin findings in their new paper, Davis's team writes, "It remains unclear whether the observed effect is substantial enough to affect one's risk of developing breast cancer."

## HIGHLIGHTS

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### **At BEMS Winter Workshop: Too Early for Epidemiology?**

If Dr. Allan Frey set out to be provocative, he clearly succeeded. His talk on epidemiological studies of cell phones and cancer at the Bioelectromagnetics Society's (BEMS) annual winter workshop left some of the epidemiologists in the audience visibly exasperated.

After pointing out the shortcomings of the U.S. and Danish studies that show no cancer risk following short-term exposures, Frey asked: "Should these epidemiological studies have been done?" He wasted no time waiting for a reply. "I don't think so because the latency is not there." Frey is with Randomline, a research firm in Potomac, MD, and is a consultant to the Peter Angelos attorneys in the Newman case (see p.1 and *MWN*, J/F02).

The media interpreted the results as an all clear, Frey said, but they are "not relevant to present-day phones." He also raised some methodological criticisms. For instance, the Danish study had excluded 200,000 corporate users, which means, Frey said, that 200,000 of the heaviest users were in the comparison group, resulting in a dilution—if not a concealment—of any possible risk.

Later, Dr. Maria Feychting of the Karolinska Institute in Stockholm, who had earlier presented a detailed, critical review of many of the same cell phone studies, politely countered that the study

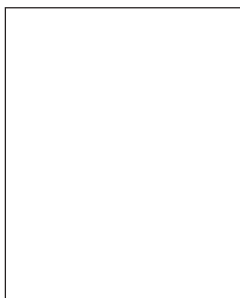
had included most of the 5 million citizens of Denmark and that, while 200,000 may sound like a large number, it would not have much of an effect.

Drs. Joshua Muscat and John Boice Jr. were also in the audience, but the two epidemiologists stayed silent on the latency issue. Each carried out one of the mobile phone cancer studies attacked by Frey—Muscat in the U.S. and Boice with Dr. Christopher Johansen in Denmark (see p.5 and *MWN*, J/F01 and M/A01).

"Maria said many of the same things as Allan Frey, but in a more discrete way," Dr. Richard Stevens, an epidemiologist at the University of Connecticut (see above) told *Microwave News* after the workshop.

In an interview, Feychting said that Frey's criticism is misplaced: "What he should criticize are the editorials that accompanied the Johansen and NCI studies because they are drawing conclusions that did not have support in the data presented."

The workshop was held in Washington on February 8.



*"I don't think the epidemiological studies should have been done."*

—DR. ALLAN FREY

## « Eye on Europe »

Drs. **Christian** and **Hella Bartsch**'s paper on the effects of chronic exposure to weak GSM-like radiation on the development of **DMBA**-induced breast tumors has finally appeared in print. Researchers have been speculating about the University of Tübingen study for three years, with two replication efforts already under way (see *MWN*, J/A99 and N/D00). This is what happened: The first time the **German** team ran the experiment they found a highly significant *delay* in the development of breast tumors among the free-moving rats exposed to 100  $\mu\text{W}/\text{cm}^2$  signals (whole-body SARs=0.0175-0.07 W/Kg). The median latency for the first malignant tumor was 278 days among the RF-exposed animals compared to 145 for the controls. The results were submitted to *Radiation Research*, but then withdrawn while the experiment was repeated twice. In the subsequent studies, there was no similar delay in tumor development. The Bartsches have no explanation for why they saw the effect the first time, but not on the second or third tries. They speculate that "some unknown" chemical or physical agent may be at work and point to some "yet unidentified conditions" under which RF radiation may be "cancer protective." Asked by *Microwave News* what the unknown agent might be, Christian Bartsch pointed to the possibility that the geomagnetic field may have played a role. He noted that the first experiment had been performed in 1997-98 when solar activity was low whereas the sun was active during the next two runs. Bartsch said that, "We would very much like to start experiments under shielded conditions" but explained there is no funding to investigate such beneficial effects. Bartsch was emphatic that Deutsche Telekom, which sponsored the studies, applied "absolutely no pressure" to delay publication of the first experiment. "This was *totally* our own decision," he said. This is the second time that a major animal study found a beneficial effect. Dr. **Ross Adey** saw fewer tumors in his study of chronically exposed mice for Motorola (see *MWN*, M/J96, J/A96 and S/O99). The Bartsches close by stating that it is "important and urgent" to resolve this issue. Their paper appears in the February issue of *Radiation Research* (157, pp.183-190, 2002).

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The team led by Dr. **Christoffer Johansen** of the Danish Cancer Society in Copenhagen, which last year reported no elevated risk of brain tumors among mobile phone users in **Denmark**, has extended that finding to eye cancer (see *MWN*, M/A01). In fact, there were fewer cases of malignant ocular melanoma than expected (8 vs. 13.5) among the 400,000 Danish mobile phone users included in the brain cancer study. Early last year, Dr. **Andreas Stang** of the University of Essen in **Germany** reported that heavy users of mobile phones were more than four times more likely to develop melanoma of the eye (see *MWN*, J/F01). The German results may have suffered from recall bias or from an inability to control for UV exposures, Johansen suggests. In the same paper, his team also reports "only small and irregular changes" in the occurrence of eye cancer in the Danish population as a whole from 1943 through 1996. This stability stands "in sharp contrast" to the "exponential increase" in phone use start-

## Vatican Electrosmog Case Thrown Out of Court

On February 19, an Italian court ruled that Vatican officials cannot be prosecuted for allowing RF exposures from their radio transmitters to exceed Italy's strict standards. Judge Andrea Calabria found that the three defendants had immunity under a 1929 treaty that established the Vatican as a sovereign state.

Last year citizens in Cesano, a suburb of Rome, blamed Radio Vatican for a cluster of leukemia cases in the vicinity of its powerful transmitters (see *MWN*, M/A01 and M/J01). The judicial decision did not play well in Cesano, where locals protested that the Vatican "has a license to kill."

The controversy is far from over. An epidemiological study by Dr. Paola Michelozzi and coworkers that supports some of the concerns of Cesano residents has been accepted for publication by the *American Journal of Epidemiology*. The paper is scheduled to appear early this summer.

At last year's meeting of the International Society for Environmental Epidemiology, Michelozzi, who is with the regional health authority in Rome, reported that the incidence of childhood leukemia within 6 km of the Vatican antennas was twice the expected rate—a result that was just short of statistical significance (see *MWN*, S/O01).

Also last September, a government report concluded that such a study had little hope of producing helpful insights (see *MWN*, S/O01).

In addition, there are rumors that the new government of Silvio Berlusconi will soon move to relax the Italian 6 V/m exposure limit, one of the strictest RF/MW standards in Europe (see *MWN*, J/F00).

ing in the 1980s, according to Johansen, but he also notes that the annual incidence rose from 6.1 to 7.8 cases per million for 1993-1996, which "suggests that further data are necessary to settle the issue." (Though it was higher, 7.9 per million, in 1968-1972.) Dr. **John Boice Jr.** of the International Epidemiology Institute in Rockville, MD, is a member of the Johansen team (see also p.4). These new results appear in the February 1 issue of the *British Journal of Cancer* (86, pp.348-349, 2002).

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On March 1, the **French** government reiterated an advisory to users of mobile phones, reminding them that, on a precautionary basis, parents should tell their children to limit the use of wireless phones, and that when using an earpiece pregnant women should keep the phone away from their bellies and teenagers should keep it away from their developing sex organs. The government also advised that phones should not be used while driving, even with a hands-free kit. These are the same recommendations issued last year in a report, *Mobile Telephones, Their Base Stations and Health*, prepared at the request of the health ministry (see *MWN*, J/F01)...On April 18, there will be two roundtable debates on *Mobile Phones and Health*—one on phones, the other on towers—at the Palais du Luxembourg in Paris, chaired by Senators **Jean-Louis Lorrain** and **Daniel Raoul**.

### **Carlo Opens Registry for Wireless Phone Complaints**

Those with health symptoms they attribute to the use of a mobile phone can now report them to Dr. George Carlo.

The Mobile Telephone Health Concerns Registry, operated by Carlo's Science and Public Policy Institute in Arlington, VA, will issue quarterly reports on the data collected over the next year. The information will be treated confidentially and distributed in aggregate.

Carlo received \$250,000 for the voluntary registry last November in a partial settlement of the *Busse* lawsuit, which was filed against his Wireless Technology Research (WTR), among others, on behalf of phone users (see *MWN*, J/A01 and N/D01).

The registry is needed to fill "the void left by the regulatory agencies," Carlo told *Microwave News*. "I really blame the FDA for being asleep at the switch," he said. Carlo ran the controversial \$28 million WTR program for the cell phone industry.

If the registry "raises enough red flags, the scientific community will be compelled to test the hypotheses," he explained. Carlo has long argued for "post-market surveillance" of phone users. He said that the site had 75,000 visitors in the two weeks following the launch in mid-March.

Carlo will run the site on an interim basis until it can be turned over to public health officials. No one has yet agreed to take over,

however. "I've had enough, I want to move out of the wireless area as soon as I can. I am living on savings," Carlo said.

People can report their complaints by filling out a questionnaire at <[www.health-concerns.org](http://www.health-concerns.org)> or by calling toll free to (866) 3-SCIENCE.

### **U.S. Government Cracks Down On Bogus Phone Shields**

In the first crackdown of its kind, the U.S. Federal Trade Commission (FTC) has charged two companies that market shields for mobile phones with making false claims. Others may soon be targeted for legal action.

On February 13, the FTC filed complaints in federal court against Comstar Communications Inc. in West Sacramento, CA, and Stock Value 1 (SV1) in Boca Raton, FL. The government is asking the courts to block the companies from selling shields and to force them to give consumers refunds.

The shields, which cost from \$20 to \$25 each, are "ultimately ineffective," according to FTC's Howard Beales. The FTC has seen "no scientific evidence" to support the claims that the shields protect phone users from radiation, said Beales, who heads its Bureau of Consumer Protection in Washington.

The FTC is not taking a position on whether wireless radiation can cause health effects. Beales cited the Food and Drug Administration (FDA), which has stated that there is no definite proof that mobile phones are harmful or that they are safe (see *MWN*, N/D99). Neither complaint filed by the FTC challenges Comstar's or SV1's statements that phone radiation is harmful.

Beales advised phone users who want to reduce their exposure to make shorter calls or use a hands-free set.

The FTC is investigating other shield sellers. "This is the beginning, not the end," Beales said. He added that, in general, "Consumers would do well to be skeptical" of phone shields.

Both Comstar's and SV1's shields are small disks of metal mesh that stick to the phone's earpiece. According to the FTC, the packaging for Comstar's NoDanger states that it is "capable of blocking up to 99% of harmful electromagnetic waves up to 2000 MHz." SV1 sold its WaveShield in packaging claiming that it "blocks up to 99% of electromagnetic radiation." Neither company's literature explains how its shields reduce exposures.

According to Beales, the FTC's investigation was prompted by the Goodhousekeeping Institute, the testing lab of *Good Housekeeping* magazine, which tested devices from Comstar, SV1 and several others and found them to be ineffective. The FTC asked the sellers to produce data to support their claims. Comstar and SV1 submitted test results, but these "did not pass scientific muster," Beales said.

Before SV1's Web site was closed in February, the company stated that its shields were tested by, among others, Coghill Research Labs in Gwent, Wales, U.K. The site quoted Roger Coghill as stating that he considered the SafeTShield to be "an effective and healthy protection" against radiation, and adding that, "I have one on my cell phone."

Copies of the two FTC complaints are available on the Internet at: <[www.ftc.gov/os/2002/02/index.htm](http://www.ftc.gov/os/2002/02/index.htm)>.

### **WHO Director on Cell Phones: Follow Precautionary Principle**

Dr. Gro Harlem Brundtland, the director general of the World Health Organization (WHO), favors a precautionary approach to the use of mobile phones, according to press reports from Scandinavia.

In an interview with *Dagbladet Norge* (March 9), a major Norwegian newspaper, Brundtland discouraged children from using mobile phones. A physician with a degree in public health, Brundtland is a former prime minister of Norway.

Jon Lidén, a communications adviser in Brundtland's office in Geneva, confirmed the accuracy of the Norwegian article to *Microwave News*.

Brundtland's outlook appears to put her at odds with the WHO International EMF Project. "Precautionary policies should not be applied to EMFs," Dr. Michael Repacholi, who oversees the project, stated recently (see *MWN*, S/O01). He could not be reached for comment.

Brundtland advises everyone to limit the amount of time on the phone, but she does not think there is enough scientific evidence to issue a formal warning.

For herself, Brundtland says that she gets a headache whenever she uses a mobile phone. "In the beginning I felt warmth around my ear. But the discomfort got worse and turned into a headache every time I used a mobile phone," Brundtland said in the interview. Making shorter calls does not help, she added. The interview was featured on the front page of *Dagbladet Norge* and was later picked up by the Swedish press.

Dr. Hardell's unpublished 2001 studies are scientifically valid and reliable?"

Smouse replied that there was other evidence, but conceded the importance of the Hardell testimony.

In the first of two papers submitted for publication last year, Hardell reports a statistically significant 26% increase in brain cancer among those who had used an analog cell phone for more than a year. The brain tumor risk rises to 35% and 77% among those who used such phones for five and ten years, respectively.

In the second paper, which looks only at astrocytomas—the type of tumor Newman developed—the risk is 29% above controls, but is not statistically significant. When Hardell limits his analysis to the parts of the brain closest to the phone (the occipital and temporal areas), he sees a significant, ninefold increased risk. This estimate is based on only 12 cases and 5 controls.

Hardell also reports a greater chance of developing a brain tumor, as well as an astrocytoma in particular, on the side of the head on which a phone was used (an ipsilateral tumor).

Some of these results were first presented at a London conference last June (see *MWN*, J/A01) and build on an earlier, smaller study released in a series of papers over the last three years (see below and *MWN*, M/J99, J/A99 and M/J00).

Lawyers for the cell phone industry sought to show that Hardell's unpublished studies are flawed and unreliable, as well

### **The Daubert Standard**

Judge Blake's five-day hearing is known as a "Daubert hearing" after the landmark 1993 Supreme Court decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, which helps define what kind of scientific evidence is allowed in court.

Under *Daubert*, the trial judge serves as the gatekeeper, who must ensure that all scientific testimony offered in court is "relevant" and "reliable."

The Supreme Court ruled that the judge must determine at the outset whether the scientific evidence "rests on a reliable foundation"—though it need not have the "general acceptance" of the scientific community. The court declined to set a "definitive checklist or test." It stated that peer review and publication are important criteria but added that publication is "not a *sine qua non* of admissibility."

as inconsistent with other published cell phone epidemiological studies (see also p.4).

In cross-examining Hardell, Janet Thorpe of Alston & Bird in Atlanta emphasized that both papers had been rejected by journals—an important, though not an absolute, indicator of their

(continued on p.9)

## **Hardell's Cell Phone Epidemiological Papers: Published and Unpublished**

### **Study 1**

**L. Hardell, A. Nasman, A. Pålsson, A. Hallquist and K. Hansson Mild, "Use of Cellular Telephones and the Risk for Brain Tumors: A Case-Control Study," *International Journal of Oncology*, 15, pp.113-116, July 1999.**

Found no general increase in brain tumors among 209 cases and 425 controls, but did see a nonsignificant increase in ipsilateral tumors (on the side of the head where phone was used) in the temporal or occipital lobe: right side OR=2.45, CI:0.78-7.76; left side: OR=2.40, CI:0.52-10.9. Elevated risk seen only for NMT analog phones. (See *MWN*, M/J99.)

**L. Hardell, A. Nasman, A. Pålsson and A. Hallquist, "Case-Control Study on Radiology Work, Medical X-Ray Investigations and Use of Cellular Telephones as Risk Factors for Brain Tumors," *Medscape General Medicine*, online publication, May 4, 2000.**

Further analysis of the same data used in the 1999 paper. Risk of ipsilateral tumors in the temporal, occipital or temporoparietal regions is OR=2.42, CI:0.97-6.05. When other risk factors, for instance exposure to ionizing radiation, are taken into account, the risk of ipsilateral tumors becomes statistically significant: OR=2.62, CI:1.02-6.71. (See *MWN*, M/J00.)

**L. Hardell, K. Hansson Mild, A. Pålsson and A. Hallquist, "Ionizing Radiation, Cellular Telephones and the Risk for Brain Tumors," *European Journal of Cancer Prevention*, 10, pp.523-529, December 2001.**

Restates the Medscape results and reviews the Muscat, Inskip and Johansen epidemiological studies.

OR=odds ratio

CI=confidence intervals

### **Study 2**

**L. Hardell, A. Hallquist, K. Hansson Mild, M. Carlberg, A. Pålsson and A. Lilja, "Cellular and Cordless Telephones and the Risk for Brain Tumors," unpublished manuscript, originally submitted to the *Lancet*, will appear in the June 2002 issue of the *European Journal of Cancer Prevention*.**

In this much larger study, with 1,429 cases and 1,470 controls, the use of analog cell phones for longer than a year was associated with a statistically significant increased risk of brain tumors: OR=1.26, CI: 1.02-1.56. For longer latency periods, the risks were higher: >5 years OR=1.35, CI:1.03-1.77; >10 years OR=1.77, CI:1.09-2.86. For ipsilateral tumors in the temporal area of the brain, OR=2.50, CI: 1.28-4.88. There was no "clear" brain tumor association for users of digital or cordless phones. Among different tumor types, the risk was highest for acoustic neuromas among users of analog phones: OR= 3.27, CI:1.67-6.43.

**L. Hardell, K. Hansson Mild and M. Carlberg, "Use of Cellular Telephones and the Risk for Astrocytomas," unpublished manuscript, submitted to *International Journal of Radiation Biology*.**

This paper addresses the 588 patients with malignant brain tumors (414 astrocytomas) among the 1,429 cases in the second study. There was no overall increased risk for either analog or digital phones: OR=1.13, CI:0.82-1.56 and OR=1.11, CI:0.85-1.45, respectively. For astrocytomas alone, the risks were approximately the same: OR=1.29, CI: 0.87-1.90 and OR=1.11, CI:0.81-1.53, for analog and digital phones respectively. But the risk was significantly higher for ipsilateral brain tumors among analog phone users: OR=1.85, CI: 1.16-2.96 for all malignant brain tumors, and OR=1.95, CI:1.12-3.39 for astrocytomas. For digital and cordless phones, the risk of ipsilateral astrocytomas was OR=1.59, CI:0.98-2.58 and OR=1.70, CI: 1.06-2.74, respectively. For astrocytomas in the temporal or occipital areas, OR=9.00, CI:1.14-71.0, based on 12 cases and 5 controls.

**For the Plaintiff**

Teaching witness.

**Dr. Neil Cherry**

Environmental Management and Research Division, Lincoln University Canterbury, New Zealand

“Based on our results and other epidemiology and cellular and animal experimental studies, my opinion is that there is an increased risk for brain tumors in certain parts of the brain, that is, the part with the highest exposure....My opinion is that [Newman’s] brain tumor was caused by his use of an analog cell phone.”

**Dr. Lennart Hardell**

Department of Oncology, Örebro Medical Center Örebro, Sweden

“My opinion is that radio-frequency radiation similar to [that] emitted from cell phones can cause DNA genetic damage or related processes in animals.”

**Dr. Henry Lai**

Department of Bioengineering, University of Washington, Seattle

“Based on my reading of the bioelectromagnetics literature and my reading of the larger body of science, RFR exposure can produce biological effects that may lead to cancer development.”

**Dr. Jerry Phillips**

Biological Sciences Curriculum Study Colorado Springs, CO

“My opinion is that exposure to radiofrequency [radiation] from cellular telephones can cause cancer. Brain cancer...[in] human beings.”

**Dr. Elihu Richter**

Occupational and Environmental Medicine Unit, Hebrew University School of Public Health and Community Medicine Jerusalem, Israel

**Expert Witnesses on Parade:  
No Secrets Allowed, But Big Payday**

The experts were the stars of the Baltimore hearing. The entire multi-million-dollar *Newman* case will be decided on the credibility and reliability of their testimony.

Angelos’s five expert witnesses tried to convince Judge Blake that there is enough evidence linking cell phones to brain tumors to allow the case to go to trial. Conversely, the industry lawyers used their own experts to try to disqualify each member of the Angelos team and get the case thrown out of court.

Serving as an expert can be rewarding, but it’s not easy. Those who agree to testify are open to the discovery process and may be required to hand over all sorts of documents, everything from letters to personal notes. For instance, Hardell had to supply the raw data from his most recent, as-yet-unpublished epidemiological study—and then sit quietly as a lawyer picked at every data point.

The defense lawyers hit pay dirt when they obtained the rejection letters Hardell had received from the *Lancet* for this study, thereby undermining the cornerstone of Angelos’s case (see p.9). The letters were projected onto a large screen for the whole court to see.

Using Cherry’s own e-mails, Jane Thorpe of Alston & Bird, one of the defense firms, showed how Cherry had recruited Richter to serve in what Cherry described as “a worthy cause of global importance.” By focusing on the dates of the various documents, Thorpe detailed how Richter had prepared his report in only a couple of days. Richter was forced to concede that he had not done a complete review of the cell phone literature.

Other revelations bordered on the trivial. On cross-examination, Calle was asked why she had highlighted certain passages, but not others, while reviewing one of the brain tumor epidemiological studies. She promptly conceded that there is no deep logic in what she underlines. Calle said that she now wishes she “had never highlighted anything.”

How much an expert is paid is also fair game for disclosure. Stampfer said that he commands \$450 an hour and that by January he had submitted bills totaling \$80,000 to Alston & Bird. Stampfer assured the court that he would soon be submitting another bill, a comment that prompted a roar of laughter from the dozens of lawyers in the courtroom. (The lawyers themselves never revealed how much they are

making.) Stampfer also disclosed, sotto voce, that he had consulted with defense attorneys on an asbestos case, as well as on a variety of other cases.

Just like movie stars, the experts are protected from the paparazzi and other annoyances by their lawyer-handlers. A reporter who asked Laterra for his phone number was quickly brushed aside by King “Chip” Hill III of Venable, another defense firm, who said, “You can call me,” as he hurried Laterra out of the room.

Curt Renner of Watson & Renner, yet another defense firm, shielded Calle from a camera as he escorted her out of the courthouse. Renner later scolded the photographer for even attempting to take a picture of the epidemiologist from the American Cancer Society.

**For the Defense**

“My conclusion based on the epidemiological studies...and...the input of the larger scientific community is...that there’s no association [between cell phone] use and brain cancer.”

**Dr. Eugenia Calle**

Director of Analytical Epidemiology, American Cancer Society, Atlanta

“There’s no plausible scientific connection between low-level exposure to RF power from a cell phone and subsequent biological effects.”

**Dr. Christopher Davis**

Department of Electrical Engineering, University of Maryland, College Park

“There is no credible basis in the scientific literature suggesting that RFR can cause brain tumors in animals.”

**Dr. Mark Israel**

Department of Genetics Dartmouth Medical School Hanover, NH

“[Newman’s] cell phone use had nothing to do with [his] tumor....There’s clearly no scientific evidence that would implicate cell phone use to brain tumors.”

**Dr. John Laterra**

Department of Neurology Johns Hopkins Medical School, Baltimore

Did not testify.

**Dr. Martin Meltz**

Department of Radiation Oncology, University of Texas Health Science Center, San Antonio

“There is no credible basis to support a causation claim between wireless phone use and brain cancers.”

**Dr. Meir Stampfer**

Department of Epidemiology Harvard School of Public Health, Boston



reliability under the legal standard set by the Supreme Court in the landmark *Daubert* case (see box on p.7).

Thorpe showed the court a letter from the *Lancet*, which notified Hardell last August that it would not publish his paper on brain tumor risks, and a December letter from the *International Journal of Radiation Biology* informing him that two of three peer reviewers had recommended the rejection of his paper on astrocytoma risks. The reviewers raised questions about the study design and the problem of recall bias. Hardell said that he had appealed both decisions.

The editors of the *Lancet* wrote back on October 9 that they were holding firm on their rejection. A consulting statistician “felt that [Hardell’s] overall message was written much too forcefully,” according to the letter. The appeal to the second journal is still pending.

[As we go to press, Hardell has confirmed to *Microwave News* that the *European Journal of Cancer Prevention* has accepted his brain tumor paper, originally submitted to the *Lancet*, and that it

will appear in the journal’s June issue. Smouse declined to comment as to whether Angelos’s team had informed Judge Blake of this development.]

The defense lawyers—a dozen strong—tried to introduce the text of the peer reviews submitted to the journals, but after a great deal of legal jousting, Judge Blake ruled that they were inadmissible.

The experts for the defense argued that Hardell’s epidemiological studies were badly designed, that Newman’s tumor was symptomatic 18 months before the March 1998 diagnosis and that it was not located where Hardell said it was.

Dr. Meir Stampfer of Harvard testified that Hardell had used an “incorrect approach” in his analysis of the laterality of the brain tumor risk. His technique gives “a completely distorted estimate of the relative risk,” Stampfer told the court.

One of the cornerstones of the defense is that Newman’s use of a cell phone prior to his diagnosis in 1998 was approximately 340 hours, which is less than the estimated peak use in the studies by Drs. Joshua Muscat and Peter Inskip, neither of which showed a brain tumor risk (see p.4).

In fact, Dr. John Laterra of Johns Hopkins Hospital testified that symptoms of Newman’s brain tumor were already apparent in September 1996, when he had logged only 166 hours of cell phone use.

In his closing argument, defense attorney Tom Watson of Watson & Renner in Washington told Judge Blake that “the selective listing of results barely above the null...does not meet the Daubert standard.” The plaintiffs “failed to show that there was an actual increase in brain tumors except by convoluted analysis,” Watson told *Microwave News*.

On behalf of the plaintiffs, Smouse closed by telling Blake that a trial is “the traditional vehicle for testing the admissibility of evidence” and asked her to allow the case to proceed.

Courts are not under a deadline to reach a decision. “Sometimes they rule from the bench and sometimes they take months. She’s given no indication,” Garrett Johnson, a lawyer for Motorola at Kirkland & Ellis in Chicago, told *Microwave News*.

Some other highlights from the expert testimony:

- Dr. Henry Lai said that the comet assay developed by Dr. N.P. Singh is preferred by eight out of nine researchers and is ten times more sensitive than Dr. Peggy Olive’s assay. In contrast, Dr. Mark Israel testified that his lab uses the Olive method and that it is “at least as sensitive” as the Singh method.
- Dr. Jerry Phillips disclosed that Dr. Mays Swicord of Motorola asked him to change the conclusion of one of his papers on gene expression and state that any effects of RF/MW exposure are of “no physiological importance.”
- Dr. Elihu Richter said that the National Cancer Institute study of brain tumors among cell phone users was done much too soon. That is like “looking for a gray hair in third graders,” he claimed.
- On the ability of RF/MW radiation from a cell phone to cause biological effects, Dr. Christopher Davis said: “Underlying [all the bioeffects] is chemical change and underlying that chemical change is bond breakage which just is implausible at the incredibly tiny energies coming from a cell phone.”

### **Five New Brain Tumor Suits**

A team led by Mayer Morganroth of Detroit has brought five more brain tumor lawsuits against the wireless industry. The defendants are the leading cell phone manufacturers and service providers, as well as ANSI, the CTIA and the IEEE. The five complaints were all filed on February 25, in a Washington, DC, court. Each seeks over \$1 billion in damages.

Morganroth is also representing Michael Murray, a 34-year-old Motorola technician with a brain tumor (see *MWN*, N/D01). Murray’s \$1.5 billion suit, originally filed in the same court last November, is now in federal court, where Judge Thomas Penfield Jackson will decide whether to return it to the DC court. Jackson presided over the Microsoft anti-trust case.

Morganroth, best known for his defense work in criminal cases, has said that he will file many more similar lawsuits. He is working with Sheldon Miller of Detroit and Joanne Suder of Baltimore, who initiated the Newman case in the fall of 2000 (see *MWN*, S/O00 and p.1).

The five plaintiffs are:

- Baldassare Agro, 42, of Howell, NJ, who began using a mobile phone in 1992 and had a malignant glioblastoma removed in January 2000. He used phones made by Motorola, Nokia and Qualcomm.
- Pamela Cochran, 35, of Mt. Airy, MD, who began using a mobile phone in 1997 and had a malignant astrocytoma removed in February 2000. She used phones made by Audiovox, Motorola and Nokia.
- David Keller, 42, of Scottsdale, AZ, who began using a mobile phone in 1995 and had an acoustic neuroma—a benign tumor—removed in March 1999. He used units from Nokia, Sanyo and Sony.
- Dino Schofield, 45, of Valley Glen, CA, who began using a mobile phone in 1988 and had a malignant oligodendroglioma removed in January 1999. He used phones made by Motorola, Nokia and Panasonic.
- Richard Schwamb, 36, of Oakdale, NY, began using a mobile phone in 1995 and has had an acoustic neuroma removed. He used a Qualcomm phone.

working on Brillouin precursors for over 15 years.

The National Academy of Sciences–National Research Council has initiated a study to evaluate Albanese’s theories at the request of Senator Edward Kennedy (D-MA), with funding from the USAF (see p.11 and *MWN*, J/F01 and N/D01).

Pulses of radiofrequency or microwave (RF/MW) radiation must have extremely short rise times or very rapid changes in phase in order to create Brillouin precursors on entering “lossy” materials like soil, water or living tissue. (Materials that absorb radiation are called lossy.) Once generated, the new pulses propagate without significant attenuation.

Brillouin precursors present both an advantage and a potential hazard. “They are useful for imaging because they penetrate materials that conventional radar signals do not,” explains Dr. Kurt Oughstun, who has long studied the dynamics of RF/MW pulses and has collaborated with Albanese for many years (see interview below). “On the other hand, it may not be a good thing to have signals that penetrate deep into human beings.”

Oughstun began investigating Brillouin precursors while a doctoral student at the University of Rochester, NY. At that time,

no one thought that they were very significant, he says, but his doctoral research suggested otherwise. Oughstun now believes that Brillouin precursors can be the dominant component of some types of RF/MW pulses traveling through human tissue.

These ideas have prompted some skeptical, even derisive, reactions. Such “strange pulse effects,” Dr. Robert Adair of Yale University in New Haven, CT, told Oughstun in a caustic letter last December, “simply don’t exist.”

Oughstun is unfazed. “I find it odd,” he told *Microwave News*, “that the USAF is pushing to develop technologies that use signals that penetrate different materials, while they are ignoring the fact that these signals will also penetrate the body.”

While Oughstun has received numerous grants from the USAF’s Office of Scientific Research, his work appears to be ignored—or dismissed—by the USAF departments responsible for radiation safety.

Albanese told *Microwave News* that he decided to go public after discovering that a 1999 report prepared for the MDPH by a panel of four experts ignored Brillouin pulses and the entire issue of phasing (see *MWN*, N/D98, N/D99 and M/A00).

## **Brillouin Precursors 101 with Professor Kurt Oughstun**

*Dr. Kurt Oughstun is a professor of electrical engineering and mathematics at the University of Vermont, Burlington. He has done extensive work on the propagation of extremely short electromagnetic pulses through different types of materials, and has collaborated with USAF’s Dr. Richard Albanese for over 15 years. Oughstun is the author of more than 50 published papers, as well as the textbook Electromagnetic Pulse Propagation in Causal Dielectrics with G.C. Sherman (Berlin: Springer-Verlag, 1994). A list of Oughstun’s publications is available on his home page, <www.emba.uvm.edu/~oughstun>. He is on the editorial board of IEEE Transactions on Antennas and Propagation. The USAF has long supported his research, with no restrictions on what he can publish or present at meetings. In fact, he does not have a security clearance for access to classified information. Oughstun spoke with Microwave News in March.*

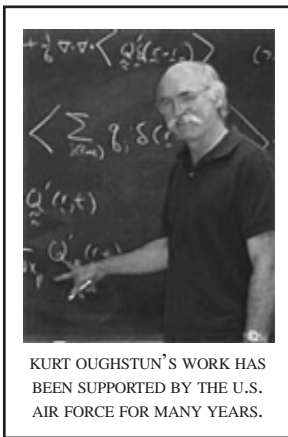
**MWN:** Do you agree with Dr. Albanese that the radiation emitted by a phased array radar system is different from other sources of RF/MW radiation or from an ordinary radar?

**KO:** Yes, I do. Our research has shown that the electromagnetic field radiated from an antenna system like PAVE PAWS can penetrate much deeper into the human body than the radiation from a conventional radar. Let me explain why: In a phased array system like PAVE PAWS, several individual antennas radiate pulses in a specified time sequence. Within the main beam of the radar, these pulses are typically separated by short time intervals. In the side lobes outside the main beam, however, the time intervals between the various pulses will be different and the assembly of pulses can overlap each other in such a way that they may produce an extremely rapid change in phase in the electromagnetic field.

**MWN:** What happens when the phase changes very rapidly?

**KO:** The most important effect is that the radiation no longer decays exponentially in lossy materials such as water, foliage and biological tissue. In these cases, most of the RF energy is absorbed within a few centimeters. But our research shows that if a change in phase is sufficiently rapid, a quasi-static field known as a Brillouin precursor is generated when

the radiation penetrates the human body. This special type of wave-field was first described by the French physicist Leon Brillouin in 1914. We have found that pulses that produce a Brillouin precursor can deliver a significant fraction of their energy deep into the tissue—much more so than can pulses from a conventional radar.<sup>1</sup>



KURT OUGHSTUN’S WORK HAS BEEN SUPPORTED BY THE U.S. AIR FORCE FOR MANY YEARS.

**MWN:** If the phased-array radiation is deposited deeper into the human body, what can it do when it gets there?

**KO:** The Brillouin precursor field is totally different from the RF/MW radiation addressed in ANSI/IEEE exposure standards. In his 1994 paper,<sup>2</sup> Dr. Richard Albanese described four potential mechanisms for biological tissue damage due to a Brillouin precursor. These are changes in the conformation of molecules, changes in the rates of chemical reactions, effects on membranes and thermal damage. In my opinion, the most serious may be the membrane effects. A single Brillouin precursor can open small channels through the cell membrane because, as it passes through the membrane, it can induce a significant change in electrostatic potential across that membrane.

**MWN:** One of the contentious effects of microwave radiation is leakage through the blood-brain barrier. Do you think that PAVE PAWS radiation may be more likely to induce such leakage?

## Does USAF Have Secret Health Studies on Phased Array Radiation? Tensions Surface at NAS–NRC Meeting on PAVE PAWS Radar

“I want to know the effects that the PAVE PAWS radar is having in my community,” Richard Judge, an elected official from Cape Cod, MA, told the newly constituted committee of the National Academy of Sciences–National Research Council (NAS–NRC) that is investigating the possible health effects of the U.S. Air Force (USAF) radar. “We need to know why the rates of disease are higher in our community.”

“We were told that there are no studies of phased array radiation, but we now believe that’s not true,” Judge charged at the panel’s first meeting on March 15 in Washington. “We would like to see the [USAF’s] electromagnetic safety program, which is classified.”

Before Judge spoke, Jimmy Dishner, the executive director of the PAVE PAWS project, emphasized that he and the USAF treat any allegation that the radar might be harming the people it is designed to protect “very seriously.”

In a series of presentations, USAF officials said that there is no evidence to suggest that the radar is responsible for any health problems on the cape.

“There is no plausible reason to believe that PAVE PAWS is a unique RF energy source from the point of view of the human body or any biological entity,” said Dr. Johnathan Kiel of Brooks Air Force Base (AFB) in San Antonio.

None of the USAF presentations mentioned any classified health data.

Then, Dr. Richard Albanese addressed the committee over a speakerphone from San Antonio. Albanese, a career USAF researcher who reports to Kiel, is the individual most responsible for the new NAS–NRC study. Close to two years ago, he wrote to the Massachusetts Department of Public Health warning that the potential effects of the PAVE PAWS radiation are “completely unexplored” (see p.1 and *MWN*, S/O00).

Albanese said that he is “particularly concerned about brain tumors” in the communities near the radar installation.

“There are simply no *published* data sets for phased arrays,” Albanese told the committee. As he repeatedly emphasized the word “published,” it became apparent that there are reports classified secret that are not available without a security clearance.\*

At one point, while explaining the biological importance of phasing, Albanese cut himself off and said that any further discussion would have to take place in “another setting.”

Asked after the meeting about the stark contrast between his concerns and the literature reviews presented by members of the USAF team, Albanese† told *Microwave News* that, “There are two distinct tracks. There is a two-world situation at work.”

The tension over secret information nearly boiled over when Judge sought to give the NAS–NRC staff copies of two of Albanese’s papers, which had been obtained by Charles Kleekamp, a retired engineer who serves as a technical advisor to citizen activists on the Cape. The equations in the papers were garbled, however, prompting NAS–NRC’s Dr. Rick Jostes to say that he would request original copies from the USAF.

Judge said that he was skeptical that the USAF would supply the papers and insisted that Jostes accept his copies—which he eventually did. Kleekamp said that it had taken him a year to obtain the two papers.

Albanese told *Microwave News* that the papers do not contain classified material. He explained that the USAF could nevertheless limit access to them. “Because they do not conform to USAF policy, they are able to stop them from open distribution,” he said. (See also commentary, p.19.)

On April 25, the USAF will hold a classified briefing‡ in San Antonio for those members\*\* of the NAS–NRC panel with security clearances: Dr. Larry Anderson of Battelle Labs in Richland, WA, and Dr. Robert Hansen, an RF consulting engineer based in Tarzana, CA. Dr. Evan Double, the NAS–NRC study director, also has a clearance. Albanese himself has a “top secret” clearance.

\*The USAF has posted references to 16 Albanese papers at <[www.pavepaws.org/Library.htm](http://www.pavepaws.org/Library.htm)>. At the same location, there is a list of 39 papers by Dr. Kurt Oughstun (see p.10), which was assembled by Albanese.

†Albanese spoke to *Microwave News* as a private citizen, not on behalf of the USAF.

‡For information on the next open meetings, see p.13.

\*\*For a complete list of committee members see *MWN*, J/F02. See also p.2.

**KO:** Published laboratory results have demonstrated that low-intensity electromagnetic radiation modifies the blood-brain barrier in laboratory animals. Additional work has shown that electromagnetic pulses with the same average power but different pulse characteristics result in different barrier permeabilities. Because the PAVE PAWS system can produce a sequence of Brillouin precursors in the brain—each precursor opening small channels through the cell membrane—radiation from the PAVE PAWS system may indeed be more likely to induce such leakage.

**MWN:** Are Brillouin precursors unique to PAVE PAWS radiation?

**KO:** No—not at all.

**MWN:** What other real-world radiation sources could they be associated with?

**KO:** As data transmission rates continue to increase, wireless communication systems will approach closer to and may, at some time in the not-too-distant future, exceed the conditions necessary to produce Brillouin precursors in living tissue.

**MWN:** The FCC recently authorized certain types of ultrawideband (UWB) signals—for example, for imaging and for short-range communications [see p.17]. Could these signals, as well as other types of UWB, generate Brillouin precursors?

**KO:** Yes. In fact, some of the UWB imaging technologies being developed are based on Brillouin precursors. In the past few years, I have been modeling the behavior of Brillouin precursors in substances like soil and vegetation for the USAF. They are ideal for locating objects hidden underground or beneath a tree canopy because they can penetrate through substances that absorb conven-

## Introducing Brillouin Precursors

tional radar, and then reflect off any metal surface that may be hidden underneath.

**MWN:** Why do you think that these ideas have prompted such skepticism among some who work on RF/MW bioeffects?

**KO:** Two reasons immediately come to mind. First of all, it has been long assumed that the adverse effects of electromagnetic radiation on living beings are primarily thermal in nature. Any non-thermal effects are assumed to be comparatively insignificant. Because of this assumption, safety standards have been established based solely on thermal effects. Entire industries that use RF/MW technologies support these safety standards. Naturally, they will resist any changes prompted by the recognition of nonthermal effects.

**MWN:** What is the other reason?

**KO:** The most widely accepted view of pulse dispersion is based upon the so-called group velocity approximation. Because of its inherent simplicity, many researchers have embraced this approximation without paying much, if any, attention to its accuracy. But this approximation breaks down for pulses with short rise times.

**MWN:** What is the group velocity approximation?

**KO:** It is based on the idea that the carrier frequency of the pulse dominates the behavior of the pulse. Other frequencies that are present when the pulse enters a lossy material are assumed to be negligible in comparison. But in reality, the Brillouin precursors can become the dominant field.<sup>3</sup>

**MWN:** Give us an example of what happens to short-rise-time pulses with a 430 MHz carrier frequency traveling through simulated brain tissue.

**KO:** The group velocity approximation predicts that the pulses decay very quickly. But if you take into account the Brillouin precursors, you see that the strength of the signal is 78 times greater at a depth of 50 cm. [See figure below.]

**MWN:** But our brains aren't that big. Do Brillouin pulses still matter?

**KO:** Yes, because the pulses are repeatedly reflected back and forth

inside the skull cavity, resulting in an effectively long propagation distance, as well as in several hot spots due to beam focusing.

**MWN:** Dr. Robert Adair is perhaps your and Dr. Albanese's harshest critic. How do you respond to his contention that such "strange" pulse effects "simply don't exist"?

**KO:** Dr. Adair's statement is simply wrong. Our research program is mathematically rigorous and we present a physically correct theoretical description of the dynamics of extremely short pulses. The work began at the University of Rochester in the 1970s and continues today at the Computational Electromagnetics Laboratory at the University of Vermont, where I work.

**MWN:** We still don't understand how Adair, a physicist with a chair at Yale University, could say that these ideas are outlandish. Are they that esoteric?

**KO:** I can only guess what any person says or believes. Perhaps it is because the math used to model the behavior of Brillouin precursors—which is known as asymptotic analysis—can be very complicated. In fact, the famous Norwegian mathematician N.H. Abel is said to have called it "the invention of the devil." But the asymptotic description of pulse behavior\* has been completely verified by independent numerical solutions and by carefully designed experiments. In spite of this incontrovertible evidence, many researchers continue to cling to the group velocity description.

**MWN:** Has a Brillouin precursor ever been experimentally observed in tissue?

**KO:** I have not seen any lab results, but I believe that the USAF has sponsored experiments that have shown Brillouin precursors in tissue. If so, the results have not been published. I do know that researchers working under contract for the USAF have observed a beautiful Brillouin precursor in water. These experimental results were reported in 1988 by Richard Smith in "Dispersive Pulse Propagation: First Experiments," which may be found at the Defense Technical Information Center. But here again, these important results have not been published in the open literature.

**MWN:** Why not?

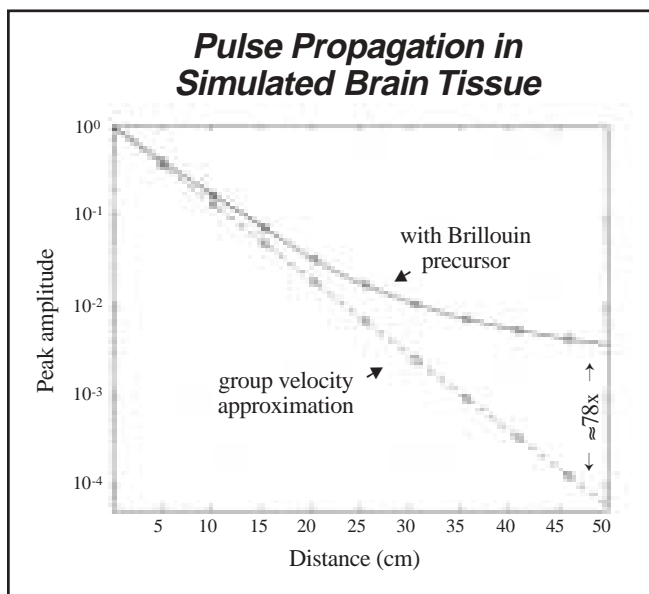
**KO:** These experiments require some highly sophisticated technology and the USAF may be reluctant to discuss it in public. More significantly, it may also be that these results raise several health and safety issues that the USAF is unable—or perhaps even unwilling—to address at this time. To be sure, our current safety standards for exposure to pulsed electromagnetic radiation have failed to consider these critical factors.

\* This is known as the Oughstun-Sherman representation.

1. K. Oughstun, "Noninstantaneous, Finite Rise-Time Effects on the Precursor Field Formation in Linear Dispersive Pulse Propagation," *Journal of the Optical Society of America A*, 12, pp.1715-1729, 1995; P. Smith and K. Oughstun, "Electromagnetic Energy Dissipation and Propagation of an Ultrawideband Plane Wave Pulse in a Causally Dispersive Dielectric," *Radio Science*, 33, pp.1489-1504, November-December 1998.

2. R. Albanese et al., "Ultrashort Electromagnetic Signals: Biophysical Questions, Safety Issues and Medical Opportunities," *Aviation, Space and Environmental Medicine*, 65 (Supplement), pp.A116-A120, May 1994.

3. H. Xiao and K. Oughstun, "Failure of the Group Velocity Description for Ultrawideband Pulse Propagation in a Double Resonance Lorentz Model Dielectric," *Journal of the Optical Society of America B*, 16, pp.1773-1785, 1999.



# FROM THE FIELD

## Meeting Notes: Italy, Russia, Japan, U.S. and Canada

• There will be two workshops during the COST281/EBEA meetings in **Rome**. *Emerging Technologies*, chaired by **Gerd Friedrich** of the FGF, the German mobile phone research group, will focus on 3G phone systems, which will be widely available later this year, and 4G systems, which are still on the drawing boards. *Mobile Phones and Children*, chaired by Dr. **Luc Martens** of Belgium's Ghent University, will address the "conjectures" in the U.K. Stewart report that children may be more at risk from cell phone radiation (see *MWN*, M/J00). Four experts are being invited to speak at each workshop (their names had not been announced at press time). Detailed descriptions of the two workshops are on the COST281 Web site, <www.cost281.org>. Attendance at some of the other COST 281/EBEA sessions will be restricted. The preliminary schedule states that the "forum and the MCM will not be open for everyone," but the criteria for attendance are not specified. Friedrich, who serves as the scientific secretary of COST281, did not respond to a request for clarification—nor did the meeting organizers at the University of Rome.

• The dates and parts of the agenda for the September EMF meeting in **Russia** have changed. The meeting will now begin a week earlier—at the request of European and American attendees, according to Andrey Vasin, the conference coordinator. A daylong roundtable, *Discussion of Results of Experiments with Chronic EMF Exposure Conducted Several Years Ago in the USSR, Which Serve as the Basis for EMF Standards in the USSR and Russia*, will take place in **St. Petersburg** on September 23. A "friendly party" will follow. "We are currently asking the Russians to give full details of the studies on which they base their standards so we can do a proper critique of them and compare their results in a much more informative and scientific manner," Dr. **Michael Repacholi**, who leads the WHO's EMF standards harmonization project, told *Microwave News*.

• The scheduled speakers at the May EMF forum in **Tokyo**, organized by the **Gauss Network**, a citizen activist group, will include Dr. **Hiroshi Yamasaki**, the former chief of the multistage carcinogenesis unit at IARC in Lyon, France. Yamasaki will review IARC's decision to classify EMFs as a "2B" carcinogen (see *MWN*, J/A01). Dr. **Neil Cherry** of New Zealand, **Libby Kelley** of the U.S. and **Anne Silk** of the U.K. are also on the program.

• This year's *Gordon Conference on Bioelectrochemistry* will be chaired by Dr. **Raphael Lee** of the University of Chicago. Dr. **Richard Nuccitelli**, a professor emeritus at the University of California, Davis, will serve as the vice chair. A preliminary list of speakers and their topics appears in the February 15 issue of *Science*.

• The NAS–NRC **PAVE PAWS** committee has scheduled two more meetings—both on Cape Cod, MA, the home of the USAF radar (see p.11, also p.1). On May 28–29, the panel will meet in Sandwich. There will be a **public forum** on May 28. Then, on July 15–16, the committee will meet at Woods Hole. It will hold an information gathering session open to the public. Details are posted on the NAS–NRC Web site, <www.nationalacademies.org>.

• Symposia on the **precautionary principle** are being arranged for each of two upcoming **epidemiology** conferences, both to be held

### New Listings

May 2-5: **COST281/EBEA Forum on European Projects, COST281 Management Committee Meeting (MCM)** and workshop on **Emerging Technologies** (May 4) and **Mobile Phones and Children** (May 5), Rome, Italy. Contact: Dept. of Electronic Engineering, "La Sapienza" University of Rome, via Eudossiana 18, Rome, Italy. E-mail: <cost281-rome@mail.elettra2000.it>, Web: <www.cost281.org>.

May 11-12: **International Forum on Health Issues of EMFs**, Edo-Tokyo Museum, Japan. Contact: Tetsuo Kakehi, Gauss Network, Higashi-yamatoshi Nakahara 3-10-1, C-201, Tokyo 207-0016, Japan, (81+425) 65-7478, Fax: (81+425) 64-8664, E-mail: <fwnp7112@mb.infoweb.ne.jp>.

July 21-26: **Gordon Research Conference on Bioelectrochemistry**, Mount Holyoke College, South Hadley, MA. Contact: Gordon Research Conferences, PO Box 984, West Kingston, RI 02892, (401) 783-4011 ext.100, Fax: (401) 783-7644, E-mail: <grc@grc.org>.

September 17-25: **3rd International Conference on EMFs and Human Health: Fundamental and Applied Research**, Moscow (September 17-20) and St. Petersburg (September 21-25), Russia. Contact: Andrey Vasin, Institute of Biophysics, (7+95) 190-5421, E-mail: <yugrigor@rol.ru>, Web: <www.pole.com.ru/news\_en.htm#eng>.

September 22-26: **3rd World Congress on Microwave and Radio-frequency Applications**, Convention and Exhibition Center, Sydney, Australia. Contact: Congress Managers, (61+2) 9262-2277, Fax: (61+2) 9262-3135, E-mail: <mrfa2002@tourhosts.com.au>, Web: <www.microwave-rf.org>.

November 26-28: **Interim International Symposium on Antennas and Propagation (ISAP)**, Yokosuka Research Park, Japan. Contact: Prof. Koichi Ito, c/o Inter Group Corp., Grace Inn Akasaka, 1-10-23 Akasaka Chuo-ku, Fukuoka 810-0042, Japan, Web: <www.ieice.org/cs/ap/ISAP2002>.

### Selected Upcoming Meetings

(For a complete list, see *MWN*, N/D01 and J/F02.)

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/events/iseaisee2002>.

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>.

in Canada in August. *Environmental Exposures, Public Health and the Precautionary Principle* will be featured at the International Society for Environmental Epidemiology meeting in Vancouver. The following week in Montreal, the International Epidemiological Association will host a session on *Evidence to Action: Science, Ethics and Precautionary Preventive Interventions*.

Hot New Papers

**Maren Fedrowitz, Jürgen Westermann and Wolfgang Löscher, "Magnetic Field Exposure Increases Cell Proliferation But Does Not Affect Melatonin Levels in the Mammary Gland of Female Sprague Dawley [SD] Rats," *Cancer Research*, 62, pp.1356-1363, March 1, 2002.**

"By using two different proliferation markers, the present study demonstrates that, at least under conditions of our experimental protocol [two-week exposure at 100  $\mu$ T (1G)], MF exposure significantly enhances proliferation in the mammary epithelium of female SD rats. This effect of MF exposure occurred in the absence of any alteration in pineal or mammary melatonin levels. On the basis of numerous previous observations in experimentally induced mammary tumors in rats, an increased proliferative activity of the mammary epithelium in response to MF exposure is a likely explanation for the cocarcinogenic or tumor-promoting effects of MF exposure observed previously by us in the DMBA model of breast cancer." (See *MWN*, S/O99; also J/F99 and J/F02.)

**Mel Greaves, "Childhood Leukemia," *British Medical Journal*, 324, pp.283-287, February 2, 2002. (Full text available at <www.bmj.com>.)**

"Epidemiological evidence suggests that ionizing radiation, certain chemicals (such as benzene), viruses (human T cell leukemia/lymphoma virus type I, Epstein-Barr virus) and bacteria (*Helicobacter pylori*) may play a part in the development of some subtypes of leukemia and lymphoma in adults and children. Whether any of these exposures have a major role in childhood leukemia is uncertain, but large-scale case-control molecular epidemiological studies in Britain and the United States may provide answers. The U.K. children's cancer study (UKCCS)...and a parallel U.S. study have already ruled out electromagnetic fields as a major factor in leukemia etiology."

**James McDevitt, Patrick Breyse, Joseph Bowman and Dina Sassone, "Comparison of Extremely-Low-Frequency (ELF) Magnetic Field Personal Exposure Monitors," *Journal of Exposure Analysis and Environmental Epidemiology*, 12, pp.1-8, January 2002.**

"The EMDEX Lite and [the MultiWave System III (MWIII)] provided comparable measures of TWA ELF magnetic field magnitudes in multiple job classifications and [a] variety of magnetic field environments. Although there was no significant difference in mean TWA measures, our findings indicate the maximum ELF magnetic field magnitudes measured by the EMDEX Lite were significantly lower than those measured by the MW III."

**J. Deadman and C. Infante-Rivard, "Individual Estimation of Exposures to Extremely-Low-Frequency Magnetic Fields in Jobs Commonly Held by Women," *American Journal of Epidemiology*, 155, pp.368-378, February 15, 2002.**

"By job category, the most highly exposed jobs (>0.23  $\mu$ T [2.3 mG]) included bakery worker, cashier, cook and kitchen worker, electronics worker, residential and industrial sewing machine operator and textile machine operator. By work environment, the most highly exposed job categories were electronics worker in an assembly plant (0.70  $\mu$ T) and sewing machine operators in a textile factory (0.68  $\mu$ T) and shoe factory (0.66  $\mu$ T)."

**Michael Kanda, Quirino Balzano et al., "Effects of Ear-Connection Modeling on the Electromagnetic Energy Absorption in a Human-Head Phantom Exposed to a Dipole Antenna Field at 835 MHz," *IEEE Transactions on Electromagnetic Compatibility*, 44, pp.4-10, February 2002.**

"Specific absorption rate (SAR) compliance measurements for wireless personal devices are usually performed in anatomically correct phantoms. The phantoms have a lossless spacer to model the external ear

**Magnetic Fields Decrease Rate of DNA Repair**

**Jacob Robison et al. (including Kim O'Neill), "Decreased DNA Repair Rates and Protection from Heat-Induced Apoptosis Mediated by Electromagnetic Field Exposure," *Bioelectromagnetics*, 23, pp.106-112, February 2002.**

"Our results demonstrate that [0.15 mT (1.5 G) 60 Hz sinusoidal for time periods between 4 and 24 h] EMF exposure offers significant protection from apoptosis ( $p < 0.0001$  for HL-60 and HL-60R,  $p < 0.005$  for Raji) after 12 h of exposure and that protection can last up to 48 h after removal from the EMF....Results showed that EMF exposure significantly decreased DNA repair rates in HL-60 and HL-60R cell lines ( $p < 0.001$  and  $p < 0.01$ , respectively), but not in the Raji cell line. Importantly, our apoptosis results show that a minimal time exposure to an EMF is needed before observed effects....Our studies demonstrated that EMF exposure results in a time-dependent decrease in susceptibility to heat-induced apoptotic signaling for three human cancer cell lines as well as a time-dependent decrease in DNA repair rates for two of these cell lines. Importantly, these results suggest a mechanism by which EMF exposure may influence tumor formation....These two effects of EMF exposure may combine to further increase the probability of perpetuating DNA mutations that eventually lead to cancer."

(pinna). The use of a lossless spacer has been questioned. The purpose of this paper was to study the effects of the lossy pinna by E-field and numerical assessments validated with thermal measurements....The results of this investigation using a canonical structure (rectangular box and balanced dipole) clearly show that although the location of the absorption maxima might be different, the difference in magnitude of the peak 1g averaged SAR between the lossy and the lossless pinna is negligible. The location of the peak may shift, but actual impact of the shift on the 1g average SAR falls within the measurement uncertainty....To keep the phantom model for cellular phone dosimetry at a reasonable geometric and maintenance level of complexity, it is suggested that the pinna be simply simulated by a thin lossless dielectric spacer. The spacer should be 4 mm thick (6 mm including the 2 mm phantom shell) and shaped like a human ear collapsed under the slight pressure of placing the cellular phone at the pinna." (See *MWN*, N/D99, J/F00 and J/F01.)

**E. Fear, S. Hagness, P. Meaney, M. Okoniewski and M. Stuchly, "Enhancing Breast Tumor Detection with Near-Field Imaging," *IEEE Microwave Magazine*, pp.48-56, March 2002.**

"In the next decade, microwave systems are likely to become a viable diagnostic option for many women....More so than for any other cancers, breast tumors have electrical properties at microwave frequencies that are significantly different than those of healthy breast tissues....The methods are attractive to patients because both ionizing radiation and breast compression are avoided, resulting in safer and more comfortable exams. Microwave breast tumor detection also has the potential to be both sensitive and specific, to detect small tumors and to be less expensive than methods such as MRI and nuclear medicine. The imaging process is expected to be very rapid. The key to sensitivity, specificity and the ability to detect small tumors is the electrical property contrast. In particular, we anticipate a contrast between malignancies and non-

mal tissues that is more significant than the density contrast imaged by X-rays....[W]e anticipate weaker responses from benign lesions, while malignancies are expected to be the dominant feature in images.” (See *MWN*, M/A00.)

**Dean Yamaguchi et al., “Inhibition of Gap Junction Intercellular Communication by Extremely-Low-Frequency Electromagnetic Fields in Osteoblast-Like Models Is Dependent on Cell Differentiation,” *Journal of Cellular Physiology*, 190, pp.180-188, February 2002.**

“[EMFs] have been used to augment the healing of fractures because of [their] ability to increase new bone formation. The mechanism of how [EMFs] can promote new bone formation is unknown...[M]agnetic fields over a frequency range from 30 to 120 Hz and field intensities up to 12.5 G dose-dependently decreased gap junction intercellular communication in MC3T3-E1 cells during their proliferative phase of development....ELF magnetic fields may affect only less differentiated or pre-osteoblasts and not fully differentiated osteoblasts....[T]he mechanism of [EMF] inhibition of gap junction communication...may be at the level of gating gap junction channels either directly mediated by [EMFs] on gap junction proteins in the plasma membrane or indirectly via action of [EMFs] on other cellular messenger systems.”

**Christopher Mueller, Helmut Krueger and Christoph Schierz, “Project NEMESIS: Perception of a 50 Hz Electric and Magnetic Field at Low Intensities (Laboratory Experiment),” *Bioelectromagnetics*, 23, pp.26-36, January 2002.**

“The double-blind laboratory experiment tested the hypothesis that there are subjects with the ability to perceive 50 Hz EMFs at 100 V/m and 6 μT (60 mG)... A total of 63 volunteers, 49 with [electrical hypersensitivity syndrome (EHS)] and 14 controls...had to...[judge] 10 sham and 10 exposed 2 min blocks in [a] randomized sequence....When performing 63 independent statistical tests, three significant results with  $p < 0.05$  are expected to occur by chance....The individual analyses...produced seven significant results...The probability to get seven or more significant results out of 63 tests is  $p = 0.037$ ....The result...indicates that a small but statistically significant number of subjects is able to detect weak 50 Hz [EMFs]...Since there was no difference in the EMF perception scores between [the EHS group and controls]...it can be assumed that the subjective hypersensitivity to electricity is not correlated with the actual ability to detect weak EMFs.” (See *MWN*, N/D00.)

## Across the Spectrum

“At the end of the day, it is a question of which kind of a society we live in: Wherever you go you’ll be faced with electromagnetic fields. If you don’t dare drive your Volvo car, you don’t dare take a commuter train.”

—Lennart Strom, spokesperson, Volvo Car Corp., Gothenburg, Sweden, commenting on test results published by *Vi Bilägare*, a Swedish motorists’ magazine, showing that magnetic fields in Volvo cars can be as high as 180 mG—the highest of any of the makes tested—quoted by Anna Peltola, “Three Volvo Cars Pose Electromagnetic Risk—Study,” *Reuters*, February 14, 2002 (see p.16)

Indeed, Americans have experienced the pain and suffering that can result from insufficient precaution in risk management. The health risks of smoking, the neurotoxic effects of low doses of lead, once used as an additive to gasoline, and the respiratory diseases from exposure to asbestos in the workplace—each became major public health problems in the U.S. Public health historians teach us that these problems could have been reduced or even prevented altogether if early signals of danger had stimulated precautionary measures by risk managers.

—Dr. John Graham, administrator, Office of Information and Regulatory Affairs, U.S. Office of Management and Budget, Washington, “The Role of Precaution in Risk Assessment and Management: An American’s View,” p.2., presented at *The U.S., Europe, Precaution and Risk Management: A Comparative Case Study Analysis of the Management of Risk in a Complex World*, a conference organized by the European Commission, the U.S. Mission to the European Union and others, Brussels, January 11-12, 2002

“When people have all the facts, they can deal with risk. That was the central lesson from the influential inquiry into the government’s handling of the BSE crisis. What will it take to get health officials to learn it?”

—Editorial on the U.K. Department of Health’s dismissal of public concerns about a possible link between vaccination for mumps, measles and rubella (MMR) and autism, “Come Clean: Britain’s Stance on MMR Won’t Wash, and People Know It,” *New Scientist* (U.K.), February 16, 2002; BSE refers to mad cow disease

## “MICROWAVE NEWS” FLASHBACK

### Years 20 Ago

- Massachusetts public health officials draft a maximum 200 μW/cm<sup>2</sup> general population standard for RF/MW radiation—the most stringent state limit in the country.
- The Ontario government investigates a cluster of miscarriages among VDT operators at Toronto’s Old City Hall.

### Years 10 Ago

- Women operating VDTs that emit strong magnetic fields are more likely to miscarry than those using low-field terminals, reports Dr. Maila Hietanan at the first EBEA conference in Brussels.
- An advisory panel to the U.K.’s NRPB, headed by Sir Richard Doll, concludes that “no firm evidence” exists that links exposure to ELF EMFs and cancer.

- Angered by industry remarks condemning prudent avoidance, Dr. Granger Morgan of Carnegie-Mellon University counters that the policy “is an example of using incomplete science to make a reasoned judgment in the face of uncertainty.”

### Years 5 Ago

- Physicists and biologists clash over the threshold for EMF effects at an NIEHS meeting. Physicists say that they only occur at 1 G or above, but biologists argue they can see changes at 10-20 mG.
- Lifetime animal studies are the number one priority, the FDA tells the cell phone industry.
- At an FDA workshop on biological effects of wireless radiation, Dr. Stephen Cleary of Virginia Commonwealth University criticizes the industry. “It is ultimately frustrating that no one wants to fund this research,” he says.

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E-mail: <mwn@pobox.com>****ALLERGIES****Chromium Rashes...** Splotches that break out on the cheeks of cell phone users may have nothing to do with radiation. In a case report appearing in the February issue of *Archives of Dermatology* (138, pp.272-273, 2002), Japanese doctors describe how a shiny chromium-plated phone can cause an allergic reaction in a 35-year-old woman. "Chromate is a common cause of allergic contact dermatitis," they state. They close their case study by noting that they had also recently seen two teenaged boys who had similar allergic reactions.**AUTOMOBILE EMFs****High Magnetic Fields in Volvos...** Drivers of some Volvo cars can be exposed to ELF EMFs over 175 mG, according to a Swedish motorists' magazine. *Vi Bilägare* reported in February (issue No.2, 2002) that three Volvo models had the highest levels in a survey of 13 cars from eight different manufacturers. Fields up to 180 mG, primarily in the 30-70 Hz range, were measured in the V70 station wagon, and 150 mG and 120 mG EMFs were found in the S60 sedan and the S80 sedan, respectively. The highest readings in all three cars were in the area where the driver's left foot usually rests. Strong fields were also found at seat level on the driver's side (20-30 mG) and on the left rear seat (30-66 mG). The source of the fields is a cable that runs from the generator in the front of the car to the battery in the rear. According to Dr. Kjell Hansson Mild of Sweden's National Institute for Working Life in Umeå, the company has known about the problem since 1996. Indeed, at a bioelectromagnetics meeting held in Bologna, Italy, in June 1997, Dr. Yngve Hamnerius of Chalmers University of Technology and Kjetil Vedholm of the Volvo Truck Corp., both in Gothenberg, reported that ELF EMFs were approximately 10 times higher in cars with the battery in the back. In the 5 Hz-2 kHz band, the levels were below 5 mG when the battery was in the front and up to 40 mG with the battery in the rear. In a statement issued on February 15, the day after *Vi Bilägare* published its findings, Volvo Car Corp. said that it takes concerns about EMFs "with the utmost seriousness," but pointed out that the readings were "10-100 times under the recommended limits" adopted by the EU Council of Ministers (see p.15 and *MWN*, J/A 99). "There are no reasons for Volvo to take technical or other measures," the company asserted. On February 20, the company changed course and announced that, for about \$200, Volvo owners in Sweden will soon have the option of installing a new electrical cable that will lower EMFs by a factor of ten. (No word yet on whether owners in other countries will be given the same offer.) While cars made by other manufacturers fared better in the *Vi Bilägare* survey, readings above 10 mG were common. Passengers in the rear seats of BMW sedans, for example, could be exposed to 25 mG. The magazine is set to publish measurements on a second set of cars in mid-April. In 1998, James Hatfield, Dr. Samuel Milham and Richard Tell reported that spinning steel-belted radial tires could produce ELF fields as high as 20 mG inside cars (see *MWN*, M/A 98)...Meanwhile, TCO Development has announced that Volvo Truck Corp. has become the first major international corporation to include the TCO'01 specifications for mobile phones used by its employees. (Volvo



Truck Corp. is independent from Volvo Car Corp., which became a subsidiary of Ford Motor Co. in 1999.) Volvo's example is being followed by a number of others, TCO stated. (See *MWN*, N/D00 and J/F01.)

**MILITARY RADAR**

**German Veterans Go to Court...**On March 26, six former soldiers with injuries stemming from working with radar sued the German Ministry of Defense for compensation. They each want lump-sum payments of at least €60,000 and larger pensions. Reiner Geulen, their Berlin-based attorney, also represents more than 700 servicemen with cancer and other ailments, who may file their own claims. Last June, after an independent commission set up by the defense ministry reported that some soldiers had been exposed to X-rays generated by high-power radars, Defense Minister Rudolf Scharping said that compensation claims would be settled in a "prompt, nonbureaucratic" manner (see *MWN*, S/O01). After reviewing a third of the 1,500 claims that have been filed, the ministry has rejected all but eight because the vast majority could not show they had been exposed to X-rays. Citing work by Dr. Eduard David of the University of Witten/Herdecke, the commission had concluded that radar radiation was unlikely to have damaged the soldiers' health. But Remo Klinger, an attorney working with Geulen, believes that RF/MW exposures should not be discounted. "Microwave radiation and X-rays together are much more dangerous than microwaves alone," Klinger told *Microwave News*. The Geulen firm also announced in March that it is working with a "major American law firm" to bring lawsuits in the U.S. against ITT, Raytheon and other manufacturers of military radar used in Germany from the 1950s through the 1970s. Geulen said that the approximately 400 plaintiffs would include Dutch, Greek and U.S. citizens in addition to German servicemen and their families. (In the 1970s and 1980s, a number of U.S. electronics companies settled a variety of radar health claims out of court; see *MWN*, D82.)

**ULTRAWIDEBAND**

**FCC Authorizes Limited Use...**On February 14, the FCC gave a green light to ultrawideband (UWB) technology for imaging, surveillance and communications. It could soon approve other applications. In its preliminary order, the FCC specified limits for UWB devices to curb interference with aviation radar and other electronic devices. The strength of the UWB signal in any specific frequency band must be less than 500µV/m. For the 960MHz-1.61GHz band used by the Global Positioning System (GPS), the FCC set even stricter limits. These vary with the specific application—with the tightest rules for communication systems. Overall, the guidelines "ensure that existing and planned radio services, particularly safety services, are adequately protected," the FCC states, adding that the rules "err on the side of conservatism." The FCC's move follows months of wrangling among government agencies over potential EMI. Early last year, the National Telecommunications and Information Administration (NTIA), a branch of the Department of Commerce that coordinates the government's use of RF/MW spectrum, warned

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that even a small number of UWB devices could potentially cause air traffic control and GPS equipment to malfunction (see *MWN*, M/A01). According to the FCC, its limits are “based in large measure” on the NTIA’s recommendations. The rules have apparently eased some of NTIA’s concerns. Commerce Secretary Donald Evans hailed the FCC’s “balanced approach,” noting that it would “promote innovation” and “enhance public safety.” But the Air Transport Association is still worried. The industry lobby group is not convinced that the new rules will prevent EMI to a number of systems vital to airline safety, including radar altimeters, microwave landing systems and Doppler weather radar, *Aviation Week* reported on March 4. The FCC has not yet released the final version of the UWB guidelines. In late March, an FCC official predicted that it would do so “any day now.” The FCC will consider whether to relax its UWB emissions standards and allow additional applications later this year.

### AS WE GO TO PRESS

**Joint FCC–FDA Web Site...**The FCC and the FDA will soon launch a Web site to provide information on mobile phone safety to consumers, Bruce Romano, associate chief of the FCC’s Office of Engineering and Technology, told *Microwave News* in early April. Last year, Sen. Joe Lieberman (D-CT) and Rep. Ed Markey (D-MA) urged the two agencies to develop such a site after a report from the General Accounting Office, the research arm of the U.S. Congress, concluded that the public needed “clear, accurate and timely information” (see *MWN*, M/J01 and J/A01). Romano acknowledged that SAR data are often hard to access on the FCC’s Web site. “We are looking into ways of making this information more accessible,” he said.

## Keeping Current: Follow-Up on the News

◆ Thomas Kuhn, president of the Edison Electric Institute (EEI), the main trade association of the nation’s electric utilities, is poised to emerge as “one of Washington’s top power brokers,” according to the *Washington Post* (March 4). Kuhn was a classmate of President Bush at Yale and is particularly adept at fund-raising. The *Post* reports that the EEI paid him close to \$1 million in salary and benefits last year.

◆ The U.K.’s *Daily Mail* (March 1) is reporting that locals are dubbing a road in East London “cancer street” after five people living within 90 feet of a mobile phone site developed cancer over the last seven years. Radiation measurements have not turned up anything unusual, according to Dr. Michael Clark of the NRPB.

◆ Within a decade, the USAF will put a high-power microwave (HPM) weapon on its unmanned strike aircraft, predicts *Aviation Week* (February 25). The research lab at Kirtland AFB, NM, is working on at least five HPM projects designed to zap enemy electronics, according to the usually well-informed magazine.

◆ The March 2002 *IEEE Transactions on Microwave Theory and Techniques*, the 50th anniversary issue, includes a variety of

invited papers. Dr. Eleanor Adair and Ron Petersen review biological effects and exposure standards. Drs. Arye Rosen, Maria Stuchly and André Vander Vorst write on medical applications. Dr. John Osepchuk describes microwave power applications.

◆ Just when we had nearly forgotten about the still-unexplained Taos Hum (see *MWN*, M/J93 and N/D93), a similar annoying, low-pitched noise is being heard in Kokomo, Indiana. Residents have been complaining about it for over two years, according to abcnews.com (February 13).

◆ Mobile phone service providers have gotten some unwanted publicity from David Letterman, the host of CBS’s popular *Late Show*. Taped in New York City and broadcast every weekday night in the U.S., the talk show is also seen in many other countries—Letterman is a favorite in Sweden. It appears that one of the local wireless companies has erected a cell tower near Letterman’s office window. On his March 28 show, Letterman described the three-antenna site as “some kind of deadly X-ray radiation emitting tower.” Some staff members are guessing that Letterman will soon be moving to another office.

# VIEWS ON THE NEWS

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## Set Albanese Free

The U.S. Air Force should let Dr. Richard Albanese speak out, unfettered by military secrecy. The scientific community can then decide whether his concerns about Brillouin precursors are justified or not. That is the way the scientific process is supposed to work.

Albanese, an Air Force researcher for more than 31 years, charges that the military is engaged in human experimentation by exposing the residents of Cape Cod to an untested type of radiation from the PAVE PAWS radar. He has shown courage in speaking out when his superiors want him to keep silent.

Professor Kurt Oughstun and Albanese believe that Brillouin pulses have unique properties that allow them to travel through biological tissue with little attenuation (see p.1 and p.10).

Both Oughstun and Albanese are funded by the Air Force. While Oughstun's papers are in the open literature, much of Albanese's work on human health effects is classified secret.

We don't understand why this is so hush-hush. Is the health impact of Brillouin precursors important to our military preparedness? Does the Pentagon fear a Brillouin precursor "gap"?

More generally, why is the Air Force Electromagnetic Health and Safety (EHS) program mired in secrecy? The situation is so out of control that only two members of the National Academy of Sciences committee convened to investigate Albanese's charges are allowed to attend Air Force briefings on the EHS (see p.11).

We suspect that many of the Air Force papers are classified not because their release would be a threat to national security, but because they could force the military to do more to protect the public and those serving in the armed forces.

When you read some of Albanese's equation-laden papers—the few that are accessible—it is easy to forget that he is trained as a physician. Albanese graduated from the Columbia University medical school in 1967. In a field dominated by engineers, a medical doctor should be welcomed with open arms. After all, physicians are as rare in the radiation standard-setting committees as are intensive discussions of nonthermal effects.

Oughstun tells us that Brillouin precursors will become increasingly common as wireless data transmissions become faster and as ultrawideband technologies enter the mainstream. These insights add even greater urgency for less secrecy and for more research.

Albanese and Oughstun's concerns may be unfounded. It may turn out that some radiation pulses do travel deeper, but not deep enough to make any biological difference. Or, the pulses may not be powerful enough to do any damage however deep they do go.

But this is all speculation. The only way to know is to go to the laboratory and do the experiments.

More than a year has passed since Senator Edward Kennedy asked the Air Force to declassify Albanese's work and make it freely available. The Air Force should have done this long ago.

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## Precautionary Limits for EMFs: Why They Are Needed

Those who continue to resist the call for EMF precautionary limits should think about whether they would want their children to sleep at the day care center in Melbourne, Australia, where magnetic fields are close to 300 mG (see p.3).

Dale Fisher, the general manager at the hospital, must have a lot on her mind beyond EMFs. When confronted by a group of anxious mothers, she probably looked up the applicable standard. Seeing that exposures of up to 1,000 mG are allowed by Australian authorities, by ICNIRP and by the WHO, Fisher labeled the mothers' concerns "emotional" and discounted any health risk.

Numerical limits have their advantages. They give the uninitiated an easy way to gauge safety and compliance. But, once a whole body of scientific and medical literature has been boiled down to a single number, any remaining uncertainties are ignored. For instance, a number cannot communicate that an EMF standard discounts cancer risks or that a panel convened by the International Agency for Research on Cancer (IARC) unanimously classified EMFs as possible human carcinogens at levels as low as 3-4 mG, hundreds of times below the standard.

Precautionary limits—which need not have the same legal weight as other standards—give newcomers added context to reach an informed decision.

To the north of Melbourne, city officials in Brisbane show

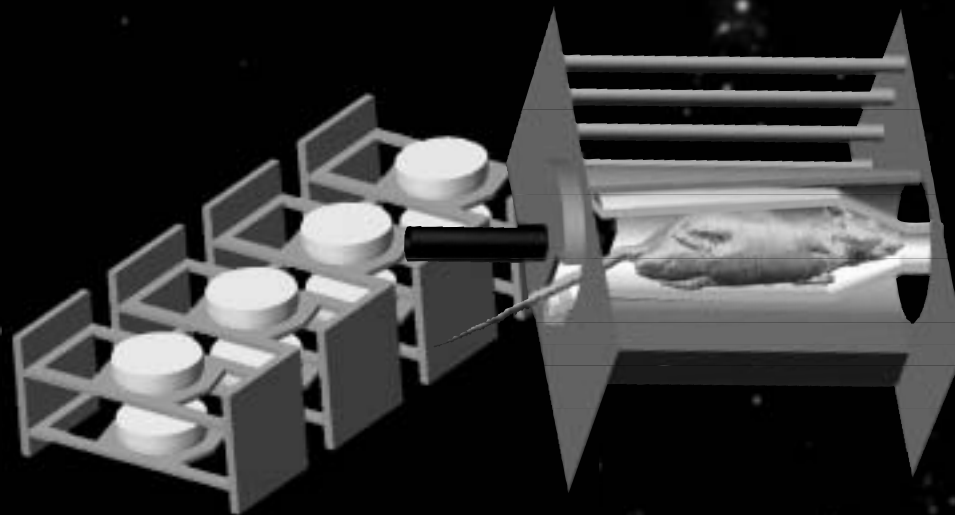
how this can be done (see p.3). In the face of the IARC decision, local activists, utility representatives and elected officials agreed on a 4 mG benchmark for upgrading an electrical substation. The agreement states that Energex, the utility, will seek to meet this standard "where reasonably practicable." The town gets its upgraded substation and those living nearby get assurances that the EMF exposures will be kept to a minimum.

*Postscript:* We are surprised that Mark Elwood, the head of Australia's National Cancer Control Initiative, represented Energex in its appeal. Elwood may not, as he testified, place much confidence in the EMF epidemiological evidence. But it is strange indeed that a government cancer advisor substituted his own judgment for that of IARC, the world's most widely acknowledged arbiter of what is and is not a cancer agent. If the head of the cancer control initiative does not err on the side of caution, who will?

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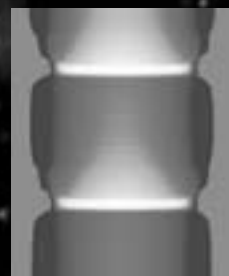


*In vitro* setup  
incl. controlling &  
monitoring tower

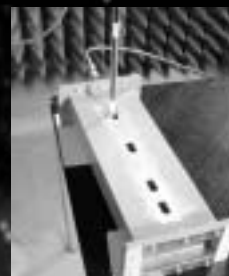


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