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Changes in Protein Folding: A Nonthermal RF Mechanism

Is There a Risk of Neurological Disease?

In a series of new experiments, Dr. David de Pomerai has shown that very weak microwave radiation can change the shape of proteins, prompting them to clump together. He has also found that the radiation can lead to the formation of long strands of proteins called fibrils. De Pomerai argues that these changes in protein structure can in turn trigger the production of heat shock proteins, previously reported by his and many other laboratories.

"This is the first direct evidence suggesting that the microwave-induced heat shock response could involve damage brought on by changes in protein conformation," de Pomerai told *Microwave News* from his lab at the U.K.'s University of Nottingham.

If de Pomerai is right, he has added an important new piece to the jigsaw puzzle that might one day explain the mechanism for a nonthermal effect.

Writing in the May 22 issue of *FEBS Letters*, he raises the possibility that the protein fibrils he has observed following microwave exposure may be similar to those associated with neurological diseases like Alzheimer's, Parkinson's and Creutzfeld-Jakob.

(continued on p.6)

WHO Flip-Flops on EMFs, Precautionary Principle Now Revoked

The World Health Organization (WHO) has decided not to invoke the precautionary principle for electromagnetic fields (EMFs), Dr. Michael Repacholi has told *Microwave News.*

Less than three months after releasing a draft position paper that called for applying the precautionary principle to both extremely-low-frequency (ELF) and radiofrequency (RF) EMFs, the WHO has backed off from this recommendation (see *MWN*, M/A03). The draft had been circulated at a WHO workshop held February 24-26 in Luxembourg. Attendance was by invitation.

"The draft we submitted to the Luxembourg workshop was purely a discussion draft to provoke comment....It was very successful at that," Repacholi, the head of the WHO International EMF Project, wrote in a May 22 e-mail.

The decision caught many of those who attended the meeting by surprise. It "really *does* surprise me because in Luxembourg we agreed, more or less, that the precautionary principle *should be invoked*, especially for ELF," Dr. Mirjana Moser of the Swiss Federal Office of Public Health in Bern told *Microwave News.*

(continued on p.11)

RF/MW Epidemiological Studies: Cell Towers and Beyond

As an English team begins the first major epidemiological survey of people living near mobile phone base stations and a German group is working on a feasibility study for a similar effort, the debate rages on as to whether such studies should be done at all.

Speaking at a May workshop on *Mobile Phone Base Stations and Health** in Dublin, Dr. Norbert Leitgeb of Austria's Technical University of Graz reiterated his now well-known view that they are a waste of time and money. They can neither detect a possible small risk nor demonstrate the absence of harm and can therefore do nothing to settle the issue, he argued. Late last year, COST281, the European mobile phone research group, which Leitgeb chairs, issued a statement† that spells out the argument against pursuing this line of research.

The situation is more complex than for ELF magnetic fields

—Norbert Leitgeb

Leitgeb drew a parallel between RF radiation from mobile phone antennas and magnetic fields from power lines. Base stations present a "more complex" problem than power lines, he said. After a large number of studies over the last 24 years covering more than a million people, the cancer risk from power-frequency EMFs remains mired in uncertainty. Leitgeb maintains that public concerns stem from perception—or more precisely misperception—of the risks.

Dr. Paolo Vecchia, a physicist at Italy's National Institute of Health in Rome, offered another reason for not supporting base station epidemiological studies: They can amplify the perceived risk. "Doing a study may increase public concerns," Vecchia argued.

We must test the hypothesis that there is no risk

—Stan Szmigielski

Dr. Stanislaw Szmigielski looked at the matter from a different perspective: If the objective is to calm public anxiety, some data are better than no data at all. Szmigielski and Elzbieta Sobiczewska, both of the Military Institute of Hygiene and Epidemiology in Warsaw, have been investigating public attitudes on base station radiation for the last five years. In Dublin, they reported that there is "strong" evidence that as people learn more about the radiation, concerns about health risks diminish.

"You can turn Leitgeb's argument around," Szmigielski said. "Residents are not convinced that there is no risk, so you need to test the hypothesis of no risk." Leitgeb was unswayed. "The absence of risk is difficult to prove," he replied. Szmigielski has carried out a major epidemiological study of military personnel exposed to RF radiation (see most recently *MWN*, J/F98).

The Vatican RF study is the best to date

—Joachim Schüz

Some of those at the workshop believe that a better strategy is to look for observable health impacts among populations that have greater exposures than do those living near base stations.

"I am not convinced by Leitgeb's argument," Dr. Joachim Schüz told *Microwave News*. "Epidemiologic studies, if well-designed, can contribute significantly to the clarification of this issue."

"The first step is to look at highly exposed people," said Schüz, an epidemiologist at Germany's University of Mainz. "Can you imagine if [Sir Richard] Doll and [Richard] Peto had looked at passive smoking first, instead of heavy smokers?"

"Michelozzi's study of the Vatican transmitters is the best so far," Schüz said. Last year, Dr. Paola Michelozzi, an epidemiologist with the regional health authority in Rome, reported a higher rate of childhood leukemia close to the high-power antennas in Cesano, outside Rome (see *MWN*, J/A02; also S/O01).

What is the right hypothesis to test?

—Mirjana Moser

Other studies of people living near radio and TV antennas, carried out in Australia and England, have also suggested that RF radiation can lead to higher rates of leukemia, Schüz said. But, he warned, they, like the Vatican study, were small and suffered from methodological problems.

Dr. Mirjana Moser of the Swiss Federal Office of Public Health in Bern agreed with Leitgeb that a base station study should not be a high priority. But she does favor looking at the health of highly exposed workers.

"We are a long way from having a clear picture of what is the right hypothesis to test," Moser warned.

In a recent report, the Health Council of the Netherlands recommended doing an epidemiological study of people who are highly exposed to RF radiation, possibly including those living near radio and TV towers, but discouraged doing a base station investigation (see *MWN*, M/A03).

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* *Mobile Phone Base Stations and Health*, a COST281 Workshop, Dublin, Ireland, May 15-16, 2003. The agenda and abstracts of the presentations are available at <www.cost281.org>. A very limited number of CDs containing the slide presentations of the papers is available from Dr. Tom McManus, who organized the meeting. For more information, write to: <Mary.Leavy@dcmnr.ie>. The German feasibility study is being done in Lower Saxony by Dr. Rainer Frentzel-Beyme at the Bremen Institute for Prevention Research and Social Medicine; see also *MWN*, J/F02. For the U.K. study, see *MWN*, N/D02 and M/A03; also p.3.

† *Scientific Comment on Epidemiologic Studies on the Health Impact of Mobile Communcation Base Stations*, November 2002 (see *MWN*, N/D02, J/F03 and M/A03). It, too, is on the COST281 Web site.

The Talk of Dublin

Imelda O'Connor of County Cork, who describes herself as electrosensitive, wanted everyone at the COST281 workshop to know that Dr. **Gro Harlem Brundtland**, the Norwegian director-general of the WHO, says she, too, is electrosensitive. For instance, Brundtland does not use a mobile phone or allow anyone nearby to use one (see *MWN*, M/A02). Dr. **Gunnhild Oftedal** of Sør-Trøndelag University College in Trondheim, Norway, then rose to say that Brundtland's condition is still something of a mystery because she has not undergone any confirmatory tests. A little later, we asked Oftedal if anyone had approached Brundtland to see if she would allow herself to be tested. "No comment," she immediately replied, "I can't say anything." We did not let it end there: "Does that mean you are holding something back?" Oftedal smiled and said, "I have promised not to say anything."

GUNNHILD OFTEDAL WOULD NOT COMMENT —OR DID SHE?

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Dr. **Eric van Rongen** of the Health Council of the Netherlands in The Hague is investigating the claims of those who say they are electrosensitive. He presented the protocol for a study which will expose 36 self-described **electrosensitives** and 36 controls to various microwave signals at a power level of 1 V/m. "My impression is that this is a zero experiment," commented Dr. **Niels Kuster** of IT'IS in Zurich. He wondered why van Rongen had not used higher exposures so that he would have had a better chance of picking up a response. Van Rongen acknowledged that the field was very low but said that he was bound by the instructions of the ethics committee that had reviewed the experiment. "It's very interesting that the committee would not allow exposures up to the ICNIRP level," replied Kuster. (The Dutch health council has endorsed ICNIRP-type guidelines: see *MWN*, M/J 97; ICNIRP allows exposures of up to 61 V/m at 2 GHz.) Results are due this summer. "My expectation is that we will not see anything," van Rongen said.

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The COST281 workshop highlighted the different approaches to the mobile phone mast issue in Europe and in the U.S. Public concerns are being aggressively addressed in a host of countries across the continent. In his welcome, **John Browne**, Ireland's minister for communications, explained why: He spends more time talking to his constituents about towers than all other issues combined. On the day before the workshop, the ***Irish Times*** brought the point home, with a big picture of a vandalized phone mast with damage estimated at €100,000 (US$115,000).

U.K. Pledges $8 Million To Study Long-Term Effects of TETRA

The U.K. government will spend £5 million (US$8.3 million) to assess whether its new terrestrial trunked radio (TETRA) digital communication system has any long-term health effects.

The project will "provide further reassurance to users about long-term safety," said Bob Ainsworth, a minister at the Home Office, on May 23. The Home Office oversees the U.K. police, who, among others, will use the TETRA system.

The new program will monitor the health of as many as 100,000 police officers over a 15-year period. A much smaller study with volunteers will look for changes in cognitive function (see also p.8).

The project will be carried out at the Imperial College in London. The lead investigator has not yet been announced. Prof. Paul Elliott of the college was recently awarded a contract to study the health of people living near mobile phone base station antennas (see *MWN*, M/A03; also p.2).

This is the first major prospective study of users of handheld communication devices. "The government is spending more on this one project than on the whole MTHR program," said Alasdair Philips of Powerwatch, the U.K. advocacy group. Philips was referring to the ongoing research effort that grew out of the Stewart report on mobile phone health risks (see *MWN*, M/J00, J/F02 and M/A03).

Questions have been raised about possible adverse effects of TETRA's 17.6 Hz pulse modulation frequency, but an NRPB advisory panel has discounted such concerns (*MWN*, J/A01).

The TETRA system has already been the target of complaints from police officers, who blame the radios for headaches and other symptoms (see *MWN*, J/A02). A police employees' group in Lancashire is threatening legal action. (See also p.15.)

American Cancer Society: Cell Phone Cancer Risk Is a Myth

The American Cancer Society (ACS) wants to pull the American public back from the "brink of paranoia" by setting us straight about what can and cannot cause cancer.

On May 26, the ACS joined forces with the Discovery Health Channel to air the *Top 10 Cancer Myths* on cable television.

Myth 8: "Electronic devices, like cell phones, can cause cancer in the people who use them." Dr. Ted Gansler, ACS' director of medical content, advises that microwave radiation cannot cause changes in DNA.

Last year, Dr. Eugenia Calle, an ACS epidemiologist, testified for the cell phone industry in the Newman brain tumor case (see *MWN*, M/A02; also p.18).

IEEE Move To Relax Cell Phone SAR Exposure Limit Under Fire

A proposal by IEEE's International Committee on Electromagnetic Safety (ICES) to relax the limit for exposures to mobile phone radiation is generating controversy.

The plan would create "the most relaxed RF safety standard in the world," warned Dr. Om Gandhi in a December 9 open letter to ICES' Subcommittee 4, which is drafting the new standard. Gandhi, who is at the University of Utah in Salt Lake City, pointed out that the proposal would make the IEEE SAR limit 3-5 times higher than the standard set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

"The newly proposed ICES/IEEE RF safety standard would potentially allow cellular telephone radiations that would be 8 to 16 times those allowed in the U.S. at present," Gandhi told *Microwave News*. "They would also be larger than twice those allowed under the ICNIRP guidelines—thus vitiating the desire to have a harmonized safety standard for cellular telephones."

The ICES subcommittee, which is chaired by Drs. C.K. Chou of Motorola and John D'Andrea of the U.S. Navy, has voted to increase the averaging volume for measuring specific absorption rates (SARs) from 1 g to 10 g of tissue. This change alone would effectively allow exposures to be 2-3 times higher. The subcommittee also wants to relax the SAR limit from 1.6 W/Kg to 2 W/Kg (see *MWN*, S/O01).

The combined effect of these two changes would appear to bring the IEEE mobile phone standard in line with the ICNIRP limit of 2 W/Kg over 10 g. But the IEEE recently approved a separate relaxation in which the SAR for the outer ear (the pinna) was increased from 1.6 W/Kg over 1 g to 4.0 W/Kg over 10 g (see *MWN*, N/D99 and M/J02). ICNIRP does not treat the ear differently than the rest of the human head or body.

On March 15, Richard Tell, a consultant based in North Las Vegas, NV, replied to Gandhi on behalf of ICES, arguing that simple arithmetic shows that the ICES limit of 4 W/Kg in the ear would be at most twice that of ICNIRP's 2 W/Kg.

Gandhi responded that Tell's argument is moot because U.S. manufacturers do not measure SARs in the pinna for compliance purposes—indeed, the pinna has been replaced with a plastic spacer. "Test procedures only focus on the 2 W/Kg for any 10 g of head/body tissues," Gandhi wrote in a March 28 letter to Tell.

The important question is whether the Federal Communications Commission (FCC), which sets the U.S. safety standard for mobile phones, will follow IEEE's lead. "We would be under some obligation to consider new guidelines after they are adopted," said FCC's Dr. Robert Cleveland (see box at right).

In the past, the FCC has favored the RF standards recommended by the National Council on Radiation Protection and Measurements (NCRP), an organization chartered by the U.S. Congress. NCRP Scientific Committee 89-5, now in the midst of updating its 1986 RF biological effects report, has been barred from recommending its own set of exposure limits (see *MWN*, M/A03). Interestingly, Dr. James Lin of the University of Illinois in Chicago, the chair of SC89-5, has been one of the most outspoken critics of raising the averaging volume from 1 g to 10 g. He has said that such a move is not "scientifically defensible" (see *MWN*, J/A00 and N/D00).

Dr. Alastair McKinlay of the U.K.'s NRPB, who serves as the chair of ICNIRP, told *Microwave News* that the commission is now embarking on a major review of all aspects of RF radiation and health. He said that ICNIRP has "no plans to alter its RF guidelines at this stage," including raising the limit for the ear. Nor does the NRPB, he added (see p.7).

Standards Watch

• The U.S. **FCC** will soon propose revisions to its **RF exposure guidelines**. On May 1, **Michael Powell**, the chairman of the commission, revealed that this would be part of an "action plan" to "protect valuable historic and environmental resources." He did not offer any details, however. Dr. **Robert Cleveland** advised that the agency has been preparing draft rules that address a number of compliance issues. They will be released for public comment "probably sometime in June," he said. Cleveland, who is at the Office of Engineering and Technology in Washington, told *Microwave News* that the proposed changes will cover both fixed and portable sources, but that the exposure limits themselves will remain unchanged. "After six or seven years of experience, we've determined that there are several areas where some fine-tuning may be needed," he explained. The FCC issued rules for evaluating compliance in 1997 (see *MWN*, S/O97).

• **Kent Jaffa** of **PacifiCorp** has stepped down as the chair of **ICES**' subcommittee 3 (SC-3), which addresses the **0-3 kHz** frequency band. **Thanh Dovan**, an engineer with **SPI Powernet** in Australia, has agreed to serve as a cochair of SC-3. A search is under way for another cochair. Dovan is a member of the recently assembled ELF working group that is preparing a set of Australian exposure limits (see *MWN*, M/A03); previously, he worked with Enertech Consultants in Campbell, CA. SPI Powernet owns and operates 6,000 km of high-voltage power lines in Victoria....Dr. **Bob Ashley** has resigned from **ICES** and all its subcommittees. He had challenged ICES' new ELF standard, but those concerns were rejected by the IEEE Standards Board (see *MWN*, N/D02 and J/F03; see also M/A03). Ashley explained that he is "professionally embarrassed" to be named as a contributor to the new standard when his advice was ignored. By resigning, he said, his name would not appear on the published standard. ICES is also known as SCC-28. (See also p.16.)

• **Australia**'s code of practice for **siting telecommunications antennas** became fully mandatory on April 10. Under the code, carriers must provide RF exposure assessments of existing sites on request, as well as notify and consult local officials and nearby residents about new sites. All transmitters must be designed and operated in such a way as to minimize unnecessary exposures (see *MWN*, M/J02 and N/D02). The Australian Communications Authority (ACA) granted a six-month transition period when it adopted the rules last October. The code was originally developed by industry.

« Eye on Europe »

Vatican officials are not immune from prosecution in the Italian courts, Italy's supreme court ruled in early April. The decision clears the way for three Vatican officials, including the director-general of **Vatican Radio**, to face charges for endangering the health of those living near the **antennas** in Cesano, outside Rome (see p.2). The case had been dismissed in February 2002 under a 1929 treaty that established the Vatican as a sovereign state (see *MWN*, M/A02). Italian prosecutors were delighted by the decision. "I could have not received a better birthday present," one of the prosecutors told BBC News. No word yet on when the trial might begin.

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On April 28, **Switzerland**'s Federal Agency for Environment, Forest and Landscape (known as **BUWAL**) released its assessment of possible **health risks of RF radiation**. According to Dr. **Gerhard Leutert**, who heads BUWAL's division for air quality and non-ionizing radiation, the report confirms the need for the national precautionary limits adopted three years ago (see *MWN*, J/F00). A continued and consistent application of the precautionary limits is advised "without qualification," Leutert writes in the introduction to the report. He points to indications of health effects at levels below ICNIRP's limits, including increased brain cancer risks and changes in cognitive function. BUWAL asked the report's authors, Drs. **Martin Röösli** and **Regula Rapp** of the Institute for Social and Preventive Medicine in Basel, to take a more finely shaded approach than simply determining whether biological effects are established or not. Effects may now be assigned to one of five categories: "established," "probable," "possible," "improbable" or "not assessable" (see *MWN*, M/A 03). The full report is available in German, with summaries in English, French and Italian, at <www.umwelt-schweiz.ch>. Abstracts of most of the more than 200 studies cited in the report will soon be available (only in German) in an online database accessible to the public, <www.unibas.ch/elmar>.

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Germany's **Office of Technology Assessment** in Berlin is proposing a new way to help consumers minimize their exposure to mobile phone radiation: Include a continuous readout of antenna output power on the display screen of every phone. In a report released on May 21, the office's Dr. **Christoph Revermann** contends that the **Blue Angel** label for low-SAR phones promoted by the German government "ultimately does not ensure safety"

Swedish BBB Research Faulty, Says German Wireless Group

Reviews commissioned by FGF, the German telecom industry research group, cast doubt on the validity of the Salford-Persson experiments on the effects of RF radiation on the blood-brain barrier (BBB).

FGF is now sponsoring *in vitro* studies of RF radiation and the BBB, according to Dr. Gerd Friedrich, FGF's managing director in Bonn. Cells are being exposed to UMTS (3G) phone radiation; experiments with GSM signals are being planned. Results are scheduled to be released at the 2004 annual meeting of the Bioelectromagnetics Society.

Friedrich declined to say who is leading the study, but *Microwave News* has learned that the principal investigator is Dr. Florian Stögbauer of the University of Münster.

Earlier this year, Drs. Leif Salford and Bertil Persson of Sweden's University of Lund reported that extremely low levels of GSM radiation can increase the permeability of the BBB and cause nerve cell damage in rats (see *MWN*, J/F03).

FGF is also hosting a workshop on RF and the BBB, to be held in Reisensburg, near Ulm, Germany, November 3-6 (see p.12). Salford has been invited, Friedrich told *Microwave News*, adding that Persson is also welcome.

In the first of three sharply critical reviews published in the March issue of the *FGF Newsletter*, Dr. Roland Glaser contends that the Lund researchers made many errors and violated the rules adopted by the international scientific community to assure high-quality research. Among the alleged shortcomings are: the exposure of a small number of rats; the lack of a double-blind protocol; poorly characterized exposures; and the failure to include appropriate controls in the study design.

According to Glaser, who is a professor emeritus at Humboldt University in Berlin, Salford and Persson also fail to address previous research by other labs that failed to see effects.

In the second critique, Drs. Helmut Franke, Frank Gollnick and Sheila Johnston contend that the Swedes' measurements of nerve cell degeneration and leakage through the BBB are unreliable. They argue that the type of degeneration observed is common and could be the result of aging rather than radiation.

Johnston, a consultant based in London, states in a separate comment that the Lund team overreached in raising the possibility that the reported effects could have an impact on neurological health. Like Stögbauer, Franke is at the University of Münster; Gollnick is an advisor to FGF.

In concluding his commentary, Glaser writes that it is "a pity" that such results are presented to the public without peer review. In fact, *Environmental Health Perspectives* stated on its Web site that Salford and Persson's paper "has been peer-reviewed, revised and accepted for publication." Their paper, which was first posted on the Web in January, is now in print in the June issue of *Environmental Health Perspectives (111*, pp.881-883, 2003).

The March issue of the *FGF Newsletter* is available in pdf format at: <www.fgf.de>. It is currently only in German, but an English translation will soon be posted on the Web site, Friedrich said.

(see *MWN*, J/A02). The label's maximum SAR of 0.6 W/Kg has little bearing on the user's average exposure, Revermann argues, because the phone's actual radiation output varies continuously. The technology assessment office is an arm of the **Bundestag**, the lower chamber of the German parliament.

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On April 16, the **French Agency for Environment and Health** (AFSSE) recommended a continuation of a precautionary approach to mobile phone health risks. Two years ago, a report by a panel headed by Dr. **Denis Zmirou** had advised such a strategy (see *MWN*, J/F01 and J/A02). Zmirou is the scientific director of the AFSSE, which was set up last year. Dr. **Bernard Veyret** of the University of Bordeaux led a seven-member group that prepared a 100-page update of the Zmirou panel's findings. "Our report is reassuring for base stations, but not for mobile phones," Veyret told *Microwave News.* "One of our main conclusions is that there remains uncertainty over leakage through the blood-brain barrier, over headaches and over the activation of heat shock proteins." AFSSE's advice, Veyret's report and an assortment of related documents are available on the Internet at <www.afsse.fr>. At present, these are only available in French.

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There is no evidence of any health risk from using a mobile phone or living near a base station, according to a report issued on April 2 by the **Norwegian Radiation Protection Authority** (NRPA) in Oslo. But NRPA's advisory panel recommends "continued caution" in the use of phones, especially by children and teenagers, explaining that it "cannot exclude the possibility" of adverse effects. Dr. Gunnar Brunborg of the Norwegian Institute of Public Health in Oslo is the chair of the panel; NRPA's Dr. **Tore Tynes** and Dr. **Gunnhild Oftedal** of Sør-Trøndelag University College in Trondheim are among its members (see also p.3). ***Mobile Telephones and Health*** is available in Norwegian only at: <www.nrpa.no>.

RF-Induced Changes in Protein Folding *(continued from p.1)*

He stresses that it would be premature to extrapolate this new finding to any link between mobile phone use and neurological disease. Indeed, de Pomerai suggests that the microwave-induced synthesis of heat shock proteins may be protective. "It is conceivable that modest microwave exposures might even prove beneficial rather than harmful," he concludes.

He goes on to state: "What is clear is that microwaves can exert nonthermal effects in biological systems, at least partially arising from alterations in the conformation of cellular proteins."

MWs may be more beneficial than harmful
—David de Pomerai

In de Pomerai's latest experiments, the exposures were at 1 GHz with specific absorption rates (SARs) ranging from 0.015 W/Kg to 0.05 W/Kg. He notes that these are higher than those implicated in his earlier experiments, published in *Nature*, in which he observed heat shock responses in *C. elegans*, better known as nematodes or roundworms.

The SARs used in the new work are still at least 100 times less than those required to produce thermal effects, according to de Pomerai. The temperature increase in the medium surrounding the cells was less than 0.2˚C (see also *MWN*, N/D02).

De Pomerai cites the work of Drs. Henrik Bohr and Jakob Bohr, physicists at the Technical University of Denmark in Lyngby. Three years ago, the Bohrs reported* that 1-10 GHz radiation can, under very specialized conditions, modulate the folding and unfolding of proteins through a nonthermal mechanism.

In an interview this May, Jakob Bohr told *Microwave News* that he now believes that the most likely route for microwave excitation of a protein molecule is through an interaction with its side chains.

This is not the first time that questions have been raised about a possible link between microwaves and neurological diseases. In 1986, Dr. Sam Koslov of the Johns Hopkins University Applied Physics Lab in Laurel, MD, reported that he had observed the characteristic pattern of fibrils associated with Alzheimer's in a monkey chronically exposed to microwaves (see *MWN*, S/O86). But Koslov, whose work with Henry Kues was supported by the U.S. Navy, was unable to obtain funding for a follow-up study to pursue their hypothesis that the biological events that led to the formation of the fibrils began with leakage through the blood-brain barrier.

In addition, Samuel Yannon, a New York Telephone technician who had worked for 15 years near microwave transmitters on the top of the Empire State Building in New York City, died in 1974 after developing severe neurological symptoms. In a workers compensation case brought by his widow, the late Dr. Sol Michaelson testified for the defense that his symptoms were probably those of Alzheimer's disease. Nettie Yannon's legal battles ran for more than a decade, but she eventually prevailed, winning her compensation claim and later a $250,000 settlement from RCA Corp., which manufactured the equipment used by Yannon (see *MWN*, M/J89).

David de Pomerai et al., "Microwave Radiation Can Alter Protein Conformation Without Bulk Heating," *FEBS Letters, 543,* pp.93-97, May 22, 2003; see also: *Nature, 405,* pp.417-418, 2000.

* Henrik Bohr and Jakob Bohr, "Microwave-Enhanced Folding and Denaturation of Globular Proteins," *Physical Review E, 61,* pp.4310-4314, 2000.

U.K. NRPB Proposes To Adopt ICNIRP's Exposure Limits

The U.K.'s National Radiological Protection Board (NRPB) has proposed adopting the exposure guidelines recommended by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). The ICNIRP limits for both ELF EMFs and RF/MW radiation are significantly stricter than the NRPB's current guidelines.

"There appears to be neither scientific justification nor...any practical merit" in adopting new limits different from ICNIRP's, the NRPB states.

The NRPB cites the need to harmonize its approach with those of other EC member states. In its "consultation document," released for public comment on May 1, the NRPB notes that the U.K. government "fully supported" the EC's 1999 resolution endorsing the ICNIRP limits (see *MWN*, J/A99).

The new proposal is also in line with the recommendations of a Parliamentary committee in 1999, which were reaffirmed the following year in a report on mobile phone safety prepared for the Department of Health by a panel chaired by Sir William Stewart (see *MWN*, S/O99 and M/J00). Sir William is now the head of the newly established Health Protection Agency and, since April 1, the chairman of the NRPB (see *MWN*, M/A03).

At a meeting held in late May 2000, the members of the NRPB backed stronger limits at mobile phone frequencies. Previously, the U.K. had the most lenient SAR standard for mobile phones—10 W/Kg. And at its next meeting later that year, the board noted that it "may be appropriate" to adopt the ICNIRP guidelines for ELF EMFs and RF radiation.

The NRPB has close ties to ICNIRP. Dr. Alastair McKinlay, the head of the physical dosimetry department at the NRPB, is a longtime member of ICNIRP and is its current chairman. McKinlay led the NRPB team that drafted the board's proposal.

In the new proposal, the NRPB states that it will consider applying the precautionary principle to exposures of children to ELF EMFs (see excerpts at right). It will also consider precautionary measures for RF/MW radiation from mobile telecommunications, although it considers the evidence of any health risk to be "much weaker" for RF than for ELF fields. But the NRPB will not propose any specific steps until the WHO EMF project has completed a framework for applying the precautionary principle (see p.1).

Both NRPB's existing limits and those of ICNIRP are designed to prevent injury due to induced currents at the lower frequencies and heating at high frequencies. But they specify different limits to protect against these potential hazards, with ICNIRP taking a somewhat more restrictive approach. They will now be the same.

In its report, the NRPB advises that future revisions of its exposure guidelines will consider two additional changes: (1) whether the basic restrictions for time-varying EMFs below 100 kHz should be based on limiting the electric field strength inside the body; and (2) whether the basic restriction for partial-body SARs for occupational exposures to RF/MW radiation should be reduced from 10 to 5 W/Kg.

NRPB Proposals: Key Excerpts

The International Agency for Research on Cancer (IARC) has classified power-frequency magnetic fields as a possible carcinogen. This conclusion is considered by NRPB as a powerful stimulus to addressing the case for adoption of further (precautionary) measures to limit the exposure of children to EMFs. ...NRPB takes the view that exposure of children to power-frequency magnetic fields is an issue requiring consideration for application of the precautionary principle. (§6.3.4.2)

The scientific evidence linking RF exposure in everyday life with cancer or other possible adverse health consequences is much weaker than that for power-frequency magnetic fields. However, factors other than scientific ones should also be considered in assessing the applicability of the precautionary principle. There is clearly considerable public concern about exposure to RF radiation from mobile phone masts. It is the view of NRPB that RF mobile phone radiation should also be considered as an issue for application of the precautionary principle... (§6.3.4.2)

In respect of general public exposure [to frequencies below 100 kHz, the] view is taken that those exposed might include people potentially susceptible to electrical stimulation, i.e., people with epilepsy, a family history of seizure or using tricyclic antidepressants, neuroleptic agents and other drugs that lower seizure threshold and people with serious heart disease or with increased intracranial pressure....[S]uch sensitive people should be adequately protected at lower induced electric field strengths, possibly about a factor of five lower than for normal adults.... (§7.2.2.2)

General community protection, including people potentially susceptible to heat related disorders, will be assured if the whole-body RF heat load is below about an SAR of 0.1W/Kg. This will provide protection to older people, infants, children, pregnant women, other adults taking certain medications and to people undertaking cognitively demanding tasks. For frequencies between 100 kHz and 10 GHz this is a factor of 4 more restrictive than the current U.K. exposure guidelines...for the general public but agrees reasonably well with the ICNIRP...restriction of 0.08 W/Kg for the general public. (§7.2.3.2)

For exposure to mobile phones, there are conflicting reports as to whether there is a significant increase in the SAR absorbed in the head, and particularly in the brain, for children compared to adults. This is an area where clarification is needed. (§7.4)

In a report released last October, the NRPB told the government that levels of non-ionizing radiation in many workplaces exceeded the ICNIRP limits (see *MWN*, N/D02).

Proposals for Limiting Exposure to Electromagnetic Fields (0-300 GHz) is available free at: <www.nrpb.org/publications/consultation_documents/index.htm>. "Hard copies" of the document can also be ordered for £30 (US$50), plus £3 for postage, from the NRPB Information Office, Chilton, Didcot, Oxon OX11 0RQ, U.K., Fax: (44+1235) 822746, E-mail: <information@nrpb.org>. The deadline for comments is July 28.

Sorting Out Mobile Phone Cognitive Effects

Increasingly, research into the effects of mobile phone radiation on human brain function has been hampered by a lack of consistency.

In one recent paper, a U.K. team describes seeing an effect on memory in men, but not in women. In another, a Nordic group reports failing to confirm an earlier finding that phone signals can speed up reaction times.

Despite what appear to be confusing results, some patterns are emerging. First, the observed effects are mostly, though not always, improvements in performance rather than impairments.

Second, there are indications of an exposure threshold. "At 1 W/Kg, it is relatively easy to detect the effect," the U.K.'s Dr. Alan Preece told *Microwave News.* "It gets progressively harder as you turn the power down." Four years ago, Preece, who is at the University of Bristol, reported faster reaction times in volunteers exposed to analog and digital phone signals at 1W/Kg (see *MWN*, M/A99).

Here are some highlights of some recent findings:

• A team led by Christian Haarala of the University of Turku in Finland performed various reaction time tests with volunteers exposed to 900 MHz GSM radiation at 0.88 W/Kg. No significant differences were observed in comparison with sham exposures, Haarala reports in the May issue of *Bioelectromagnetics (24,* pp.283-288, 2003). These results contrast with the Turku group's three-year-old finding that exposed volunteers had shorter reaction times in several tests (see *MWN*, M/A00).

• A follow-up study by the Turku researchers has provided only partial support for their earlier work showing that exposure to phone signals altered the electroencephalograms (EEGs) of subjects performing cognitive tasks (see *MWN*, M/J00). "We observed some effects, but were unable to replicate the findings we reported three years ago," explained Dr. Christina Krause, who has led the investigation of EEG effects. And volunteers made more mistakes when exposed to phone radiation, Krause told *Microwave News*—a result that stands in contrast to the trend of enhanced performance. A paper detailing these tests will appear in *Bioelectromagnetics.*

• When male volunteers were exposed to 1800 MHz phone signals at 0.79 W/Kg, they made fewer mistakes in memory tests than they did when the radiation was switched off, Drs. Brenda Costall and James Smythe of the U.K.'s University of Bradford report in the February 10 issue of *NeuroReport (14,* pp.243-246, 2003). No such effect on accuracy was seen among female volunteers, however.

• SARs greater than 0.5 W/Kg, in combination with greater daily phone use, "may be an important factor" in the incidence of dizziness, discomfort and warmth behind the ear, a new analysis of data on headaches and other symptoms among 17,000 mobile phone users in Norway and Sweden suggests (see *MWN*, M/J 98). Drs. Jonna Wilén, Monica Sandström and Kjell Hansson Mild of the National Institute for Working Life in Umeå, Sweden, report their results in the April issue of *Bioelectromagnetics (24,* pp.152-159, 2003).

• Subjects were able to hit the brakes faster in response to a visual cue when driving and not using a phone, reports Dr. William Berg of Miami University in Oxford, OH, in the July *Accident Analysis and Prevention (35,* pp.495-500, 2003). But slower reactions were also observed when the phones were used with hands-free kits, suggesting that phone radiation was not a factor.

For a recent review of cognitive and sleep effects of mobile phone radiation, see "Hot New Papers," *MWN*, J/A02.

Phone Shields Still for Sale Despite Government Crackdown

The Federal Trade Commission (FTC) says that it has stopped two companies from making false claims for the effectiveness of mobile phone shields—but they are still selling the devices on the Internet.

The FTC sued Comstar Communications Inc. and Stock Value 1 (SV1) last year, contending that the two companies lacked scientific evidence to support their claims that their shields protect phone users from radiation (see *MWN*, M/A02).

Both Comstar's WaveShield and SV1's NoDanger are small disks of metal mesh that stick to the phone's earpiece. The FTC maintains that the devices are ineffective because most of the radiation emitted by a mobile phone does not come from the ear-piece.

On May 7, the FTC announced that the U.S. District Court in Sacramento, CA, had approved a settlement barring Comstar from asserting that its shields are effective unless the company can support such a statement with "competent and reliable scientific evidence."

Previously, the U.S. District Court in Miami had ordered SV1 and an affiliate, Meristar International, to pay the FTC $726,874 and prohibited the companies from making unsubstantiated claims about their shields.

According to Serena Viswanathan, an attorney in the FTC's Bureau of Consumer Protection in Washington, SV1 had failed to respond to the FTC's charges. The company appears to be defunct, she told *Microwave News,* and it could be difficult to collect the money awarded by the court.

But an Internet search showed that both SV1 and Comstar still have Web sites offering shields for mobile phones—their statements about effectiveness are essentially the same.

For example, SV1's site continues to claim that NoDanger "is able to filter out 99% of the EMF waves emitted from the ear piece of a mobile phone." Although the site has been revised to note that radiation is "present throughout the entire surface of a mobile phone," it does not state, as required by the court, that the "vast majority" of the radiation is emitted by the antenna and other parts of a phone and that an earpiece shield does not reduce the user's exposure to this radiation.

When told about the sites, Viswanathan said that she would investigate. She noted, however, that the FTC "can't stop someone from selling a product—it depends on the claims they're making."

Jury: Workplace EMFs Did Not Cause Male Breast Cancer

A jury in Albuquerque, NM, has refused to compensate two men who developed breast cancer after working in a basement office next to an electrical vault. James Montaño, 54, and Arthur Slater, 80, had sought damages from the owners of the building — Bernalillo County, their employer, and the City of Albuquerque — charging that exposure to magnetic fields had caused their breast cancer.

"The jury did not believe the science was there," said Paul Yarbrough of Butt, Thornton & Baehr in Albuquerque, who is representing the county. He told *Microwave News* that other factors, including age and family histories of cancer, increased the men's cancer risk.

In its April 23 decision, the 12-member jury found that the county had failed to take adequate steps to protect the men against EMF health risks. But they concluded that magnetic fields were not responsible for the cancers and refused to award the two men any money. The trial lasted two weeks.

Sam Bregman, an attorney in Albuquerque, who represents Montaño and Slater, said he was pleased that the jury had found the county had been negligent, but expressed disappointment that his clients had not received a financial settlement. "It is hard to understand how [the jury] can find [the county] negligent [for] not informing them about electromagnetic fields, and then not compensate them," Bregman told the *Albuquerque Journal* (April 24).

At the end of May, Bregman told *Microwave News* that he does not intend to appeal.

Shortly before the start of the trial, the City of Albuquerque settled, agreeing to pay each man $70,000. Montaño and Slater, who worked as property assessors, filed suit in state court two years ago (see *MWN*, M/J01 and M/A03). A third man who worked in the same office developed breast cancer, but did not join the lawsuit.

Male breast cancer is a rare disease. Approximately 1,300 new cases are diagnosed in the U.S. each year, according to the American Cancer Society (ACS).

The fact that three men in a relatively small office had breast cancer was a key part of Bregman's case. He called Dr. Sam Milham, an epidemiologist based in Olympia, WA, who testified that only three cases of male breast cancer in 4,000 years would be expected among the cohort working in the office.

Dr. John Moulder of the Medical College of Wisconsin, Milwaukee, countered for the defense that Milham's statistical analysis was inappropriate. One cannot judge the accuracy of a Texas sharpshooter by drawing a bull's eye around three bullet holes, he argued: The target must be drawn before the shooting begins. Similarly, an epidemiologist must identify a study population before anything is known about the rate of illness within the group.

The link between male breast cancer and EMFs was first made by Dr. Genevieve Matanoski of the Johns Hopkins University school of public health in 1989. She found a cluster of up to six cases among a group of New York Telephone workers (see *MWN*, N/D89 and M/A91). Soon afterwards, a number of other researchers found similar excess rates of male breast cancer among EMF-exposed workers (see *MWN*, J/A90 and J/F91).

Two years ago, Dr. Thomas Erren of the University of Cologne in Germany reported that a meta-analysis of 15 epidemiological studies pointed to "a fairly homogeneous increased risk" of breast cancer among men with elevated EMF exposures. But Erren noted that the results of individual studies were inconsistent and cautioned that it would be "premature" to conclude that the association reflected a real increase in risk (see *Bioelectromagnetics, Supplement 5*, pp.S105-S119, 2001).

Michael Silva of Enertech Consultants in Campbell, CA, testified on behalf of the county that the magnetic fields in the locations where the men worked were below 5 mG, according to Yarbrough.

Bregman disputed this estimate. In a survey he commissioned, Cindy Sage, a consultant in Santa Barbara, CA, measured levels ranging from 5 to 20 mG in the men's work area. But, following a motion from the defense, Sage was barred from testifying.

In an interview with *Microwave News*, Sage suggested that Silva's figures may have been 24-hour averages, which would include much lower readings from the overnight period, when the office was not occcupied. Silva refused to comment. "I do not want to get further involved in any way," he said.

Workplace EMFs Increase Prostate Cancer Risk

Male electric utility workers exposed to high EMFs had a greater risk of developing prostate cancer than those less exposed, according to a new epidemiological analysis. There was no increased risk, however, among those exposed to both EMFs and polychlorinated biphenyls (PCBs).

The new findings are reported by Dr. Luenda Charles and coworkers in the April 15 issue of the *American Journal of Epidemiology (157*, pp.683-691, 2003).

The data used in the study — on 138,905 men employed by five U.S. electric utilities — were originally collected by Drs. David Savitz and Dana Loomis, both of the University of North Carolina, Chapel Hill (see *MWN*, J/F95). Charles, who was Loomis's doctoral student, is now at the Centers for Disease Control in Atlanta.

For the 10% of the workers with the highest EMF exposures — but with low PCB exposures — the risk of dying from prostate cancer was twice that of controls, a statistically significant difference.

Charles suggests that EMFs might be inhibiting melatonin, leading in turn to elevated levels of testosterone which can increase cancer risk in the prostate gland as well as other tissues whose growth is regulated by testosterone.

"You would expect to see an increase in prostate cancer following EMF exposure if you believe in Stevens's melatonin hypothesis," Loomis told *Microwave News*, referring to Dr. Richard Stevens's 1987 paper, which has prompted many studies on the possible link between EMFs and breast cancer (see *MWN*, J/F87).

The Letter BEMS Refused To Print

In its January/February 2002 issue, the Bioelectromagnetics Society Newsletter *ran a commentary by Asher Sheppard and Quirino Balzano under the title "All the News That Is Fit To Spin." The two Motorola consultants made it clear that they took strong exception to our news item on their recent paper which attacked the application of the precautionary principle to RF radiation in general and to mobile phones in particular. They also were stung by a short item on our "Wish List for 2003," in which we questioned their state of mind when writing that paper.*

Sheppard and Balzano accused us of "outrageous and distorting journalistic excesses," and of mocking not only their work but also the "distinguished scientists" who had helped them prepare their paper. They also berated us for making what they called a "snide editorial comment."

After reading this, we immediately asked Mays Swicord, the Motorola staffer who serves as the editor of the BEMS Newsletter*, for an opportunity to respond. Our contribution would be "most welcome," he replied. But when we later forwarded our letter, BEMS refused to publish it.*

Janet Lathrop, the managing editor of the newsletter, told us that our comments about George Carlo were "closer to libel than the BEMS Newsletter *is prepared to go."*

We called Swicord, who told us that the objective of the newsletter is to address "scientific" issues and that publishing our letter would take the newsletter "in a direction that is unhealthy for the society." We asked how our statement that Carlo had run a "confidence game" was any more libelous than the accusations leveled against Microwave News *by Sheppard and Balzano. "We should have removed [them] from the letter," he said, adding that the society should "apologize openly" for allowing them in print.*

We then appealed to Frank Prato, the president of BEMS. He replied that he, too, was concerned about the liability issue and would therefore not overrule the editors' decision.

Reprinted below is our response to Sheppard and Balzano which BEMS declined to publish in the March/April newsletter. BEMS' apology did not appear in that issue either. See also p.19 for a commentary on this affair and the state of BEMS on its 25th anniversary.

Note that after we sent our letter to BEMS, the WHO EMF project decided not to invoke the precautionary principle (see p.1 and p.19). The others on the list below, to the best of our knowledge, are holding firm.

April 9, 2003

To the Editor:

Asher Sheppard and Quirino Balzano say that *Microwave News* ran an unfair news item about their paper, which was critical of the precautionary principle. They do not, however, point to a single factual error in our 300-word item.

Sheppard and Balzano take offense at our subhead, "The Decline and Fall of Modern Society." Readers of the *BEMS Newsletter* can judge for themselves whether this headline does damage to their message. Here, in its entirety, is the last paragraph of their conclusions, which is also the last paragraph of their paper:

> Unless current efforts lead to its successful reformulation, the precautionary principle could institutionalize excessive caution and thus deepen rather than alleviate alarm from the doom-laden hypothetical risks called "perceived threats." The resulting suppression of innovation and technological progress would inevitably have disastrous effects on society, leaving it susceptible to the decay that over time turns great civilizations into antique ruins. It is hopeful that from the inherent contradictions of the precautionary principle will be born new environmental and health policies that use the uncertainties of scientific discovery for beneficial stewardship of life and human society.

Perhaps we should have run a headline such as: "Fixed Precautionary Principle Would Make Society Better." Perhaps not. The note of optimism in that last sentence is out of step with the nonstop attacks on the precautionary principle that make up most of what is written on the other 17 pages of their paper. We continue to believe that our article accurately reflects their message.

Sheppard and Balzano are also in a huff over our editorial comment. They call it sarcasm. We call it satire. Whatever you call it, it is our opinion and is clearly labeled as such. We each have our own opinions: Theirs took 18 pages, ours three lines. We thought about writing a detailed editorial, but their rant struck us as so wrongheaded in so many ways that we opted for brevity.

What are other people doing and saying? In February, the World Health Organization (WHO) International EMF Project announced that it is invoking the precautionary principle to address RF health risks. (They have a similar outlook on power-frequency EMFs.)

The WHO is one of the most recent converts. Here are some others who have either set precautionary exposure limits or advised precaution with respect to the use of mobile phones and the siting of mobile phone antennas:

- Government of Italy (1998)
- Advisory Board on Non-Ionizing Radiation to the Czech National Institute of Public Health (1999)
- Government of Switzerland (1999-2000)
- U.K. Independent Expert Group on Mobile Phones, also known as the Stewart Committee (2000)
- Advisory Committee to the Director-General of Health of France, also known as the Zmirou Committee (2001)
- British Medical Association (2001)
- German Academy of Pediatrics (2001)
- German Radiation Protection Commission (2001)
- Advisory Panel to the Spanish Ministry of Health (2001)
- German Federal Office for Radiation Protection (2002)
- Russian National Committee on Non-Ionizing Radiation Protection (2002)
- City of Paris (2003)

Sheppard and Balzano would have us believe that invoking the precautionary principle is equivalent to succumbing to some vague and illegitimate fear. Here, again, we disagree. Over the years, *Microwave News* has reported on a number of key experimental findings that point to the possibility of serious health effects. They must be either refuted or confirmed—not simply denied. Until then, a precautionary approach is the appropriate response in order to give fair warning to the more than one billion people who regularly place an RF transmitter next to their brains.

One reason these findings remain unresolved is that the wireless industry allowed (encouraged?) George Carlo to play a six-year, $25-million confidence game instead of running the RF research program that the industry promised. Motorola, for which both Sheppard and Balzano are consultants, and the other companies never exposed Carlo's deception.

Sheppard and Balzano say that we also mocked the significant contribution of John Graham, whom they acknowledge in their paper. Graham himself was an active player in Carlo's con game. The Center for Risk Analysis, which Graham used to run at the Harvard School of Public Health, received more than $419,000 from Carlo so that his Wireless Technology Research program would have a veneer of respectability. (Sheppard was a member of the Harvard peer-review panel.)

Finally, we wonder why Motorola's Mays Swicord allowed Sheppard and Balzano to voice their complaints in the *BEMS Newsletter.* Custom dictates that offended parties write to the publication that they believe did them wrong, not to a publication where one of their coworkers runs the show.

Louis Slesin
Editor, *Microwave News*
New York City

WHO Revokes the Precautionary Principle for EMFs *(continued from p.1)*

"My understanding, based on the draft position paper and from what the staff of the EMF project said in Luxembourg, is that they were planning to invoke the precautionary principle for EMF," said Dr. Joel Tickner of the University of Massachusetts, Lowell. "There was absolutely no question about applying it to ELF EMFs; the case for RF was less sure," he added.

Prof. Mike O'Carroll of REVOLT, an advocacy group based in northern England, has a similar recollection."Repacholi made it very clear. He directed the workshop not to waste time on 'whether' but to focus on 'how' to invoke the precautionary principle," O'Carroll said.

Others see things differently. Dr. Kenneth Foster of the University of Pennsylvania in Philadelphia commented, "I am not surprised at all. This was the first inkling of a new idea." Foster went on to say, "In several long discussions, Repacholi has made it clear to me that he is trying to develop an overarching framework for using the precautionary principle and not, at this point, to invoke it for EMFs. That might come later."

And Dr. Anders Ahlbom of the Karolinska Institute in Stockholm offered the following opinion: "I honestly think they are in the process and have not decided anything. The draft report certainly suggested the precautionary principle should be applied to power-frequency EMFs."

The draft position paper, presented to the Luxembourg workshop in February, stated in bold type:

> In the EMF context there is sufficient evidence, judged against these criteria, to invoke the Precautionary Principle both for extremely low frequencies (ELF) and radiofrequency (RF) electromagnetic fields.

The draft, which was written by WHO's Dr. Leeka Kheifets, continued:

> This conclusion is based on several factors:
>
> • The classification by IARC in 2001 of ELF magnetic fields as a possible carcinogen based on studies of childhood leukemia;
>
> • The comparable radiation levels of existing mobile phones to established international guidelines;
>
> • The availability of some low-cost exposure reduction options.

When asked how their present view is consistent with the one they offered in February, Repacholi and Kheifets responded in a joint e-mail: "We have not changed our minds and have not made [a] 180˚ turn, but rather we have developed a comprehensive risk management framework in which precaution plays a role at every stage, thus there is no need to evoke it—it is always a consideration in the process. Once this framework is finalized we plan to apply it to EMF and other case studies."

Repacholi said that he will address pesticides, mad cow disease and SARS, among other agents. "The case studies for EMF will be completed over the next couple of months," he said.

With respect to recommending policies for exposures to EMFs, Repacholi said that they would be "worked up over time and be presented to a WHO task group next year."

On May 2, Repacholi and Kheifets released a new draft position paper, *Precautionary Framework for Public Health Protection.* It makes no specific mention of EMFs or RF radiation.

Kheifets To Leave WHO EMF Project

The WHO is looking for a new head for its radiation program in Geneva. The successful candidate will replace Leeka Kheifets, who joined Michael Repacholi at the International EMF Project two years ago (see *MWN,* M/J01).

Repacholi told *Microwave News* that he hopes to have her replacement on the job as soon as possible.

Kheifets has made no secret of her desire to return to California, where she worked for EPRI, the research arm of the electric utility industry, before joining the WHO (see *MWN,* M/A03).

A couple years ago, Repacholi announced that he was giving up the reins of the EMF project because he could no longer stand the constant criticism he was being subjected to (see *MWN,* N/D00).

Meeting Notes

• The ***22nd Annual Conference of the Society for Physical Regulation in Biology and Medicine***, which was to be held June 8-11 in San Antonio, has been tentatively rescheduled for January 7-10. The delay was caused by a lack of financial support compounded by travel restrictions arising from the SARS epidemic. "It was a painful decision, but we had to make it," said Dr. Michael Cho of the University of Illinois in Chicago, the president of the society. The budgets of two major sponsors, the U.S. Air Force (USAF) and NASA, were cut back due to the war in Iraq and the shuttle disaster, respectively. The meeting was designed to coincide with ***ElectroMed2003***. That meeting is going ahead as planned, according to the USAF's Dr. Michael Murphy. He said that the proceedings of ElectroMed will be published in a special issue of *IEEE Transactions in Plasma Physics.*

• The next COST281 workshop will be held in Budapest in November (see listing at right). Two others are being planned for next year: ***Mobile Telecommunications and Cellular Effects*** will be held in May, probably in Paris, and ***Specific Effects of 4G Mobile Telecommunications Systems*** is scheduled for September at a location still to be determined. For reports on the Dublin workshop, see pp.2-3.

New Listings

November 3-6: **RF Effects on the Blood-Brain Barrier,** Reisensburg, near Ulm, Germany. By invitation. Contact: Gerd Friedrich, FGF, see below; Web: <www.fgf.de>. (See p.5.)

November 15-16: **COST281 Workshop: Mobile Telecommunications and the Brain,** Budapest, Hungary. Contact: Gerd Friedrich, FGF, Rathausgasse 11a, D-53111 Bonn, Germany, (49+228) 726220, Fax: (49+228) 7262211, E-mail: <info@fgf.de>, Web: <www.cost281.org>. The workshop will follow the **6th International Congress of the European Bioelectromagnetics Association** (EBEA), which will be held November 13-15.

• The USAF and the WHO's ***Asia Pacific EMF Conference,*** slated for November 6-12, has been rescheduled—for the second time. The meeting was originally going to be held in October 2002 but was postponed following the 9/11 attacks (see *MWN*, J/F02). This time it has been delayed due to the SARS epidemic. The Thai Ministry of Health has been lined up as a cosponsor, according to the USAF's Murphy. "We plan to reschedule at the earliest opportunity," he said.

On the Internet

Russian Destinations

Thanks to the following Web sites, recent developments in Russia and other successor states of the Soviet Union are now much more accessible.

Russian National Committee on Non-Ionizing Radiation Protection (RNCNIRP), <www.pole.com.ru/news_en.htm>: The section in English offers a lot of detailed news, including the RNCNIRP's advice on mobile phone safety (see *MWN*, M/A03). There is also information on research reports, meetings and standards—including one for exposures to 50 Hz magnetic fields being developed by the Research Institute of Occupational Health and the Center for Electromagnetic Safety. The committee is chaired by Prof. Yuri Grigoriev.

Center for Electromagnetic Safety, Institute of Biophysics of the Russian Ministry of Public Health, <www.tesla.ru/news_en.html>: The English-language page offers a brief description of the center's activities, which focus on measuring and mitigating electromagnetic emissions from the power grid, household appliances and telecommunications antennas.

Magnetobiology and Electromagnetobiology, <www.biomag.info>: A site devoted to the work of Dr. Vladimir Binhi, the head of the Radiobiology Lab at the Russian Academy of Sciences' General Physics Institute. It explores the mechanisms of interaction between electromagnetic radiation and biological tissue. Binhi is the author of *Magnetobiology: Underlying Physical Problems* (see *MWN*, M/J02).

Mobile Telecommunication and Human Health, <www.ecopole.ru>: This site is in Russian only.

Two Reviews by Ross Adey

The EMR Network has posted two reviews by Dr. Ross Adey on its Web site, <**www.emrnetwork.org**>. They address the interaction of EMFs with brain tissue—one is a general discussion, the other is on the effects of cell phone signals. Both will be published next year in Elsevier's *International Encyclopedia of Neuroscience*. Adey is at Loma Linda University in California.

NRPB's RF Primer

The U.K.'s NRPB has added an animated introduction to RF radiation to its Web site, <**www.nrpb.org**>. *Radio Waves at a Glance* provides a basic overview of the sources, physical properties and health effects—established and possible—of 30 kHz–300 GHz radiation (for instance, decreasing field strength with increasing distance from the source). It is adapted from an updated version of a pamphlet that was first published six years ago (see *MWN*, J/F97). To access the tutorial from NRPB's home page, click on "Understanding Radiation" and then on "Radiowaves." The NRPB is planning a similar Internet "module" on ELF EMFs (see *MWN*, J/F95). See also p.7.

Hot New Papers

Yoon Hee Cho and Hai Won Chung, "The Effect of Extremely-Low-Frequency Electromagnetic Fields (ELF EMF) on the Frequency of Micronuclei [MN] and Sister Chromatid Exchange [SCE] in Human Lymphocytes Induced by Benzo(*a*)pyrene [BP]," *Toxicology Letters, 143,* pp.37-44, June 5, 2003.

"[T]he possible carcinogenic or cocarcinogenic potency of 60 Hz ELF EMFs with a flux density of 0.8 mT [8 G] in human lymphocytes with the genotoxic agent BP was examined with MN and SCE analysis. BP, the well-known carcinogen, was applied as an initiator in this experiment. Following BP treatment, the frequency of SCE and MN increased in a dose-dependent manner. An 0.8 mT ELF EMF exposure alone could not induce MN and SCE inductions in human lymphocytes.... [C]o-exposure of human lymphocytes to BP and 0.8 mT ELF EMFs for 24 h followed by BP exposure alone for 48 h increased the MN frequency significantly ($p<0.05$), compared to those in BP-treated sham-exposed cells...BP and ELF EMF co-exposure for 24 h followed by BP exposure alone for 48 h increased the frequency of SCE by BP treatment alone ($p<0.001$)....This suggested that ELF EMFs interacted with cellular systems by an indirect mechanism, probably as an enhancer of initiation or as a cocarcinogen, leading to increased MN and SCE formations *in vitro*."

Reprints: H.W. Chung, School of Public Health, Seoul National University, South Korea, E-mail: <chunghw@snu.ac.kr>.

Jianqing Wang and Osamu Fujiwara, "Comparison and Evaluation of Electromagnetic Absorption Characteristics in Realistic Human Head Models of Adult and Children for 900 MHz Mobile Phones," *IEEE Transactions on Microwave Theory and Techniques, 51,* pp.966-971, March 2003.

"In view of the inconsistent controversy caused by Gandhi's and Kuster's groups on the dosimetry in children's heads for mobile telephones, we did a double check for their calculation results in order to [clarify] the contradiction. We employed two newly developed children's head models that were scaled with different scaling factors for different parts based on Japanese children's statistical data on external head shapes. Using the children's head models, we calculated the local peak SAR under almost the same conditions as those previously employed by Gandhi's and Kuster's groups. Compared to the local peak SAR in the adult head model, we found an increase of 31.5% in the 1 g averaged spatial peak SAR and 21.6% in the 10 g averaged spatial peak SAR in the children's heads when we fixed the output power of the monopole-type antenna, but a difference [of] less than 10% when we fixed the effective current of the dipole-type antenna. This finding suggests that the contradictory conclusions of Gandhi's and Kuster's groups may be due to the different conditions in their numerical SAR evaluations. Moreover, we also showed that all these results can be explained from the variations of the resistive components of the antenna input impedance. For a real-world mobile telephone, there is not a definitive answer to how the antenna input impedance or the antenna output power varies."

Reprints: Dr. Jianqing Wang, Department of Electrical and Computer Engineering, Nagoya Institute of Technology, Japan, E-mail: <wang@odin.elcom.nitech.ac.jp>.

For more on the differences between Gandhi's and Kuster's SAR estimates, see *MWN*, N/D01 and M/J02.

Suchinda Jarupat et al., "Effects of the 1900 MHz Electromagnetic Field Emitted from Cellular Phone on Nocturnal Melatonin Secretion," *Journal of Physiological Anthropology and Applied Human Science, 22,* pp.61-63, 2003.

"The study group consisted of 8 young females, average age 27 years ranging from 16-36 years old...all in the follicular phase of menstrual cycle. The subjects had not used a cellular telephone at least one week before the experiment, and led a well-regulated life for a week prior to participation. The subjects entered the climatic chamber at 10 a.m....The light intensity was controlled 1000 Lx from 10:00 h to 18:00 h and 50 Lx from 18:00 h to 01:00 h, then completely dark from 01:00 h to 07:00 h in the next morning. Salivary melatonin was collected at 19:00 h and 2:00 h. For 30 min every hour from 19:00 h to 01:00 h the subjects used a cellular telephone continuously (on one day it emitted electromagnetic fields and on the other day it did not). The receiver was directly attached to the left ear without distance....[T]he average salivary

Melatonin Hypothesis Rejected: Chronic 50 Hz Exposure Has No Effect

Yvan Touitou et al., "Magnetic Fields and the Melatonin Hypothesis: A Study of Workers Chronically Exposed to 50 Hz Magnetic Fields," *American Journal of Physiology—Regulatory, Integrative and Comparative Physiology, 284,* pp.R1529-R1535, June 2003.

"In this study, we examine the circadian rhythm of melatonin in 15 men exposed chronically and daily for a period of 1-20 yr, in the workplace and at home, to a 50 Hz magnetic field in search of any cumulative effect from those chronic conditions of exposure. The weekly geometric mean of individual exposures ranged from 0.1 to 2.6 μT [1-26 mG]. The results are compared with those for 15 unexposed men who served as controls (individual exposures ranged from 0.004 to 0.092 μT). Blood samples were taken hourly from 2000 to 0800. Nighttime urine was also collected and analyzed. This work shows that subjects exposed over a long period (up to 20 yr) and on a daily basis to magnetic fields experienced no changes in their plasma melatonin level, their urinary 6-sulfatoxymelatonin level or the circadian rhythm of melatonin. Our data strongly suggest that magnetic fields do not have cumulative effects on melatonin secretion in humans and thus clearly rebut the "melatonin hypothesis" that a decrease in plasma melatonin concentration (or a disruption in its secretion) explains the occurrence of clinical disorders or cancers possibly related to magnetic fields....It is possible that the difference in the effects observed in animals and humans is the result of both the anatomical configuration of the pineal gland and the principally nocturnal rhythm of rodent activity. A different sensitivity to magnetic fields between species could also be part of the explanation, as it is known that some species detect and perceive magnetic fields differently. It is also possible that some subjects are more sensitive to magnetic fields than others; this is very difficult to demonstrate in a case-control study because of the enormous inter-individual variability of melatonin secretion and plasma melatonin concentrations in humans."

Reprints: Prof. Yvan Touitou, Department of Biochemistry and Molecular Biology, Faculty of Medicine Pitié-Salpétrière, Paris, France, E-mail: <touitou@ccr.jussieu.fr>.

For some different results, see papers by Burch, *MWN*, M/A00, p.1, and N/D02, p.11. See also Jarupat et al. at left.

melatonin...was significantly lower in [exposed] compared with [shams] ($p<0.05$, by paired t-test)....Unknown factors which we do not recognize might be responsible for these discrepancies."

Reprints: Prof. Hiromi Tokura, Institute of Textiles and Clothing, Hong Kong Polytechnic University, Hung Hom, Kowloon, E-mail: <tchiromi@polyu.edu.hk>. Full text available at: <www.jstage.jst.go.jp/en>.

See also Burch et al., "Hot New Papers," *MWN*, N/D02.

W. Boivin, J. Coletta and L. Kerr, "Characterization of the Magnetic Fields Around Walk-Through and Hand-Held Metal Detectors," *Health Physics, 84,* pp.582-593, May 2003.

"Magnetic field strength measurements were made around 8 hand-held and 10 walk-through metal detectors....Special magnetic field probes specifically designed for metal detector measurements were used.... Magnetic field strength measurements were collected on one hand-held metal detector in the laboratory. The remaining data were collected at airport terminals, federal and state government buildings and a local high school. Walk-through metal detectors had considerably higher magnetic field strengths (up to 299 A/m p-p [peak-to-peak] (3,741 mG)) than hand-held metal detectors (up to 6 A/m p-p (76 mG)). The frequencies of the magnetic field signal for walk-through detectors were between 0.1 kHz and 3.5 kHz while those for hand-held detectors were between 89 kHz and 133 kHz. Waveforms for all hand-held metal detectors were sinusoidal; those for walk-through metal detectors varied, with most being saw-toothed or pulsed....With the increasing use of metal detector systems in environments such as federal and local government buildings, hospitals and schools and the increase in the prevalence of portable medical devices, the potential for EMI between metal detectors and body-worn medical devices also increases. Body-worn medical devices should be immune to field-strength levels comparable to the data reported here if they are intended for use in the everyday environment."

Reprints: W. Boivin, U.S. FDA, Engineering and Analytical Center, Winchester, MA, E-mail: <wboivin@ora.fda.gov>.

For more on possible EMI from anti-theft systems to cardiac pacemakers, see *MWN*, N/D98.

Hironori Yamaguchi et al. (including Shoogo Ueno and Masao Taki), "1439 MHz Pulsed TDMA Fields Affect Performance of Rats in a T-Maze Task Only When Body Temperature Is Elevated," *Bioelectromagnetics, 24,* pp.223-230, May 2003.

"This study sought to clarify the effects of exposure to electromagnetic waves (EMW) used in cellular phones on learning and memory processes. Sprague-Dawley rats were exposed for either 1 h daily for 4 days or for 4 weeks to a pulsed 1439 MHz time division multiple access (TDMA) field in a carousel type exposure system. At the brain, average specific absorption rate (SAR) was 7.5 W/Kg, and the whole-body average SAR was 1.7 W/Kg. Other subjects were exposed at the brain average SAR of 25 W/Kg and the whole-body average SAR of 5.7 W/Kg for 45 min daily for 4 days. Learning and memory were evaluated by reversal learning in a food-rewarded T-maze, in which rats learned the location of food (right or left) by using environmental cues. The animals exposed to EMW with the brain average SAR of 25 W/Kg for 4 days showed statistically significant decreases in the transition in number of correct choices in the reversal task, compared to sham-exposed or cage control animals. However, rats exposed to the brain average SAR of 7.5 W/Kg for either 4 days or for 4 weeks showed no T-maze performance impairments....These results suggest that the exposure to a TDMA field at levels about four times stronger than emitted by cellular telephones does not affect the learning and memory processes when there are no thermal effects....Wang and Lai (2000) reported that the exposure to pulsed 2450 MHz EMW at the whole-body average SAR of 1.2 W/Kg for 1 h daily for 6 days caused deficits in spatial reference memory in rats using a Morris water maze....Our study differs from theirs in several respects....Under their exposure conditions, it is very likely that their rats heard the sounds that can be generated by pulsed EMW. Several studies suggest this auditory effect can affect behavioral performance....This auditory effect also might have caused the operant learning deficits reported by Lai et al. [1994]."

For more on Dr. Henry Lai's water maze experiment, see *MWN*, J/F00.

Reprints: Hironori Yamaguchi, Department of Surgical Oncology, Graduate School of Medicine, University of Tokyo, E-mail: <yamaguchih-tky@umin.ac.jp>.

"MICROWAVE NEWS" FLASHBACK

Years 20 Ago

• In a WHO report, Prof. R. Hauf in Freiburg, Germany, deems 50/60 Hz electric and magnetic fields of 20 kV/m and 3 G to be safe.

• The *Washington Post* reveals that E-bombs (which propagate electromagnetic pulses) are being developed at two U.S. national labs.

• A woman in her 50s continues to experience pain in her arms four years after reaching into a still-active microwave oven, Dr. Henry Fleck writes in the *Bulletin of the New York Academy of Medicine.*

Years 10 Ago

• A jury finds that San Diego Gas & Electric was not negligent for failing to warn customers of potential EM health risks. Ted and Michelle Zuidema had filed the lawsuit alleging that the utility's power lines caused their daughter to develop a rare kidney cancer.

• Rep. Bill Richardson (D-NM) requests that the Air Force identify the source of a low-frequency "hum" in Taos, NM.

• The Air Force's Ground Wave Emergency Network poses a "minimal to nonexistent" public health risk, the NAS–NRC concludes in a new report.

Years 5 Ago

• A Swedish-Norwegian study of 17,000 mobile phone users finds that those who talked for long periods reported more headaches and were more likely to sense warmth behind their ears.

• In a survey, Dr. Luciano Zaffanella finds that, while most Americans are exposed to power-frequency magnetic fields of less than 1 mG, over 1 million are exposed to more than 10 mG.

• The Norwegian Navy releases a report that discounts the role of EM radiation in a suspected cluster of birth defects among children whose fathers serve aboard the *Kvikk*, a torpedo boat equipped for electronic warfare. The families accuse the navy of a cover-up.

Across the Spectrum

Once the experiments are done and the data are out there, scientists may argue forcefully for the appropriateness of their conclusions and for the policies they believe should follow. Others will criticize them for this, arguing that it's important for scientists to be "objective." Indeed they should be—in doing their analyses and in reporting their results. But in advocating policies based on what they have learned, it's good for them to take sides. Indeed, it's their responsibility.

—Dr. Donald Kennedy, editor-in-chief, *Science,* former commissioner, U.S. Food and Drug Administration, in an editorial, "Research Fraud and Public Policy," *Science,* p.393, April 18, 2003

The Stewart Report is a milestone in the way that issues of public concern are addressed.

—National Radiological Protection Board, Chilton, U.K., "Mobile Phones and Health—an Update," *eBulletin* (formerly *Radiological Protection Bulletin*), March 2003 (full text available at: <www.nrpb.org/publications/bulletin/no3/article3.htm>)

"It's nutty to require conclusive evidence when the risk, if it comes to fruition, is extremely serious."

—Prof. Cass Sunstein, University of Chicago Law School, quoted by Samuel Loewenberg, "Precaution Is for Europeans," p.14, Week in Review, *New York Times,* May 18, 2003; Sunstein cites President Bush's preemptive strike on Iraq's putative weapons of mass destruction as an example of precautionary action

Lost Opportunities? MW Health Risks—30 Years Ago

It may be that little pathology has been observed because the bulk of the exposure is at low dose levels where any risk of untoward sequelae is not large enough to produce effects that can be easily detected. Perhaps the protective guides and standards have served to prevent the escalation of occupational exposure as the uses for microwave radiation multiplied and the power of equipment steadily advanced. It may also be that systematic efforts have not been made to identify and follow exposed and nonexposed persons adequately and for sufficiently long periods of time. The growing body of Russian and eastern European literature describing a wide variety of functional changes and clinical effects, leading to consideration of "radiowave sickness" as a possible independent nosologic entity, cannot simply be ignored. With increasing uses and power, the stage is set for the appearance of late effects previously undetected possibly because of their infrequency, lack of distinctiveness or mild character. There may now be a better opportunity to resolve the uncertainties of present knowledge in the face of an increasing risk.

—Dr. Charlotte Silverman (1913-2003) in a review and commentary on "Nervous and Behavioral Effects of Microwave Radiation in Humans," *American Journal of Epidemiology, 97,* p.223, April 1973 (see also p.17)

Only the Good News, Please

Excerpted below is an exchange of letters, published in the June 2003 issue of Health Physics *(p.788), concerning a review by Geoffrey Eichholz of the International Agency for Research on Cancer's (IARC) monograph on static and ELF EMFs, which originally appeared in the journal's December 2002 issue (see* MWN, *J/A01 and M/J02).*

Eichholz leads the reader to believe that there is no evidence to support a link between exposure to extremely low frequency [ELF] magnetic fields and increased health risk by summarizing the IARC's findings in the following terms: "The general conclusion seems to be that the studies indicate no discernible pattern of increased risk associated with increased duration or frequency of exposure to ELF fields." His summary is a considerable departure from IARC's overall evaluation that [ELF] magnetic fields are possibly carcinogenic to humans (Group 2B). The IARC conclusion never appears in [the] review.

—Norbert Hankin, Office of Radiation and Indoor Air, Environmental Protection Agency, Washington, DC

I essentially summarized statements in the summary of the monograph [that indicate no consistent associations]...I believe that such positive statements by a renowned panel of experts need to be aired and are important in allaying public apprehension and fears...

—Dr. Geoffrey Eichholz, emeritus professor of nuclear engineering, Georgia Institute of Technology, Atlanta

In spite of the great improvements in analytical techniques, the difficulties in assessing toxic risks are not on the decline, but rather, the reverse seems to be true. What we observe is a general increase in toxicophobia. Perhaps we have to consider the paradoxical situation that the steady progress of analytical sensitivity produces more and more data that nobody can yet appraise with respect to factual risk. This often results in an irrational attribution to toxic strain. Some well-known examples are multiple chemical sensitivity (MCS), electrosensitivity syndrome and sick building syndrome.

—Dr. Hugo Rüdiger, Division of Occupational Medicine, University of Vienna, Austria, "Challenges to Occupational Medicine in a Changing World of Labor," p.172, *International Archives of Occupational and Environmental Health, 76,* April 2003

"With the TETRA roll-out, we could be seeing a pandemic of brain tumors in 10 years....I'm certain that if there were the same degree of uncertainty over a food or medicine, the government would never have licensed it."

Dr. Gerard Hyland, Warwick University, U.K., on the terrestrial trunked radio (TETRA) network for police and emergency crews, quoted by Victoria Silverman, "Poles Apart," the *Guardian,* May 21, 2003 (see also p.3)

UPDATES

MOBILE PHONE EMI

U.K. Tests Confirm Avionics EMI... Radiation from mobile phones produced "various adverse effects" in aircraft electronic equipment tested under controlled conditions, according to a report released by the U.K. Civil Aviation Authority (CAA) on April 30. Electromagnetic interference (EMI) caused navigation displays and indicators to give incorrect readings; made a gyroscopic compass freeze or indicate an incorrect bearing; and reduced the sensitivity of a radio receiver for the instrument landing system. In view of these findings, the CAA advises that the U.K. continue to ban the use of phones on aircraft once doors are closed in preparation for departure, and that carriers take additional preventive measures such as making sure that all phones in checked luggage are switched off. The CAA also recommends alerting the general aviation community to potential EMI hazards in small aircraft. In its testing, the CAA found that malfunctions could result from signals above 30 V/m—a level that can be produced by a mobile phone operating at maximum power and within 30 cm of sensitive equipment or its associated wiring. The tests covered 900 MHz GSM and 1700 MHz radiation, as well as 412 MHz signals from TETRA handsets. Most of the EMI problems were observed with 1700 MHz signals. Three years ago, the CAA reported that several phones operating simultaneously in the cabin of an aircraft produced readings as high as 4.5 V/m on the plane's flight deck—well above the 1 V/m standard for immunity from interference for older electronic equipment (see *MWN,* J/A00). Commercial airline crews have long suspected EMI from mobile phones or other electronic equipment to be the culprit in some malfunctions of navigation systems and other equipment (see, for example, *MWN,* S84, N/D88 and S/096). In its new report, the CAA notes that, from 1996 through 2002, crews reported 35 safety-related incidents citing mobile phones as a factor. *Effects of Interference from Cellular Telephones on Aircraft Avionic Equipment* is available at <www.caa.co.uk>.

PEOPLE

Thorne Auchter, who served as the administrator of OSHA during President Reagan's first term (1981-1984) and more recently as the chief operating officer of Dr. **George Carlo**'s consulting firm, Health & Environmental Sciences Group Ltd. (see *MWN,* S/O98), is now the CEO of Grace News Network. The GNN "is dedicated to transmitting the evidence of God's presence in the world today," according to information posted on its Web site, <www.gracenewsnetwork.com>....Dr. **Tom McManus** officially retired as the chief technical advisor of Ireland's Department of Public Enterprise at the end of last year, but he was pressed back into service on a temporary basis until a replacement is found. McManus told us that he will continue to represent Ireland on COST281. He is also a long-standing member of the executive committee of IEEE's ICES (SCC-28), but it is not yet clear whether his department wants to support his continued participation on this standard-setting committee (see also p.4)....Dr. **Gayle Woloschak** of the Northwestern University medical school in Chicago has been elected to the National Council on Radiation Protection and Measurements (NCRP), which is based in Bethes-

da, MD. Woloschak is also a member of the NRC panel investigating the potential health effects of the Air Force's PAVE PAWS radar on Cape Cod. Among those reelected to the NCRP are Dr. **John Boice Jr.** of the International Epidemiology Institute in Bethesda and **Susan Wiltshire** of JK Research Associates (emeritus) in South Hamilton, MA....On January 1, 2004, Dr. **Peter Boyle** will become the director of the International Agency for Research on Cancer (IARC) in Lyon, France (see *MWN*, M/A 03). Boyle, age 51, currently leads the Division of Epidemiology and Biostatistics at the European Institute of Oncology in Milan. He was a member of a team that discounted the leukemia risks associated with the Vatican RF transmitters in Cesano, outside Rome (see *MWN*, S/O01)....Prof. **Colin Blakemore**, the head of the Center for Cognitive Neuroscience at Oxford University, has been appointed the chief executive of the London-based Medical Research Council, the principal sponsor of biomedical research in the U.K. He takes over on October 1. Blakemore is a member of the National Radiological Protection Board's Advisory Group on Non-Ionizing Radiation and was a member of the Stewart panel on mobile phones. Last year he served as an expert witness opposing compensation in a case of two tower workers who claimed to have been overexposed to RF radiation (see *MWN*, S/O02)....Dr. **Charlotte Silverman**, an epidemiologist who worked at what is now known as FDA's Center for Devices and Radiological Health from 1968 to 1992, died of congestive heart failure on April 17. She was 89. She is a coauthor, with Dr. **Dennis Robinette** and **Seymour Jablon**, of the 1980 study on the potential effects of radar radiation on the health of navy personnel—the first of its kind. (See also p.15.) ...Dr. **Carl Sutton** died on April 12 in Tampa, FL, at the age of 73. Sutton retired from the Medical College of Wisconsin and the VA Hospital in Milwaukee in July 2001....Dr. **Neil Cherry** died in New Zealand on May 24 at the age of 56. He was diagnosed with motor neuron disease less than two years ago. Cherry was arguably the world's most active campaigner for tough EMF exposure limits. One of his last public appearances was testifying at the Newman brain cancer–mobile phone trial in Baltimore in February 2002 (see *MWN*, M/A02). Cherry, a meteorologist by training, was an associate professor of environmental health at Lincoln University in Canterbury.

RF ANIMAL STUDIES

NTP Study Moving Forward... On May 28, NIEHS toxicologist Dr. Ron Melnick hosted a meeting in Research Triangle Park, NC, to brief and to get feedback from the RF Interagency Work Group on the multimillion-dollar RF animal studies being planned by the National Toxicology Program (see *MWN*, M/J 01). "We are still planning to go ahead," Melnick told *Microwave News.* Under the current study design, rats and mice will be exposed to either 900 MHz or 1900 MHz microwaves in reverberation chambers that will allow unrestrained animals to be exposed for more than six—perhaps as many as twenty—hours a day. Among those present were representatives from EPA, FCC, FDA and NIOSH, as well as Dr. Perry Wilson of NIST in Boulder, CO, and Dr. Niels Kuster of IT'IS in Zurich, who are working on the dosimetry for the new project.

Keeping Current: Follow-Up on the News

◆ The U.S. Court of Appeals in Richmond, VA, has delayed oral arguments in the Newman brain cancer–mobile phone lawsuit (see *MWN*, S/O02 and N/D02). Originally scheduled for June, they will be probably now held in late September, though at press time no date has been set.

◆ The *Wall Street Journal* (May 23) reports that EMI may have caused Patriot missile defense systems to shoot down a British fighter jet, killing its two pilots, and an American F/A-18 Hornet fighter during the Iraqi war. Analysts suspect that the Patriots, built by Raytheon, were placed too close together, causing their high-power radars to interfere with the systems' electronics.

◆ Officials in Zurich are measuring fields in schools and other buildings owned by the city to find out which transformers will have to be shielded to meet Switzerland's 10 mG precautionary limit for locations where people spend several hours or more a day (see *MWN*, J/F00). About 50 substations are located in or near schools, a spokesperson for Zurich's department of urban development told the *Neue Zürcher Zeitung* (April 15). The survey should be completed by the end of the summer.

◆ Papers from the WHO EMF project's workshop on *Adverse Temperature Levels in the Human Body*, held in Geneva last year (see *MWN*, J/F02), are available in a special issue of the *International Journal of Hyperthermia* (May-June 2003).

◆ In the May 1 issue of *Nature*, researchers report a new example of the potential significance of polarization in triggering biological effects: Male *Heliconius cydno* butterflies—found in Central American jungles—detect polarized light reflected by the wings of females of their species, and rely on these signals to locate prospective mates in the dappled shade beneath the forest canopy. (See also *MWN*, M/A00.)

◆ Recently published by the Neuromagnetics Group at Vanderbilt University in Nashville: *Magnetotherapy: Potential Benefits and Adverse Effects.* The 292-page collection of 15 papers is available for $45.00 from <magnetotherapy.spellgen.com>. Two of the papers, including a review of ELF EMF effects by Dr. Wolfgang Löscher, may be downloaded for free from this Web site.

VIEWS ON THE NEWS **Conflicts at BEMS Taint Research Agenda** *(continued from p.19)*

not, see p.10.)

WTR's $25-million research budget was by far the largest pot of money ever earmarked for RF research. It was squandered. The public is a loser because Carlo brought us no closer to understanding the health risks from cell phone radiation. BEMS suffered, too, and more directly. For close to a decade, its members were denied the chance to do the promised research.

Carlo's strategy was clever and effective. By dangling a huge amount of money in front of the cash-starved RF community, Carlo guaranteed silent obedience. Anyone who dared complain risked being cut off from his millions. There was the added benefit that scientists were discouraged from helping lawyers who were thinking about suing cell phone companies.

WTR's bank account is now empty, but BEMS still refuses to speak out—on behalf of its members or the public interest.

Donald Kennedy, the editor of *Science*, recently urged scientists to add their voices to public policy debates because they have knowledge others often lack (see p.15). Yet, BEMS is unable to admit that promises were made and broken, and that a huge amount of money disappeared with no accounting ever offered. Its members were cheated, but BEMS keeps silent.

The cell phone industry has never admitted that Carlo's WTR was a sham. If it did so, there might be calls for a real research effort. The reason BEMS is still unwilling to speak out appears to be that it, too, speaks for industry.

Support for this view comes in the March/April issue of the the *BEMS Newsletter*, in which our rebuttal should have been published. What appears to be a news item from a London conference is actually nothing more than industry propaganda. Nokia's Sakari Lang is cited as saying that the RF literature "does not support a need for studying nonthermal effects" and that there is "clearly" no necessity to do any more research on third-generation phone signals. If accepted, this would save the mobile phone companies millions. No other view is offered.

And in the same item, Eleanor Adair, now retired from the U.S. Air Force, is reported to have decried "shoddy" RF experiments that were "more like entertainment than science." Here again, Motorola's Swicord, the editor of the newsletter, saw no need to offer any specific examples or any opposing opinions.

Not long ago, the *BEMS Newsletter* devoted a page and a half to the opinions of five Swedish scientists—none of them members of the society—who trashed other Swedish researchers for daring to publish research which suggests that mobile phones might present a health risk. Someone went to the trouble of translating the text from the original Swedish, but no one thought of giving those who were attacked a chance to respond, even though one of them was a former president of BEMS.

BEMS seems willing to promote corporate ideas, even when they could drive the society into bankruptcy. Last year, BEMS, feeling the pinch of deteriorating finances and declining membership, issued a strategic plan. Here is the closing thought: "The long-range plan might have to include an exit strategy."

Maybe this was BEMS' strategy all along: Give industry and the military control of the research agenda and, when the inevitable stagnation follows, quietly turn off the lights and lock the door.

In late June, BEMS will hold its annual meeting in Hawaii and celebrate its 25th anniversary. Maybe some of those who are committed to science will take a break from the festivities and take control of their society.

Corporate Conflicts at the Bioelectromagnetics Society Taint Research Agenda

Bioelectromagnetic research should be exciting. It is, after all, about one of the most basic questions in biology: How do electromagnetic signals affect us?

Instead, it is mostly about politics, often nasty politics. One side says the radiation is nothing more than a source of energy and, at high enough levels, can heat us up. Otherwise, the question is not worth thinking about. This is—no surprise—the position of industry and the military, who don't want any restrictions on their use of the radiation.

Others counter that we are, by our very nature, electromagnetic beings, and it is highly likely therefore that some types of signals will have some types of effects.

This argument has been raging for 30 years—without resolution.

The Bioelectromagnetics Society was founded in the late 1970s to bring the two sides together and to get some answers. That mission has failed because BEMS is an organization at war with itself. The society has been so co-opted by special interests that it is now ambivalent about doing research. Many of its members aren't even excited by experiments that presage scientific breakthroughs.

Take, for example, a series of recent animal studies which suggest that RF/MW radiation can actually protect against the development of cancer (see *MWN*, S/O02). These were chance findings and remain somewhat fuzzy, but they are certainly fascinating. What could be more rewarding than identifying those electromagnetic signals that can delay, or even prevent, cancer? Yet, you would never know it by hanging out at at a BEMS meeting. One hardly ever hears a word about these experiments within the society. Why isn't BEMS interested?

The simple answer is that most members of the society still will not look beyond the thermal dogma. At BEMS, scientific curiosity takes a backseat to economic and political imperatives.

BEMS was created by the U.S. military. Today, the mobile phone industry is the major force within the society. Not long ago, it was the power companies, but they are taking a more relaxed approach now that their campaign to write off the EMF–cancer link has been so successful. Motorola alone has eight staff members in the society, more than from all the American electric utilities combined.

A disagreement between BEMS and *Microwave News* provides a good example of how vested interests keep BEMS from promoting research. A recent issue of the *BEMS Newsletter* featured an attack on *Microwave News* by two Motorola consultants. Asher Sheppard, a past president of BEMS, and Q. Balzano, a runner-up for the presidency a few years earlier, took offense at what we wrote about one of their recent papers. Instead of taking the matter up with us, they turned to BEMS, where Motorola's Mays Swicord runs the newsletter.

We submitted our response, but BEMS refused to print it because, we were told, we wrote that George Carlo's Wireless Technology Research (WTR) had run a confidence game on behalf of the mobile phone companies. Our point is that Carlo and the industry he represented never wanted to do any actual research. This is, in fact, the majority view within BEMS—even among those in industry, if asked in private. (We are publishing the full text of our response because the BEMS leadership would

(continued on p.18)

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WHO Do You Trust?

We admit it, we got sucked in. We believed what most of those who were at the February WHO workshop told us: Michael Repacholi has accepted a precautionary approach to EMF health risks.

Repacholi now says that it was all a misunderstanding. He was only floating a trial balloon to provoke discussion (see p.1). The EMF project is instead devising a framework for applying the precautionary principle to all types of environmental risks, something many others have already done.

It's the usual Repacholi doubletalk—not unlike when he tried to convince us that exposure to power line EMFs, like drinking a cup of coffee, might be good for our health (see *MWN*, N/D02).

What makes Repacholi's latest flimflam especially cynical—some would say hypocritical—is that invoking the precautionary principle does not require any specific action. It is a symbolic act that simply puts the public on notice about an uncertain risk.

Repacholi is sending a different message: Industry can be confident that he will fend off precautionary policies.

What's he up to? The only thing we can think of is that he is positioning himself as industry's candidate to become the WHO honcho on the precautionary principle. If he succeeds, he would be Geneva's replicant of John Graham, the Bush Administration's czar for regulatory reform, who recently said: "We consider [the precautionary principle] to be a mythical concept, perhaps like a unicorn."

Memo to Dr. Jong-Wook Lee, the incoming head of the WHO: It's time to clean house.

CLASSIFIEDS