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MATERIALS ON ELECTROMAGNETIC RADIATION, RADIOFREQUENCY RADIATION, MOBILE PHONES & RELATED ISSUES

Articles and snippets of information which we have collected over recent months.

Particular thanks to the following who have supplied many of the items:

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Electronic copies supplied free. There is a charge for hard copies. For details, please contact Ken Norling, ACTU OHS Unit, 393 Swanston St, Melbourne VIC 3000. Phone (03) 9664 7302, Fax (03) 9663 8220, or e-mail ohs@actu.asn.au

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GENERAL

State of the Research on Electromagnetic Fields – Scientific and Legal Issues – Catania Resolution

September 2002

The Scientists at the International Conference "State of the Research on Electromagnetic Fields – Scientific and Legal Issues", organized by ISPEL*, the University of Vienna, and the City of Catania, held in Catania (Italy) on September 13th – 14th, 2002, agree to the following:

1. Epidemiological and in vivo and in vitro experimental evidence demonstrates the existence for electromagnetic field (EMF) induced effects, some of which can be adverse to health.
2. We take exception to arguments suggesting that weak (low intensity) EMF cannot interact with tissue.
3. There are plausible mechanistic explanations for EMF-induced effects which occur below present ICNIRP and IEEE guidelines and exposure recommendations by the EU.
4. The weight of evidence calls for preventive strategies based on the precautionary principle. At times the precautionary principle may involve prudent avoidance and prudent use.
5. We are aware that there are gaps in knowledge on biological and physical effects, and health risks related to EMF, which require additional independent research.
6. The undersigned scientists agree to establish an international scientific commission to promote research for the protection of public health from EMF and to develop the scientific basis and strategies for assessment, prevention, management and communication of risk, based on the precautionary principle.

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On October 9, 2002 twenty two medical doctors of the Interdisciplinary Association for Environmental Medicine (Interdisziplinäre Gesellschaft für Umweltmedizin. V. IGUMED) met in Germany in order to discuss the increasing burdens brought on by high-frequency-radiation (radiofrequency/microwave radiation) and to talk about possible remedies. A result of this meeting is the October 9, 2002, "Freiburger Appeal" text reproduced below.

pdf file available at: http://www.emrnetwork.org/news/IGUMED_english.pdf

Freiburger Appeal

Out of great concern for the health of our fellow human beings do we as established physicians of all fields, especially that of environmental medicine, turn to the medical establishment and those in public health and political domains, as well as to the public.

We have observed, in recent years, a dramatic rise in severe and chronic diseases among our patients, especially:

- Learning, concentration, and behavioural disorders (e.g. attention deficit disorder, ADD)
- Extreme fluctuations in blood pressure, ever harder to influence with medications
- Heart rhythm disorders
- Heart attacks and strokes among an increasingly younger population
- Brain-degenerative diseases (e.g. Alzheimer's) and epilepsy
- Cancerous afflictions: leukaemia, brain tumors

Moreover, we have observed an ever-increasing occurrence of various disorders, often misdiagnosed in patients as psychosomatic:

- Headaches, migraines
- Chronic exhaustion
- Inner agitation
- Sleeplessness, daytime sleepiness
- Tinnitus
- Susceptibility to infection
- Nervous and connective tissue pains, for which the usual causes do not explain even the most conspicuous symptoms

Since the living environment and lifestyles of our patients are familiar to us, we can see - especially after carefully directed inquiry - a clear temporal and spatial correlation between the appearance of disease and exposure to pulsed high-frequency microwave radiation (HFMR), such as:

- Installation of a mobile telephone sending station in the near vicinity
- Intensive mobile telephone use
- Installation of a digital cordless (DECT) telephone at home or in the neighbourhood

We can no longer believe this to be purely coincidence, for:

- Too often do we observe a marked concentration of particular illnesses in correspondingly HFMR-polluted areas or apartments
- Too often does a long-term disease or affliction improve or disappear in a relatively short time after reduction or elimination of HFMR pollution in the patient's environment
- Too often are our observations confirmed by on-site measurements of HFMR of unusual intensity

On the basis of our daily experiences, we hold the current mobile communications technology (introduced in 1992 and since then globally extensive) and cordless digital telephones (DECT standard) to be among the fundamental triggers for this fatal development. One can no longer evade these pulsed microwaves. They heighten the risk of already-present chemical/physical influences, stress the body's immune system, and can bring the body's still-functioning regulatory mechanisms to a halt. Pregnant women, children, adolescents, elderly and sick people are especially at risk.

Our therapeutic efforts to restore health are becoming increasingly less effective: the unimpeded and continuous penetration of radiation into living and working areas-particularly bedrooms, an essential place for relaxation, regeneration and healing-causes uninterrupted stress and prevents the patient's thorough recovery.

In the face of this disquieting development, we feel obliged to inform the public of our observations - especially since hearing that the German courts regard any danger from mobile telephone radiation as "purely hypothetical"(see the decisions of the constitutional court in Karlsruhe and the administrative court in Mannheim, Spring 2002)

What we experience in the daily reality of our medical practice is anything but hypothetical! We see the rising number of chronically sick patients also as the result of an irresponsible "safety limits" policy, which fails to take the protection of the public from the short - and long- term effects of mobile telephone radiation as its criterium for action. Instead, it submits to the dictates of a technology already long recognized as

dangerous. For us, this is the beginning of a very serious development through which the health of many people is being threatened.

We will no longer be made to wait upon further unreal research results - which in our experience are often influenced by the communications industry - while evidential studies go on being ignored. We find it to be of urgent necessity that we act now!

Above all, we are, as doctors, the advocates for our patients. In the interest of all those concerned, whose basic right to life and freedom from bodily harm is currently being put at stake, we appeal to those in the spheres of politics and public health. Please support the following demands with your influence:

- New health-friendly communications technique, given independent risk assessments before their introduction.

And, as immediate measures and transitional steps:

- Stricter safety limits and major reduction of sender output and HFMR pollution on a justifiable scale, especially in areas of sleep and convalescence.
- A say on the part of local citizens and communities regarding the placing of antennae (which in a democracy should be taken for granted)
- Education of the public, especially of mobile phone users, regarding the health risks of electromagnetic fields
- Ban on mobile telephone use by small children, and restrictions on use by adolescents
- Ban on mobile telephone use and digital cordless (DECT) telephones in preschools, schools, hospitals, nursing homes, events halls, public buildings and vehicles (as with the ban on smoking)
- Mobile telephone and HFMR-free zones (as with auto-free areas)
- Revision of DECT standards for cordless phones with the goal of reducing radiation intensity and limiting actual use time, as well as avoiding the biologically critical HFMR pulsation
- Industry-independent research, finally with the inclusion of
- amply available critical research results and our medical observations

The So-far Undersigned (Names and qualifications included in the pdf files, available at:

<http://www.emrnetwork.org/news/news.htm>)

Official FREIBURG WEBSITE (22 LANGUAGES): http://www.e-smog-nrw.de/Freiburger_Appell/freiburger_appell.html

Brain tumour rates rising in Europe, US

By Rosella Lorenzi, 2003-03-12

FLORENCE, Italy (Reuters Health) - The number of brain tumour cases in the US and Europe has increased by up to 40% in the past 20 years, according to data to be released at a medical conference this week.

The incidence rate for brain tumours is increasing among people of all ages, but males between 20 and 40 years old are the most affected, according to Dr. Alba Brandes, an oncologist at the Azienda-Ospedale in Padua.

Brandes is chairman of the 2nd International Conference on Neuro-Oncology being held Friday and Saturday in Padua. "The latest epidemiological studies indicate that white collar workers--intellectuals and professionals--are among the most affected," he told Reuters Health.

"The reason is still unknown, though environmental causes such as cellular phones, computers and exposure to electromagnetic fields cannot be ruled out," he said.

At the conference, scientists will discuss new treatment options that are moving from laboratories into the clinic and a more rigorous approach to conducting clinical trials in neuro-oncology, Brandes said.

Draft European Union directive on electromagnetic fields

<http://www.europarl.eu.int/meetdocs/committees/empl/20031103/st13428-ad01.en03.pdf>

COUNCIL OF THE EUROPEAN UNION, Brussels, 14 October 2003

Interinstitutional File: 92/0449/C (COD)13428/03 ADD 1 SOC 396 CODEC 1358

from: Permanent Representative Committee (Part I) to: Council (EPSCO)

Amended proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) (...th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 137(2) thereof,

Having regard to the proposal from the Commission, presented after consultation with the Advisory Committee on Safety, Hygiene and Health Protection at Work,

Having regard to the Opinion of the Economic and Social Committee,

Having consulted the Committee of the Regions,

Acting in accordance with the procedure laid down in Article 251 of the Treaty,

Whereas:

(1) Under the Treaty the Council may, by means of directives, adopt minimum requirements for encouraging improvements, especially in the working environment, to guarantee a better level of protection of the health and safety of workers. Such directives are to avoid imposing administrative, financial and legal constraints in a way which would hold back the creation and development of small and medium-sized undertakings.

(2) The communication from the Commission concerning its action programme relating to the implementation of the Community Charter of the Fundamental Social Rights of Workers provides for the introduction of minimum health and safety requirements regarding the exposure of workers to the risks caused by physical agents. In September 1990 the European Parliament adopted a Resolution concerning this action programme⁴, inviting the Commission in particular to draw up a specific directive on the risks caused by noise and vibration and by any other physical agents at the workplace.

(3) As a first step, on 25 June 2002, the European Parliament and the Council adopted Directive 2002/44/EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration) (16th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC). Next, on, the European Parliament and the Council adopted Directive 2002../EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (17th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

(4) It is now considered necessary to introduce measures protecting workers from the risks associated with electromagnetic fields, owing to their effects on the health and safety of workers. However, the long-term effects, including possible carcinogenic effects due to exposure to time-varying electric, magnetic and electromagnetic fields for which there is no conclusive scientific evidence establishing a causal relationship, are not addressed in this Directive. These measures are intended not only to ensure the health and safety of each worker on an individual basis, but also to create a minimum basis of protection for all Community workers, in order to avoid possible distortions of competition.

(5) This Directive lays down minimum requirements, thus giving Member States the option of maintaining or adopting more favourable provisions for the protection of workers, in particular the

fixing of lower values for the action values or the exposure limit values for electromagnetic fields. The implementation of this Directive should not serve to justify any regression in relation to the situation which already prevails in each Member State.

(6) A system of protection against electromagnetic fields must limit itself to a definition, free of excessive detail, of the objectives to be attained, the principles to be observed and the fundamental values to be applied, in order to enable Member States to apply the minimum requirements in an equivalent manner.

(7) The level of exposure to electromagnetic fields can be more effectively reduced by incorporating preventive measures into the design of workstations and by selecting work equipment, procedures and methods so as to give priority to reducing the risks at source.

Provisions relating to work equipment and methods thus contribute to the protection of the workers involved.

(8) Employers should make adjustments in the light of technical progress and scientific knowledge regarding risks related to exposure to electromagnetic fields, with a view to improving the safety and health protection of workers.

(9) Since this Directive is an individual Directive within the meaning of Article 16(1) of Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work⁵, that Directive therefore applies to the exposure of workers to electromagnetic fields, without prejudice to more stringent and/or specific provisions contained in this Directive.

(10) This Directive constitutes a practical step towards creating the social dimension of the internal market.

(11) The measures necessary for the implementation of this Directive should be adopted in accordance with Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission⁶,

(12) Adherence to the exposure limit and action values should provide a high level of protection as regards the established health effects that may result from exposure to electromagnetic fields but such adherence may not necessarily avoid interference problems with, or effects on the functioning of, medical devices such as metallic prostheses, cardiac pacemakers and defibrillators, cochlea implants and other implants; interference problems especially with pacemakers may occur at levels below the action values and should therefore be the object of appropriate precautions and protective measures.

HAVE ADOPTED THIS DIRECTIVE:

SECTION I - GENERAL PROVISIONS

Article 1, Aim and scope

1. This Directive, which is the ...th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC, lays down minimum requirements for the protection of workers from risks to their health and safety arising or likely to arise from exposure to electromagnetic fields (0 Hz to 300 GHz) during their work.
2. This Directive refers to the risk to the health and safety of workers due to known short-term adverse effects in the human body caused by the circulation of induced currents and by energy absorption as well as by contact currents.
3. This Directive does not address suggested long-term effects.
4. This Directive does not address the risks resulting from contact with live conductors.
5. Directive 89/391/EEC shall apply fully to the whole area referred to in paragraph 1, without prejudice to more stringent and/or more specific provisions contained in this Directive.

Article 2, Definitions

For the purposes of this Directive, the following definitions apply:

- (a) electromagnetic fields: static magnetic and time-varying electric, magnetic and electromagnetic fields with frequencies up to 300 GHz.
- (b) exposure limit values: limits on exposure to electromagnetic fields which are based directly on established health effects and biological considerations. Compliance with these limits will ensure that workers exposed to electromagnetic fields are protected against all known adverse health effects.
- (c) action values: the magnitude of directly measurable parameters, provided in terms of electric field strength (E), magnetic field strength (H), magnetic flux density (B) and power density (S), at which one or more of the specified measures in this Directive must be undertaken.

Compliance with these values will ensure compliance with the relevant exposure limit values.

Article 3, Exposure limit values and action values

1. The exposure limit values are as set out in the Annex, Table 1.
2. The action values are as set out in the Annex, Table 2.

For the assessment, measurement and/or calculation of workers' exposure to electromagnetic fields, until harmonised European standards from the European Committee for Electrotechnical Standardisation (CENELEC) cover all relevant assessment, measurement and calculation situations, Member States may employ other scientifically-based standards or guidelines.

SECTION II - OBLIGATIONS OF EMPLOYERS

Article 4, Determination of exposure and assessment of risks

1. In carrying out the obligations laid down in Articles 6(3) and 9(1) of Directive 89/391/EEC, the employer shall assess and, if necessary, measure and/or calculate the levels of electromagnetic fields to which workers are exposed. Assessment, measurement and calculation may, until harmonised European standards from CENELEC cover all relevant assessment, measurement and calculation situations, be carried out in accordance with the scientifically-based standards and guidelines referred to in Article 3 and, when relevant, by taking into account the emission levels provided by the manufacturers of the equipment when it is covered by the relevant Community Directives.
 - 1a. On the basis of the assessment of the levels of electromagnetic fields undertaken in accordance with paragraph 1, if the action values referred to in Article 3 are exceeded, the employer shall assess and, if necessary, calculate whether the exposure limit values are exceeded.
 - 1b. The assessment, measurement and/or calculations referred to in paragraphs 1 and 1a need not be carried out in workplaces open to the public provided that an evaluation has already been undertaken in accordance with the provisions of Council Recommendation 1999/519/EC on the limitation of exposure of the general public to electromagnetic fields, and the restrictions as specified therein are respected for workers and safety risks are excluded.
2. The assessment, measurement and/or calculations referred to in paragraphs 1 and 1a shall be planned and carried out by competent services or persons at suitable intervals, taking particular account of the provisions of Article 7 of Directive 89/391/EEC concerning the necessary competent services or persons. The data obtained from the assessment, measurement and/or calculation of the level of exposure shall be preserved in a suitable form so as to permit consultation at a later stage.
3. Pursuant to Article 6(3) of Directive 89/391/EEC, the employer shall give particular attention, when carrying out the risk assessment, to the following:
 - a) the level, frequency spectrum, duration and type of exposure
 - b) the exposure limit values and action values referred to in Article 3 of this Directive
 - c) any effects concerning the health and safety of workers at particular risk

d) any indirect effects, such as:

- interference with medical electronic equipment and devices (including cardiac pacemakers and other implanted devices);
- the projectile risk from ferromagnetic objects in static magnetic fields with a magnetic flux density greater than 3 mT;
- initiation of electro-explosive devices (detonators);
- fires and explosions resulting from ignition of flammable materials by sparks caused by induced fields, contact currents or spark discharges.

e) the existence of replacement equipment designed to reduce the levels of exposure to electromagnetic fields

f) appropriate information obtained from health surveillance, including published information, as far as possible

g) multiple sources of exposure

h) simultaneous exposure to multiple frequency fields.

4. The employer shall be in possession of an assessment of the risk in accordance with Article 9(1)(a) of Directive 89/391/EEC and shall identify which measures must be taken in accordance with Articles 5 and 6 of this Directive. The risk assessment shall be recorded on a suitable medium, according to national law and practice; it may include a justification by the employer that the nature and extent of the risks related to electromagnetic fields make a further detailed risk assessment unnecessary. The risk assessment shall be updated on a regular basis, particularly if there have been significant changes which could render it out-of-date, or when the results of health surveillance show it to be necessary.

Article 5, Provisions aimed at avoiding or reducing risks

1. Taking account of technical progress and of the availability of measures to control the risk at source, the risks arising from exposure to electromagnetic fields shall be eliminated or reduced to a minimum. The reduction of risks arising from exposure to electromagnetic fields shall be based on the general principles of prevention set out in Directive 89/391/EEC.

2. On the basis of the risk assessment in accordance with Article 4, once the action values referred to in Article 3 are exceeded, the employer, unless the assessment carried out in accordance with Article 4(1a) demonstrates that the exposure limit values are not exceeded and that safety risks can be excluded, shall devise and implement an action plan comprising technical and/or organisational measures intended to prevent exposure exceeding the limit values, taking into account in particular:

- a) other working methods that entail less exposure to electromagnetic fields
- b) the choice of equipment emitting less electromagnetic fields, taking account of the work to be done
- c) technical measures to reduce the emission of electromagnetic fields including, where necessary the use of interlocks, shielding or similar health protection mechanisms
- d) appropriate maintenance programmes for work equipment, workplaces and workstation systems
- e) the design and layout of workplaces and workstations
- f) [.]
- g) [.]
- h) limitation of the duration and intensity of the exposure
- i) the availability of adequate personal protection equipment.

3. On the basis of the risk assessment in accordance with Article 4, workplaces where workers could be exposed to electromagnetic fields exceeding the action values shall be indicated by appropriate signs in accordance with Directive 92/58/EEC, unless the assessment carried out in accordance with Article 4(1a) demonstrates that the exposure limit values are not exceeded and that safety risks can be

excluded. The areas in question shall be identified, and access to them limited where this is technically possible and where there is a risk that limit values could be exceeded.

4. In any event, workers shall not be exposed above the exposure limit values. If, despite the measures taken by the employer to comply with this Directive, the exposure limit values are exceeded, the employer shall take immediate action to reduce exposure below the exposure limit values. He shall identify the reasons why the exposure limit values have been exceeded, and shall amend the protection and prevention measures accordingly in order to prevent them being exceeded again.

5. Pursuant to Article 15 of Directive 89/391/EEC, the employer shall adapt the measures referred to in this Article to the requirements of workers at particular risk.

Article 6, Worker information and training

Without prejudice to Articles 10 and 12 of Directive 89/391/EEC, the employer shall ensure that workers who are exposed to the risks from electromagnetic fields at work and/or their representatives receive any necessary information and training relating to the outcome of the risk assessment provided for in Article 4(1) of this Directive, concerning in particular:

- a) measures taken to implement this Directive
- b) the values and concepts of the exposure limit values and action values and the associated potential risks
- c) the results of the assessment, measurement and/or calculations of the levels of exposure to electromagnetic fields carried out in accordance with Article 4 of this Directive
- d) why and how to detect and report signs of injury
- e) the circumstances in which workers are entitled to health surveillance
- f) safe working practices to minimise risks from exposure.

Article 7, Consultation and participation of workers

Consultation and participation of workers and/or of their representatives shall take place in accordance with Article 11 of Directive 89/391/EEC on the matters covered by this Directive.

SECTION III - MISCELLANEOUS PROVISIONS

Article 8, Health surveillance

Appropriate health surveillance shall be carried out according to Articles 14 and 15 of Directive 89/391/CEE for workers who might suffer adverse health or safety effects, especially for workers at particular risk.

Article 9, Technical amendments

1. Modifications of the exposure limit values and action values set out in the Annex are adopted by the Council and the European Parliament in accordance with the procedure laid down in Article 137(2) of the Treaty.
2. Amendments to the Annex of a strictly technical nature in line with:
 - a) the adoption of Directives in the field of technical harmonisation and standardisation with regard to the design, building, manufacture or construction of work equipment and/or workplaces
 - b) technical progress, changes in the most relevant harmonised European standards or specifications, and new scientific findings concerning electromagnetic fields shall be adopted in accordance with the regulatory procedure laid down in Article 10(2).

Article 10, Committee

1. The Commission shall be assisted by the Committee referred to in Article 17 of Directive 89/391/EEC.
2. Where reference is made to this paragraph, Articles 5 and 7 of Decision 1999/468/EC shall apply, having regard to the provisions of Article 8 thereof. The period referred to in Article 5(6) of Decision 1999/468/EC shall be set at three months.

3. The Committee shall adopt its rules of procedure.

SECTION IV - FINAL PROVISIONS

Article 11, Reports

Every five years Member States shall provide a report to the Commission on the practical implementation of this Directive, indicating the points of view of the social partners.

The Commission shall inform the European Parliament, the Council, the Economic and Social Committee and the Advisory Committee on Safety and Health Protection at Work of the content of these reports and of its assessment of developments in the field in question and of any action that may be warranted in the light of new scientific knowledge.

Article 12, Transposition

1. The Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive no later than They shall forthwith inform the Commission thereof.

When Member States adopt these measures, they shall contain a reference to this Directive or shall be accompanied by such reference on the occasion of their official publication. The methods of making such reference shall be laid down by Member States.

2. Member States shall communicate to the Commission the provisions of national law which they adopt or have already adopted in the field covered by this Directive.

Article 13, Entry into force

This Directive shall enter into force on the day of its publication in the Official Journal of the European Communities.

DRAFT STATEMENTS TO BE ENTERED IN THE COUNCIL MINUTES

1. Statement concerning the health effects of static magnetic fields

"The Council regrets that it was not able to address in the present Directive the health effects resulting from occupational exposure to static magnetic fields due to the delay in production of an updated review of the scientific evidence of health effects of static magnetic fields which would remove uncertainties in existing knowledge. The Council is aware of the work being undertaken by ICNIRP to address this issue and invites the Commission to closely monitor developments in this area in order to include in this Directive exposure limit values for static magnetic fields, when scientific findings make this possible."

2. Commission response to the above draft Council Minutes Statement

"The Commission reminds the Council that the preparatory scientific work for the Commission's proposal was undertaken in close cooperation with ICNIRP. On the basis of this continuous cooperation, the Commission will propose any updating that it considers necessary in light of the evolution of scientific knowledge in this field."

3. Statement by the Commission re Article 8

"The Commission, in noting the Council's unanimity, considers the provisions on health surveillance unsatisfactory. The Commission regrets that the Council has not been able to maintain in the common position those elements of the Commission's amended proposal, following two amendments of the European Parliament, that emphasise the preventive character of the medical surveillance and give the right to medical examination to workers in case of overexposure."

4. Statement by the Greek delegation re Article 8

"The Greek Presidency had accepted at the time, in the framework of reaching a compromise, the deletion of paragraphs 2 and 3 of Article 8 on Health Surveillance. Greece regrets that, by including neither specific measures nor any preventive elements, the Directive will be poorer."

[http://europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=IP/03/1416\(0\)RAPID&lg=EN&display](http://europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=IP/03/1416(0)RAPID&lg=EN&display)

European Commission hails Council agreement on measures to protect workers exposed to electro-magnetic fields and waves

IP/03/1416, Brussels, 20 October, 2003

The European Commission has congratulated the Italian Presidency on securing agreement at today's Council meeting on legislation designed to protect the health and safety of workers exposed to electromagnetic fields and waves. The directive requires employers to carry out assessments of the risks posed to their employees from electro-magnetic fields, for example from electricity generation, radio and TV broadcasting antennae, mobile phone antennae, radar installations, or large furnaces of the type used in the metal industries. The directive sets out issues that should be covered in this risk assessment, for example certain direct and indirect effects, such as interference with medical equipment e.g. pacemakers, or ignition of flammable objects.

"We are all committed to achieving better protection of the health and safety of workers exposed to risks at work", said Anna Diamantopoulou, Commissioner for Employment and Social Affairs. "The scientific data available shows that overexposure to electromagnetic fields can have serious consequences for workers' health. The directive foresees preventive actions to protect the health and safety of workers, in particular against induced electric currents in the body, shocks and burns, and absorption of thermal energy produced by electromagnetic fields."

The directive sets out maximum levels for exposure and also establishes levels at which preventive measures must be taken by employers. Depending on the outcome of the risk assessment, employers may also be required to draw up an action plan of organisational and technical measures in order to reduce levels and to put up warning signs in areas with excessive levels of electromagnetic field. Employers are also required to provide adequate information and training for workers that might be at risk.

For workplaces open to the public, if an evaluation has already been made in line with Council Recommendation 1999/519/EC on the limitation of exposure of the general public to electromagnetic fields, and this evaluation excludes safety risks, then the employer is not requested to perform a new evaluation of the exposure levels.

Scientific data shows that overexposure to electro-magnetic fields can have serious consequences for workers' health. The directive is intended to provide for preventive measures in particular against induced electric currents in the body, shocks and burns, and the absorption of thermal energy produced by electromagnetic fields. Adequate medical surveillance is essential to ensure that any injuries are diagnosed in good time by specialised health professionals.

The proposal applies to all sectors of activity but chiefly concerns workers exposed to a high risk of irradiation. This will include those working in heavy industries such as steel or metallurgical treatment. Other workers affected include those working for long periods near TV and radio broadcasting installations, radar installations and mobile phone masts, and even cashiers exposed for long periods to anti-theft devices used in shops.

This directive is the third in a package of four health and safety directives designed to protect workers from the risks arising from exposure to physical agents. Directives have already been adopted on noise and vibrations and a fourth on optical radiation will be proposed by the Commission next year.

European Trade Union Technical Bureau on Exposure of workers to electromagnetic fields

<http://www.etuc.org/tutb/uk/pdf/2003-21p12-16.pdf>

<http://www.etuc.org/tutb/uk/pdf/2003-21p17-18.pdf>

Exposure of workers to electromagnetic fields: proposal for a directive

Ten years after the Commission published its proposal on the protection of workers exposed to physical agents, the Council is carrying on addressing each individual agent separately. At the start of 2003, a Council working party began its scrutiny of a Danish Presidency proposal for a directive

specifically addressing the exposure of workers to electromagnetic fields and waves in a range between 0 Hz and 300 GHz.

As far back as 1993, when the first proposal was tabled, the Social Affairs Council had already recognized the risks related to exposure of workers to non-ionizing radiation. The VDU Directive (90/270/EEC), for instance, requires that radiation "shall be reduced to negligible levels from the point of view of the protection of ... health", while the Pregnant Workers Directive (92/85/EEC) requires the employer's risk assessment to take into account non-ionizing radiation which may cause foetal lesions and/or are likely to disrupt placental attachment.

International standards

The International Commission on Radiological Protection (ICRP), a private scientific society founded in 1928, has had a specific working party addressing health problems caused by non-ionizing radiations since 1974. Under the impetus of the UNEP¹, the World Health Organization published a joint document with the ICNIRP² in 1993 setting out recommended exposure limits for the protection of workers and the general public (fields ranging from 300 Hz to 300 GHz). The current Commission proposal is based on their activities.

Since then, the ILO has published two sets of guidance (Nos 69 and 71) on protection for workers, and the ICNIRP adopted a new version of its recommendations in 1998. It aims to provide tools for limiting the time-weighted exposure of workers to all electrical, magnetic and electromagnetic fields (frequency up to 300 GHz).

None of these documents include values for the performance standards of products or equipment, or exposure measurement methods. In Europe, the Commission mandated CENELEC to draw up standards that address these failings, in particular under R&TTE (radio and telecommunications terminal equipment) Directive 1999/5/EC, and to ensure mutual recognition of their conformity. CENELEC's work programme also includes a standard for the working environment and a safety standard for induction furnaces under Low Voltage Directive 73/23/EEC. But as the LV Directive makes no reference to the safety and health of workers, it is at best a dubious legal basis for these mandates.

A mounting public debate

The public debate on the health effects of electromagnetic fields in the range of frequencies mentioned has gained unprecedented momentum with the growing number and range of electromagnetic field sources, like TV, radios, computers, mobile phones, microwave ovens, radar and industrial equipment (induction furnaces), medical display equipment, etc. The public debate has focused on telephones, high voltage power lines and speed control equipment, fuelled by suggestions in scientific reports that exposure to electromagnetic fields (at low doses) may be harmful to health, leading to cancer, reduced fertility and memory loss (non-thermal effects). This led the Council to adopt a Recommendation in 1999 on exposure of the general public to electromagnetic fields which includes the ICNIRP's recommended values.

In line with the Scientific Steering Committee's advice, the Commission and Council did not refer to the precautionary principle, and went with international values that do not explicitly allow for nonthermal effects. The Council nevertheless asked the Commission to prepare a report within five years - i.e., in 2004 - with a view to revision of the Recommendation in the light of current scientific research data, including relevant aspects of precaution. The Commission's recently-announced publication of a joint health assessment for very low frequencies with the WHO in 2003, and on the effects of radio frequencies in 2005, tie in with this.

In 2001, an IARC³ scientific working group concluded that extremely low frequency magnetic fields were "possibly carcinogenic to humans" (IARC Group 2B). Limited data show a possible causal link with childhood leukemia. The working group also concluded that static magnetic or electrical fields and extremely low frequency electrical fields could not be listed in "Group 3".

Protection for workers

The current debates in Council are awaiting the conclusions of the Commission/WHO assessment. All those concerned are champing at the bit : the equipment-using general public, but especially so

telephone and electrical manufacturers and network operators. The latter are apt to believe that protection for workers is mainly built-into product design standards, forgetting about the employer's responsibilities in the workplace (work organization, choice and maintenance of equipment, worker information,...) and cumulative effects - workers may be exposed to multiple sources of radiation.

As a result, some Member States are trying to throw the principles of the Framework and individual directives - coverage for all exposed workers above a threshold value, duty to perform a risk assessment and apply the ALARA (as low as reasonably achievable) principle, right to medical surveillance and, above all specifying exactly which health risks are covered and not covered - open to question.

The WHO reference standards must form part of employers' obligations that define the employment relationship. Technical standards for measurement must enable them to discharge their obligations in easily achievable conditions and comply with the Directive's principles. But a procedure for checking the standards mandated by the Commission from the standards institutions is also required. Only on those terms will the new Directive mark a significant step towards controlling the sources and exposure to electromagnetic radiations.

Marc Sapir, TUTB

1. *United Nations Environment Programme.*
2. *International Commission on Non-Ionizing Radiation Protection.*
3. *International Agency for Research on Cancer (vol (80) 2002).*

May/June issue of Microwave News

Dear Colleagues:

We have now posted the front page of our May/June issue of Microwave News with a complete table of contents and the opening paragraphs of our two lead stories:

- *Changes in Protein Folding: A Non-Thermal RF Mechanism*
- *Is There a Risk of Neurological Disease?*
- *WHO Flip-Flops on EMFs, Precautionary Principle Now Revoked*

We have also posted the full text of our editorials:

- *Corporate Conflicts at the Bioelectromagnetics Society Taint Research Agenda*
- *WHO Do You Trust?*

To download these pages and to learn about a special discount offer to obtain this issue, simply follow the link below: <http://www.microwavenews.com>

Since we first told you about Mike Repacholi decision not to have the WHO invoke the precautionary principle ten days ago, he has posted a "clarification" on the WHO Web site, <http://www.who.int/peh-emf/project/en/>

This statement confirms the basic facts of our story and makes plain Repacholi's strategy to delay applying the precautionary principle until some time in the future, if ever.

If you have any comments, we would like to hear them. Please send them to: mwn@pobox.com
Louis Slesin, Editor

What WHO is doing on application of the Precautionary Framework to EMF

This statement is presented to clarify WHO's plans for the development of the Precautionary Framework on Protection of Human Health.

WHO has embarked on a comprehensive, open and transparent process to develop a general framework for application of precautionary measures to protect public health. The Precautionary Framework is intended to cover all public health issues. Because the Framework is being developed by staff of WHO's International EMF Project, in collaboration with other key departments in WHO, there will be generic case studies on how to apply the Framework for many health concerns, including EMF.

As part of this process WHO held an international workshop in Luxembourg in February 2003 in collaboration with the European Commission and US National Institute of Environmental Health Sciences. At this workshop inputs were received from a diverse range of stakeholders. Based on this input WHO developed a comprehensive risk management Framework in which precaution plays a role in every stage of the risk management process.

In this Framework, the application of precautionary measures is considered throughout the process and not "invoked" in response to specific circumstances. Once this Framework is finalized WHO will develop generic case studies for ELF and RF fields that will provide information to Member States on ways they can apply the Framework to suit their own circumstances and needs. This two-step process was recommended by the Luxembourg Working Group.

The draft Framework has been made available for review to the Luxembourg Working Group participants, WHO management, the EMF Project's International Advisory Committee, and other key specialists in the world. The draft Framework is currently available for public comment on the WHO EMF Project web site (www.who.int/emf). We encourage the active participation of all stakeholders in this process.

International EMF Standards

WHO's International EMF Project has summaries (and links, where available) for national standards from most of the world's countries, including Russia. Go to <http://www.who.int/docstore/peh-emf/EMFStandards/who-0102/Worldmap5.htm>

Power stands charged

By Anjana Ahuja, The Times March 03, 2003

Are electromagnetic fields causing women to miscarry, triggering childhood leukaemias, and even driving some people to suicide? As new studies emerge, the experts are divided

YOU CAN'T SEE, smell, hear or feel them, but they surround you at work and at home. And, according to some scientists, the electromagnetic fields given off by electrical appliances, house wiring, computers or overhead power lines are far from innocuous - they constitute an invisible menace eating away at our health and are responsible for such diverse ills as childhood leukaemias, brain cancers, miscarriage, depression and even suicide.

Last year, the National Radiological Protection Board (NRPB), the government-funded organisation which sets safety limits on exposure, concluded that high electromagnetic fields (EMFs) might double the risk of childhood leukaemia, and was probably responsible for an additional two deaths from the disease each year. Now a massive report from researchers in the United States has cast the net of doubt much wider. The report, conducted by three senior figures at the California Department of Health Services, concluded that the authors "are inclined to believe that EMFs can cause some degree of increased risk of childhood leukaemia, adult brain cancer, Lou Gehrig's disease (a degenerative neurological condition similar to motor neurone disease) and miscarriage".

The link to miscarriage was especially dramatic - as many as one in 20 pregnancies may end prematurely due to EMF exposure, the report said. Whether by coincidence or serendipity, the NRPB, which is independent of the power industry, will shortly issue a discussion document on whether action is needed.

The miscarriage link is controversial - both the NRPB and the Electricity Association, which speaks for power companies, say the studies on this were flawed.

But Denis Henshaw, a professor of physics at Bristol University, who argues that power lines can make people sick, says that the new findings on miscarriage turn this into a major public health issue.

"We're talking about an absolute extra risk of miscarriage of 5 to 10 per cent, which is considerable," Henshaw says. "The power industry has always argued that even if there was an increased risk of childhood leukaemias, they are still very rare, and so it wasn't a public health matter. This is a much bigger can of

worms." Henshaw believes that EMFs are responsible for skin cancers, lung cancers, depression and around 60 suicides a year.

The authors of the American report, which took ten years to complete, cost \$7 million (£4.4 million) and runs to 400 pages, couldn't rule out links with suicide or adult leukaemia. All three scientists were "close to the dividing line between believing and not believing" that EMFs put a person at increased risk of these. They did not believe that EMFs were implicated in birth defects, other cancers, heart disease, Alzheimer's disease or depression. The report did not look at the EMFs from mobile phone masts.

Henshaw has hailed the report, the final draft of which was released on the internet without announcement last summer, as "groundbreaking". He says: "(The report) is unprecedented in its depth. The power industry has tried to ignore it, but it's so substantive that people can't really complain about it. Importantly, it's also been independent from industry pressure. It should wake people up."

Henshaw argues that the NRPB should follow the examples of Switzerland and Sweden in reducing the maximum safe exposure levels. The doubling of childhood leukaemias was seen at levels of 0.4 millionths of a Tesla (0.4 microTesla). The safe limit is set at 4,000 times that, at 1600 microTesla. Four years ago, Switzerland dropped the maximum to just 1 microTesla. To drop the limits any less dramatically, Henshaw comments, "would be as irrelevant as reducing the speed limit on the motorway from 1,000mph to 500mph". He also believes that houses should no longer be built near power lines or substations, and that cables should be buried underground.

Dr Michael Clark, scientific spokesman for the NRPB, says the Californian report "can't be dismissed but, because it is a review of existing work rather than new research, it doesn't substantially change anything". He cautions against being too prescriptive about exposure levels because the conveniences of modern life might be as much to blame as pylons and power lines. "Hairdryers produce large fields, as do car engines, but can we really tell people not to drive their cars?"

While someone standing directly beneath a power line might experience a magnetic field of 40 microTesla, a hairdryer or electric razor can produce 1000 microTesla. However, Dr John Swanson, scientific adviser on EMFs to the Electricity Association, says that these high exposures come in short bursts, and holding a hairdryer even a few inches away from the head cuts the level to about 100 microTesla.

Clark says that because many factors probably contribute to miscarriage, it is vital to be sure that the role played by EMFs is genuine.

The NRPB has appointed Sir Richard Doll, the epidemiologist who famously spotted the association between smoking and lung cancer, to review all the evidence, including that on miscarriage. Under his guidance, the NRPB believes that there is "(no) substantial evidence of increased risk of miscarriage attributable to exposure to above-average magnetic fields" and therefore no regulatory action is called for.

Doll's scepticism is shared by Swanson, who says: "The miscarriage studies are sufficiently flawed for me to be wary. For example, the participation rate was only about 39 per cent of the women approached, and most epidemiologists would look for a rate of at least 50 per cent. The questions raised are valid but these studies don't answer them.

"I think the California report is wrong. Their conclusions are out of line with most other reputable research groups around the world."

What is really needed to resolve the issue is harder statistical evidence, or a killer fact - a convincing, provable scientific theory of how EMFs

can physically damage the body. Such a theory would not only settle the uncertainty, but would also pave the way for legal action. Lawyers such as Martyn Day, whose London firm Leigh & Day is in touch with potential litigants, say that the California report is an important new weapon in the battle. "It's a significant new piece of evidence which has pushed me back to the edge," he says.

"But I could see the courts being very nervous about this one. There is evidence that EMFs affect molecules, but not enough to break them apart. And it is always possible that it is something else, rather than the EMF, that's causing the damage." And so, in the midst of blurred, ambiguous statistics, the controversy lingers. People living in the shadow of power stations continue to pile up anecdotal evidence of ill-health,

miscarriage and suicide. And, in the absence of hard figures, scientists remain reluctant to believe that the power lines that lattice the landscape could damage unborn babies and make people take their own lives.

http://www.nrpb.org/press/press_releases/2003/press_release_12_03.htm

Consultation on Limiting Exposure to Electromagnetic Fields

National Radiological Protection Board Press Release

NRPB has issued a public Consultation Document¹ on advice for restricting exposures to people from electromagnetic fields (EMFs) at work and at home. The document reviews the scientific data for adverse health effects from EMFs and how this evidence leads to quantitative exposure restrictions. NRPB proposes that the exposure guidelines of the International Commission on Non-Ionizing Radiation be adopted in the UK. An aim of the Consultation Document is to receive comments on the issues related to EMF exposure restrictions and aspects of precaution. The closing date for comments is Monday 28 July 2003.

The Consultation Document reviews scientific information on possible health effects published since its previous reviews in 1992 and 1993. It also takes account of reviews carried out by expert bodies, including the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the World Health Organization (WHO), the UK Independent Expert Group on Mobile Phones (IEGMP) and NRPB's Advisory Group on Non-ionising Radiation (AGNIR). The review considers epidemiology, experimental biology, volunteer studies and dosimetry.

All scientific investigations are subject to uncertainties, including the interpretation of studies on the possible adverse health effects of exposure to EMFs. The results from well designed and conducted studies have uncertainties that can be quantified statistically, but may not always be explicable. Not all studies are well designed and executed, and this must also be taken into account in any scientific review. Hence a cautious approach is used in making proposals for quantitative restrictions on EMF exposures.

NRPB is aware of developments from international bodies including WHO, ICNIRP and the European Commission (EC), towards the harmonisation of approaches to EMF exposure guidelines development.

Careful consideration has been given in the Consultation Document to the possible application of the Precautionary Principle to EMF exposure. Proposals are set out in the document that would bring together all stakeholders, including the general public, to facilitate an open discussion on EMFs and the Precautionary Principle.

Formal advice to Government on guidelines for limiting exposure to EMFs will be issued by NRPB after a review of the comments received on the Consultation Document.

1. *NRPB Consultation Document. Proposals for Limiting Exposure to Electromagnetic Fields (0 - 300 GHz). NRPB Chilton, 2003.*
2. *NRPB. Restrictions on Human Exposure to Static and Time Varying Electromagnetic Fields and Radiation. Doc NRPB 4(5), 7-63 (1993).*
3. *NRPB. 1998 ICNIRP Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300 GHz): NRPB Advice on Aspects of Implementation in the UK. Doc NRPB 10(2), 5-59 (1999).*

<http://news.bbc.co.uk/1/hi/health/2992921.stm>

BBC News, 1 May 2003

UK plans to lower EMF limits

By Alex Kirby, BBC News Online environment correspondent

The exposure of people in the UK to electromagnetic fields (EMFs) should be cut significantly, the government's radiation advisers say. The National Radiological Protection Board (NRPB) says the UK should adopt international exposure standards.

EMFs are given off by many industrial and domestic electric installations and appliances, including mobile telephones and wiring circuits.

Some experts say deeper cuts are necessary to protect people's health. EMFs are measured in units called microTeslas. The NRPB has recommended for many years that nobody should be exposed to a level higher than 1,600 microTeslas.

But in a consultation document on restricting people's exposure, it now recommends the UK should adopt the guidelines of the International Committee on Non-Ionizing Radiation Protection (Icnirp).

The commission's recommended level is far lower, at 100 microTeslas.

Health impact

The NRPB paper reviews recent research on possible health effects. It includes reviews of EMFs and possible health effects by Icnirp, the World Health Organisation, and the UK's Independent Expert Group on Mobile Phones.

The NRPB says: "All scientific investigations are subject to uncertainties, including the interpretation of studies on the possible adverse health effects of exposure to EMFs. The results from well designed and conducted studies have uncertainties that can be quantified statistically, but may not always be explicable. Hence a cautious approach is used in making proposals for quantitative restrictions on EMF exposures."

But some experts believe the traditionally cautious NRPB should have seized the chance to be much bolder.

Denis Henshaw, professor of physics at the University of Bristol, told BBC News Online: "The adoption by the NRPB of a precautionary approach to EMF exposures is to be welcomed. In the case of new installations (power lines, sub-stations, etc.) this needs to result in public exposures well below 0.4 microTeslas, the level at which a doubling of the risk of childhood leukaemia has been seen.

"This should also protect against increased risk of adult brain cancer, miscarriage and a number of other adverse health outcomes. In the case of existing installations the adoption of the Icnirp exposure limit of 100 microTeslas still leaves people living near high-voltage power lines potentially exposed to magnetic field levels of several or even tens of microTeslas, well above the levels where adverse health effects have been reported.

"Future consideration will need to be given to reducing exposures with respect to existing installations."

Leukaemia risk

Two years ago an NRPB investigation found "a weak association" between EMFs and an increased risk of childhood leukaemia. It said the extra danger was slight, but recommended further research.

The investigation included a study of 3,000 children which suggested electricity pylons could double the childhood leukaemia risk. But the NRPB said the evidence applied not just to power lines, but to the effects of electrical power inside houses.

In 2000, a US study concluded people might be likelier to commit suicide if they were regularly exposed to low-frequency electromagnetic fields.

The UK Electricity Association said it fully supported the NRPB approach. Dr John Swanson, its scientific adviser, said: "The new proposals do not change what the science says, but are more about looking at what could be the pros and cons of changing the safety margins from those we use now.

"This does not mean that the old guidelines were fundamentally flawed. It is simply asking the question, should we have even greater safety margins than we already have."

USA: Exposure to Radiofrequency Electromagnetic Fields - Federal Communications Commission

Proposed rule: Written comments are due December 8, 2003, and reply comments are due January 6, 2004

This document seeks comment on proposed amendments to the FCC's rules and regulations relating to compliance of transmitters and facilities with guidelines for human exposure to radio frequency (RF) energy. These proposals are intended to ensure protection of the public from potentially adverse health

effects from RF exposure, while avoiding any unnecessary burden in evaluating compliance with FCC requirements. Several proposals are made regarding the Commission's rules and regulations including proposals related to categorical exclusion from routine evaluation for RF exposure, requirements for evaluation of Specific Absorption Rate (SAR) for certain RF devices, RF evaluation requirements for modular transmitters, labeling requirements for consumer devices, clarifications of responsibilities for evaluating compliance, special considerations regarding occupational exposure to RF fields, procedures for measuring RF fields for evaluating compliance, and other miscellaneous items related to clarification of the FCC's rules for RF exposure.

<http://a257.g.akamaitech.net/7/257/2422/14mar20010800/edocket.access.gpo.gov/2003/03-22624.htm>

New postings on the EMR Network's Research Page

<http://www.emrnetwork.org/research/research.htm>

Two new articles from EMF Researcher W. Ross Adey, M.D., Distinguished Professor of Physiology, Loma Linda University School of Medicine, will be published in upcoming issues of International Encyclopedia of Neuroscience, Third Edition; B. Smith and G. Adelman, editors. Elsevier, New York.

- "Electromagnetic fields, the modulation of brain tissue functions - A possible paradigm shift in biology." http://www.emrnetwork.org/research/adey_encneuro_emfs.pdf
- "Brain interactions with RF/microwave fields generated by mobile phones." http://www.emrnetwork.org/research/adey_encneuro_mp.pdf

<http://www.pole.com.ru>

Russian National Committee on Non-Ionizing Radiation Protection – April, 2003 Meeting

Agenda:

- RNCNIRP advice on the safe use of the mobile phones
- RNCNIRP annual journal
- Electromagnetic fields and ecological systems
- Development of hygienic standard for 50 Hz magnetic field
- RNCNIRP report-2002
- Results of the Moscow EMF Conference, 2002
- About RNCNIRP.

Russian National Committee on Non-Ionizing Radiation Protection (RNCNIRP) meeting was held on March 12, 2003 with the next agenda:

1. The work results and prospects of the Laboratory of electromagnetic fields of the Research Institute of Occupational Health of the Russian Academy of Medical Sciences. Devoted to the 50th anniversary of the Laboratory.
2. The substantiation of the draft of the sanitary standard "Protection of workers from electromagnetic impulses".
3. Suggestions to the new edition of Russian Ministry of Health Order Д 90 (March 14, 1996) "About the procedure of carrying out preliminary and periodical medical examinations of workers and medical permission to jobs".
4. Situational chronic stress of population in conditions of wide implementation of EMF sources to the human environment.

RNCNIRP ADVICE ON THE SAFE USE OF MOBILE PHONES

The RNCNIRP offers the following advice on the safe use of mobile phones. These recommendations are based on the precautionary principle of the World Health Organization, published scientific and medical studies, reviews and recommendations by scientific groups and the expert opinions of RNCNIRP members.

1. Children under the age of 16 should not use mobile phones.

2. Pregnant women should not use mobile phones.
3. Those suffering from given below diseases and disorders should not use mobile phones: neurologic diseases such as neurasthenia, psychopathy, psychosteny, and all neurosis with asthenic, obsessional hysterical disorders and reducing of mental, physical activity, memory loss, sleep disorders, epilepsy and epileptic syndrome, epileptic predisposing.
4. The duration of calls should be limited to a maximum of three minutes, and after making a call the user should wait a minimum of 15 minutes before making another call. The use of headsets and hands-free systems is strongly encouraged.
5. Manufacturers and retailers of mobile phones should include the following information together with the engineering specifications: all of the above recommendations regarding use; all relevant health and epidemiological data on mobile phones, together with the radiation exposure levels associated with the phone and the name of the measurement lab.

RNCNIRP ANNUAL BOOK

The Russian National Committee on non-ionizing radiation protection is preparing an annual book RNCNIRP-2002 where the most important scientific research carried out in Russia and long-term activity trends are presented. The articles will be in Russian with a detailed English abstract.

ELECTROMAGNETIC FIELDS AND ECOLOGICAL SYSTEMS

Since October 2002 the Center for Electromagnetic Safety has been working out a standard document regulating the procedure of developing, approval and standards application concerning maximum permissible exposure levels of electromagnetic fields on living environment. The work has been funded by the Russian Ministry of Natural Resources. The aim of the study is development of complex measures for EMF protection of ecological systems and modernization of work of EMF sources.

The document would contain the requirements on the harm reduction caused by electromagnetic fields to ecological systems. Also there will be developed requirements on laying out maximum permissible exposure levels of environmental electromagnetic pollution and incentive mechanisms of the environment protection from EMF influence.

DEVELOPMENT OF HYGIENIC STANDARD FOR 50 HZ MAGNETIC FIELD

Research Institute of Occupational Health in cooperation with Center for Electromagnetic Safety has been developing a regulatory-methodic document, regulating 50 Hz magnetic field population exposure. This work was funded by the Moscow City Government. The aim of the work is to provide a healthy living environment for population, daily exposed by 50 Hz magnetic fields in Moscow.

This project has the next objectives:

- development of practical measuring methods and a hygienic evaluation of 50 Hz magnetic fields (MF) in residential areas;
- assessment of contribution of this MF sources in total magnetic condition, created by different MF sources;
- substantiation MPEL of 50 Hz MF for population;
- substantiation of principles and methods of 50 Hz magnetic fields control in residential areas;
- substantiation of principles and methods of population protection from harmful influence of 50 Hz magnetic fields;
- development of a regulatory-standard document, regulating 50 Hz magnetic fields influence in residential areas;

- substantiation of principles and methods of control and protection.

The work results will be used for the development of draft of regulatory-standard document. This document would be used by system of the State sanitary-epidemiological inspection in Moscow for controlling of environmental electromagnetic pollution in the city and protecting population health.

RNCNIRP REPORT-2002

In 2002 the work of the Russian National Committee on non-ionizing radiation protection (RNCNIRP) was coordinated with plan confirmed by both Chairman of the Russian National Committee on Radiation Protection A. Tsyb and First Deputy Minister of the Russian Ministry of Health G. Onischenko.

In 2002 RNCNIRP carried out 4 plenary meetings and the International Conference "Electromagnetic fields and human health" (September 17-24, Moscow - Saint-Petersburg).

The main work results are the following:

1. Application of the results of the experiments conducted on animals to people. A lot of experiments on animals concerning radio frequency EMF influence (power flux density <math>< 500 \mu\text{W}/\text{cm}^2</math>) were carried out in Russia in the 50s-60s, the results being valuable for modern scientists and substantiation of EMF maximum permissible exposure level (MPEL). However, currently the problem connected with extrapolation of the results of the experiments conducted on animals to people remains unsolved. As far as a thermal level of EMF influence is concerned there have been developed mathematical models allowing to make use of the results obtained. But the method of extrapolation of biological effects from thermal EMF levels to non-thermal ones is not correct. A great experience of extrapolation of experimental biological data has been accumulated in ionizing radiation studies, some methods could be applied to non-ionizing radiation. However, the energy distribution after influence of different EMF frequencies has its specific features. The disadvantage of mathematical modeling is that if biological effect becomes more complicate, then more sophisticated its mathematical equation would be. This fact surely increases the differences between calculated and real data.
2. Analysis of the regulatory and methodical documents on EMF in Russia. The principle documents regulating EMF influence on population and having primary significance for further development have been considered. At present time it is vitally important to review many standards because they fall short to modern requirements, at the same this action needs the considerable expenses. Many EMF frequencies are not regulated by sanitary-hygienic standards, for instance, frequency range 20-50 Hz, magnetic fields of 50 Hz for population and so on. A list of regulatory-methodical documents, which need to be reviewed, is the following:
 - (i) 50 Hz magnetic fields MPEL for population.
 - (ii) Sanitary standards and regulations for population protection from 50 Hz electrical and magnetic fields, generated by electrical equipment and systems.
 - (iii) MPEL of low-frequency magnetic fields (0-20 Hz) for population and employees (magnetic fields generated by ground and underground vehicles, sea and river vessels, sewing machines, telephone station equipment and so on).
 - (iv) Electromagnetic fields MPEL at working places of PC users.
 - (v) Sanitary standards and regulations "Hygienic requirements upon working conditions of employees using office equipment" (PCs, printers, scanners, copiers and others).
 - (vi) MPEL of reduced alternating natural EMF at working places in shielded areas.
 - (vii) Sanitary standards and regulations "Hygienic requirements to working conditions in shielded areas".

- (viii) Methodical instruction "Certification of working places of employees, working under EMF influence".
 - (ix) MPEL of 50-300 MHz magnetic fields for workers.
 - (x) MPEL of 10 kHz -300 MHz magnetic fields for population.
 - (xi) MPEL of EMF from portable radio stations including HF, UHF frequency bands and microwaves.
 - (xii) MPEL of steady magnetic fields for population.
 - (xiii) MPEL of wide-band electromagnetic impulses.
 - (xiv) Sanitary-epidemiological regulations "Hygienic requirements to work organization of medical personnel, operating EMF- generated physiotherapeutic equipment."
3. Alternative EMF protective methods and RNCNIRP attitude toward these methods. The experts are concerned by attempts to put alternative methods of EMF protection into practice. There is neither any scientific substantiation of their efficiency, no reliable data obtained by experimental scientific methods to prove their protective qualities. Unfortunately, some experts in the sphere of electromagnetic safety published articles, supported such methods without any significant argumentation. It is essential to carry out a series of experiments both physical and biological to determine their efficiency and to study the consequences of their application by people. RNCNIRP is preparing an expert opinion to prevent wide spread occurrence of alternative EMF protective methods, which to be located on the web-site.
4. RNCNIRP members prepared the suggestion to the WHO draft "Framework for Developing EMF Standards" which after it adopting become the principle recommendatory document in the EMF international standard harmonization process. RNCNIRP suggestions contain the Russian scientists' position on defining the terms "maximum permissible exposure level", "EMF harmful influence cut-off" and also their opinion concerning the necessity to admit a non-thermal mechanism of microwave EMF exposure and to distinguish the critical systems: nerve, endocrine, immune, reproductive and blood. It was underlined, that MPELs should be established on the basis of chronic experiments results, clinical and physiological hygienic researches rather than the effects from the acute exposure.

RESULTS OF THE MOSCOW EMF CONFERENCE - 2002

The 3rd International conference "Electromagnetic fields and human health. Fundamental and Applied Research " was hold on September 17-24 in Moscow and Saint-Petersburg. The conference was organized in cooperation with the Russian Academy of Sciences, the Russian Ministry of Health, the World Health Organization, the North-West Scientific Center of Hygiene and Public Health, the Centers of Electromagnetic Safety and Bioelectromagnetic Compatibility, supported by the BBC laboratory, USA. More than 120 scientists including 40 ones from 17 foreign countries (Argentina, Byelorussia, Belgium, Bulgaria, Brazil, Great Britain, Germany, Italy, China, Poland, the USA, Turkey, the Ukraine, Finland, France, Switzerland, Sweden) participated in the conference. More than 140 reports were presented at the sessions. The results of the 3rd conference were published in the proceeding "Electromagnetic fields and human health. Fundamental and applied research" (Moscow, 2002).

Special attention was paid to the studies made in frame of the WHO International EMF project and devoted to the implementation of precautionary principle. The conference participants assessed EMF carcinogenicity, biological effect of chronic EMF exposure, significance of hypersensitivity syndrome, EMF effects on the central nerve and immune systems. The most interest aroused the results of both experimental and theoretical studies of EMF biological effects. Many studies were devoted to the research of radio frequency EMF

including EMF from cellular telecommunication. The harm from cellular communication (base station, cellular phones) today is very difficult to assess. Because there is no reliable information about accumulation of EMF bioeffects and clear understanding of remote EMF effects and, first of all, the possibility of brain tumor development. At the modern scientific stage the problem of mobile phones standardizing remains unsolved. One of the most important problems is international harmonization of EMF standards. Currently differences in MPELs of EMF reach 100 times in different countries. These differences appeared first of all due to different approaches to determining negative EMF biological effects and rejection of "non-thermal" EMF effects. Problem of standard harmonization is very important because Russia intend to enter the World Trade Organization. That is why one of the primary aims of the 3rd conference was the introduction of results and experiments descriptions which being the basis of MPELs established in Russia to the foreign scientists and the World Health Organization experts. 2 days of the conference were dedicated to analyzing and discussion of Russian MPELs at the Round table on harmonization of international standards in Saint-Petersburg.

At Round table session the results of expertise and hygienic researches of biological effects of radio frequency EMF, which were used in the 70s to substantiate the USSR standards were presented. A retrospective analysis of materials introduced confirms the possibility of harmful consequences caused by chronic exposure of radio frequency EMF (power flux density 50-500 $\mu\text{W}/\text{cm}^2$) on organism. On the basis of the above formulated criteria in the USSR MPELs were adopted less than 50 $\mu\text{W}/\text{cm}^2$ (for population 10 $\mu\text{W}/\text{cm}^2$).

Russian scientists substantiated their approach to MPEL establishing. The research results used as background for current EMF MPEL in Russia also were used for standards developing in CIS, former East Block and other countries.

The research methods, scientific centres' equipment, characteristics of EMF sources and their spreading have changed for the last 20 years. That is why it reasonable to repeat a number of key researches as a part of the joint international research projects under the supervision of the Russian Ministry of Health from one side and the World Health Organisation from another. At the end of the Round table session there were determined the primary steps to be taken to realise the WHO program on EMF standard coordination.

Summarizing the results of the 3rd International conference "Electromagnetic fields and human health. Fundamental and applied research" Moscow - Saint-Petersburg (2002) Russian scientists suggested the following resolution:

1. To formulate a common definition of the term "maximum permissible exposure level" for EMF.
2. To admit a necessity of consideration of the study results with chronic EMF exposure during establishing the MPEL. These materials are to be an unalienable part of MPEL substantiation as well as the study results from acute exposure.
3. To admit officially a non-thermal mechanism of influence of radio frequency EMF at low intensities (less than 1 $\mu\text{W}/\text{cm}^2$).
4. To develop the available methods of a electromagnetic conditions dosimetric control, allowing to the sanitary - epidemiological inspection services to assess and control operatively the standards performance (radio frequency EMF standards).

ABOUT RNCNIRP

Russian National Committee on Non-Ionising Radiation Protection (RNCNIRP) was established in 1998. Members of RNCNIRP are scientists and specialists in the field of human and environmental protection from non-ionising radiation.

The main RNCNIRP objectives:

- Participation in forming of law, social and economic systems of organizing measures directed on ensuring of non-ionising radiation protection and population health of Russian Federation.
- Development of main directions and methods of complex regulation of scientific and technical problems in the field of non-ionising radiation protection scientific and methodological regulation of concept developments, normative acts aimed to control and improve environmental situation in Russia.
- Development of recommendations for the inculcation of scientific and technical achievements in practice in case of emergency non- ionising radiation exposure.
- Expert assessment and participation in the development of standards and guidance for population protection from non-ionising radiation.

RNCNIRP works in coordination with Russian Ministry of Public Health, WHO International EMF project and International Commission on Non-Ionising Radiation Protection. RNCNIRP hold meetings 4 times a year.

Alzheimer Dis Assoc Disord. 2003 Jul-Sep;17(3):139-45.

http://www.ncbi.nlm.nih.gov:80/entrez/query.fcgi?db=PubMed&cmd=Display&dopt=pubmed_pubmed&from_uid=14512826

Risk factors for Alzheimer disease: a population-based case-control study in Istanbul, Turkey.

Harmanci H, Emre M, Gurvit H, Bilgic B, Hanagasi H, Gurol E, Sahin H, Tinaz S.

SUMMARY: The objective is to study risk factors for Alzheimer disease (AD) in Istanbul, Turkey. This is a population-based case-control study. We screened people over age 70 in the community for cognitive impairment. The screen positives and a proportion of screen negatives underwent neurologic examination in the second phase. Cases were 57 "probable" AD patients and controls were 127 cognitively normal individuals identified by neurologic examination. Odds ratios (OR) were calculated using multivariate logistic regression analysis. Having a university/college degree had a protective effect on AD risk (OR = 0.10, 95% confidence interval [CI] = 0.02-0.50). Exposure to occupational electromagnetic field had an OR of 4.02 (95% CI = 1.02-15.78). Use of electricity for residential heating also showed elevated risk (OR = 2.77, 95% CI = 1.12-6.85). Our results suggest that having a higher education is protective from AD and that electromagnetic field exposure at work or at home is a significant risk factor.

Am J Epidemiol 2003; 157:683-691.

Electromagnetic Fields, Polychlorinated Biphenyls, and Prostate Cancer Mortality in Electric Utility Workers

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5. Current affiliation: Foodborne and Diarrheal Diseases Branch, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, GA.

The purpose of this study was to determine whether there was an association between occupational exposure to electromagnetic fields (EMFs) or polychlorinated biphenyls (PCBs) and mortality from prostate cancer among US electric utility workers. Data on participants, who were current and former employees of five large US electric utility companies, had been collected during 1987-1994, and the

mortality of the cohort was followed through 1988. This nested case-control study contained 387 cases, men whose underlying cause of death was prostate cancer, and five controls for each case. Workers categorized in the highest 10 percent of EMF exposure were twice as likely to die from prostate cancer as those exposed to EMFs at lower levels, after adjustment for PCB exposure, race, and active work status within the past 2 years (odds ratio = 2.02, 95% confidence interval (CI): 1.34, 3.04). The odds ratio for PCB exposure and prostate cancer mortality was 1.47 (95% CI: 0.97, 2.24) after adjustment for suspected confounding factors. Exposure to high levels of both EMFs and PCBs showed no association with prostate cancer mortality. Non-White race was strongly associated with risk of prostate cancer mortality (odds ratio = 3.67, 95% CI: 2.66, 5.06). The association between EMF exposure and prostate cancer mortality warrants further investigation.

Epidemiology. 2003 Jul;14(4):420-6; discussion 427-8.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=12843765&dopt=Abstract

Neurodegenerative diseases in welders and other workers exposed to high levels of magnetic fields.

Hakansson N, Gustavsson P, Johansen C, Floderus B., Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden. niclas.hakansson@imm.ki.se

BACKGROUND: Previous work has suggested an increase in risk of amyotrophic lateral sclerosis (ALS) and Alzheimer's disease among workers exposed to extremely low-frequency magnetic fields (ELF-MF). We evaluated the relation between ELF-MF from occupational exposures and mortality from neurodegenerative diseases.

METHODS: The study was based on a cohort of Swedish engineering industry workers, comprising 537,692 men and 180,529 women. The cohort was matched against the 3 most recent censuses and The Causes of Death Registry. Levels of ELF-MF exposure were obtained by linking occupation according to the censuses to a job exposure matrix. We used 4 levels of exposure and considered both the primary and contributing causes of death, 1985-96.

RESULTS: The risk of Alzheimer's disease as primary or contributing cause of death increased with increasing exposure to ELF-MF among both men and women, with a relative risk (RR) of 4.0 and a 95% confidence interval (95% CI) of 1.4-11.7 in the highest exposure group for both sexes combined. There was a RR of 2.2 (95% CI: 1.0-4.7) for ALS in the highest exposure group with the suggestion of an exposure-response relationship. No evidence of increased risk was seen for Parkinson's disease or multiple sclerosis.

CONCLUSIONS: The findings support previous observations of an increased risk of Alzheimer's disease and ALS among employees occupationally exposed to ELF-MF. Further studies based on morbidity data are warranted.

Book Notice: Electromagnetic Environments and Health in Buildings

Electromagnetic Environments and Health in Buildings (ed. D Clements-Croome), Spon Press, London & New York, August 2004

Having been originally trained in architectural building design in the USA, I have given numerous presentations to OH&S Union groups in Tasmania, South Australia and Victoria on workplace problems associated with chemical and EMF exposures in modern IT workplace environment.

At last there is a book available that extensively covers the building EMF issue from an architectural perspective. In my opinion it is THE essential reference for Trade Unions, Building Designers and basically anyone interested in the impact of EMF on the built environment. I highly recommend it!

Don Maisch

<http://www.amazon.co.uk/exec/obidos/tg/stores/detail/-/books/0415316561/reviews/202-0023296-7991853>

Book Description

With increasing use of mobile phones and VDUs, levels of background radiation and electromagnetism are rising, particularly in the workplace and also in the home. To some extent this is unavoidable, but the level of dangers is unclear: is it trivially small, moderate or high? What are the risks of illness or death, and how can

these be reduced to minimal or tolerable levels? What can or should employers, building engineers and designers, product designers, workers and other members of the public do? This book, of which the chapters derive from presentations given at a major international conference, aims to present sound technical information on the whole range of key issues in a clear and accessible way.

Synopsis

Electromagnetic fields are an intrinsic part of the universe but there has been a rapid increase of electrical equipment, inside and outside buildings, in the 20th century. Does this rise in electropollution affect the health of people? "Electromagnetic Environments and Health in Buildings" brings together the work of an international group of specialists in this fragmented subject area. The book covers the health effects of electromagnetic fields and emission standards and offers some glimpses into the future. It analyses the debate over the mechanisms which underlie the phenomenon and explains the methodologies that are implemented to understand the relationship between the human body and electromagnetic fields.

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http://www.rdg.ac.uk/AcaDepts/kc/publishcme/People_contacts/Staff/Staff/Derek_Croome.htm

<http://news.bbc.co.uk/1/hi/health/2503291.stm>

Friday, 22 November, 2002, 12:55 GMT

Burned groin blamed on laptop

A Swedish scientist who rested his laptop computer on his lap for just an hour needed medical treatment for extensive blistering.

A concerned doctor wrote to The Lancet medical journal after encountering the distressed patient. He is warning the public of the potential dangers of using a laptop "in the literal sense".

The 50-year-old father-of-two used the laptop machine, of unknown origin, to write a report while sitting in an armchair.

Dr Claes-Goran Ostenson, from Sweden's Karolinska Institute, told the journal: "He had placed his laptop computer on his lap while writing for about one hour. The next day he noticed irritation."

Infection

The irritation of his penis and scrotum led to blisters, one with a diameter of 2cm.

Dr Ostenson said: "The patient recalled that, while sitting two days earlier with his computer on his lap, he occasionally had felt heat and a burning feeling on his lap and thigh."

Unfortunately for the victim, the blisters broke and developed into infected suppurating wounds.

The manual of the computer concerned told users not to allow the laptop to rest directly onto skin, warning: "With extended operation, heat can potentially build up in the base. "Allowing sustained contact with the skin could cause discomfort or, eventually, a burn."

However, the patient in this case insisted he had been wearing both trousers and underpants at the time.

Fact Sheets from the EMRAA

You may be interested in including the facts sheets from our web page in future editions [of the ACTU Digests of OHS Information] and feel free to do so if you feel they would be useful.

Lyn McLean, Executive Officer, EMR Association of Australia

These fact sheets cover computers, microwave ovens, and mobile phones and are available at <http://www.emraa.org.au/>

Date: 4 July 2003

Electromagnetic Radiation Health Complaints Register Launched

Australia has its first centralised Electromagnetic Radiation (EMR) Health Complaints Register from today. The CEO of ARPANSA, Dr John Loy, said in Sydney: "Members of the public who believe they have suffered ill-effects as a result of exposure to EMR can now lodge a written complaint with a national database administered by ARPANSA. The agency cannot investigate or attempt to resolve individual complaints, but a standard reporting form allows people to describe the nature of their exposure and any adverse health effects they claim to have experienced. ARPANSA will protect the privacy of complainants."

"The Health Complaints Register will collect reports of health concerns related to possible EMR field exposures in the range of 0-300 GHz. Therefore, it is important to note that the register will not be limited to telecommunications equipment like mobile phones and broadcasting transmitters but will also include sources such as powerlines, induction heaters, microwave ovens and other personal, industrial and scientific EMR producing equipment."

John Loy added: "In designing the Health Complaints Register ARPANSA consulted with other government departments, industry, and community organisations. Relevant data gathered will be used to produce statistical summaries for the public, and the Commonwealth Government, on the nature and level of complaints received. Information could be used by ARPANSA to help identify future areas of research into the effects of electromagnetic fields on people and the environment. Register information may also be disclosed to the National Health and Medical Research Council for its consideration."

The Health Complaints Register honours an undertaking made by the Commonwealth Government in response to recommendations of the Senate Environment, Communications, Information Technology and the Arts References Committee inquiry into EMR in late 2000. The Committee report was tabled in May 2001. Government Senators considered (p.180): "...that the development of a database of reports of adverse health effects from mobile phones and other sources of radiofrequency radiation would assist researchers in formulating research hypotheses, and contribute to public confidence in measures being adopted to minimise health risks associated with EMR."

To avoid restricting and distorting responses the standard reporting form asks people to record six things:

1. personal details;
2. whether they are willing to be contacted by the NHMRC and/or ARPANSA if necessary;
3. symptoms which they believe result from their EMR exposure;
4. whether they have seen a medical or health practitioner about their complaint;
5. the EMR exposure source; and
6. acknowledgment that they understand the purpose for which the information has been collected, and the conditions that surround its collection, retention and use.

Use the link at the head of this page to download a copy of the standard reporting form or request a copy from the ARPANSA Secretariat via 03 9433 2211 or (toll-free) on 1800 022 333 during normal business hours. http://www.arpansa.gov.au/media/mr1_040703.htm

Senate Speech by Australian Democrat Lyn Allison (Excerpt)

September 10, 2003

ADJOURNMENT: Commonwealth Scientific and Industrial Research Organisation – Senator ALLISON (Victoria) (7.31 p.m.)

Tonight I wish to draw the attention of the Senate to the crisis in our nation's premier science organisation, the CSIRO, and in particular to the forced shift in that organisation away from science that is in the public interest-in this case the public health interest-to science that benefits commercial interest.

The result is that most matters of public health and development of standards of practice will effectively be left to voluntary organisations. I find this to be a ludicrous situation for a nation that is as wealthy as ours. I ask: how is it that we could afford to do this work and fund it publicly 20 years or so ago-maybe even seven years ago-but not now? I think the answer to that question is that we can afford it but it is ideology and lack of will that stops us from doing so.

The parlous state of the CSIRO came to my attention in a conversation I had with senior principal research scientist Dr Stan Barnett last week. Dr Barnett, who is Section Manager in the National Measurement Laboratory's Division of Radiophysics, has just been advised that he is redundant. He is not of an age where retirement is appropriate, and he is surprised-as was I-that he is in this position. He says that so are the 250 or so other scientists who are now being given the boot.

Dr Barnett's work first came to my attention in the Senate inquiry into electromagnetic radiation from mobile phones. His 1994 report entitled "Status of research on biological effects and safety of electromagnetic radiation: telecommunications frequencies" was pivotal in bringing the nation's attention to the potential health problems of mobile phone technology. Back in 1993 the federal department of communications approached CSIRO to evaluate the status of research on the biological effects of radiofrequency radiation.

That report concluded that there was insufficient reliable scientific evidence on which to base sound conclusions about the safety of radiofrequency exposures in telecommunications. It stated: ... because of its equivocal nature, the database for RF emissions has limited value. It may be dangerous to make general statements on safety based on lack of evidence of harmful effects when so little relevant research has been carried out.

I point that out because I want to explore tonight the importance of research and why we need it in these areas that might not attract the commercial dollar. Of course the news from this 1994 report was not welcomed by the telecommunications industry or by the government, both of whom moved to relax mobile phone emission standards more recently despite opposition from the CSIRO through Dr Barnett, who said that there was no scientific basis for doing so.

That report I mentioned was a literature study by Dr Barnett, as opposed to hands-on experimental research. According to CSIRO, they have just a watching brief on telecommunications radiation issues and no budget to actually do research. The CSIRO did apply several times for funding to conduct hands-on research from the \$4½ million fund on EMR. They wanted to examine the potential effects of radiofrequency radiation on DNA and cancer production, but they were knocked back. Submissions to the electromagnetic radiation inquiry that reported two years ago stressed the need for independent research into the controversial area of EMR. A lot of the studies supposedly showing that mobile phones are safe in fact rely on research which has been done or was funded by telecommunications companies.

The demise of jobs in this general area of public health was to some extent pre-empted by Dr Haddad, head of the CSIRO Division of Telecommunications and Industrial Physics, when he appeared before the committee. He said: "CSIRO has a choice these days. It is required to maintain its external income level at a reasonably high level for a research organisation and, as such, it has to choose the areas in which it works quite carefully. Appropriation funding has been flat; in fact, in real dollar terms, it has decreased

significantly over the last few years. That makes it harder and harder to maintain a variety of areas of what I would call more fundamental research ... which underpins all this sort of short-term tactical work that you can do to earn money."

As well as working full time in his position, Dr Barnett worked in a voluntary capacity on research into the safety of diagnostic ultrasound equipment, and he has had over 100 studies published in medical journals in this area. He has been investigating the potential medical implications of some types of exposure of the foetus to ultrasound equipment. He has found, for example, that Doppler ultrasound technology can heat tissue up to five degrees. The World Federation for Ultrasound in Medicine and Biology says that increases of four degrees for five minutes or more are potentially hazardous.

Dr Barnett has found some evidence to suggest that ultrasound-induced bioeffects can be enhanced by modest increases in temperatures. He says that pulsed Doppler exposure, as opposed to non-pulsed B-mode scanning exposure, can produce significant heating in the foetus, particularly near bone, where the ultrasound beam is fixed onto a single point tissue target. Dr Barnett's work also shows that foetal tissue is also sensitive to physical change and that the resultant perturbation of cell differentiation may result in significant consequences. He says that the scientific database is incomplete and cannot keep pace with technological development in modern equipment and that the clinical implications of non-thermal effects have not been fully evaluated. So, despite the fact that every pregnant woman who presents to a doctor will have an ultrasound, very little work is being done on the safety of this technology and there are no standards to protect the foetus from adverse effects. The reason I point out all this detail-it is not necessary for us to know it-is that we need to understand the implications if we stop important work being done.....

Redesign for Microwave News web site

We are pleased to announce that today we are launching our redesigned Web site, <http://www.microwavenews.com> The site will be regularly updated with news and opinion. We encourage you to visit us often to keep up with all the latest developments on low- and high-frequency EMFs. We have also posted our 2004 Conference Calendar (as a pdf), which has been an annual feature of the print edition of Microwave News.

We will you all a healthy, happy and successful new year – Louis Slesin

POWER LINES, BASE STATIONS AND TOWERS

How Exposure to GSM & TETRA Base-station Radiation can Adversely Affect Humans

G J Hyland (Associate Fellow - Department of Physics, University of Warwick Coventry, UK & Executive Member - International Institute of Biophysics, Neuss-Holzheim, Germany) August 2002

It is perfectly true that the levels of microwave radiation in publicly accessible locations near GSM and TETRA Base-stations comply, by many factors of 1000, with the current safety guidelines set by the International Commission for Non-Ionising Radiation Protection (ICNIRP).

These limits are, however, purely thermally based - i.e. they simply limit the intensity of the radiation to ensure that the amount of tissue heating by absorption of microwave radiation is not in excess of what the body can cope with. If heating were the only effect of the radiation, existing guidelines would afford the public adequate protection against the emissions of Base-stations; unfortunately, however, this is not the case. For microwaves are waves, and, as such, have properties other than solely intensity.

In particular, the pulsed microwave radiation used in the GSM and TETRA systems of telecommunication has a number of rather well defined frequencies that facilitate its discernment by the alive human organism, and via which the organism can, in turn, be affected in a purely non-thermal way. This is so because the alive human organism (and only the alive one) itself supports a variety of oscillatory electrical biological/ biochemical activities, each characterised by a specific frequency, some

of which happen to be close to those found in the GSM / TETRA signals; this coincidence makes these bioactivities potentially vulnerable to interference.

It comes about because these oscillatory electrical activities play a role akin to the tuned circuits in a radio, making the living organism an electromagnetic instrument of great and exquisite sensitivity that is able to 'recognise' and discern the presence of the radiation 'informationally' by decoding (demodulating) its various frequency characteristics, including those of any amplitude modulations.

Since these activities are involved in bio-communication and in the control and regulation of bio-processes essential to well-being, it is reasonable to anticipate that it is the functionality of the alive organism that is impaired by exposure to radiation of sub-thermal intensity containing bioactive frequencies; this contrasts strongly with the situation at thermal levels where actual material damage to DNA, cells and tissue can occur.

It is to be stressed, however, that unlike heating, non-thermal (informational) influences are possible only when the organism is alive: the Dead have no electrical brain activity with which an external electromagnetic field can interfere!

The frequency of the radiation that is used to carry the voice information (messages) in both GSM and TETRA lies in the microwave band - a frequency range in which processes as fundamental as cell division can be interfered with - the somewhat lower carrier frequencies characterising the TETRA radiation facilitating its deeper penetration into tissue. On the other hand, the rates at which the microwaves are emitted in distinct groups of flashes (or pulses) happen to be close to the frequencies of some of the brain's own electrical and electrochemical rhythms; accordingly, these can be amplified, interfered with, and even entrained by the radiation.

In the case of GSM, the basic 'flash rate' is 217Hz, but the flashes are emitted in groups of 25 at the rate of 8.34Hz - a frequency that lies in the range of the human alpha brain wave activity. In the case of TETRA, on the other hand, the nature of the pulsing is somewhat different, but is again characterised by low frequencies that are here close to 70Hz and 17Hz - the latter, in particular, characterising the much more accentuated pulsing of the emissions of vehicularly mounted antennae. 17Hz is very close to the frequency (16Hz) at which there are reports of a significant increase in loss (efflux) of calcium from brain cells - thereby potentially undermining the integrity of the nervous system - and to the frequency at which seizures can be provoked in photosensitive epileptics by a light flashing at between 15-20 times per second (see below).

What the Mobile Phone Industry and the various Regulatory Bodies (such as the NRPB and ICNIRP) dispute is that the very weak, pulsed microwave radiation used in GSM and TETRA exerts any non-thermal biological influences that entail adverse health reactions. Their conviction that, provided the intensity of the radiation complies with the ICNIRP safety guidelines, human exposure to this kind of radiation is innocuous is, however, based, firstly, on the erroneous belief that electromagnetic fields should be regarded as toxins to the body - rather than an integral feature of its living state - and, secondly, on an outdated 'linear' mindset, which prejudices the conclusion that exposure to weak radiation (below guideline levels) can entail only correspondingly weak effects, and vice versa.

The invalidity of the latter is clearly indicated by the existence of the 'informational' influences referred to above, which, being contingent on our aliveness, are inherently non-linear effects: any attempt to understand such effects from a purely linear perspective are thus doomed, in that they are impotent to address the most discriminating feature of all, namely, the 'aliveness' of the system under consideration.

The importance of ensuring non-thermal electromagnetic compatibility between mobile phone radiation and energised electronic equipment, such as that in aircraft and hospitals, for example, is, of course, generally accepted and respected. Ironically, however, the same does not yet obtain in the case of the alive human organism, despite (i) the fact that the latter is itself an electromagnetic instrument par excellence, as already mentioned, and (ii) the existence of a wide variety of non-thermal bio-effects induced by low intensity microwave radiation (both pulsed and continuous) that have been revealed by many experiments, enjoying varying degrees of corroboration*, (* Difficulties in replication can often be traced to some crucial difference in experimental protocol that effectively undermines the fidelity of the purported replication; thus the reason why some experiments have not been replicated is precisely because they have not been rigorously replicated!) which have been performed over the last 30 years

on many different kinds of living organisms - including humans - most of which have been published in international, peer reviewed scientific journals.

Of particular concern is the way in which this radiation non-thermally affects brain function - specifically, its electrical activity (EEG), its electro-chemistry, and the blood/ brain barrier - and degrades the immune system. For these non-thermal influences are of a kind that are consistent with the nature of some of the adverse health reactions reported both by some users of mobile phones and by some people (involuntarily) exposed long-term to the radiation from Base-stations.

Thus, for example, the radiation is known to affect the dopamine-opiate system of the brain and to increase the permeability of the blood brain barrier (thereby facilitating the passage of chemical toxins into brain fluid), both of which are medically considered to underlie headache - one of the most persistently reported adverse health effects.

Similarly, the duration of REM sleep is shortened by exposure to radio-frequency radiation, whilst nocturnal secretion of melatonin is partly inhibited, both of which are consistent with reports of sleep disruption and concentration problems.

Furthermore, the possibility of deliberately provoking epileptic seizures in certain animals by exposing them to pulsed microwave radiation is consistent with reports of an increased incidence of seizures in some epileptic children when exposed to the emissions of GSM Base-stations. The latter finding is not at all unreasonable, given the known ability of a visible light (such as a stroboscope) flashing at a rate somewhere between 15-20 times per second to provoke seizures in the 5% minority of epileptics who are photosensitive. For visible light and microwaves are both simply different realisations of electromagnetic radiation, and the microwave radiation used in GSM and TETRA similarly 'flashes' (pulses) at rates that the brain is able to recognise; unlike visible light, however, pulsed microwaves are not reliant on the eye and optic nerve to access the brain, since they can penetrate the skull directly.

Another possible contributory factor to sleeping problems is the phenomenon of so-called 'microwave hearing', whereby people (even those who are clinically totally deaf) can discern buzzing/clicking sounds in their heads when exposed to low energy, pulsed microwaves.

It should be noted that although microwave radiation is non-ionising - i.e. does not have enough energy to break chemical bonds, particularly in DNA - it can, nevertheless, functionally interfere with the natural processes involved in DNA replication and repair, by subtly altering molecular conformation (architecture), for example; this could well account, respectively, for the reports of chromosome aberrations / micronuclei formation and for the increased amount of DNA fragmentation observed under irradiation.

Similarly, the finding that exposure to pulsed GSM radiation (of an intensity comparable to that realised during mobile phone use) promotes the development of cancer in mice that have been genetically engineered to have a predisposition to cancer is consistent with other studies showing an over-expression of heat shock proteins (HSPs) in both human and animal cells exposed to GSM radiation; for HSPs are known to inhibit natural programmed cell death (apoptosis), whereby cells that should have 'committed suicide' continue to live. Taken together, these various effects are, in turn, consistent with the 2-3-fold increase in the incidence of a rare form of cancer in the periphery of the human brain (where the radiation from the handset most easily penetrates) - the laterality of which correlates with that of handset use - which has been found in a recent epidemiological study in the USA.

It is important to appreciate that these and other findings pertaining to exposure to the emissions of GSM handsets are not irrelevant to the consideration of the effects of exposure to Base-station radiation, since the informational content of the latter is the same as that of the phone signals; indeed, the increasing number of disturbing reports of rather serious adverse health effects in animals (particularly cattle) exposed to GSM Base-station radiation could well be valuable warning portents that should not be ignored.

It is essential to appreciate, however, that because the possibility of non-thermal influences is dependent on the organism being alive, it necessarily follows that not everyone will be equally susceptible, even when exposed to exactly the same radiation - susceptibility depending not only on the radiation, but also on the genetic predisposition and physiological state of the individual when irradiated, such as the stability of electrical brain activity and the person's level of stress prior to exposure. Whilst this admittedly makes the occurrence of non-thermal effects more difficult to predict

(and hence to regulate against) than is the case with thermal effects, it does not mean that they can be safely ignored, or that they cannot provoke adverse health reactions in some people, the severity of which will again vary from person to person, according to the robustness of their immune systems. It is probably true to say that if the same degree of risk and uncertainty as to subjective noxiousness obtained in the case of a new drug or foodstuff, it is unlikely that they would ever be licensed.

Quite apart from their weaker immune systems, children are particularly vulnerable because of the increased rate at which their cells divide (making them more susceptible to genetic damage) and because their nervous system is still developing - the smaller size of their heads and their thinner skulls increasing the amount of radiation that they absorb. Particularly vulnerable to interference by the pulsed microwave radiation used in GSM is their electrical brain-wave activity, which does not settle into a stable pattern until puberty. The use of mobile phones by pre-adolescent children is thus to be strongly discouraged, and the siting of Base-station masts in the vicinity of schools and nurseries strongly resisted: financial gain must not be allowed to be the overriding consideration.

In connection with Base-station exposure, it must be appreciated that it is impossible to cite a unique 'safe distance'. The only meaningful approach, at present, is to require, in publicly accessible locations near a mast, that the intensity of the radiation should be below the level at which any adverse health effects have so far been reported; including an additional safety factor of 10, a maximum intensity limit of 10nW/cm² (= 10⁻⁴ W/m² - equivalent to 0.2V/m) is indicated. The precise distance from a mast at which this level is realised depends, however, on how powerful are the antennae, the orientations of the main beams and their 'side lobes' (subsidiary emissions that are much more localised in the immediate vicinity of a mast), and the local topography.

To cite the examples of radio and television transmission in an attempt to support the claim that exposure to the (much less intense) radiation used in mobile telephony is harmless is flawed on at least two accounts: (i) the occurrence, in any case, of certain health problems that correlate with exposure to the radiation from these installations, and (ii) the fact that, unlike the radiation used in GSM / TETRA installations, this radiation is not emitted in pulses, in patterns characterised by frequencies that the brain can recognise. Furthermore, before taking reassurance from an apparent absence of health problems amongst continental users of TETRA, it should be remembered that it is often the much less biologically active TETRAPOL (as opposed to TETRA) that is there used.

In conclusion, it can hardly be disputed that to enjoy an acceptable quality of life requires more than simply an absence of terminal disease. Adverse health effects in humans of the kinds already reported worldwide - such as headaches, sleep disruption, impairment of short-term memory, etc. - whilst maybe not life-threatening in themselves, do nevertheless have a debilitating effect that undoubtedly affects general well-being, and which in the case of some children could well undermine their neurological and academic development. It should, of course, be stressed that the apparent absence, to date, of more serious pathologies attributable to exposure to the emissions of GSM / TETRA Base-stations is no guarantee of immunity in the long-term. For exposure to this kind of radiation is still in its 'early days' in comparison to the much longer latency periods that are generally considered to characterise the kinds of cancers that could well be promoted or initiated in certain people, although it should be appreciated that existing latency estimates, based on experience under non-exposed conditions, are not necessarily relevant here.

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The Microwave Syndrome: A Preliminary Study in Spain

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Abstract

A health survey was carried out in Murcia, Spain, in the vicinity of a Cellular Phone Base Station working in DCS-1800 MHz. This survey contained health items related to "microwave sickness" or "RF syndrome". The microwave power density was measured at the respondents' homes. Statistical

analysis showed significant correlation between the declared severity of the symptoms and the measured power density. The separation of respondents into two different exposure groups also showed an increase of the declared severity in the group with the higher exposure.

Introduction

The hypothesis that radiofrequency (RF) exposure might produce health damage has been analyzed mainly from several epidemiological studies. Insomnia, cancer, leukemia in children, and brain tumors are the clinical entities more frequently described (Dolk et al., 1997; Hocking et al., 1996; Maskarinec et al., 1994; Minder and Pfluger, 2001; Selvin et al., 1992). Moreover, the clinical consequences of being exposed to microwave radiation such as radar has been evaluated from military and occupational studies (Balode, Garaj-Vrhovac, 1999; Goldsmith, 1997; Johnson-Liakouris, 1998; Robinette et al., 1980).

A specific symptomatology, linked to radar exposure at low levels of RF, has been termed "microwave sickness" or "RF syndrome." (Johnson-Liakouris, 1998) With few exceptions, functional disturbances of the central nervous system have been typically described as a kind of radiowave sickness, neurasthenic or asthenic syndrome. Symptoms and signs include headache, fatigue, irritability, loss of appetite, sleepiness, difficulties in concentration or memory, depression, and emotional instability. This clinical syndrome is generally reversible if RF exposure is discontinued.

Another frequently described manifestation is a set of labile functional cardiovascular changes including bradycardia, arterial hypertension, or hypotension (Johnson-Liakouris, 1998). This form of neurocirculatory asthenia is also attributed to nervous system influence. More serious but less frequent neurologic or neuropsychiatric disturbances have occasionally been described as a diencephalic syndrome (Johnson-Liakouris, 1998). All these disturbances following low level exposures (of the order of microwatts/cm²) have been reported for many years from Eastern Europe. The exposures have been mainly low level and long term (Goldsmith, 1997; Johnson-Liakouris, 1998).

Also, several articles have found biological dysfunction at very low density of radiation without temperature elevation, favoring the hypothesis of nonthermal biological effects and pointing to the probability of clinical dysfunction below the actual standard of safety norms in the European Union (Arber and Lin, 1985; Baranski, 1972; Byus et al., 1988; Daniells et al., 1998; de Pomerai et al., 2000; D'Inzeo et al., 1988; Dutta et al., 1989; Kues et al., 1992; Lai and Singh, 1995-1997; Lai et al., 1984, 1989; Malyapa et al., 1998; Sanders et al., 1985; Sarkar et al., 1994; Stagg et al., 1997; Wachtel et al., 1975).

Low levels of RF are found around the GSM-DCS cellular phone Base Stations (BS), where antennas are usually located on the roofs or in the top of tall towers. GSM-DCS cellular phones use pulsed microwaves. These signals have a spectral similarity to radar signals. The spectral power distribution of pulsed signals includes low frequency harmonics. Typical pulse duration time ranges from 100 msec to 0.050 µsec in radar, and 576.9 µsec for each slot of GSM-DCS.

From this point of view, the hypothesis of a "microwave sickness" in the neighborhood of the GSM-DCS Base Stations is analyzed in this study. The present analysis tries to evaluate if there is some statistical justification to the complaints and related dysfunction locally associated with RF exposure from the GSM-DCS Base Stations, as has been found in previous studies (Santini et al, 2001, 2002a&b).

Materials and Method

A local team, specially trained for this work, delivered the questionnaires in La Ñora, a town of Murcia in Spain during January 2001. This was always introduced to respondents as a part of a study to evaluate the impact on the area of the cellular phone Base Stations (GSM-DCS). In general, the people were quite prepared to cooperate (the ratio of returned to delivered was about 70%). The questionnaire was a Spanish language adaptation of the Santini publication (Santini et al., 2001). This was composed of 25 different items mainly concerning health information about the respondents.

The respondents scored and marked from 0 to 3 the presence of the suffered health dysfunction: 0 never, 1 sometimes, 2 often, 3 very often.

The asked symptoms were those described in earlier studies of the microwave syndrome: fatigue, irritability, headache, nausea, appetite loss, insomnia, depression, discomfort, difficulty in

concentration, memory loss, skin alterations, visual dysfunction, auditory dysfunction, dizziness, gait difficulty, and cardiovascular alterations.

Questions included demographic data: address, sex, and age, distance to the antennas (distance in meters to the Base Station), exposure time in days/weeks, hours/days, and time from the beginning of the emissions. The questionnaire also collected information about proximity to power lines, and the use of personal computer and cellular phone.

More than 5% of the population of La Ñora (around 1900 habitants) answered the questionnaire. Questionnaires from people with a history of deep psychological or neurological disease were excluded. Finally, 101 surveys were considered valid.

The survey was supplemented with electric field measurements, conducted February 24, 2001, and March 10, 2001 (Saturday). Measurements were carried out from 11:00 hr to 19:00 hr each day, in the bedrooms of each respondent. More measurements were carried out in the streets during working days and weekends, to check the possible variability in time of the measurements. The measurements were individually added to the survey of each respondent.

A portable broadband (1 MHz-3 GHz) electric field meter (EFM) was used. The EFM was hand-oriented in order to measure the maximum field strength above the bed. The electric field in each room presented a standing wave pattern because of reflection of the waves from the walls and metallic structures such as windows and metallic furniture.

Therefore the EFM was held around 1 m from the walls, 1.2 m above the ground, and was moved around a circle of 25 cm of radius, orienting the antenna to get the maximum electric field strength.

The EFM was calibrated in the anechoic chamber of the University of Valencia with a standard measurement set-up using a network analyzer HP-8510C.

To check the intensity of TV and radio channels, as well as the number of working channels of the GSM-DCS BS, measurements of the spectral power density were carried out with a probe antenna and a portable spectrum analyzer.

The TV and radio channels maintained their intensities during the measurements, but the cellular phone channels presented dramatic differences in amplitude from channel to channel, some of them going on and off the air at random times.

The probe was mounted on a linen phenolic tripod about 1.2 m above the ground. The location of the probe was the same on both days, on a hill next to the town, 20 m from the BS. With the spectrum analyzer we scanned the GSM and DCS bands, at the beginning of the journey, taking the average over a period of 6 min. The measurement of the spectrum was similar on both days, having a difference in the peak estimation (carriers of the channels) of about 1 dB.

Results

The respondents were 47% male and 53% female, with a wide age range: 15-25 years (22%), 26-35 years (22%), 36-45 years (19%), 46-55 years (11%), 56-65 years (13%), and over 65 years (13%).

The exposure time, explained as the time spent in the vicinity of the BS, was more than 6 hr per day, 7 days a week, for 95% of the respondents. The bedroom was where the electric field was measured.

Concerning the attitude of the respondents about the use of cellular phone: 24% of them declared themselves to be active users of mobile GSM-DCS phone for more than 20 min per day.

The measurements were very low compared with European safety guidelines 1999/519/EC DOCE 30/7/99 (1999/519/EC:). The Spanish legislation established a maximum limit of 450 $\mu\text{W}/\text{cm}^2$ at a single frequency (900 MHz), the same as the European safety guidelines 1999/519/EC DOCE 30/7/99. This is one of the characteristics of the present work: the low levels of RF exposures.

We divided the surveys into two groups: One group with high exposure, averaging 0.11 $\mu\text{W}/\text{cm}^2$, consisted of 47 respondents. These respondents declared themselves to be living less than 150 m from the BS. The second group, with an average exposure of 0.01 $\mu\text{W}/\text{cm}^2$, were at a distance greater than 250 m.

Although both groups were obviously at different distances from the BS, there was still the risk of a distance perception that could influence the survey.

Table 1 *[omitted from this reprint – ACTU]* shows the average declared severity in both groups.

A possible relationship between the declared severity of the symptom and the microwave power density was explored. A mathematical model with logarithmic dependence on the measured electric field (EFM) was used. The SPSS statistical package, with different regression methods, was used for this analysis. The results for the correlation coefficient and statistical significance are presented in Table 2. *[omitted from this reprint – ACTU]* Correlation coefficients were grouped in four sections: asthenic, diencephalic, sensorial, and cardiovascular symptoms.

Discussion

It is interesting to compare the severity of the reported symptoms between both groups of Table 1: more severe symptoms were reported in the first group. The first group (< 150 m from BS) was exposed to a mean EMF power density 10 times higher than the second group (> 250 m from BS). Asthenic syndrome was 42% higher in the first group, diencephalic syndrome was 55% higher in the first group, sensorial alterations were 25% higher in the first group, and cardiovascular alterations 55% higher as well.

However, the use of mobile phones was 30% in the first group and 17% in the second group. Use of the personal computer was 16% in the first group and 1% in the second group. Therefore, these differences could bias the health response. The use of the mobile cellular phone implies a considerably higher exposure of the head to microwaves during the phone call, roughly 5 mW/cm², 10,000 times higher than the maximum EMF exposure attributed to the BS. Moreover, the symptomatic response could be influenced by personal or human idiosyncrasy. The exposure to radiation from the computer screen occurs at extremely low frequencies and is under 0.3 μ T, at normal distances. It is therefore not considered significant, but will be the subject of a future work.

Results from Table 2 indicate the correlation between severity of the reported symptoms and the logarithm of the measured electric field (EFM) with $p < 0.001$. We find that discomfort (0.544), irritability (0.515), and appetite loss (0.485) are the most relevant symptoms correlated with exposure intensity. Others symptoms, fatigue (0.438), headache (0.413), difficulty in concentrating (0.469), and sleep disturbances (0.413), also show a significant correlation with exposure intensity. However, other symptoms such as auditory dysfunction, gait difficulty, and cardiovascular, have a lower correlation coefficient, but significant $p < 0.01$.

However, the most interesting aspect of our results is the significance of the dependence between both variables: The declared severity of the symptom and the logarithm of the measured electric field. Another interesting observation is that four of the highly correlated symptoms (Table 2) such as headache, sleep disturbances, concentration difficulty, and irritability also show the most relevant differences between both groups and the highest values in the clinical scale, 2.17, 1.94, 1.56, and 1.56 respectively (Table 1).

The validity and interpretation of the results of Tables 1 and 2 must be analyzed in the proper context, by comparison with results from other researchers, or with our results from previous similar surveys. Actually there are no studies similar to the presented in this communication. However, our work shows a similarity in procedure and results with previous surveys on noise annoyance. Results for the correlation coefficients (Table 2) are similar to those obtained in previous social surveys on noise annoyance, where the maximum correlation coefficient was around 0.35 (Schultz, 1978).

If there is a casual relationship between severity of the symptoms and the measured electric field, it may be that the logarithmic approach is still too approximate, and a more elaborate model would be convenient. The logarithmic model is extended in the analysis of noise annoyance, since the devices used in noise measurements use logarithmic scales (dBA). Moreover, the used measurement was a spatial-point, timepoint, measurement. This would most likely be an improvement in correlation for EMF average levels during days or weeks. However, the existence of appropriate instrumentation is a limitation.

It is worth pointing out that noise is a recognized environmental pollutant, and the social surveys on noise annoyance address its subjective response. Although noise is perceived by the senses, the same is not true for the electromagnetic field. Therefore biasing is less likely in the present study, and the results are probably more objective than in the surveys on noise annoyance.

Trying to find comparisons between our results and previous work, we can claim a strong similarity with the Lilienfeld study (Johnson-Liakouris, 1998), which showed a dose-response relationship between various neurological symptoms and microwave exposure. These symptoms were grouped under the name "microwave syndrome" or "radiofrequency radiation sickness."

The present results demonstrate a significant correlation between several symptoms of what is called microwave sickness and the microwave power density associated with the Base Station located on a hill at the edge of the town. The severity of the symptoms weakens for people who live far away, at a distance greater than 250 m from the main EMF source and at a power density lower than 0.1 $\mu\text{W}/\text{cm}^2$. As there is a significant difference between both groups in terms of the irradiated power density, a hypothetical relationship between the DCS emission and the severity of symptoms may exist.

There is a large and coherent body of evidence of biological mechanisms that support the conclusion of a plausible, logical, and causal relationship between RF exposure and neurological disease. Hence it is possible that cell sites are causing adverse health effects. Public health surveys of people living in the vicinity of cell site BSs should be carried out immediately, and continued over the next 2 decades. Prompt effects such as miscarriage, cardiac disruption, sleep disturbance, and chronic fatigue could well be early indicators of adverse health effects.

This is the first social survey concerning the microwave syndrome carried out in Spain, and is a preliminary study. Future surveys in another geographical locations are underway. More research and comparison of statistical results from different areas would be useful.

At present, the electromagnetic/microwave power density is not a recognized environmental pollutant. The reported results are obtained from one of the first social surveys on the health of the population living in the vicinity of a Base Station of GSM-DCS cellular phone.

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Power Line Facts Update

1) Recent Developments: The California Department of Health Sciences has delayed to August the final release of its Evaluation. The draft Evaluation concluded that magnetic fields likely cause childhood and adult leukemia, adult brain cancer, spontaneous abortions, and ALS. The draft Evaluation further concludes that magnetic fields possibly cause childhood brain cancer, female and male breast cancer, Alzheimers disease, suicide, and heart problems.

2) The City of Sunfish Lake denied Xcel Energy's application for a permit to build a transmission line through the city. The basis for this denial was the City's judgment that the line would endanger health and would reduce property values. Unfortunately, a Minnesota District Court overturned the Council's decision on the grounds it was arbitrary and capricious. The Power Line Task Force is appealing the court decision, and the PLTF's attorney thinks there is a good chance for a favorable result.

Information on this and many other new developments is available on the PLTF website, www.powerlinefacts.com

Adult and childhood leukemia near a high-power radio station in Rome

Date:2002-08-13

Some recent epidemiologic studies suggest an association between lymphatic and hematopoietic cancers and residential exposure to high-frequency electromagnetic fields (100 kHz to 300 GHz) generated by radio and television transmitters. Vatican Radio is a very powerful station located in a northern suburb of Rome, Italy. In the 10-km area around the station, with 49,656 residents (in 1991), leukemia mortality among adults (aged >14 years; 40 cases) in 1987-1998 and childhood leukemia incidence (eight cases) in 1987-1999 were evaluated. The risk of childhood leukemia was higher than expected for the distance up to 6 km from the radio station, and there was a significant decline in risk with increasing distance both for male mortality and for childhood leukemia. The study has limitations because of the small number of cases and the lack of exposure data.

Although the study adds evidence of an excess of leukemia in a population living near high-power radio transmitters, no causal implication can be drawn. There is still insufficient scientific knowledge, and new epidemiologic studies are needed to clarify a possible leukemogenic effect of residential exposure to radio frequency radiation.

Authors P Michelozzi, A Capon, U Kirchmayer, F Forastiere, A Biggeri, A Barca, CA Perucci
Full source American Journal of Epidemiology, 2002, Vol 155, Iss 12, pp 1096-1103

Melanoma incidence and frequency modulation (FM) broadcasting

Date:2002-08-13

The incidence of melanoma has been increasing steadily in many countries since 1960, but the underlying mechanism causing this increase remains elusive. The incidence of melanoma has been linked to the distance to frequency modulation (FM) broadcasting towers. In the current study, the authors sought to determine if there was also a related link on a larger scale for entire countries. The exposure-time-specific incidence from all 4 countries became almost identical, and they were approximately equal to the reported age-specific incidence of melanoma. A correlation between melanoma incidence and the number of locally receivable FM transmitters was found. The authors concluded that melanoma is associated with exposure to FM broadcasting.

Authors O Hallberg, O Johansson

Full source Archives of Environmental Health, 2002, Vol 57, Iss 1, pp 32-40

Monday October 7 2002

Hydro lines increase cancer risk: U.S. study

Appliances also a hazard: Canadian experts say evidence is still inconclusive

Tom Arnold National Post, with files from news services

Hydro transmission lines are emitters of electromagnetic fields that a California report links to disease in humans.

Overhead power lines and household electrical appliances very likely increase the risk of developing cancer, according to preliminary findings from an eight-year study into the health effects of electromagnetic fields.

The California study, considered the largest project examining the effects of electromagnetic fields (EMFs) on health, suggests hundreds of thousands of people, particularly children, are at risk from life-threatening illnesses linked to the emissions. Pregnant women are also at greater risk of miscarriage.

The latest findings were commissioned by the California Public Utilities Commission, which is expected to publish the full report within several months. Scientists also reviewed a large number of previous studies from around the world and carried out new research in the San Francisco area.

The researchers said their findings show EMFs increase the risks of life-threatening illnesses, including childhood leukemia, adult brain cancer and amyotrophic lateral sclerosis, a degenerative disease that attacks nerve cells in the brain and spinal cord.

"People have a right to be warned, but whether a major effort to reduce EMFs is appropriate must still be decided," said Vincent DePizzo, a senior member of the research team from the California Department of Health Services.

Fergal Nolan, president of the Radiation Safety Institute of Canada, a national independent safety group, said: "So far, the information that's been available says the evidence is inconclusive. Assertions have come out and have said EMFs have been causing cancers, but no reliable scientific evidence has come out to date to support that."

"This may tip the balance, I don't know yet," said Tony Muc, president and chief physicist with Canadian-based Radiation Health and Safety Consulting.

The findings could be "as significant as conclusions about smoking and lung cancer," he said. "Now the evidence is strong [on tobacco-related cancer] despite the early debates decades ago whether or not smoking was harmful."

However, Mr. Muc, who has studied the issue for 30 years, said: "I am in the camp that would still say, pending a further look at this particular study, that it remains inconclusive."

Mr. Muc taught non-ionizing radiation with an emphasis on environmental health and safety issues at the University of Toronto for more than 20 years.

Neither specialist would comment on the specific findings because they have not reviewed the research and its methodology.

"If the study comes out and shows conclusively that EMF exposure from power lines and home appliances, your ovens and clothing irons and kettles, cause cancer, well, that is a very serious matter," Mr. Nolan said. "Certainly, it would be significant."

"All you have to do is look out the window and see there are power lines everywhere," he added. "If one is exposed to EMF from all kinds of sources in common use, that is obviously a serious matter. It would become a public health issue."

Regardless of conflicting findings, governments, communities and individuals across the country have taken some precautions. In some cities, power lines running along or over highways and residential areas now are carried by much higher poles. A more costly option, removing them from the air and placing them underground, has been considered but the option is very costly.

"There appears to be a lot of concern in the public and the workplace about this, to the extent when a power line or a cellphone tower are proposed near neighbourhoods [people don't want them there]," Mr. Nolan said.

In 1994, a major study involving 223,000 men who worked at electric utilities in Ontario, Quebec and France linked exposure to magnetic fields to elevated rates of leukemia. It reviewed the cancer experience of workers employed at Ontario Hydro, Hydro-Quebec and Electricité de France from 1970 to 1989. Over the study period, the men developed 4,151 cases of cancer, of which 140 were leukemia and 108 were brain cancers.

It found those exposed to above-average magnetic fields had leukemia rates as much as three times the level of those exposed to weaker fields. It also found the incidence of brain cancer among workers exposed to the most intense magnetic fields was 12 times that of those exposed to weaker fields, but the result was considered inconclusive because of the small number of cases involved.

The latest findings could prompt a string of lawsuits against power companies or domestic appliance manufacturers.

In Britain, Ray and Denise Studholme believe their son Simon would still be alive if he had not been subjected to a strong electromagnetic field in his bedroom.

The boy slept in a room where his head was less than one metre from an electricity meter and a burglar alarm in a hall cupboard. According to the family, tests after their son's death revealed the two appliances gave off an EMF more than six times the recommended safe limit.

Simon was diagnosed with leukemia in November, 1990. He died in September, 1992, aged 13. The family hopes to use the study's findings to launch a case against their electricity supplier.

"If I had known about the electromagnetic fields, Simon would not have been sleeping there," Mr. Studholme said. "Within six months of moving here, he used to get up in the morning complaining of headaches and feeling light-headed."
tarnold@nationalpost.com

http://www.ananova.com/news/story/sm_631332.html?menu

Police say new digital handsets are making them ill

Police are blaming their new radios for migraines, sleeplessness and problems concentrating. Nearly 200 officers have taken time off ill, blaming the Airwave handsets they're testing in a pilot scheme.

The digital sets are due to be introduced nationwide by 2005 under a £2.9billion programme.

Those affected include 173 officers in Lancashire and another 20 in North Yorkshire.

According to The Sun, the Home Office has agreed to health checks.

Steve Edwards, chairman of the Lancashire Branch of the Police Federation, said: "It is worrying that so many officers believe they are suffering symptoms because of Airwave use. Nobody is saying these radios are unsafe but we are being used as guinea pigs."

The Airwave radios, made by Motorola, use technology known as Tetra to offer improved sound quality and security. But some scientists are concerned that they pulse at 17.6Hz - close to the 16Hz at which brain signals operate.

Alasdair Philips, of consumer group Powerwatch, said: "I believe these new radios are dangerous. Previous studies have shown Tetra-like pulses put brain cells under stress."

A Home Office spokeswoman said: "We are taking a precautionary approach and have had advice from independent experts."

Story filed: 08:17 Thursday 18th July 2002

<http://www.ehn-online.com/cgi-bin/news/news1/EpuyAVEZEukSQsrsAp.html>

Tetra masts raise anxiety levels

Stuart Spear, Thursday, March 6 2003

EHN has learnt that the mobile phone company O2 Airwaves is submitting planning applications to erect new masts for a controversial new police communication system next to schools, amid mounting public health fears over the network.

Some independent experts are warning that the terrestrial trunk radio network, or Tetra, which the police hope to have rolled out by 2005, is a potential health risk to police officers using the system and to people living or working near the masts. Campaign groups are claiming that, by siting masts near schools, there is a risk that childrens decision-making and learning capabilities may be impaired, as well as increasing stress levels.

Health fears centre on the rate at which the system pulses radiation, at 17.6Hz a second, which is close to the 16Hz that brainwaves operate at. The health risks are thought to be greatest from the hand sets. Some police using them have reported migraine, a burning sensation, sleeplessness, and a lack of concentration during trials in Lancashire and Yorkshire. But experts believe proximity to the base station is also a health risk despite the 17.6Hz pulse being far weaker.

Lynne Edmunds, Tetra co-ordinator for the campaign group Mast Action UK, believes that in parts of Gloucestershire, where police hope to have the system in place by June, Tetra masts are being erected every 5km.

They are putting in applications to erect masts on everything and anything, said Ms Edmunds. One of the ones we are fighting the hardest is less than 90 metres from the Stroud Valley primary school, in a densely populated area, while another is in the little town of Dursley, again near to houses, shops, churches with play groups, and housing for older people.

Campaigners are fighting four court actions in Gloucestershire to have masts removed from sites they believe to be potentially dangerous to health.

EHN has also learnt of a planning application to erect a Tetra base station within metres of Fairlawn primary school in south-east London as part of the Metropolitan polices Tetra network. Campaigners fear that more schools may face a similar fate as the government has failed to make public the location of new Tetra sites on security grounds. This is despite a recommendation by Sir William Stewart, in his report on mobile phone safety, that all base stations and their emissions should be recorded on a national database.

Dr Grahame Blackwell, an independent scientific expert on Tetra, told EHN he was horrified at the thought of Tetra being sited by schools as it could pose a serious health risk.

Echoing this view, Barry Trower, the author of an independent report commissioned by the Police Federation into the health effects of Tetra, published last year, said: I would expect that, if you put a mast near to a school, it will affect the childrens decision-making processes and their learning capabilities. Also, if a child is stressed in school from bullying or exams, it will become exaggerated because the Tetra frequency interferes with the brains beta rhythm.

The Stewart inquiry also raised concerns about the 17.6Hz transmission pulse used by Tetra. The report concluded as a precautionary measure, amplitude modulation around 16Hz should be avoided, if possible, in future development signal coding.

An O2 Airwaves spokesperson said: The guidelines for emissions are set by independent organisations like the National Radiological Protection Board at a precautionary level and we, as a commercial organisation, adhere to these guidelines. Our mast siting policy is to try to be as sensitive as we can but inevitably some of the Airwaves masts will be sited near schools because of the geographical coverage we need to provide for the police.

<http://www.telegraph.co.uk/news/main.jhtml?xml=%2Fnews%2F2003%2F04%2F25%2Fnmast25.xml>

The Telegraph U.K.

Mobile mast 'spreading cancer'

By Nick Britten (Filed: 25/04/2003)

Residents of a hamlet near a mobile telephone mast have recorded high levels of illness, including seven cases of cancer, raising fresh concerns over the safety of the transmitters.

Among the 50 people living in Wishaw, Warwicks, 34 people have reported medical complaints in the past two years. Five women have been diagnosed with breast cancer and two men have been told they have tumours. All live within a mile of the mast.

Regular complaints include sleeplessness, skin irritation and problems with the immune system.

Now an application has been submitted to build another transmitter next to Wishaw. The Government says mobile telephone masts are no threat to public health.

The mast, erected nine years ago and used by T-Mobile, is in a field among the hamlet's 25 houses, valued at £350,000 to £700,000.

Eileen O'Connor, 39, has had surgery twice in 18 months for breast cancer and hopes to recover fully. "Like all the others, I have no history of it in my family and I wondered where it had come from. Six months into my treatment, I heard of an application from another company to use the mast and suddenly the penny dropped. I wrote to all the neighbours and suddenly everyone started coming forward."

Mrs O'Connor, whose house is 300 yards from the mast in Bulls Lane, gave up running a successful photographic business with her husband, Paul, to concentrate on research and campaigning. "My 11-year-old daughter saw me having tests and was in tears, worrying that she was going to get cancer and die. It was horrible.

"This is destroying us and financially crippling us but I have spent a year researching and have uncovered over 1,000 pieces of research going back to the First World War. I have spoken to untold numbers of scientists and experts and I am in no doubt the mast is to blame."

The family has spent £6,000 campaigning and is spending a further £2,500 on copper nets, to be used like mosquito nets over their beds, deflecting the microwaves.

The Wishaw Action Group has merged with other local groups to form Sutton Coldfield Against Masts (Scam) and lodged papers with solicitors to sue T-Mobile and Crown Castle, the owners of the land on which the mast stands. Both deny any connection and say they act within Government guidelines.

The application for a new mast involves a Tetra system, to be used by the emergency services. The system was due to be introduced in the West Country but has been delayed by public fears on safety.

Gerard Hyland, Associate Fellow of Physics at Warwick University, said: "No research has been undertaken into the Tetra system and its safety and people are being used as guinea pigs. Their fears [about masts] are not unfounded."

T-Mobile's spokesman said: "T-Mobile, with Crown Castle, the site provider, have met with residents in Wishaw on numerous occasions to discuss the installation in Bulls Lane. In July last year, an independent survey undertaken by Alasdair Philips, of Powerwatch [an anti-mast lobby group], showed the levels of signal were well below international safety guidelines recognised by the World Health Organisation.

"With representatives of the residents we also looked at alternative sites in the area but they proved to be unsuitable. T-Mobile is satisfied that the site meets with national and international guidelines, is safe and does not present a health risk to any member of the public."

<http://news.bbc.co.uk/1/hi/sci/tech/2977778.stm>

10 June 2003

Fresh debate over pylon cancer risk

UK research has cast further doubt on claims of a link between overhead power lines and childhood leukaemia.

Some scientists say strong magnetic fields in homes near high-voltage cables may increase the risk of cancer. They believe electromagnetic fields from power lines or household appliances may impair the body's ability to fight disease.

But the theory has been dismissed by researchers at the National Radiological Protection Board (NRPB) in Oxfordshire. They say they have failed to find evidence to support it in laboratory experiments.

"Some studies in the past have thrown up evidence of a weak link between unusually strong magnetic fields experienced in some homes, and leukaemia in children," said lead researcher Dr David Lloyd.

"We tried to produce this effect in cells in the lab, but couldn't find it even using magnetic fields stronger than people would experience in everyday life."

Weak links

Large-scale studies looking at disease trends have found that there is no link between magnetic fields given off by overhead power lines or electrical appliances and most cases of childhood leukaemia.

"Studies show very clearly that the vast majority of children in the UK are not exposed to levels of electromagnetic radiation that would constitute any risk at all," said Dr Lesley Walker, of Cancer Research UK.

However, the NRPB, the UK Government's radiation watchdog, has admitted in the past that there is a "weak association" between electromagnetic fields and increased risk of childhood leukaemia.

In homes with prolonged exposure to unusually strong magnetic fields – 0.5% of those in the UK – there may be a slight increased risk of the disease. Researchers have been unable to explain why this might be the case.

"Studies like ours have failed to uncover a pathway by which magnetic fields could cause childhood leukaemia – and it's looking probable that none exists," said Dr Lloyd.

Radiation

This position is disputed by some scientists, including Professor Denis Henshaw of Bristol University. He questions the conclusions of the latest study, published in the British Journal of Cancer.

"Country studies have not had enough statistical power to see an increase of childhood leukaemia near power lines," he told BBC News Online.

"The pooled analysis of country studies has clearly shown a doubling of child leukaemia at levels well below what you get under power lines."

He believes melatonin plays a role in protecting the body against damage that can lead to leukaemia and may be disrupted by strong magnetic fields.

"The study carried out by Dr Lloyd and colleagues did not involve melatonin," said Professor Henshaw. "Therefore, while publication of this study is to be welcomed, failure to observe an effect of magnetic fields on these cells may be unsurprising."

The latest study used blood cells from a donor to test the effect of magnetic fields on the normal repair process.

The researchers blasted cells with radiation to create the sort of damage that leads to cancer. They found that the cells repaired themselves naturally, even if they were exposed to stronger magnetic fields than those found in British homes.

Health of people living near mobile phone base stations

August 2002

Elsevier's French journal entitled *Pathologie Biologie* has published the study by Roger Santini et al. on the health of people living near mobile phone base stations. It is the first published study looking at exposures from mobile phone base station antennas. The link below takes you to the English translation of the complete study: "Study of the health of people living in the vicinity of mobile phone base stations: I. Influences of distance and sex."

http://www.emrnetwork.org/research/santini_pathbio_eng.pdf

<http://www.newscientist.com/news/news.jsp?id=ns99994225>

3G base stations may cause headaches

Duncan Graham-Rowe 02 October 03 NewScientist.com news service

Exposure to radio signals from 3G cellphone base stations can cause headaches and nausea, finds new work from a Dutch research organisation. However, both independent and industry experts are sceptical about the results and the researchers themselves admit surprise at their findings.

The government-backed research is the first to compare how current GSM phone signals and next generation, or 3G, signals may affect cognitive functions. The study involved exposing two sets of 36 volunteers to signals simulating those from base stations. One group consisted of people who had previously reported feeling effects from base stations, while the other group had no history of complaint.

In both groups, they found a significant relationship between exposure to the 3G signal and detrimental effects on general "well-being", characterised by feelings of nausea, tingling and headaches. No such relationships were found for GSM exposure. Both 3G and GSM signals affected cognitive functions in some cases, including reaction times, memory and alertness.

Peter Zwamborn, who led the TNO team that produced the report, says he cannot explain the effect but adds that the findings have forced him to re-evaluate his view of cellphones. "Now I see that electromagnetic fields do something to humans, but what bothers me is that I cannot understand it," he told *New Scientist*.

The GSM Association, which represents mobile phone operators, says it welcomes such studies and acknowledges that the effects are statistically significant. But it adds in a statement: "As the effects are small, it is unclear whether they have any health significance."

Too low

Alan Preece at the University of Bristol, UK, who has also studied the cognitive effects of mobile phones, is unconvinced by the work: "On the face of it, it seems incredibly unlikely."

He says the exposure levels are simply too low to expect an effect. There are also 3G base stations in operation in numerous places, so "lots of us are exposed to this sort of level - we should already be seeing a massive effect", he says.

Zwamborn says he can appreciate this view: "I didn't expect to find an effect with such a low exposure." One possible explanation is that the level used is the maximum found in normal circumstances. "Normally it's a 10 times lower," he says.

A spokeswoman for the Dutch Ministry of Economic Affairs, one of the three ministries that commissioned the research, told New Scientist that the government plans to take up the issue of base stations and human health with the European Commission.

http://www.reuters.com/locales/newsArticle.jsp?type=technologyNews&locale=en_IN&storyID=3534399

30 Sep 2003 20:05

3G mobile signals can cause nausea, headache - study

AMSTERDAM (Reuters) - Radio signals for the next generation of mobile phone services can cause headaches and nausea, according to a study conducted by three Dutch ministries.

The study, the first of its kind, compared the impact of radiation from base stations used for the current mobile telephone network with that of base stations for new third generation (3G) networks for fast data transfer, which will enable services such as video conferencing on a mobile device.

A base station, which usually covers a "cell" area of several square kilometers (miles), transmits signals to mobile phones with an electromagnetic field.

"If the test group was exposed to third generation base station signals there was a significant impact ... They felt tingling sensations, got headaches and felt nauseous," a spokeswoman for the Dutch Economics Ministry said.

There was no negative impact from signals for current mobile networks.

However, cognitive functions such as memory and response times were boosted by both 3G signals and the current signals, the study found. It said people became more alert when they were exposed to both.

Government ministers responsible for Economic Affairs, Health and Telecommunications said follow-up research was needed to confirm the findings as well as to look at any longer-term health effects and biological causes. They will also discuss the study with the European Commission, the spokeswoman said.

The double-blind laboratory tests -- meaning no one in the survey knew if a 3G-like base station was actually transmitting signals -- exposed test subjects to expected levels of average radiation for 3G networks when they become commercial.

The GSM Association, a global organization of mobile telecommunications operators, said it was studying the report and could not comment.

The study, conducted by the Dutch technological research institute TNO, was the first to look for an impact of mobile telephones on well-being. It was also the first study to find a statistically significant negative impact from 3G base stations.

Previous research on a negative health impact of mobile phones, mostly second-generation, has been inconclusive. Existing research gives no scientific evidence that second-generation phones cause brain tumors, while a long-term study by the International Agency on Research on Cancer is not expected to yield results before 2004.

Previous research did find an impact on cognitive functions, which was also found in the Dutch survey. But TNO noted that earlier studies always measured the impact of cellphones held close to the head, causing high fields of radiation close to the ear and warming of the brain.

TNO's study used lower a dose of radiation to mimic base station signals rather than handsets. Handsets emit stronger radiation when they are used, while base stations transmit more constant levels of radio signals, exposing everyone within range.

TNO study: http://www.tno.nl/en/news/article_6265.html

Dutch Government Study Finds Non-Thermal Effects from Exposure to Mobile Telecommunications Antennas

Background Behind the Headlines

In late September 2003 the Netherlands Ministries of Economic Affairs, Housing, Spatial Planning and the Environment, and Health, Welfare and Sport released the results of a study of the effects on human well being and cognition from exposure to low-intensity radiofrequency/microwave (RF/MW) radiation. **The study outline characterizes the strength of the applied RF/MW fields (maximum 1V/m) as comparable to the field strength that the Netherlands Organization for Applied Scientific Research (TNO) has measured at the base of antenna towers, on rooftops, and to the maximum field strengths measured by TNO in people's homes.**

Statements in the conclusion section of the study include (emphasis added):

From our research it is concluded that our hypotheses to find no causal relation between the presence of RF-fields and the measured parameters is rejected. We have found a statistically significant relation between UMTS-like fields with a field strength of 1 V/m and the Well Being . . . It is noted that the World Health Organization (WHO) definition of health reads as "a state of complete physical, mental and social well being and not merely the absence of disease or infirmity." Within this WHO definition, the perceived Well Being is part of health. . . . The results are unlikely to be attributed to statistical noise . . . Note that each exposure frequency is associated with changes in some tasks or parameters, while other frequencies are not . . . In literature, it is speculated that the effects on the cognitive parameters may be explained by an unknown mechanism induced by thermal effects. In our study, it is shown that the thermal effects are negligible and therefore, an explanation based on thermal effects seems highly unlikely for effects on the cognitive parameters.

Currently the RF/MW exposure limits in The Netherlands endorse guidelines similar to those recommended by the International Council on Non-Ionizing Radiation Protection (ICNIRP). These guidelines allow exposures of up to **49V/M for the 900 MHz frequency range and 61 V/M for 1800 MHz frequency range. In the United States the exposure limits allowed by the Federal Communications Commission (FCC) are 47 V/m and 61 V/m at those frequencies respectively.**

Two articles from the journal *Microwave News - A Report on Non-Ionizing Radiation* give much-needed context to the findings of this Dutch government study entitled: "Electromagnetic fields generated by mobile telecommunication antennas can have effects on well-being."

Here, by permission of the publisher, is the pertinent text of those articles (emphasis added):

From the November/December 2000 issue, p.3, article entitled "Dutch Panel Advises Against Precautionary Limits for Towers:"

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

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

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

From the May/June 2003 issue, p. 3, "The Talk of Dublin" an article reporting on the May 2003 COST 281 Workshop: *Mobile Phone Base Stations and Health*, held in Dublin, Ireland:

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 1997. (ICNIRP allows exposures of up to 61 V/m at 2000 MHz.) Results are due this summer. "My expectation is that we will not see anything," van Rongen said.

The EMR Policy Institute, P.O. Box 117, Marshfield VT 05658 www.emrpolicy.org

http://heraldsun.news.com.au/common/story_page/0,5478,7442191%255E11869,00.html

Mobiles lacking radiation research

3 October 2003

THE head of the Australian Centre for Radio Frequency Bioeffects Research, Professor Irena Cosic, said Australia was lacking in research into 3G phones because they were so new here. However, she said they operated on a higher frequency than traditional mobiles, which should theoretically make it more difficult for radiation to penetrate the brain and body.

The centre intended to follow up Dutch research, she said.

The Dutch study raised concerns about the safety of antennas for new generation high-speed video phones after finding they can cause headaches and nausea.

About 50,000 Australians have a 3G phone following telco Hutchison Orange's launch in April.

Hutchison has about 1600 antennas, or base stations, all in city areas of Sydney, Melbourne, Brisbane, Adelaide, Perth and the Gold Coast.

A study by the Dutch government and technological research institute TNO compared radiation from base stations for the current mobile phone network with base stations for 3G networks.

"If the test group was exposed to third-generation base station signals there was a significant impact," the Dutch Economics Ministry said.

"They felt tingling sensations, got headaches and felt nauseous."

Dr Colin Roy, director of the non-ionising radiation branch of the Australian Radiation Protection and Nuclear Safety Agency, said the study was credible but needed replication.

He said radiation from transmitters was generally low and well within Australian safety standards.

Mobile phone exposure, while not the subject of the study, was much higher, he said. "Phones actually do give the same sort of radiation but at a much higher level and much closer to the standard."

"Because of the nature of the networks the emissions from the 3G towers are even lower than the current digital ones."

"But what we're talking about here specifically is the tower, and of course that exposure occurs whether you have a mobile phone or not."

Australia's mobile industry said there was no substantive evidence mobiles caused headaches.

The executive director of the Mobile Carriers Forum, Tanya Stoianoff, also noted advice from the World Health Organisation that said no recent reviews had concluded exposure to radio frequency fields from mobile phones and their base stations caused adverse health consequences.

A spokeswoman for Hutchison said the company did not wish to comment. - AP

Mobile Phone Tower Regulation Should Be Obligatory, Not Voluntary

The Australian Democrats today called for an urgent Government response to the new Dutch study that shows health effects from the radio signals from transmission towers for the next generation of mobile phone services. When the test group was exposed to 3G base station signals, they felt tingling sensations, got headaches and felt nauseous.

Democrats' Communications spokesperson Senator John Cherry and Health spokesperson Senator Lyn Allison, said no Australian research has been done on the new 3G technology. Base stations have a shorter range, meaning substantially more towers are needed to achieve the same reach as GSM technology.

Senator Allison said, "The Government relaxed emission standards to suit 3G mobiles without any scientific justification and now it seems these transmitters pose significant health risks."

Senator Allison chaired a 2001 Senate Inquiry into the effects of electromagnetic radiation and opposed the 'low impact' provisions in the Government's 1997 legislation, which left telecommunications carriers with extraordinary powers to commandeer buildings and sites for their roll-outs.

Senator Cherry called for a halt to the 3G roll-out until Government agency, ARPANSA has provided a response to the Dutch study.

"Before the roll-out gets underway, Australians need to be assured that it is safe, particularly for children and those who are involuntarily exposed to transmitters.

"While the recent ACIF Code requires a carrier to have regard to community sensitive sites for smaller installations, it does not go far enough in terms of requiring carriers to consider alternatives to minimise the radiation risk to the public," Senator Cherry added.

Last month the Democrats moved in the Senate an amendment to give the Australian Communications Authority the power to reject mobile phone towers being built near sensitive sites such as hospitals, schools and residential areas.

The Democrat amendment would give the ACA the power to reject absolutely the siting of mobile phone towers adjacent to sensitive sites without community approval.

The Democrats will be calling on the Government to support the Democrats amendment to the communications Bill no.1, when the Bill next goes through the House of Representatives and to strengthen the planning codes to take into account potential health risks.

http://www.democrats.org.au/news/index.htm?press_id=3018&display=1

<http://www.nytimes.com/2002/12/17/technology/17WIRE.html?todayshadlines>

Limits Sought on Wireless Internet Access

By JOHN MARKOFF

SAN FRANCISCO, Dec. 16 2002 - The Defense Department, arguing that an increasingly popular form of wireless Internet access could interfere with military radar, is seeking new limits on the technology, which is seen as a rare bright spot for the communications industry.

Industry executives, including representatives from Microsoft and Intel, met last week with Defense Department officials to try to stave off that effort, which includes a government proposal now before the global overseer of radio frequencies.

The military officials say the technical restrictions they are seeking are necessary for national security. Industry executives, however, say they would threaten expansion of technology like the so-called WiFi systems being used for wireless Internet in American airports, coffee shops, homes and offices.

WiFi use is increasingly heavy in major American metropolitan areas, and similar systems are becoming popular in Europe and Asia. As the technology is installed in millions of portable computers and in antennas in many areas, industry executives acknowledge that high-speed wireless Internet access will soon crowd the radio frequencies used by the military. But industry executives say new types of frequency spectrum sharing techniques could keep civilian users from interfering with radar systems.

The debate, which involves low-power radio emissions that the Defense Department says may jam as many as 10 types of radar systems in use by United States military forces, presents a thorny policy issue for the Bush administration.

"Nobody, including the Pentagon, doubts that this is important for consumers and industry," said Steven Price, deputy assistant secretary of defense for radio spectrum matters. "The problem comes when it degrades our military capabilities."

So far, though, there have been no reports of civilian wireless Internet use interfering with military radar, Edmond Thomas, chief of the office of engineering and technology for the Federal Communications Commission, said.

Industry executives say that military uses can coexist with the millions of smart wireless Internet devices that can sense the nearby use of military radar and automatically yield the right of way. These devices are in use in Europe and will soon be used in the United States.

But Pentagon officials say that the new digital technologies are unproven and could interfere with various types of military radar systems, whether ones used for tracking storms, monitoring aircraft or guiding missiles and other weapons. The Pentagon wants regulators to delay consideration of opening an additional swath of radio frequencies in the 5-gigahertz band that is eagerly sought by American technology companies and is already in civilian use internationally.

In this country, industry executives and some members of Congress see new spectrum-sharing technologies as a way to jump-start innovation and commerce. Last month, for example, Senator Barbara Boxer, a Democrat from California, and her Republican colleague Senator George Allen of Virginia, said that they would introduce a bill in the next session of Congress to expand the radio spectrum available for wireless Internet use.

An estimated 16 million WiFi-enabled computers and other devices are already in use in this country and overseas. And in the coming year, Intel plans to put currently designed WiFi technology on all of the microprocessor chips it ships for tens of millions of desktop, laptop and hand-held computing devices.

"This is a hugely important issue to Intel," said Peter Pitsch, Intel's communications policy director in Washington. "I'm hopeful at the end of the day, the U. S. government will accept a reasonable compromise."

The dispute may also foreshadow a coming battle over the airwaves as traditional broadcasters and communications businesses like cellular companies confront a dazzling array of new digital communications technologies that can potentially use the spectrum far more efficiently by permitting it to be shared by different types of users.

The roots of the dispute lie in an effort that began during the Clinton administration and which has continued at the Federal Communications Commission under the current administration, to permit civilian use of portions of the airwaves without licenses.

"The unlicensed spectrum is a hot-bed of entrepreneurial activity and one of the few bright spots in our high-tech economy," said Tom Kalil, the former deputy director of President Bill Clinton's National Economic Council and an early advocate of unlicensed spectrum of radio frequencies. The Bush administration, he said, "should be trying to increase the amount of spectrum for unlicensed devices, as opposed to imposing new, retroactive restrictions right as the market is taking off."

Earlier this month, the United States presented the Pentagon position at an international technical meeting in Geneva of the World Administrative Radio Conference, the body that oversees radio frequency allocations and standards.

European governments hotly disputed the United States position at the meeting, but it was nonetheless included as a footnote in the planning document that resulted. The issues will be confronted directly, and perhaps decided, in June at the World Administrative Radio Conference in Geneva.

Industry officials said that the Defense Department position had little chance of gaining international support. As a consequence, they said, the existing radio bands would probably become more congested, and the Pentagon would face even more sources of interference internationally.

There is a need for global coordination, executives acknowledge, but they say the Defense Department is going about it the wrong way. "The idea is to get the world on a single page, and Europe is way ahead of the U. S. in understanding these interference issues," said Rich Redelfs, president and chief executive of Atheros, a Silicon Valley maker of chips used for WiFi systems.

MOBILE PHONES

Feds to launch \$10 million investigation of cell phones, wireless technologies

By Nancy McVicar, Health Writer, <http://www.sun-sentinel.com>, November 16, 2003

More than 10 years after the safety of cellular telephones was called into question by the death of a Florida woman from a brain tumor, the federal government is preparing to launch a multimillion dollar investigation into potential cancer-causing or toxic effects associated with the phones.

When Susan Reynard, 33, of Madeira Beach died in 1992, 10 million people in this country were using cell phones. Today 150 million Americans, including children and teenagers, put the phones up against their heads every day, yet no government agency vouches they are safe.

With 1.5 billion people using wireless phones worldwide, and more devices such as personal computers rapidly switching to wireless technologies, getting answers to the health questions has become crucial.

Gary Brown, an adjunct professor in technologies at Nova Southeastern University, said people don't realize the issue of cell phone safety has not been settled.

"The industry says there's no problem and the public remains ignorant. Adults can do what they want, but where the issue becomes critical, is with children," Brown said.

The new federal research will follow up on studies that have been going on in 15 other countries around the world under a World Health Organization research agenda developed since the Reynard case prompted consumer worries.

At least one of those studies has caused concern that children and teens might be adversely affected.

Dr. Lief Salford, of Lund University in Sweden, who has called the evolution of wireless phones "the largest biological experiment in the history of the world," reported in June that cell phone radiation damaged neurons in the brains of young rats.

The study showed cells in the parts of rats' brains that control sensation, memory and movement died after being exposed to various cell phones at different levels of radiation for two hours.

"The situation of the growing brain might deserve special concern, since biological and maturational processes are particularly vulnerable," Salford said.

He cautioned that it is possible that after decades of daily use a whole generation of users may suffer negative effects as early as middle age. The paper was published in *Environmental Health Perspectives*, a U.S. National Institutes of Health journal.

Plans for the new federal research -- what will be studied, how the studies will be done, what types of animals will be used, and how they will be exposed to the radiation -- will be determined by the U.S. National Toxicology Program, a division of the National Institute of Environmental Health Sciences, part of the National Institutes of Health. The program will also get some guidance from the FDA and the National Institute of Standards and Technology.

Because of time it takes to plan such a project and seek proposals for carrying out the research, the work is not expected to get underway until 2005 and won't be completed for six to seven years.

Ron Melnick, a toxicologist and director of special programs at NTP, said at least \$10 million has been earmarked for the research initiative.

The U.S. Food and Drug Administration, which has health-related jurisdiction over the phones, but no money for research, recommended the NTP get involved, Melnick said.

"There's also been a fair bit of interest from the U.S. Congress about what the U.S. government is doing and why aren't we doing more," Melnick said.

U.S. Rep. Edward Markey, D-Mass., and Sen. Joseph Lieberman, D-Conn., both requested the U.S. General Accounting Office investigate the issue of cell phone safety. The GAO has produced two reports, one in 1994 and another in 2001, both calling for more research.

Wireless phones emit radio frequency radiation as they transmit a signal that can be picked up by a base station miles away. The radiation is called non-ionizing and is on the same part of the radio frequency spectrum as microwave ovens and radar. Some of the low-level radiation enters the user's head, and the concern is that such exposures might lead to health problems.

The United Kingdom and some other countries have issued cautions about cell phone use, particularly warning parents to limit the amount of time a child spends talking on the phones, because not enough is known about the effects of the radiation on developing brains.

The FDA and the Federal Communications Commission, agencies that both have some jurisdiction over the phones, have a joint Web site that says: "The available scientific evidence does not show that any health problems are associated with using wireless phones. There is no proof, however, that wireless phones are absolutely safe."

1993 Lawsuit

In January 1993, the South Florida Sun-Sentinel published a story about a lawsuit filed by David Reynard of Madeira Beach alleging that the cellular phone he bought his wife, Susan, caused or accelerated the growth of a brain tumor that took her life in May 1992. The story was picked up by other media, including CNN, and worries from the public caused wireless stocks to temporarily plummet.

The wireless industry at first said thousands of studies had proven emissions from the phones were safe, but when asked to produce them, said none or few had been done at cellular phone frequency levels.

The FDA issued an advisory recommending that people keep their calls short and saying "if there is a risk from these devices -- and at this point we don't know if there is -- it is probably small."

But an internal memo written in April 1993, by two scientists in the FDA's Center for Devices and Radiological Health shows the agency was concerned.

"There are a few reported experiments which bear directly on the question of cancer progression and chronic low-level exposures," said the memo co-authored by Mays Swicord, who now works for Motorola in Plantation.

"This small and incomplete database strongly suggests that under at least some circumstances these exposures do indeed accelerate the development of cancer by some unknown mechanism," said the memo obtained this year by Microwave News, a New York-based publication that has covered the industry for two decades.

The Cellular Telecommunications & Internet Association, the trade association that represents cell phone manufacturers and service providers, pledged in mid-1993 to pay for the necessary research to prove the phones cause no harm.

Jo-Anne Basile, vice president of the CTIA, said she could not provide a list of the studies paid for with the CTIA's \$25 million or their findings.

"It was completed in 1999, and there was some frustration in the fact that a number of the studies did not get published. The projects ended and they were never submitted for publication," Basile said.

Instead, she pointed to reviews of hundreds of studies done by scientists in other countries.

"To date they've found nothing to suggest there was any adverse health effects with cellular phones," Basile said, "but some said more research is needed before we can be definitive about this."

Critics say the CTIA's research agenda was ill conceived.

"[The industry] never funded the real work -- the blood-brain barrier work, the sleep work, the DNA breaks -- the things people were concerned about," said Louis Slesin, publisher of Microwave News.

"We still don't really know much. You can't say they're safe; you can't say they're not safe, but what we've learned certainly doesn't allow us to discount the risk," Slesin said.

Dr. George Carlo, an epidemiologist at The George Washington University, who was in charge of the industry's \$25 million research program, announced in 1999 at the conclusion of his contract that two studies showed a possible cancer risk and that more research should be done.

The industry agreed to pay for the follow-up studies, but that work, which is being monitored by the FDA, is not yet complete. Carlo could not be reached for comment.

Scientists in 1993

At the time of the Reynard case, many scientists dismissed any health risks by saying the phone emissions were not strong enough to heat tissue, and that heating was necessary to cause damage.

W. Ross Adey, distinguished professor of physiology at Loma Linda University School of Medicine in Loma Linda, Calif., said that attitude is changing, even among military researchers who are working on non-lethal microwave weapons that could alter consciousness by interfering with brain activity or be used to stun.

"In a report in 2002, they point out that old notions that we knew everything about microwave interactions with tissue based solely on heating is worthless, and we have to deal now with non-thermal effects," he said. "It involves a whole new area of science," said Adey, who has done research in the field for 40 years.

"Tissue has its own communication system, and that communication system allows cells to whisper together with a faint and private language that has not been realized until very recently," Adey said.

Cell phone radiation may interfere with that communication, he said.

Some animal and test-tube studies have found no ill effects from radio frequency radiation, but others have found evidence of breakage in DNA strands, sleep and memory problems, brain cell death or damage, leakage through the blood-brain barrier (nature's way of protecting brain tissue from toxins), and other problems.

Mays Swicord, now director of electromagnetic energy research at Motorola, one of the world's largest manufacturers of wireless products, who wrote the FDA memo in 1993 about possible dangers, says now there is no reason for concern.

"In the last 10 years, the world has spent \$200 million on this research," Swicord said. "To be considered valid, scientific studies must show the same or similar results when repeated by other researchers, and that has not happened."

Dr. Henry Lai, research professor of bioengineering at the University of Washington, who found DNA breaks in animals exposed to RF radiation, has done his own review of the research findings from around the world and has a different view.

"There are 172 studies up to today that I can find, and quite a lot of them, about half, found some kind of effects," Lai said.

"Some came up with very interesting data, including a series of studies by [Lennart] Hardell, of Sweden. He published several papers and found depending on which side you use the phone, there tends to be a higher rate of cancer on that side of the head," Lai said. "But some people think it's still too soon to see any cancer effects, because usually, brain tumors take many years."

Some brain tumors have a latency period of 10 to 20 years before they become large enough to cause symptoms.

Hardell published some of his findings in the *International Journal of Oncology* in February. He found a 30 percent greater risk of developing a brain tumor among people who had used cell phones, compared with a similar population of people who did not.

Studies looking for an increased incidence of cancers among cell phone users in this country found none, however. The studies were published in late 2000 and early 2001 in two prestigious medical journals, the *New England Journal of Medicine* and *JAMA*. The researchers said, however, that the studies did not answer questions about long-term use of the phones.

Reynard's lawsuit eventually was dismissed for lack of scientific evidence, and many similar cases during the past decade have met the same fate. To present scientific evidence in court requires that it be widely accepted in the scientific community, and so far there is no consensus.

Robert Kane, a former engineer with Motorola and author of a book called *Cellular Telephone Russian Roulette*, sued his employer after developing a brain tumor. He alleged the tumor was caused by exposures from a prototype phone he tested. His case also was dismissed.

"The issue really is what happens to a cell phone user 10 years from now. There are more than a billion people using these phones, and a fairly strong body of literature that says there could be a problem," Kane said.

"More testing has been done that indicates biological damage than with other products that have been removed from the marketplace," Kane said, "but this is an economy-driven society, and the device is not going to be taken out of the hands of the public."

Mobiles 'make you senile'

http://news.independent.co.uk/world/science_medical/story.jsp?story=443248

By Geoffrey Lean, Environment Editor, 14 September 2003

Mobile phones and the new wireless technology could cause a "whole generation" of today's teenagers to go senile in the prime of their lives, new research suggests.

The study - which warns specifically against "the intense use of mobile phones by youngsters" - comes as research on their health effects is being scaled down, due to industry pressure. It is likely to galvanise concern about the almost universal exposure to microwaves in Western countries, by revealing a new way in which they may seriously damage health.

Professor Leif Salford, who headed the research at Sweden's prestigious Lund University, says "the voluntary exposure of the brain to microwaves from hand-held mobile phones" is "the largest human biological experiment ever". And he is concerned that, as new wireless technology spreads, people may "drown in a sea of microwaves".

The study - financed by the Swedish Council for Work Life Research, and published by the US government's National Institute of Environmental Health Sciences - breaks new ground by looking at how low levels of microwaves cause proteins to leak across the blood-brain barrier.

Previous concerns about mobile phones have concentrated on the possibility that the devices may heat the brain, or cause cancer. But the heating is thought to be too minor to have an effect and hundreds of cancer studies have been inconclusive.

As a result, the US mobile phone industry has succeeded in cutting research into the health effects, and the World Health Organisation is unlikely to continue its studies. Mays Swicord, a scientific adviser to Motorola told New Scientist magazine that governments and industry should "stop wasting money" by looking for health damage.

But Professor Salford and his team have spent 15 years investigating a different threat. Their previous studies proved radiation could open the blood-brain barrier, allowing a protein called albumin to pass into the brain. Their latest work goes a step further, by showing the process is linked to serious brain damage.

Professor Salford said the long-term effects were not proven, and that it was possible the neurons would repair themselves in time. But, he said, neurons that would normally not become "senile" until people reached their 60s may now do so when they were in their 30s.

He says he deliberately refrained from publicising his work to avoid alarm, and acknowledges that mobile phones can save lives.

<http://news.bbc.co.uk/2/hi/health/2728149.stm>

BBC News, Wednesday, 5 February, 2003, 12:35 GMT

Mobile phones 'may trigger Alzheimer's'

Mobile phones damage key brain cells and could trigger the early onset of Alzheimer's disease, a study suggests.

Researchers in Sweden have found that radiation from mobile phone handsets damages areas of the brain associated with learning, memory and movement.

The study, which was carried out on rats, is the latest twist in the long-running debate over whether mobile phones are a health risk.

Scientists have yet to find any conclusive evidence that mobile phones damage the human brain.

This latest study was carried out by Professor Leif Salford and colleagues at Lund University in Malmo.

Lab tests

They experimented on rats aged between 12 and 26 weeks. Their brains are regarded as being in the same stage of development as teenagers.

The rats were exposed to two hours of radiation, equivalent to that emitted by mobile phones. Their brains were examined under a microscope 50 days later.

The researchers found that rats which had been exposed to medium and high levels of radiation had an abundance of dead brain cells.

Professor Salford said there was good reason to believe that mobile phones could have the same effect on humans.

"A rat's brain is very much the same as a human's. They have the same blood-brain barrier and neurons," he told BBC News Online. "We have good reason to believe that what happens in rat's brains also happens in humans."

Professor Salford said that there was also a chance exposure to mobile phone radiation could trigger Alzheimer's disease in some people.

"What we are saying is those neurons that are already prone to Alzheimer's disease may be stimulated earlier in life. However, this theory is hypothetical. We do not have evidence yet that the human brain is affected in this way."

The study is published in *Environmental Health Perspectives* – the journal of the US government's National Health Institute of Environmental Health Sciences.

Writing in the journal, the researchers concluded: "We cannot exclude that after some decades of often daily use, a whole generation of users may suffer negative effects maybe already in their middle age."

Further research

Professor Salford said mobile phone users should not be alarmed by the findings.

"This is a negative finding and yes it doesn't seem to be particularly good. But this is one observation, in one laboratory with a small number of animals. This study will have to be repeated before we get alarmed. Nevertheless, it is strong enough to merit more research into this area."

But he added: "Perhaps putting a mobile phone repeatedly to your head is something that might not be good in the long term. Maybe we should think about restricting our use of mobile phones."

A UK-government funded study, published three years ago, found no evidence to suggest mobile phones affect health.

However, the report by the Independent Expert Group on Mobile Phones recommended that teenagers should only make essential calls and that these should be as short as possible.

A spokeswoman for the Mobile Operators Association dismissed this latest study. She said: "Independent scientific review bodies in the UK and around the world have consistently concluded that the weight of scientific evidence to date suggests that exposure to radio waves from mobile phones operating within the international exposure guidelines do not cause health problems."

Sunday Age, July 6 2003

Centre to examine health risks of mobile phones

By Brendan Nicholson, Political Correspondent

RMIT will head a new national research centre to study possible health risks from mobile phones.

Health Minister Kay Patterson said the new Centre of Research Excellence in Electromagnetic Energy would receive \$2.5 million over five years, funded from a levy on telecommunications companies, administered by the National Health and Medical Research Council.

The research centre will use the internet to link researchers at RMIT, the Institute of Medical and Veterinary Science in South Australia, Monash University, Swinburne University of Technology and Telstra Research Laboratories.

This consortium will be headed by Professor Irena Cosic, from RMIT's school of electrical and computer engineering.

Senator Patterson said that while no one had conclusively established a health risk from the use of mobile phones, Australia's research effort in this area must be strengthened.

Co-chair of the research council's expert committee on electromagnetic energy Professor Judith Black said studies carried out around the world had produced little evidence of any harmful effects caused by mobile phones.

"The level of public anxiety and the potential for it to be a problem means we have to keep on the qui vive," she said. "We decided to boost our research capacity in this field and prepare us not just to handle the potential for harm from mobile phones but also whatever the next big thing is on the horizon in this area."

Professor Black said technology was changing all the time and medical research had to keep pace.

"Just because we show that the current technology mightn't have harmful biological or health effects doesn't mean that the next wave of technology will also be side-effect free," Professor Black said. "We have to keep ourselves up to speed constantly, constantly alert and constantly ready to fund it."

Professor Black said that it was possible that any harmful effect from using mobile phones might only show up over a long period of time. "It's something we just have to be vigilant about," she said.

The Centre of Research Excellence in Electromagnetic Energy will combine the efforts of engineers, epidemiologists, physicists, psychophysicists and veterinary pathologists.

PhD and post-doctoral students will be trained by six principal investigators to help them deal with "whatever comes up and bites us next".

Professor Black said the centre would not duplicate the studies already under way around the world examining whether head, neck or brain tumours could be caused by mobile phones but will concentrate on neurological effects in areas such as the memory and blood pressure.

<http://news.bbc.co.uk/2/hi/health/3394877.stm>

Mobile phones 'appear to be safe'

UK government scientists have given a cautious thumbs up to mobile phones and transmission masts. A report from the Advisory Group on Non-Ionising Radiation says there is no evidence they harm health.

However, the scientists said more research is needed before they can be absolutely certain there is no risk.

The report is based on a review of all of the scientific research into mobile phone safety published over the past three years.

More than 40m mobiles are in circulation in the UK. Many of these are used by children. In 2000, a report by the Independent Expert Group on Mobile Phones – the so-called Stewart Report – suggested that children should only use mobile phones in emergencies.

The recommendation was based on the theory that children could be more at risk from the radiowaves emitted by mobile phones. This is because their brains are still developing and their skulls are thinner, making it easier for the radiowaves to penetrate them.

The Stewart Report said there was no evidence mobile phones were harmful to adults. However, it recommended a "precautionary approach" until further research is carried out.

This latest report is the first major review of the scientific evidence on mobile phone safety by UK government scientists since 2000.

The advisory group said there was no reason to change the advice on mobile phones. It said "little has been published specifically on childhood exposures" in the past three years so the advice to children remained the same. Similarly, there was no new evidence to suggest adults were at risk.

"In aggregate, the research published since the IEGMP report does not give cause for concern," the report states.

More research

However, the scientists said further research is needed. "Mobile phones have only been in widespread use for a relatively short time. The possibility remains that there could be health effects," the report says. "Continued research is needed."

Professor Anthony Swerdlow, chairman of the advisory group, said the report is based on what is known at the moment and warned that the situation could change.

"It's hard to communicate degrees of uncertainty and it is often difficult to know how uncertain things are and what might be found in 10 years time," he said. "One cannot be absolutely sure what we will find in the future".

The report also dismissed fears about the safety of mobile phone base stations. It said exposure levels from base stations were extremely low and were unlikely to pose a health risk.

There are 30,000 mobile phone base stations dotted around Britain.

"Exposure levels from living near to mobile phone base stations are extremely low, and the overall evidence indicates that they are unlikely to pose a risk to health," the report said.

Mike Dolan, executive director of the Mobile Operators Association, welcomed the report. "The report clearly confirms the findings of the Stewart Report which concluded that the balance of evidence suggests that mobile phone technologies do not cause adverse health effects."

Doctors at University College London Hospitals NHS Trust are seeking volunteers to take part in a study to examine the effects of mobile phones on hearing and balance.

The advisory group's report can be downloaded free from the UK's National Radiological Protection Board website: http://www.nrpb.org/publications/documents_of_nrpb/abstracts/absd14-2.htm

http://www.wsws.org/articles/2002/jul2002/cell-j11_prn.shtml

Do cellular phones represent a health risk?

By Joanne Laurier, 11 July 2002

A major study carried out by scientists in Finland suggests that radiation from mobile phones causes changes to the brain. Professor Dariusz Leszczynski headed up the two-year program at Finland's Radiation and Nuclear Safety Authority.

The researchers discovered that radiation from cellular phones can cause activity in hundreds of proteins in human cells grown in a laboratory. It is the first time that scientists have looked at the effects of mobile phone radiation on human cells rather than those of rats.

The scientists found that changes in cells that line blood vessels could weaken the functioning of the brain's protective shield against harmful substances. These changes damaged the blood-brain barrier—a safety barrier that stops harmful substances in the blood from entering the brain.

The study found that exposure caused increased activity in a protein called hsp27 linked to the functioning of the blood-brain barrier.

"[Increased protein activity] might cause cells to shrink—not the blood vessels but the cells themselves—and then tiny gaps come between those cells through which some molecules could pass," said Professor Leszczynski.

Speaking to BBC News Online, he stated: "The blood-brain barrier has been shown to be affected by radiation in animal studies. There is a lot of uncertainty about whether this happens in humans. We have shown some biological effects. If it did happen it could lead to disturbances, such as headaches, feeling tired or problems with sleeping. A study by a Swedish research group even suggested it could lead to Alzheimer's disease." He also stated that a study by French scientists found similar results in rats.

An abstract of the Finnish study was published in the May 2002 issue of *Differentiation*. The authors concluded: "Based on the known functions of hsp27, we put forward the hypothesis that mobile phone

radiation-induced activation of hsp27 may (1) facilitate the development of brain cancer by inhibiting the cytochrome c/caspase-3 apoptotic pathway and (2) cause an increase in blood-brain barrier permeability through stabilization of endothelial cell stress fibers. We postulate that these events, when occurring repeatedly over a long period of time, might become a health hazard because of the possible accumulation of brain tissue damage. Furthermore, our hypothesis suggests that other brain damaging factors may co-participate in mobile phone radiation-induced effects."

An article published by Earthpulse Press, entitled Cell Phone Convenience or 21st Century Plague by Dr. Nick Begich and James Roderick, postulates that cell phones "have been one of the fastest growing industries in modern history," with cell phone usage estimated to climb to 1.3 billion users by the year 2005. The article is a compilation of much of the research and reporting produced over the last 10 years in the cell phone area.

Among the article's many citations is the demand by British scientists that mobile phones carry a health warning. "Amid an explosive growth of mobile communications, concerns are mounting about cellular telephones potential links to health problems ranging from headaches to brain tumors. ... Mobile telephones are arguably the most radiative appliance we have ever invented apart from the microwave oven and people are putting them by their heads-arguably the most sensitive part of the body," said bioelectromagnetics scientist Roger Coghill, as reported by Reuters in January 1998. "Cell phones emanate microwave radiation, and human brains may absorb up to 60 percent of that energy."

The Begich/Roderick article continues: "Researchers have shown that low intensity microwave exposure opens up the blood/brain barrier, a biological effect which can allow the release of dangerous chemicals into the brain." The article goes on to quote from the September 15, 1999 issue of Svenska Dagbladet: "New Swedish research shows that the radiation from mobile phones might make it easier for poison to penetrate the brain. The findings could explain the diseases that American soldiers who have participated in high-tech warfare are suffering from. The unexplained symptoms of American soldiers of the Kuwait war are suspected to link to the medication they took against nerve gas. The microwaves surrounding soldiers in high-tech warfare could have opened the blood-brain barrier, and the medication penetrated into the brain. The possibility is now being investigated by the US Air Force in co-operation with the Lund [Swedish] scientists."

The authors report that a group of German scientists found that exposure to electromagnetic fields during mobile phone use may increase resting blood pressure and that Colorado University researchers have shown that frequent mobile users had significantly depressed melatonin-a vital cancer-preventing hormone. Also mentioned is an Australian study that has linked cell phones to a higher rate of brain cancer, while a Swedish study suggests that using a mobile phone for more than 15 minutes could lead to headaches and fatigue.

The article makes reference to a study by Dr. Lennart Hardel showing that mobile phone use increases the risk of a brain tumor by almost two and a half times.

According to Begich and Roderick, cell-phone companies like Motorola attempt to influence the results of research studies. Mentioned in this context was the work of biologists Ross Adey and Dr. Henry Lai. The latter, "who has been studying the biological effects of electromagnetic fields for 20 years, was asked three times [by Motorola] to change findings on how they caused DNA breaks in rats."

Another biochemist, Jerry Phillips, who worked with Ross Adey on Motorola-funded research beginning in 1991, commented: "Motorola was adamant that Adey never mention DNA damage and radiofrequency (RF) radiation in the same breath." Said Adey: "Motorola has been manipulative of research that we and others have reported to them. Essentially they cut us off because we were too inquisitive." Begich and Roderick report that "Phillips, Adey, and other said they see a strong parallel between what's happening now and the decades of denial by the tobacco industry..."

Other bioeffects that have been reported to result from RF exposure include changes in cell membrane function, metabolism, cellular signal communication, activation of proto-oncogenes and cell death. Resulting effects which have been reported in scientific literature "include DNA breaks and chromosome aberrations, increased free radical production, cell stress and premature aging, changes in cell membrane function including memory loss, learning impairment, headaches and fatigue, sleep disorders, neurodegenerative conditions, reductions in melatonin secretion, and cancer."

Dr. George Carlo, a health scientist and epidemiologist, ran a \$28 million cell phone surveillance and research program from 1993 through 2001. Wireless Technology Research, which was established to conduct the study, was chaired by Dr. Carlo and, significantly, was funded by the cell phone industry. The industry-sponsored research suggested a possible mobile phone-cancer link. Said Dr. Carlo: "You would come to the [possible] conclusion that RF [radio frequencies] causes genetic damage."

On October 7, 1999, Dr. Carlo, in his capacity as chairman of Wireless Technology Research, sent a letter to C. Michael Armstrong, chairman and chief executive officer of AT&T Corporation.

He wrote that hand-held phone users had a higher rate of brain cancer than those who used non-hand-held phones that were away from their heads; that the risk of rare neuro epithelial tumors on the outside of the brain more than doubled in cell phone users as compared to those who did not use cell phones; and that there appeared to be a correlation between brain tumors occurring on the right side of the head and the use of the phone on the right side of the head.

"The companies are now spending millions trying to discredit me because, basically, they didn't like what I told them.... They have shown total disregard for mobile phone users," Dr. Carlo stated in an October 1999 interview with the British newspaper, *The Express*.

The Begich/Roderick article mentions that the industry has largely put forward studies that "looked at the effects of radio waves outside the cellular frequency, or at exposure levels that are different from those experienced by cellular phone users.... Very limited information has been available to the public about the risks of cell phones or various electromagnetic fields outside of some obscure research and academic circles. The fact is that increasing evidence has been mounting and the true risks of these energy fields are becoming well known."

The authors criticize the Federal Drug Administration and the United States government for being reluctant to take action against the risks of cell phone usage and blame this reluctance on "lobby efforts, public relations gimmicks and the manipulation of the facts."

But as the cell phone industry and US government agencies are downplaying these risks, Begich and Roderick write that "[t]he risks associated with cell phones are being considered too risky even by the biggest risk takers in the insurance industry." Underwriters from big insurers like Lloyd's and Stirling have refused "to cover manufacturers against the risk of being sued if mobiles turn out to cause long-term damage," according to the April 11, 1999 issue of *The Observer*.

The Begich/Roderick article concludes: "The research continues and the health effects mount. With over 1.3 billion people projected to be using these devices in the year 2005 the risks must be understood and addressed. Perhaps we will see the litigation of the 21st century overtake the incredible tobacco settlements as the record holder for 'damage by industry when its head's in the sand.'"

Another indication of the possible dangers in cell phone usage involves the cell phone industry itself. Patents taken out by the industry contain revelations of health hazards connected to their products. Baltimore attorney Joanne Suder has recently filed a high-profile lawsuit against the cell phone industry and is considering 36 more suits. Her contention that cell phone are dangerous is based on the "dozens and dozens" of patents filed by the industry to create radiation-shielding technology.

For example, a Nokia patent for a shield layer between the antenna and the user to reduce the electromagnetic irradiation of the user, received on July 28, 1998, states: "[I]t has been suggested that modulated radio-frequency radiation induces changes in the electrical status, i.e., in the ion balance of nerves. A continuous localized exposure to radio-frequency irradiation has been suggested to weaken myelin sheets of cells and to eventually lead to an impairment of hearing capability, vertigo, etc. It has been suggested that radio-frequency irradiation may stimulate extra growth among supportive cells in the nerve system, which in the worst case it has been suggested could [lead] to a development of malignant tumors, e.g., glioma.... Although the consequences described above have not been scientifically verified, the uncertainty has some effects by reducing the speed of growth of the market of radiophones."

Motorola, Ericsson and other handset manufacturers own similar patents, Suder said.

The degree and magnitude of the health risks involved in cell phone usage have yet to be determined in a comprehensive manner. It is not clear whether the risk is comparable to that posed by smoking

(potentially fatal), for example, or by passing through a metal detector in an airport (minor, with an offsetting benefit). A factor making it more difficult to ascertain the potential hazards has clearly been the influence of the firms with enormous amounts of money invested in cell phone production. Can anyone doubt that without this big business influence the true facts about cellular phone usage could be established by a coordinated scientific effort in relatively short order?

However, the cell phone manufacturers, telecommunications companies and those who profit enormously from this new and booming industry, would apparently rather use 1.3 billion people as human guinea pigs in a radiological experiment than investigate any potentially life-threatening "consequence."

Blake dismisses five mobile-phone lawsuits

March 06 2003

WASHINGTON—U.S. District Judge Catherine Blake today dismissed five class-action lawsuits against the mobile-phone industry that sought to force wireless carriers to supply consumers with headsets to reduce radiation exposure and to compensate subscribers who already purchased such accessories.....

Click here to view complete article: <http://www.rcrnews.com/cgi-bin/news.pl?newsId=7458>

<http://rcrnews.com/cgi-bin/news.pl?newsId=15619&type=news&bt=appeals%20court%20affirms%20mobile-health%20decision>

Appeals court affirms mobile-health decision

By JEFFREY SILVA, October 23, 2003

WASHINGTON-The 4th U.S. Circuit Court of Appeals Wednesday unanimously affirmed a lower court's dismissal of an \$800 million brain-cancer suit against Motorola Inc. and others.

The decision puts in further jeopardy nine pending brain cancer suits against the mobile-phone industry in Baltimore federal court and likely will chill health litigation generally.

The three-judge panel in Richmond, Va., ruled U.S. District Judge Catherine Blake did not abuse her discretion in excluding expert testimony of Dr. Lennart Hardell, a Swedish epidemiologist and star witness for the plaintiff. The appeals court turned the case around in relatively quick fashion, having heard oral argument less than a month ago.

In 2000, Christopher Newman, a Baltimore neurologist, filed suit against Motorola Inc. and other telecom firms, claiming his brain cancer was caused by cell-phone use. Newman was represented by the law firm of high-powered trial lawyer and Baltimore Orioles owner Peter Angelos.

Last fall, after extensive briefing and a five-day hearing on scientific evidence in which industry lawyers raised doubts about Hardell's methodology and relevancy of his data, Blake ruled Hardell's testimony did not meet the Supreme Court's standard for acceptability and jury consideration. The case was dismissed shortly thereafter.

Blake is sitting on nine other brain cancer suits against the mobile-phone industry in Baltimore federal court, awaiting a ruling in a separate health-related appeal before the 4th Circuit that turns on jurisdiction.

In the latter case, also litigated by the Angelos law firm, Blake in March dismissed five class action suits brought against industry for failure to inform consumers about possible health risks from cell phones and not supplying them with headsets to reduce their exposure to phone radiation.

"Today's decision reaffirms that the finding of the district court in Newman v. Motorola et al. that there is insufficient scientific evidence to support allegations that wireless phones cause brain cancer," said the Cellular Telecommunications & Internet Association.

John Angelos, a lawyer for Newman, declined to comment on the 4th Circuit decision. "The opinion speaks for itself. We will need to speak to Dr. Newman concerning any future activity in this case," said Angelos.

"The courts have spoken, and again the message is loud and clear: These claims of health risks from mobile phones have no basis in accepted science," said Norm Sandler, director of global strategic

issues for Motorola. "Anyone pursuing such claims at present or considering them in the future should take careful note."

Popular Science - September 2002, Suzanne Kantra Kirschner, Technology Editor

FDA, It's Time to Study Cellphone Radiation

With 137 million cellphone users in the U.S., and with more radiation-intensive broadband applications in the offing, the time for such testing is now.

Here we go again: In June, Darius Leszczynski of Finland's Radiation and Nuclear Safety Authority found that an hour of cellphone exposure shrinks cultured human cells. The resulting gaps between the cells, the study suggests, could allow toxins to enter the brain. As quickly as several scientists dismissed the study saying the shrinkage was probably caused simply by heat Gro Harlem Brundtland, General-Director of the World Health Organization, issued a warning to parents to limit cellphone use in children.

This is the latest volley in the decade-old debate over the dangers of cellphone radiation, a controversy that has spawned a cottage industry hawking everything from hands-free devices to radiation blockers. Despite countless studies most of which were too small or too partisan we still don't know if cellphones are dangerous. Even Leszczynski admits his study proves nothing definitively, adding that large-scale human testing must be done.

With 137 million cellphone users in the U.S., and with more radiation-intensive broadband applications in the offing, the time for such testing is now.

The U.S. Food and Drug Administration (FDA), which shares jurisdiction over cellphones with the FCC, should develop a plan to definitively study the long-term effects of cellphone use. It's time to put this issue to rest, and only the government's deep pockets can do so.

In the meantime, you can find basic information about this issue at www.fda.gov/cellphones .

<http://www.popsci.com/popsci/computers/article/0,12543,334192,00.html>

This study will be published in October 2003 in the "Journal of Clinical Neurophysiology"

Acute mobile phone operation affects neural function in humans

Croft R, Chandler J, Burgess A, Barry R, Williams J, Clarke A. Brain and Behaviour Research Institute, University of Wollongong, Northfields Ave., 2522, Wollongong, Australia

OBJECTIVES: Mobile phones (MP) are used extensively and yet little is known about the effects they may have on human physiology. There have been conflicting reports regarding the relation between MP use and the electroencephalogram (EEG). The present study suggests that this conflict may be due to methodological differences such as exposure durations, and tests whether exposure to an active MP affects EEG as a function of time.

METHODS: Twenty-four subjects participated in a single-blind fully counterbalanced cross-over design, where both resting EEG and phase-locked neural responses to auditory stimuli were measured while a MP was either operating or turned off.

RESULTS: MP exposure altered resting EEG, decreasing 1-4Hz activity (right hemisphere sites), and increasing 8-12Hz activity as a function of exposure duration (midline posterior sites). MP exposure also altered early phase-locked neural responses, attenuating the normal response decrement over time in the 4-8Hz band, decreasing the response in the 12-30Hz band globally and as a function of time, and increasing midline frontal and lateral posterior responses in the 30-45Hz band.

CONCLUSIONS: Active MPs affect neural function in humans and do so as a function of exposure duration. The temporal nature of this effect may contribute to the lack of consistent results reported in the literature.

PMID: 12350439 [PubMed - in process]

RCR Wireless News <http://rcrnews.com/>

New epidemiology review pummels key witness in brain-cancer lawsuit

by JEFFREY SILVA, September 23, 2002

WASHINGTON-A review of epidemiology studies by two U.S. scientists found no clear association between mobile phones and cancer, while reserving some of its harshest criticism for the lead scientific witness in a cancer lawsuit against the wireless industry and dismissing the possibility of non-thermal bioeffects from handset radiation.

John Boice and Joseph McLaughlin, two former government scientists who head the International Epidemiology Institute USA, were hired by the Swedish Radiation Protection Authority to conduct the survey. IEI, a biomedical research firm in Rockville, Md., previously contributed to a Danish epidemiology study published last year. That study did not detect a link between cell-phone use and cancer risk. But it has been criticized for failing to account for slow-growing tumors and excluding corporate subscribers, who can be heavy wireless users.

The Swedish Radiation Protection Authority, also known as SSI, last week released the epidemiology review by Boice and McLaughlin. The reviewers analyzed more than a dozen epidemiology studies published in recent years. SSI said the conclusions of Boice and McLaughlin do not necessarily represent its own views.

The Boice-McLaughlin review, among other things, takes aim at two combustible issues: the research of Dr. Lennart Hardell and claims in some research of non-thermal bioeffects. Both issues have occupied the wireless industry and their lawyers in recent months.

Indeed, the research of Hardell-the pivotal witness for Christopher Newman in his \$800 million brain-cancer lawsuit against industry-is singled out for criticism in a press release accompanying Boice and McLaughlin's epidemiology survey.

In the review itself, Boice and McLaughlin said Hardell's methodology was "limited and inferior in design" compared with other epidemiology studies. They also called misleading his statistical analysis of brain-cancer risks based on brain tumors on the side of the head used by subscribers to make calls. Defense attorneys representing mobile firms in the Newman case have made similar arguments, most recently in a Sept. 10 letter to the Baltimore federal judge overseeing the Newman case.

In contrast, Boice and McLaughlin generally gave high marks to other epidemiology studies that appear to rule out a relationship between cell-phone use and cancer.

Boice and industry defense lawyers did not reply to requests for comment on whether they are assisting with mobile-phone health litigation.

Norman Sandler, a spokesman for Motorola Inc., said he is not aware of any association between Boice and defense lawyers. Sandler said the release of the Boice-McLaughlin review last week surprised Motorola.

In releasing the epidemiology review so close to a ruling by U.S. District Judge Catherine Blake on whether to let the Newman case go to trial, Boice and McLaughlin have opened themselves up to criticism.

<http://www.newscientist.com/news/news.jsp?id=ns99992959>

Cancer cell study revives cellphone safety fears

Duncan Graham-Rowe, NEW SCIENTIST, 24 October 2002

The safety of cellphones has been brought into question once again by research that suggests radio waves from the devices could promote the growth of tumours. Paradoxically, the study suggests that the radiation makes tumours grow more aggressively by initially killing off cancer cells.

Cell biologist Fiorenzo Marinelli and his team at the National Research Council in Bologna, Italy, decided to investigate whether radio waves had any effect on leukaemia cells after previous studies indicated that the disease might be more common among mobile phone users. The life cycle of leukaemia cells is well understood, making it relatively easy to spot changes in behaviour.

The team exposed leukaemia cells in the lab to 900-megahertz radio waves at a power level of 1 milliwatt, and then looked at the activity of a gene that triggers cell suicide. Many European mobile networks operate

at 900 megahertz, and maximum power outputs are typically 2 watts, although they regularly use only one-tenth of this power.

After 24 hours of continuous exposure to the radio waves, the suicide genes were turned on in far more leukaemia cells than in a control population that had not been exposed. What is more, 20 per cent more exposed cells had died than in the controls.

But after 48 hours exposure, the apparently lethal effect of the radiation went into reverse. Rather than more cells dying, Marinelli found that a survival mechanism kicked in. Three genes that trigger cells to multiply were turned on in a high proportion of the surviving cells, making them replicate ferociously. The cancer, although briefly beaten back, had become more aggressive.

DNA damage?

Marinelli presented his results this month at the International Workshop on Biological Effects of Electromagnetic Fields on the Greek island of Rhodes. While the results do not show a direct health threat from mobile phones, they provide fresh evidence that radiation from such devices could play an important role in activating genes that might help cancer cells thrive.

"We don't know what the effects would be on healthy human cells," says Marinelli. "But in leukaemia cells the response is always the same." Marinelli suspects the radiation may initially damage DNA, and that this interferes with the cells' biochemical signals in a way that ultimately triggers a defensive mechanism.

Many scientists believe that because radiation from cellphones does not have enough energy to break chemical bonds, it cannot damage cells. The only way damage could occur, they say, is if the radio waves heated tissues up.

But British research earlier in 2002, by molecular toxicologist David de Pomerai at the University of Nottingham, showed that radio waves can cause biological effects that are not due to heating. He found that nematode worms exposed to radio waves showed an increase in fertility - the opposite effect from what would be expected from heating (New Scientist print edition, 9 February).

"Confused field"

Marinelli's study is intriguing, says de Pomerai. "But I'm far from convinced that these authors are looking at any reproducible and real phenomena," he says. Other studies have shown mobile phone radiation to have no effect on cell death, de Pomerai adds.

An inquiry in April 2000 by the British government found no evidence of any health risks from mobile phones. But it still recommended that people take a precautionary approach until further evidence emerged. In particular, it suggested children, whose brains are still developing, should not use mobile phones excessively.

"It's a very confused field," admits Colin Blakemore, a physiologist at the University of Oxford and a member of the British National Radiological Protection Board's advisory group on non-ionising radiation. People should place more reliance on animal studies than lab-based experiments on cells, he says.

But de Pomerai insists that a consensus is emerging that non-ionising radiation can indirectly damage DNA by affecting its repair system. If the DNA repair mechanism does not work as well as it should, mutations in cells could accumulate, with disastrous consequences. "Cells with unrepaired DNA damage are likely to be far more aggressively cancerous," he says.

How Cell Phones Affect Brain Cells

This Is Bristol, March 19, 2003, on the web at: http://www.rfsafe.com/articles/how_cell_phones.htm

Part of a major research programme into the effects of mobile phones on the brain is set to be implemented by Bristol scientists this summer.

Professor Alan Preece, head of Biophysics Group of the Department of Medical Physics at the Bristol Oncology Centre, and his colleague Dr Stuart Butler, director of the Burden Neurological Institute at Frenchay Hospital, are to conduct the two-year study.

They are currently awaiting highly-specialised equipment to use in the research, which will involve more than 30 people over a range of ages.

The pair, along with a team of researchers, will look into the electrical interference on the brain and any neurological patterns and responses they create.

Professor Preece has been looking into the effects of mobile phones for years and released a study which conclusively found that mobile-phone radiation does disturb brain patterns in 1999.

He said: "We are looking forward to starting the research, which has been in the pipelines for some time now. But the regulations of the equipment are proving tricky to meet, because there are many parts to this study and we all must be working from the same level."

The UK-wide study has cost £7.3 million to implement and all the phones being made by companies have to adhere to the exact same standards, output and technical ingredient.

Phones will have no logos or identifiable markings on them, but will carry only a code so that they can be sufficiently recorded by each group of researchers.

Monitoring used must also be extremely similar or exactly the same so that no results can be played off against each other.

This will enable the findings to be regarded as a solid body of information, even though they are being carried out by numerous groups of scientists.

Prof Preece said: "It is unfortunate that we would like to have all the answers now as more and more people are taking up using mobiles, but the tests must be exact and so the preparation will take a long time.

"Even at the end of the results we will still have a long way to go before we are able to answer certain questions which are commonly raised by the public."

Teen cellphone radiation risk

The New Zealand Herald 04.04.2003

By ANITA MATTHEWS

Mobile phone manufacturers should take seriously a Swedish finding that their products are dangerous for teenagers and work on developing safer phones, says scientist Dr Neil Cherry.

Cherry, an associate professor in environmental health at Lincoln University, Christchurch, said there were more than 50 patents for devices or methods to make phones safer that were not being used by manufacturers.

"My estimate is that it is practical to reduce users' exposure by 100 to 1000 times," he said. "The primary methods are to manufacture the handset within a 'Faraday cage' shield," he said. "The antenna is on the outside but focused into a narrow beam of about 30 degrees pointed away from the user. The hands-free kit is a fibre-optic cable to connect the phone to the ear and mouth."

Cherry was commenting on a study by Swedish scientists, led by neurosurgeon Leif Salford and published last month. It found that cells in the parts of rats' brains that controlled sensation, memory and movement died after being exposed to various GSM phones at different levels of radiation for two hours. The rats tested were said to be equivalent in age to teenagers.

Salford warned that long-term exposure could potentially lower brain reserve capacity. "We cannot exclude that after some decades of [often] daily use, a whole generation of users may suffer negative effects," he said.

There are 2.3 million mobile phones in use in New Zealand, with an estimated 60 per cent of households having at least one.

Cherry claimed that phone manufacturers were promoting their products to teenagers and children to create a lifelong customer base. "Even though science shows that mobile phones are more dangerous than tobacco, they use the fact that radiation is invisible and can't be seen or smelt like smoke."

He urged the Government to make manufacturers place safety warning on phones. "Companies should be required to publicly agree to make phones much safer."

Cherry also urged parents to minimise their children's use of mobile phones. "They should find the lowest-exposure cellphone, use a hands-free kit, and frequently question phone makers so they are continuously made aware of public concern. Whenever you can, use a wire phone."

Martin Gledhill, science adviser at the National Radiation Laboratory in Christchurch, also advised consumers to take precautions but said the Salford study had to be replicated and supported by similar research before it could be accepted as definitive. Children younger than 16 were more vulnerable to radiation and should be discouraged from using mobile phones, he said.

Manufacturers the Herald contacted insisted their phones abided by international safety standards.

Sony Ericsson general manager David Georgetti said the Salford-led study was simply a re-analysis of earlier data produced by Swedish researcher Lennart Hardell. "No overall statistically significant increased risk was found for all mobile phone users." Georgetti said product safety was a top priority for Sony and its products were well within World Health Organisation limits. "We have also introduced some models with speaker-phone functionality [external speaker and long-range microphone] and a desk-stand accessory which converts any phone to speaker-phone," he said.

Motorola's director of communications and public affairs (Pacific division), Russell Grimmer, said safety was an important part of the company's business. "We are sensitive and responsive to any questions about the safety of Motorola products. "We stand behind those products and devote considerable resources to assuring their safety."

Lane Stephens of Nokia Mobile Phones NZ said emission rates were below the prescribed limits. "All Nokia phones fulfil relevant national and international safety standards and limits. Next-generation products are no different, since they must meet the same limits."

Radiation risks

The National Radiation Laboratory, a Ministry of Health business unit, provides expert advice, service and research concerning public, occupational and medical exposure to radiation. Its recommendations on mobile phone use are:

- Use the phone in places with a strong signal. This allows the phone to transmit at low power (up to 100 times lower than its maximum value), reducing exposure accordingly.
- Minimise the length of time on calls.
- Extend the antenna and hold it away from the head.
- Use a hands-free kit with an external antenna.

Individuals concerned about exposure to radiation from mobile phones can refer to guidelines available at the National Radiation Laboratory.

<http://www.nzherald.co.nz/storydisplay.cfm?storyID=3350734&thesection=technology&thesubsection=general>

SILICON.COM Tue 5 August 2003

French tackle mobile phone health dangers

Compulsory hands free kits and a restriction on masts are among a raft of new public health measures announced by the French government to combat the potential dangers posed by mobile phones.

French Industry minister Nicole Fontaine said in an interview with the Journal de dimanche: "In a few months time, mobile phones will not be able to be sold without a hands free attachment."

The government initiative envisages the sale of mobile phones only if they come with a hands free kit. Most mobile shops are already there and the operators, who distribute handsets en masse, are marketing mobiles with hands free kits thrown in as well.

Phones that come with hands free kits have been the standard since September 2002 at French mobile operator SFR, and customers with older mobiles can get a free kit on demand. At fellow providers Orange and Bouygues, all mobile packs have come with a hands free kit since 2001.

The minister also announced a future regulation that will put a limit on the power of handsets.

But Marc Seguinot, head of the EC division in charge of protecting the health of consumers, said: "All mobile phones that come on to the market now already have to conform to European standards that limit radiation."

Fontaine also said that before the end of the year, the three main French operators will sign a 'good behaviour charter', whereby they will undertake, among other measures, to "inform the inhabitants before any mast is put up, use existing masts rather than building new ones".

She said: "I am convinced that we won't have to adopt a more restrictive approach."

This initiative, however, hasn't come from the government itself. The operation was developed on behalf of operators by the French association of mobile operators, AFOM, which works in concert with local authorities and various groups.

Nevertheless, the minister still maintains that taking precautions is the way forward, even if scientific studies listed by the World Health Organisation conclude that there isn't any danger from either mobiles or phone masts.

Elaine Spiterly, a member of the Priartem association - which campaigns for regulation of phone masts - and a trainee doctor, said: "Finally, the government's conscience has kicked in over the potential danger of mobiles and phone masts."

Christophe Guillemin writes for ZDNet France

Ireland: Dail to probe health risks of mobiles

Kathy Donaghy, Irish Independent 3rd November 2003 www.unison.ie/irish_independent/

THE health risks of mobile phone headsets are to be examined in a major investigation to be carried out by the Dail's Communications Committee. (Dail is the Irish Parliament)

The Irish Independent has learned the committee agreed to begin a study into the safety of mobile phones in terms of radiation and damage to the brain.

The inquiry, which will start in the new year, will draw on international studies.

According to Noel O'Flynn (FF), chair of the communications committee, while there has been no conclusive scientific evidence to prove any long-term effect of mobile phone usage, some recent studies have suggested otherwise.

In Britain, health chiefs are involved in ongoing research and found that using mobiles does affect brain activity and that there are significant gaps in our scientific knowledge of the risks.

They warn of the dangers to young people in particular since the head and nervous system are still developing into the teenage years.

Britain's health ministry experts recommended that in line with a precautionary approach, the widespread use of mobile phones by children - under the age of 16 - should be discouraged for non-essential calls.

Mr O'Flynn said recent research in Finland suggested radiation from mobile phones causes changes in the brain and concluded that even low level emissions from handsets are damaging.

He said: "Swedish scientists found that mobile phones damage key brain cells and could trigger Alzheimer's Disease while the World Health Organisation last year warned parents against letting their children spend too much time on mobile phones because tests showed higher electromagnetic waves in places where mobiles are frequently used."

Mr O'Flynn added that he believed that this information was strong enough to merit more research.

"As a committee we intend to invite cancer and radiation specialists to appear before us as well as Department of Health officials and experts in the field of mobile phone technology," Mr O'Flynn said.

"At the moment it is too soon to reach a definitive verdict on health risks from mobile phones but I stress neither has research given it the all-clear and the Dail Communications Committee is committed to fully debate this issue, bringing it firmly into the public domain and reach valuable conclusions," he said.

New fears on mobile phones

(Reprinted in the Mercury from the article in the London Daily Mail, 18 March, 2003)

MOBILE phones are at the centre of new safety fears after scientists found the first evidence of a link with brain cancer. Users who spend more than an hour a day talking on the phone are almost a third more at risk of developing a rare form of brain tumour, a study has found.

The cancers were found most frequently on the side of the head to which the phone was held.

Scientists found the cancer link with digital mobiles, old style analogue mobiles and digital-enhanced cordless phones.

The findings, published in the International Journal of Oncology, will renew health concerns among mobile users. One expert yesterday said another large study would be needed to confirm the apparent link.

Radiation from mobile phones has been shown to alter the workings of brain cells and affect memory. But a big British study three years ago found no evidence of a risk to human health.

A report by the American National Cancer Institute in 2001 also failed to find a link between mobile phone use and brain cancer.

The latest findings are the first to show a link between the instruments and disease in humans.

In the study, lead researcher Professor Kjell Mild examined the medical records of 1600 tumour victims who had been using mobile phones for up to 10 years before diagnosis.

Mild, a biophysicist at Orebro University in Sweden, said the evidence was clear: "the more you use phones and the greater number of years you have them, the greater the risk of brain tumours."

Scientists compared tumour sufferers with a control group who lived similar lives but did not use mobile phones. They also compared sufferers with tumour victims who did not use mobile phones.

The study found that spending more than an hour a day on a phone increased the risk of a type of tumour known as acoustic neuroma by 30 per cent. Such tumours occur in one of the nerves in the brain and can lead to deafness in one ear. They are usually curable by surgery.

Although the cancer is rare, experts say numbers have increased from one tumour per 100,000 people in 1980 to about one per 80,000 today.

http://www.ncbi.nlm.nih.gov:80/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=12175314&dopt=Abstract
Radiat Res 2002 Sep;158(3):357-364

Long-Term Exposure of E μ -Pim1 Transgenic Mice to 898.4 MHz Microwaves does not Increase Lymphoma Incidence.

(The long awaited replication study of the Adelaide Repacholi study (Repacholi et al., Radiat. Res. 147, 631-640, 1997))

Utteridge TD, GebSKI V, Finnie JW, Vernon-Roberts B, Kuchel TR. Veterinary Services Division, Institute of Medical and Veterinary Science, Gilles Plains, South Australia, 5086, Australia.

A total of 120 E μ -Pim1 heterozygous mice and 120 wild-type mice were exposed for 1 h/day 5 days/week at each of the four exposure levels in "Ferris-wheel" exposure systems for up to 104 weeks to GSM-modulated 898.4 MHz radiation at SARs of 0.25, 1.0, 2.0 and 4.0 W/kg. In addition, 120 heterozygous and 120 wild-type mice were sham-exposed; there was also an unrestrained negative control group. Four exposure levels were used to investigate whether a dose-response effect could be detected. Independent verification confirmed that the exposures in the current study were nonthermal. There was no significant difference in the incidence of lymphomas between exposed and sham-exposed groups at any of the exposure levels. A dose-response effect was not detected. The findings showed that long-term exposures of lymphoma-prone mice to 898.4 MHz GSM radiofrequency (RF) radiation at SARs of 0.25, 1.0, 2.0 and 4.0 W/kg had no significant effects when compared to sham-irradiated animals. A previous study (Repacholi et al., Radiat. Res. 147, 631-640, 1997) reported that long-term exposure of lymphoma-prone mice to one exposure level of 900 MHz RF radiation significantly increased the incidence of non-lymphoblastic lymphomas when compared to sham-irradiated animals.

THE ((EMR)) NETWORK Press Release September 25, 2002
http://www.emrnetwork.org/press/utteridge_25sept_02.pdf

Mobile Phones and Cancer: Is the Popular Media Doing Its Job?

The vast majority of the public relies on the popular media for accurate information on scientific and medical developments relating to their everyday lives. This puts a significant burden on the popular media to do their homework and to refrain from making broad generalizations about health and safety risks that are not supported by the scientific literature.

The question at hand is adverse health effects from human exposure to radiofrequency (RF) radiation from mobile phone technology. As the number of mobile phone users grows, the global public health implications cannot be ignored.

The following item appeared late in August, 2002 on the MSN web site (www.msn.com) and gave this minimal report about one of two long-awaited studies on mobile phone radiation exposure and the risk of cancer:

Study Says Cell Phones Don't Cause Cancer

A study [Utteridge] conducted by Adelaide's Institute of Medical and Veterinary Science [IMVS] found that cell phones do not cause cancer. Researchers exposed 1600 genetically modified and normal mice to various levels of mobile phone radiation over a two-year period, for an hour each day. The study found no increase in the cancer rate of the exposed mice. The study was undertaken to replicate a 1997 Australian study [Repacholi] which found a doubling of cancer in transgenic mice.

In a letter to the editor in the September 23, 2002, issue of RCR Wireless News, Cellular Telecommunications and Internet Association's (CTIA) Vice President for External and Industry Relations Jo-Anne Basile echoes the position that the Utteridge study reliably refutes the findings in Repacholi:

As is standard practice in the scientific community, the 1997 study was replicated to ensure that its findings were reproducible and not an aberration. **After correcting for deficiencies in Repacholi's original study**, including the utilization of more stringent control conditions, the new study found that RF from cell phones caused no increase in the occurrence of cancer. *(Emphasis added.)*

The IVMS [sic IMVS], the scientific group that carried out the Australian study wrote, "The result of this large double-blind study agrees with all the other animal studies and corroborates the paucity of reproducible evidence of deleterious health effects in humans.

Has the CANCER question been answered?

In comparing the results of research studies, the question to be raised is whether the research protocol followed in the new Utteridge study is truly a replication of the protocol designed for the earlier Repacholi study. Both studies were published in the journal Radiation Research. Were the materials and methods used in the second study a replication of those used in the first? If there were differences, what significance could they predictably have on the outcome? Based on that analysis, is it then accurate for MSN, various other popular media outlets that published similar reports, and the CTIA to state that the Utteridge study found that: **"cell phones do not cause cancer?"**

Are the methods and materials in Utteridge a replication of Repacholi?

Ms. Basile's letter points out that the Utteridge study "correct[ed] for deficiencies in Repacholi's study." Indeed, in its Introduction section, the Utteridge report states:

While this Australian study set out to test the same central hypothesis as that of the study of Repacholi et al., **refinements were included** to overcome perceived shortcomings in that study, which had always been conceived as a pilot study. *(Emphasis added.)*

For Utteridge to accomplish a two-fold goal, i.e., to replicate Repacholi while at the same time redesigning aspects that were seen as shortcomings, multiple sets of control animals are required. Repacholi's RF exposure methods would have to be duplicated with exposed and control animals in his type of cages along with the improved exposure method and its own control group.

The Utteridge team cannot "have it both ways." They set out to replicate Repacholi yet did not follow his protocol exactly by exposing a control group in the same type of cages he did. At the same time, they sought to improve upon the technical aspects of uniformly exposing their animals, i.e., in tube restraint cages.

Their data as presented do not adequately address both exposure schemes by the methods outlined in the study. It appears that cage controls in the Utteridge study did not form part of the statistical analysis.

Results Reported in the Popular Media

The popular media reports would have been accurate when stating that the Utteridge study did not show the increase in cancer that occurred in the Repacholi study had they pointed out that lymphomas were the cancers studied in these two reports, not all cancers as they have implied. The popular media

reports have been critically misleading when stating that Utteridge is a replication of Repacholi. "Refinements" and "corrections" as described in Utteridge itself, without a parallel control group following Repacholi's exact protocol, rule this study out as a replication.

The Adelaide Institute of Medical and Veterinary Science, the scientific group that carried out the Australian study, has stated that, "**The result of this large double-blind study agrees with all the other animal studies and corroborates the paucity of reproducible evidence of deleterious health effects in humans.**"

"It is the position of The EMR Network, said President Janet Newton, " that the conclusion of IMVS is unwarranted."

*This release also includes a more detailed analysis, under the title **DO CELL PHONES CAUSE CANCER? REPLICATION: REPACHOLI 1997 and UTTERIDGE 2002 – for the full document, go to http://www.emrnetwork.org/press/utteridge_25sept_02.pdf***

13 countries to study cellphones and cancer

http://www.ctv.ca/servlet/ArticleNews/story/CTVNews/1039563361544_16/?hub=Health

CTV.Canada 10 December 2002

TORONTO - Can cellphones cause cancer? To date, most research says no. But with the growing use of cellphones, particularly among children, concerns persist.

The World Health Organization wants to get to the bottom of the issue. "Because of the level of public concern and because of the high use of cellphones and the increasing use of cellphones worldwide ... the World Health Organization -- I think rightly -- feels that we need to do a larger, more definitive study," said Mary McBride, one of the key Canadian researchers involved in the 13-country international study announced Tuesday.

McBride, an epidemiologist at the B.C. Cancer Agency, is one of three principal investigators for the Canadian arm of the study, which is expected to recruit 700 adults with brain, head or neck tumours. About 1,800 randomly selected Canadians who haven't been diagnosed with cancer will also be recruited.

The other Canadian researchers are located at the University of Ottawa, the Institut Armand-Frappier of the University of Quebec, and the University of Montreal.

Internationally, it's hoped a total of 9,300 people with the selected cancers and 12,000 people without cancer will participate in the study.

Those kinds of large numbers are crucial when any increased risk may be slight, explained Dr. Remi Quirion, who heads the Canadian Institutes of Health Research's Institute of Neurosciences, Mental Health and Addiction. "I think if it increases the risk, it's probably a small increase," said Quirion, who is not involved in the cellphone study.

"So to be able really to say 'Yes, if you use that you have a likelihood of an increase of brain tumours of 15 per cent,' we need a very, very large sample size, in different kinds of populations."

The researchers will interview all subjects about their cellphone use. As well, the Canadians are planning to piggyback additional research onto the WHO study and interview subjects with brain cancer about their exposure to things like solvents, petrochemical substances and X-rays.

The international study was designed by the International Agency for Research on Cancer, a division of the World Health Organization. Britain, Australia, New Zealand and Japan are among the other countries involved.

The idea is to look at enough people for a long enough period to see if there is even a slight increase in risk associated with cellphone use. Findings of the study aren't expected to be available for five years.

Most previous studies have suggested that health-related fears associated with cellphone use are unfounded. But the authors of those studies have acknowledged that the data they looked at covered too short a period of time to be considered conclusive.

That's because most cancers initially develop very slowly. And the cellphone - at least as a device used by the masses -- is still a relatively new technology.

"That's the problem," McBride said. "The average years of use for those earlier studies have been 1.5 to two years, certainly for the U.S. studies."

As well, most of the earlier studies looked only at analogue cellphones. The WHO study will look at both analogue and digital phones.

The researchers will not be studying children. McBride admitted that might draw criticism, since many people concerned about a possible link have been questioning why the scientific community hasn't addressed the question. But she said to study the impact of cellphone use on children just wouldn't make sense.

"We know cancer takes many years to develop and tends not to manifest itself until middle age," she said. "So we would be having to follow children for a long time, and we can get the same answer faster this way. "We expect that what we learn from the adults will also apply to children."

The Canadian portion of the research is being funded by the Canadian Institutes of Health Research with support from the Canadian Wireless Telecommunications Association.

Press release from the Australian Democrats: 26 August 2003

Mobile Hands Free Kits - A National Health Issue

The Australian Democrats today urged the Howard Government to heed the Senate call to establish national standards for mobile phone hands free kits and make the provision of the kits compulsory with all new mobile phones.

Democrats' Deputy Leader Senator Lyn Allison, who introduced the motion supported by the Senate, said any Government delay in pursuing the measure meant the huge number of Australian mobile phone users were being duded on important information.

"The Australian Government should set standards for hands free kits, especially after they almost doubled the allowable emissions from mobile phones in March," Senator Allison said."

"It is a health issue of national importance given the high level of mobile phone ownership in Australia."

"We believe hands free kits need to be regulated to weed out ineffective models. A Commonwealth standard for hands free kits is long overdue."

"The Government would be wise to investigate the effectiveness of the French system, given the uncertainty over mobile phone radiation."

http://www.democrats.org.au/news/index.htm?press_id=2935&display=1

MAGNETIC FIELD EXPOSURE

Brain cancer with induction periods of less than 10 years in young military radar workers

Date: 2003-03-21

The authors have reported on 5 young patients who had brain tumors that appeared within 10 years of initial occupational exposures to radar. Four of the patients were less than 30 years of age when the diagnoses were initially made. Brief induction periods that follow high exposures in individual sentinel patients are a recognized indicator of impending group risk, and these periods call attention to the need for precautionary measures. Similarly, reports of short induction periods for brain cancer on the side of the head in which there has been prior use of cell phones may also indicate increased risk.

Authors ED Richter, T Berman, O Levy, Archives of Environmental Health, Vol 57, Iss 4, 2002, pp 270-272

Brain cancer and occupational exposure to magnetic fields among men: results from a Canadian population-based case-control study

Date:2002-05-31

The relationship between occupational exposure to magnetic fields and brain cancer in men was investigated using population-based case-control data collected in eight Canadian provinces. The findings support the hypothesis that occupational magnetic field exposure increases the risk of glioblastoma multiforme.

Authors PJ Villeneuve, DA Agnew, KC Johnson, Y Mao

Full source International Journal of Epidemiology, 2002, Vol 31, Iss 1, pp 210-217

ELECTRICAL APPLIANCES

<http://www.sfgate.com/cgi-bin/article.cgi?file=/gate/archive/2002/10/17/emfs.DTL&type=printable>

The Body Electric – Are electrical appliances dangerous to your health?

Joyce Slaton, Special to SF Gate, Thursday, October 17, 2002

For decades, power companies and official scientific entities such as the U.S. Food and Drug Administration (FDA) and the World Health Organization have been telling the public that there are almost no credible health risks from electromagnetic fields (EMFs) that emanate from power lines, power transformers and every single appliance that runs on electricity. The official public-health-agency position is that, aside from a small increased risk of childhood leukemia, consumers are perfectly safe no matter how many appliances litter their homes and offices, or how many power lines exist nearby. But a newly completed \$8 million, seven-year study by the California Electric and Magnetic Fields (EMF) Program has something quite different -- and quite alarming -- to say.

"To one degree or another, all three of the scientists who worked on the EMF Program are inclined to believe that electromagnetic fields (EMFs) can cause some degree of increased risk of childhood leukemia, adult brain cancer, Lou Gehrig's disease and miscarriage," says Dr. Raymond Neutra, one of the scientists who wrote the report. Neutra is chief of the Division of Environmental and Occupational Disease Control for California's Department of Health Services (DHS), which ran the study with funding provided by the state's Public Utilities Commission (CPUC).

Considering that most of us work and live in areas full of electronics in appliances from refrigerators to television sets to computers, each of which emits more than one EMF frequency, the EMF Program's linking of health problems to the fields is cause for some alarm. If you sit in front of a computer all day long, should you be worried? Will you get a brain tumor if you live too close to a power line or routinely use a copy machine? Is that friendly-looking little electric pencil sharpener sending out waves of energy that'll kill you someday?

The answers aren't easy, but assessing your risk starts with some basic background on the fields. Artificially generated EMFs are produced when alternating current passes through a wire or device -- like when you flip on your computer, or pop bread down into the toaster. The force that's produced, an EMF, exerts pressure on everything around it -- your body, the kitchen counters, your desk, you name it. This pressure is not necessarily harmful. After all, you may remember from Science 101 that Earth has its own static magnetic fields, with magnetic poles located roughly at our North and South Poles. We don't fully understand why these magnetic fields exist or how they're generated, but humans evolved in their presence, and it's thought that many basic functions such as sleep and sense of direction are governed largely and unconsciously by these fields.

About a hundred years ago, however, humans started figuring out how to generate and use electricity, thereby changing the kinds of fields we are exposed to. These fields are not static, as are Earth's own EMFs. Human-exposure conditions created by artificially generated EMFs can vary dramatically according to the type of wiring, the number of appliances in an area, how many of those appliances are turned on at a given time and how close a person is to those devices. Exposure to EMFs can range from barely detectable levels (less than one milligauss, the unit used to measure magnetic fields) to quite strong levels (up to 100 milligauss and more).

Power companies and public-health agencies would have you believe that these artificially generated EMFs have practically no effect on human health. I was surprised when a communications officer at the FDA's Center for Devices and Radiological Health told me flatly that "there are no known health effects from appliance EMFs" and then refused to let me talk to an FDA doctor to confirm or deny this statement. But despite this hard-line stance, evidence is mounting that, in fact, EMFs do affect health -- and not in a good way.

"There is some evidence to suggest that magnetic-field exposure reduces melatonin levels," says Dr. W. Gregory Lotz, chief of non-ionizing radiation for the National Institute for Occupational Safety and Health (NIOSH). "It's an open question for now which needs more study, but at least some animal studies have shown melatonin changes."

EMF-related hormonal changes in the amount of melatonin your body produces may not, on the surface, seem like a big deal when compared to something as scary as a brain tumor. But melatonin has a far larger effect on your health than you may realize. The hormone, which is secreted by the pineal gland in the center of the brain, controls your sleeping and waking cycle. But melatonin also shores up your immune system, lowers cholesterol and blood pressure and, most important of all, is a potent antioxidant that plays a part in preventing cancer, Alzheimer's disease, Parkinson's disease, diabetes and heart disease. Make no mistake: Anything that messes with melatonin messes with you in a big way.

"The effects of EMFs on melatonin have been known for at least 10 years, as has the evidence linking EMFs to cancers, Alzheimer's and childhood leukemia," says Libby Kelley, executive director of the Council on Wireless Technology Impacts (CWTI), a San Francisco-based nonprofit health-advocacy group.

Even the shadow of a threat from these potent killers may have you wanting to throw the computer and all your other electronics out the window and jump after them. But for most people, the dangers aren't as severe as they may seem at first.

For one thing, most of the risks associated with EMFs kick in when fields are at a strength of 3 milligauss and higher. According to the DHS' Raymond Neutra, most California office workers are exposed to daily fields at an average strength of 1.5 milligauss daily, well below the level of exposure known to cause deleterious health effects.

But don't be putting on the party hats yet -- though the average worker has a safe level of exposure, some workers may be getting stronger doses of EMFs due to faulty wiring or an unusually high number of appliances in some areas. And since the strength of EMFs increases as you get closer to an appliance, those working eyeball-to-screen on a computer many hours a day face some increased risk of harmful EMF exposure, as does anyone who works very near other office appliances such as fax machines, copy machines and printers. The more electronic equipment you have clustered near you and the more time you spend in the high-EMF zone, the greater the risk you face.

"Copy machines, as it turns out, have one of the strongest magnetic fields, and they increase as you get closer," says the NIOSH's W. Gregory Lotz. "I've seen some measurements taken a foot away from the machine. The lowest field measured was 2 milligauss. The highest was 40 milligauss. Electric pencil sharpeners are even worse -- I've seen measurements of up to 90 milligauss."

"People are practically wrapped around their equipment at home or at the office, and while you're working on it, it's working on you," says the CWTI's Libby Kelley. "It's one thing to pass by your microwave in the kitchen, which produces a very strong field but isn't typically used all day, every day. It's quite another to work 40 hours a week or more right next to a piece of equipment putting out a strong field."

So what to do about these potential risks? Well, you could pick up a gaussmeter, easily available via the Web for \$50-\$100. This simple instrument definitively shows the strength of fields in a given area and may uncover potential problems. The DHS' Neutra, for example, used to work in an office where a gaussmeter showed that he and his colleagues were exposed to unexpectedly strong EMFs of 9 milligauss. After the faulty lighting circuit causing the strong fields was replaced, the EMF level dropped dramatically to normal levels.

If you're not quite worried enough to shell out for a gaussmeter or get your wiring checked by a competent electrician, there's a simple solution -- distance. Stay at least two to three feet away from your computer as you work, and make sure other appliances are at least that far from your work space. Move your desk if you have to, or cluster your appliances so that they are as far away as possible from where you generally work or hang out in your house. Practice prudent avoidance of EMFs and you will lower your risks.

Of course, these are just suggestions for what you can do on a personal level, and there's a limit to how much risk you can avoid. Moving farther away from your appliances won't do much if your home is quite near a power line, an electricity-generating plant or a power-company fuse box, where you are exposed to constant, ambient strong EMFs. And, until now, the location of these facilities and lines has been largely unregulated, with the power utilities deciding almost *carte blanche* where to place facilities. And, also until now, those utilities have shown a distinct tendency to ignore the mounting evidence of EMFs' effects on health.

"The EMF Program report is the strongest evidence yet of the health risks the power companies have been trying to pretend didn't exist," says Louis Slesin, publisher of *Microwave News*, the definitive journal on EMFs and health. "The utilities have played a very sophisticated game and have managed to smother the

health risks as a nonissue -- and, to an extent, it's worked. You never see coverage of EMFs in most media, and after the California EMF Program closes down there will be no research on the issues going on in the United States. The risks can be controlled, but only if the utilities stop pretending that there are no risks and start addressing them."

"Estimated lifetime risks smaller than the ones we've uncovered have triggered regulatory evaluation and sometimes actual regulation of chemical agents such as airborne benzene," says the DHS' Neutra.

Will the California EMF Program's report trigger increased regulation of the power utilities, bringing about some sorely needed changes in how power and its attendant EMF fields are allowed into our lives? Only if the utilities -- and their regulatory agencies -- start hearing a whole lot of protest from the public. Have you ever examined your PG&E bill closely? Ever wonder why there's a disclaimer releasing PG&E from responsibility over childhood leukemia on there? Take a good look -- and then think about what you'd like PG&E, the CPUC, the Environmental Protection Agency and other regulatory agencies to hear.

"As we bring more and more electronics into our homes and neighborhoods, we are being exposed more and more to EMFs," says the CWTI's Libbey Kelley. "We're already seeing breast cancer at younger ages, the onset of cancer at younger ages. It could be due to EMFs, environmental toxins or a whole combination of things -- we just don't know. Meanwhile, we have these aging electrical power systems, we're not looking at alternative power sources, we're building power lines and generating plants near homes. It's business as usual. Unless there's public outrage over making the world a safer place, the dangers are just going to continue."

For more information on the California EMF Program Report go to <http://www.dhs.ca.gov/ps/deodc/ehib/emf/RiskEvaluation/riskeval.html>

<http://www.japantimes.co.jp/cgi-bin/getarticle.pl5?nn20020613b5.htm>

Government, Industry Pass the Buck: NPO questions safety of electric cookers

By Kaho Shimizu, The Japan Times: June 13, 2002

A nonprofit organization's discovery in March that the radiation emitted by some portable induction-heating cooking stoves greatly exceed international limits has raised questions about the products' safety and what is being done about it.

Though it has not been proved that exposure to electromagnetic fields is linked to health problems, including cancer, some experts are calling on the government and industry to take precautionary measures before science gives its verdict.

However, neither party seems eager to make attempts to limit electromagnetic field exposure from IH cookers, with authorities and manufacturers boasting of the products' safety, while saying it is the responsibility of the other party to boost awareness of possible risks.

"IH cooking stoves are made to generate electromagnetic fields in an open space," and it is difficult to keep at a distance from them when cooking, said Takenori Ueda of the Japan Offspring Foundation, the NPO that made the discovery.

Ueda added that IH devices emit the highest level of radiation among all household electric appliances. Microwave ovens are more powerful, but their emissions are countered by stronger shielding.

IH cookers generate electromagnetic fields [in the frequency range of 100Hz and 18-23kHz] when an electric current flows through coils under the top plate. Heat is created when the electromagnetic field reacts with the metallic pan atop the plate.

Portable IH units are becoming increasingly popular in Japan as a substitute for a conventional stove. As they do not use gas, they are especially attractive to elderly people who are concerned about fires.

According to the Japan Electrical Manufacturers' Association, domestic shipments of IH stoves increased 51.8 percent from 191,000 units in 1998 to 290,000 in 2001. Of this figure, tabletop types totaled 225,000 in 2001 alone.

The foundation tested tabletop IH cookers made by Hitachi Ltd., Matsushita Electric Industrial Co., Mitsubishi Electric Corp., Sanyo Electric Co., Zojirushi Corp. and Tescom & Co. The units were tested with a radiation measuring device placed right next to the cooker set on maximum heat with a 12-cm pan on it.

All products registered incredibly high radiation levels, some as high as 1,013 milligauss, according to the NPO.

The highest level was more than 16 times the 62.5 mG limit [for 18-23 kHz frequency] set by the International Commission on Non-Ionizing Radiation Protection for short-term exposure to such fields. The ICNIRP is currently cooperating with the World Health Organization on research into the health effects of electromagnetic field exposure.

Although the companies acknowledged the NPO's findings, they said the ICNIRP guideline can be interpreted differently and that radiation levels do not exceed the limit when measuring devices are placed 30 cm away from the device.

But Ueda of the NPO said the figures are not the only problem. The manufacturers failed to disclose information regarding electromagnetic field exposure to consumers, he said.

In 1990 in Japan, the then Posts and Telecommunications Ministry set safety guidelines to protect people from electromagnetic field exposure. The legal limit for electromagnetic fields emitted within the frequency bands used by IH cooking devices -- 910 mG -- is more than 14 times that of the ICNIRP, but Yasuo Shiga of the Public Management, Home Affairs, Posts and Telecommunications Ministry maintained that the figure simply reflects a different conversion method and that there is no significant difference.

The ministry believes its measures provide sufficient protection. If concerns remain, the industry or individuals should do something about it, Shiga added.

However, the Japan Electrical Manufacturers' Association said that it is not planning to take any further action regarding exposure to electromagnetic fields.

"We believe that we have already set appropriate safety standards in line with the ICNIRP guideline," group spokesman Kenji Omi said.

He conceded, however, that no one can be 100 percent sure at this time that electromagnetic fields do not pose any health risks.

Omi added that if there is to be a framework for more stringent safety measures regarding exposure to electromagnetic fields, the government should take the lead in drawing it up.

At the same time he agreed that manufacturers have failed to provide consumers with sufficient information on electromagnetic fields. To this end, the association plans to update its Internet site within the next few months to include in-depth information on the subject.

Omi said the many people who have voiced fears of possible health problems caused by such radiation have unnecessarily fueled public concerns, and thus firms are responsible to explain the situation or IH stoves will be tagged as evil.

"I've never heard of any health problems stemming from electromagnetic fields emitted by the (IH) products," he said, adding that if people are still afraid of adverse effects, they should individually take whatever measures they feel are appropriate.

However, some critics note the case of Manami Matsuhira, a housewife and mother of two residing in Takikawa, Hokkaido.

When she approaches operating electric appliances, such as microwave ovens, she suffers headaches, dizziness and tingling sensations -- a condition that some medical experts call electromagnetic hypersensitivity.

She does not have an IH stove at home, but had an experience with the device when she went on a vacation in March last year and stayed in a cottage equipped with one.

When her friend turned the cooker on, her body was thrown backward as if she received a heavy blow -- even though she was standing almost a meter away from it, she claimed. She said she immediately left, but headaches, dizziness and tingling continued for about an hour.

"How can I believe what the companies say (about the product's harmlessness)?" Matsuhira asked, adding that it is almost impossible to convince others that her symptoms are caused by electromagnetic fields because the fields are invisible.

Koya Ogino, a Kyoto University lecturer who specializes in electromagnetic fields, criticized both the government and industry for not taking further precautions.

"If the companies are profiting by selling the products, they should first confirm their safety," he said.

Ogino is most worried about the potential health complications brought on by long-term exposure, which he believes takes years to surface. There are presently no guidelines anywhere in the world that cover possible long-term health effects.

Citing the European Commission's policy that precautionary principles be applied when considering restrictions on goods that pose risks to human health, Ogino said Japan is lagging in adopting such a stance.

Noting how the government has not learned anything from past failures to prevent problems, such as pollution-related illnesses and the outbreak of mad cow disease, Ogino said, "It will be too late if we wait until the required research turns up solid evidence."

ELECTROSENSITIVITY

Effects of ELF and Microwaves on Human Lymphocytes from Hypersensitive Persons

I. Belyaev, L. Hillert, C. Tamm, M. Harms-Ringdahl, L. Malmgren, B. Persson, Department of Genetic and Cellular Toxicology, Stockholm University, Stockholm, Sweden; Department of Environmental Health, Karolinska Hospital, Stockholm, Sweden; Department of Radiation Physics, Lund University, Lund, Sweden.

INTRODUCTION: Hypersensitivity to electricity (electromagnetic fields, EMF) is a fairly new phenomenon and etiology of the EMF hypersensitivity is not yet known. There are several symptoms that these people experience in the proximity to different sources of EMF.

The symptoms are not specific to this illness and there is no known pathophysiological marker or diagnostic test [1-2]. No causal relationship between EMF and symptoms has yet been proven, but sensitivity to specific frequencies has been suggested [1]. The frequency dependent non-thermal effects of ELF magnetic fields and microwaves on the conformation of chromatin in lymphocytes have been described and individual variability has been observed [3, 4].

OBJECTIVE: Here, we used specific conditions of exposure to ELF to investigate if the response of lymphocytes from hypersensitive persons is different as compared to healthy subjects. We also used GSM modulated microwaves, which have been previously shown to affect brain blood barrier in rats [5].

MATERIALS AND METHODS: Fresh blood samples from two groups of donors, 7 persons reporting electrosensitivity and 7 healthy controls matched by gender, age and smoking habits were coded and all data were analysed in blind. The changes in chromatin conformation were measured with the method of anomalous viscosity time dependence (AVTD).

Apoptosis was determined up to 72 h by morphological changes. Apoptotic fragmentation of DNA was analyzed by pulsed-field gel electrophoresis (PFGE). Sinusoidal magnetic field (8 Hz, 30 mT amplitude or 50 Hz, 15 mT amplitude) was applied using Helmholtz coils. Installation employing GSM signal, 915 MHz, all modulations included, SAR=1-2 mW/g in the TEMcell was used. All exposures were 2 h. The data were analyzed with the t-test.

RESULTS: Exposure to ELF at 8 Hz and specific static magnetic field as described in [3] resulted in statistically significant changes of chromatin conformation, which disappeared 19 h after exposure. This ELF exposure resulted in apoptotic DNA fragmentation, which was comparable with the response induced by 2 cGy of g-rays.

No significant differences in effects were seen between groups of control and hypersensitive donors. However, a trend to a prolonged state of relaxed chromatin was observed in lymphocytes from hypersensitive persons.

No effects of 8 Hz exposure on apoptosis or AVTD were observed when static magnetic field was changed by 10 mT.

Exposure either to 50 Hz or microwaves resulted in significant condensation of chromatin which was comparable with heat shock at 41°C. This condensation disappeared 2 h after exposure and no apoptosis was observed during 72 h.

Comparison of pooled data obtained with 50 Hz and 915 MHz did not show significant differences in effects between 4 control and 4 sensitive subjects. However, in 3 of 4 matched pairs, both 50 Hz and 915 MHz stronger affected cells from hypersensitive persons.

CONCLUSIONS: The data suggested that ELF magnetic fields and microwaves under specific conditions of exposure affect lymphocytes from healthy and electrosensitive donors. ELF under specific conditions of exposure resulted in apoptotic DNA fragmentation.

These effects differ at different frequencies and vary between donors. In some cases, cells from electrosensitive donors responded stronger than cells from gender- and age-matched control subjects, but the results need to be confirmed in a larger study group.

These studies were supported by the Swedish Council for Working Life and Social Research and the Swedish Radiation Protection Institute.

<http://www.bioelectromagnetics.org/doc/bems2002-program-platform.pdf>

"Electrosensitivity-can it be prevented "

The following message from Martin Andersson mentions a new 53 page booklet written By Andersson and Westlund. Titled "Electrosensitivity-can it be prevented " and written in English. I highly recommend as a valuable contribution to the issue. It highlights that frequency and shape of the waveform of the electric and magnetic fields is a major factor in electrosensitivity cases in the workplace. The book costs 10 EURO + postage and is available from Martin Andersson at: ama-konsult@telia.com

Don Maisch

Dear Don, I think the chemical question is very important and it can be the initial trigger for hypersensitivity. But we can also see the change of using electricity. In Sweden energy-saving equipment has been a factor of increasing the levels of high-frequency components in the powerline systems. And the use of PLC (power line communication) is also a factor. The first ES people was reported from office in connection with use of VDU's. Some reports came before 1980 of ES reported from other sources, shortwave radio transmitters and other sources. But from 1985 it was a massive increase of people that were sitting with computers that had skinproblems and problems with the CNS.

And as I wrote in the book "Electrosensitivity-can it be prevented" ISBN91-630-0661-8, I could see a connection between exposure of high-frequency electric fields, and the described symptoms.

I and my colleges made electrosanitation in thousands of work-places, and many of the sensitive persons we helped could go on working. We could see that some VDU's more frequently gave symptoms than others, and we did not know why there were differences. Maybe it was some chemicals in certain VDU's that made the difference???

But the electric HF-fields were at my standpoint one important factor. Now the levels of HF-electric fields are rising from other sources than VDU:s, so it is not easy to give a good electrical environment with small means. I am attaching a report that shows how the protective earth is involved.

I think that this problem is not just a Swedish problem, even if we have a wiring system which is different from some other European systems, and countries that have to take care of the risk of earthquakes. We are planning to do some technical measurements in other countries to see if the disturbances in the "protective earth" has taken same proportions as in Sweden.

Martin Andersson

D No. 9/2004

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