



Health Protection Agency

NRPB Press Releases

Archive for 2004

Health Effects from Mobile Phones and other Radiofrequency Sources

14 January 2004

An independent Advisory Group has [reviewed the evidence](#) ¹ for health effects from radiofrequency transmissions, especially that published since the Stewart Report on [Mobile Phones and Health](#) in 2000. The biological and epidemiological evidence does not suggest cancer causation, in particular from mobile phone use, nor any other adverse health effect from radiofrequency exposures at levels below guidelines. However, there are limitations to the research carried out so far, and mobile phones have only been in widespread use for a relatively short time. The Advisory Group concludes that there is still a possibility that there could be health effects from exposure to radiofrequency transmissions below guideline levels, and continued research is needed.

The independent [Advisory Group on Non-ionising Radiation](#) (AGNIR: Chairman, Professor Anthony Swerdlow) has examined ¹ recent experimental and epidemiological evidence for health effects due to exposure to radiofrequency (RF) transmissions, including those associated with mobile telephone handsets and base stations. There are many sources of RF exposure, including the signals from radio and TV transmitters, but the current focus of public concern tends to be on mobile phones and mobile phone base stations.

AGNIR has concluded that there is no biological evidence for mutation or tumour causation by RF exposure, and epidemiological studies overall do not support causal associations between exposures to RF and the risk of cancer, in particular from mobile phone use.

A number of studies have suggested possible effects on brain function at RF exposure levels comparable with those from mobile phone handset usage, but AGNIR regard the overall evidence as inconclusive. Other studies have indicated effects of pulse modulated RF on the movement of calcium ions in cells and tissues of the nervous system. However, AGNIR found that the early results are not supported by recent, better conducted studies.

Regarding exposures in the vicinity of mobile phone base stations, AGNIR has examined data from a number of surveys and concluded that exposure levels are extremely low and the evidence indicates that they are unlikely to pose a health risk.

Nevertheless, AGNIR points out the limitations of published research and concludes that:

"In aggregate the research published since the IEGMP report does not give cause for concern. The weight of evidence now available does not suggest that there are adverse health effects from exposures to RF fields below guideline levels, but the published research on RF exposures and health has limitations, and mobile phones have only been in widespread use for a relatively short time. The possibility therefore

remains open that there could be health effects from exposure to RF fields below guideline levels; hence continued research is needed."

The Board of NRPB, now chaired by Sir William Stewart, welcomes this timely report from AGNIR on a topic of public interest, and has issued a response statement (see Notes for Editors below).

1. [Health effects from radiofrequency electromagnetic fields](#). Report of an independent Advisory Group on Non-ionising Radiation. Doc NRPB, 14(2), 2003.

Notes for Editors

1. AGNIR Membership. The Advisory Group on Non-ionising Radiation (AGNIR) was set up by the Director of NRPB in 1990. The terms of reference are: *to review work on the biological effects of non-ionising radiation relevant to human health and to advise on research priorities.*

AGNIR was reconstituted in 1999 as an independent group and reports directly to the Board of NRPB. The Chairman of AGNIR is Professor A J Swerdlow, Institute of Cancer Research, London (Sir Richard Doll, Imperial Cancer Research Fund Cancer Studies Unit, Oxford was Chairman until his retirement on 31 March 2003). The members of AGNIR during the writing of this report were: Professor C Blakemore, University of Oxford; Professor L J Challis, University of Nottingham; Professor D N M Coggon, University of Southampton; Dr L A Coulton, University of Sheffield; Professor S C Darby (from 1 June 2003), University of Oxford; Dr P Haggard (from 24 October 2002), University College London; Professor D Noble (from 23 June 2003), University of Oxford; Professor M D Rugg (until 28 February 2003), University College London.

For further details on AGNIR membership, observers, assessors and consultants see http://www.nrpb.org/advisory_groups/agnir/index.htm

2. Independent Expert Group on Mobile Phones (IEGMP). This Group was set up in 1999 under the Chairmanship of Sir William Stewart, FRS FRSE and issued its report "Mobile Phones and Health" in May 2000. The report provided a comprehensive review of experimental and epidemiological studies related to exposures to RF radiation and made a number of recommendations. These covered government and industry, research requirements, the need for better public information and consumer choice, and the role of NRPB. These recommendations have now been taken forward by government and other bodies. One of its recommendations was: *"the issue of possible health effects from mobile phone technology should be the subject of a further review in three years time, or earlier if circumstances demand it"* (paragraph 1.60).

The AGNIR report published today is in response to this recommendation and follows a request to the Board of NRPB from Government to conduct this further review. For further information about IEGMP, see <http://www.iegmp.org.uk/>

3. NRPB Response Statement. The Board of NRPB is concerned to ensure that, as far

as possible, any potential adverse health effects of mobile phone technology on the general public are recognised early and addressed. It therefore asked the independent Advisory Group on Non-ionising radiation (AGNIR) to provide an update of the scientific evidence relevant to an assessment of the effects of exposure to RF fields which has accumulated since the IEGMP Report on Mobile Phones and Health was published in 2000. The Board considers that the AGNIR review, just published, supports the broad conclusions of the Stewart Report in 2000 that a precautionary approach to the development of mobile phone technology remains a justifiable approach.

[See the full text of the NRPB statement.](#)

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PLEASE NOTE THIS PRESS RELEASE REFERS TO A COURSE WHICH HAS NOW TAKEN PLACE

Occupational EMFs and the Physical Agents Directive New NRPB EMF Awareness Course in 2004

25 February 2004

This year, NRPB is arranging a new course for decision-makers and advisers in industry to gain an understanding of the proposed Physical Agents (EMF) Directive of the European Union (EU), and, in particular, the guidelines of the International Commission on Non-Ionizing Radiation Protection (ICNIRP), which form the basis of the Directive. NRPB advice on exposure limitation is also being published this year.

The first course will be held on 27th May at the NRPB Training Centre, Chilton, Oxfordshire. It will cover the potential hazards of electromagnetic fields (EMFs), practical aspects of measuring electric and magnetic fields, and testing and measures for compliance. The EU Physical Agents (EMF) Directive is a health and safety directive designed to protect workers from the risks arising from exposure to EMFs. The EU approval procedure for the Directive could be completed as early as April 2004, and the Health and Safety Executive (HSE) has suggested that it would come into force in the UK around 2008/2009. Once approved by the EU parliament, UK statutory instruments will be drawn up and there will be a period for implementation.

The course is broad-based and intended to cover a range of sources and sector activities. A number of important sources of exposure will be reviewed, such as those affecting workers in the electricity industry and power generation, broadcast and telecommunications, induction heating of the type used in steel and other metal processing industries, and anti-theft devices such as those used in libraries and shops. The practical aspects of assessing compliance will be considered and a guest speaker from HSE will talk about the legislative framework in the UK. The course finishes with a panel session in which the audience will be able to ask questions about particular sources and areas of activity.

To book a place on the course, or to arrange an NRPB customised course for a particular sector activity, please call Training on 01235 822701.

Press enquiries:

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Particle Deposition and Health in the Vicinity of Power Lines

10 March 2004

The independent Advisory Group on Non-ionising Radiation has examined evidence relating to whether there could be health effects caused by increased charge on pollutant particles in the atmosphere resulting from the presence of power lines. It has concluded that any effect of charge is unlikely to have more than a slight influence, if any, on the health of the general population.

In the late 1990s it was suggested that the strong electric fields that occur in the vicinity of power lines might increase the adverse effects of atmospheric pollutants on the health of the general public. Such pollutants include radon decay products, chemicals, spores, bacteria and other organisms.

The deposition of pollutant particles present in the atmosphere on the skin and in the lungs may be increased if they are electrically charged. High voltage electricity transmission lines may cause corona discharge, which can increase the charge on pollutant particles.

The effect of charge on the deposition of pollutant particles has been examined in the report 1 by the Independent Advisory Group on Non-ionising Radiation. The Advisory Group concluded that:

"?.it seems unlikely that corona ions* would have more than a small effect on the long-term health risks associated with particulate air pollutants, even in the individuals who are most affected. In public health terms, the proportionate impact will be even lower because only a small fraction of the general population live or work close to sources of corona ions."

The potential implications for the health of the general public of corona ions generated by power lines do not, therefore, provide a strong case for further research in this area. The Advisory Group suggests some possible studies that would provide further information on the charge distribution on atmospheric particulate materials and its effect on deposition in the body.

1. [Particle Deposition in the Vicinity of Power Lines and Possible Effects on Health](#). Report of an independent Advisory Group on Non-ionising Radiation and its Ad Hoc Group on Corona Ions. Doc. NRPB, 15 (1), 3-62 (2004). Available on NRPB website. Hard copies are available for sale, £18.00 per copy, from NRPB Information Office, Chilton, Didcot, Oxon, OX11 0RQ (Tel: 01235 822742, fax: 01235 822746, email: information@hpa-rp.org.uk). Major credit cards are accepted for payment or cheque with order. Please add 10% postage and packing.

*** Note for Editors - Corona ions**

These are positive or negative ions produced during (corona) discharge, which occurs when air is ionised near to high voltage electric power lines. Electric power transmission lines are designed to avoid this for reasons of efficiency and economy.

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Laser Safety for Medical and Cosmetic Applications

29 March 2004

NRPB has organised a one-day awareness course on laser safety for users of medical lasers and Intense Pulsed Light (IPL) systems. The course will be held at the NRPB Training Centre, Chilton, Oxfordshire on Wednesday 5 May 2004. The aim of the course is to assist users and managers to understand the risks from medical lasers and IPL systems.

The recent changes to the laser British Standard and UK medical laser regulations will be covered in the course. The course is especially designed to meet the needs of laser nurses, technicians, beauticians, dentists and medical consultants, although specialists working in other areas may also find the material useful. A representative from the National Care Standards Commission will be in attendance and an NCSC stand along with other exhibitor stands will be staffed throughout the course.

The subject areas to be covered are as follows:

- Laser and IPLS basics
- Lasers and related hazards
- Legislation and guidance
- Private clinic use and issues
- Laser fume - cause for concern?
- Laser Risk Assessments
- Practical Control Measures
- Laser Safety Management

Further information on the course, including the [programme and application form](#), can be found on the NRPB website. To book a place on the course please contact Training on 01235 822701, or by [email](#).

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NRPB Recommends Adoption of International Guidelines

31 March 2004

NRPB recommends (1) the adoption in the UK of the guidelines of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) for limiting exposure to electromagnetic fields (EMFs) between 0-300 GHz. These frequencies include EMFs produced by television and radio transmissions, by mobile telecommunications and by electricity supply and use.

In 1993 NRPB published exposure guidelines for limiting exposure to static and time varying EMFs continuously across the frequency range 0 to 300 GHz. Since that time there has been a considerable amount of research published and, importantly, ICNIRP has published exposure guidelines covering the same frequency range. The ICNIRP guidelines incorporate two tiers of protection: one set of values for occupational exposure and another, more restrictive, set for general public exposure based on a cautious interpretation of the science. Many countries have now adopted the ICNIRP guidelines and they provide the basis for a European Council recommendation on limiting exposure of the general public to EMFs.

NRPB has maintained an ongoing review of scientific evidence and health risk assessment and, at the request of the Department of Health, has addressed the issues of uncertainty in the science and aspects of precaution.

In its review of the science 2, NRPB obtained advice from UK and international scientific experts and from published comprehensive reviews by expert groups, including the independent Advisory Group on Non-ionising Radiation (AGNIR). NRPB has also given careful consideration to the views expressed in response to a consultation document on its proposed guidelines issued in May 2003. In addition to views expressed directly, NRPB has also listened to the concerns of the public including those raised at a public open meeting on power lines held in December 2002. It is also aware of issues raised at the open meetings held around the country by the Independent Expert Group on Mobile Phones (IEGMP).

The ICNIRP guidelines set restrictions on exposure to prevent adverse health effects for which there is clear evidence and whose mechanisms are understood. NRPB notes that uncertainties in the science remain, particularly those associated with epidemiological studies. Although these studies do not provide a sound basis for quantifying exposure guidelines, NRPB considers they indicate that further precaution may be appropriate in respect of some EMF exposures.

The NRPB Chairman, Sir William Stewart FRS FRSE, said "This new recommendation by NRPB to adopt ICNIRP guidelines reflects a detailed assessment of the risks involved, and also the need for a precautionary approach when there are genuine uncertainties in our knowledge."

1. Statement by the National Radiological Protection Board. Advice on Limiting

Exposure to Electromagnetic Fields (0 - 300 GHz). Doc. NRPB 15 (2) 2004. ISBN 0-85951-532-X. Price £12.50. Available on NRPB website (http://www.nrpb.org/publications/documents_of_nrpb/abstracts/absd15-2.htm).

2. Review of the Scientific Evidence for NRPB Advice on Limiting Exposure to Electromagnetic Fields (0 - 300 GHz). Doc. NRPB 15 (3) 2004. ISBN 0-85951-533-8. Price £30.00. Available on NRPB website (http://www.nrpb.org/publications/documents_of_nrpb/abstracts/absd15-3.htm).

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Radiofrequency Hazards Safety Awareness

19 April 2004

NRPB has organised a one-day awareness course on radiofrequency (RF) hazards. The course will be held at the NRPB Training Centre, Chilton, Oxfordshire on Thursday 17 June 2004.

The aim of the course is to provide a basic understanding of the hazards associated with RF sources such as telecommunications antennas and microwave link dishes. The course will cover recent changes in NRPB advice and proposed European legislation. In addition, current mobile telephony research will be summarised. Practical guidance on exposure and risk management will be given and procedures for safe working practices and emergency arrangements will be discussed. The course will conclude with discussion on RF safety management and current research.

The course is designed to meet the needs of any person working near a source of RF exposure such as laboratory workers, antenna riggers and workers at heights or on roofs such as heating engineers, maintenance and works department staff, emergency services personnel and surveyors. Management and health and safety personnel would also find this course an ideal introduction to RF safety and risk assessments.

The subject areas covered are as follows:

- Interaction of Radio Waves with the Human Body
- Adverse Health Effects
- Legislation and Guidance
- Sources and Applications
- Assessment of Exposure
- Risk Assessments
- Practical Controls and Contingency Arrangements
- RF Safety Management
- Current Research

Further information on the course, including the programme and application form, can be found on the NRPB website. To book a place on the course please contact Training on 01235 822701, or by [email](#).

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Sir William Stewart Reappointed as Chairman of NRPB

25 May 2004

Sir William Stewart, PhD, DSc, FRS, FRSE, has been reappointed by the NHS Appointments Commission to serve as Chairman of the National Radiological Protection Board (NRPB) from 1st April 2004 until 31st March 2005. This appointment currently has an annual remuneration of £15,420 and has been made in accordance with the Office of the Commissioner for Public Appointments (OCPA) Code of Practice.

NRPB was created by the Radiological Protection Act 1970 which is currently being considered for repeal under the Health Protection Bill in Parliament to enable NRPB to become part of the Health Protection Agency (HPA). The statutory functions of NRPB are, by means of research and otherwise, to advance the acquisition of knowledge about the protection of mankind from radiation hazards and to provide information and advice to persons (including Government Departments) with responsibilities in the United Kingdom in relation to the protection from radiation hazards either of the community as a whole or of particular sections of the community.

Sir William is also Chairman of the Health Protection Agency for which he receives an annual remuneration of £35,000. He was previously President, Royal Society of Edinburgh from 1999-2002; Chief Scientific Adviser, Cabinet Office 1990-1995 and Head of Office of Science and Technology 1992-1995. He has held a number of other high profile appointments including: Architect of the Government's Technology Foresight Programme, which was launched in 1995 and Chairman of the Independent Expert Group on Mobile Telephones and Health, which reported in 2000.

All appointments are made on merit and political activity plays no part in the selection process. However, in accordance with the original Nolan recommendations, there is a requirement for appointees' political activity to be made public. Sir William has declared that he is not involved in any political activity.

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High Radon Houses found in Cornwall

27 May 2004

Two houses with high radon levels have been found in the Kerrier District of Cornwall; one with 17,000 Bq m⁻³ (bequerels per cubic metre of air) of radon, the other with 12,000 Bq m⁻³. The highest value previously found in the UK is 10,000 Bq m⁻³. These concentrations are well above the UK Radon Action Level of 200 Bq m⁻³. NRPB has advised that action should be taken to reduce all radon concentrations which exceed the Action Level. The higher the concentration, the greater the risk to health and the earlier the remedial action should be taken. When the concentrations are very high, as in these two cases, NRPB strongly advises that effective action is taken as soon as practicable and certainly within a few months.

The householders in the two properties have been informed and advised of the health risks. One property is a rented flat; the other is a house occupied by the owner. The householder and the landlord of the flat are being given advice on remediation. Steps are in hand to renew the offer of radon tests to neighbouring householders.

These measurements were made as part of the Radon Roll-out Programme run by the Department for Environment, Food and Rural Affairs (DEFRA). The Local Authority, in this case Kerrier District Council, is a key part of the Programme that also involves the Building Research Establishment as well as NRPB. These organisations, together with the Health Protection Agency and the local medical authorities in Cornwall, are liaising to minimise the risk to the occupants of these and any other houses found with high radon levels.

Anyone concerned about the radon levels in their home can obtain a free information pack about radon (including details of how to obtain a test kit) by leaving their name, address and postcode on the free telephone number 0800 614529. Further information is also available on the NRPB website (<http://www.nrpb.org/radon/index.htm>). Test kits are available free of charge to householders in the highest risk areas of councils participating in the DEFRA Roll-Out programme. Householders should contact their local councils. Otherwise a test kit of two detectors costs £36.19 inclusive of VAT and all post and packing and is available direct from NRPB either on-line, by telephone or post.

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Notes for editors

1. Radon is a natural radioactive gas that enters buildings from the ground and gives radiation doses to the occupants. It occurs at low levels in all buildings. The average radon level for all UK dwellings is 20 Bq m⁻³ and the Action Level is 200 Bq m⁻³. At or above the Action Level, remedial action to reduce radon is recommended.
2. Exposure to high levels of radon over an extended period is linked to an increased risk of lung cancer. It is estimated that some 2,500 cases of lung cancer are caused by indoor radon each year in the UK.
3. Existing published information identifies high risk areas by 5 km grid squares (map format) and local council and postcode divisions (data tables) in England, Wales and Northern Ireland. In addition, for Southwest England data are provided by 1 km grid squares and local electoral wards. For further details see reports '[W-26 Radon Atlas of England and Wales](#)' and 'R308 Radon in dwellings in Northern Ireland'. W26 is available free as a download or to buy direct from NRPB (£16.50 including postage and packing). A summary of R308 is available and the full report is available from the Environment and Heritage Service (EHS), Department of the Environment for Northern Ireland.
4. Most recent measurements made under government programmes (DEFRA, Welsh Assembly Government, Scottish Executive and EHS, Northern Ireland) which involves local authorities and the Building Research Establishment as well as NRPB. Further details are given in POSTNOTE 158 (www.parliament.uk/post/home.htm).
5. The recommended method of measuring radon is to use two passive detectors in each dwelling. The detectors are sent by post and left in place for three months: one in the living area and one in a bedroom. The three-month measurement period averages out any short-term variations caused by changing weather conditions.
6. Prior to the current initiative, householders in the highest risk areas have received offers of a radon measurement at no charge over the years. This has included all 650,000 homes in Cornwall and Devon in 1992 by a leaflet delivered with the mail. This was followed by individual invitations to the householders of all unmeasured homes in the highest risk areas.
7. Remedial action is normally simple and effective. Typically installation costs range from around £500 to £1,500 and running costs (for active systems) around £30 to £50 per year for electricity to power the fan. In time, replacement fans will be required (perhaps every 5 to 10 years) at a cost of about £180.

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NRPB publishes phone mast surveys

24 June 2004

The results of radio wave surveys in the vicinity of mobile phone base stations and other transmitters have just been published on the NRPB website. They include measurements near schools, homes and apartments, hospitals, public utilities, offices and other workplaces. Exposures from mobile phone base stations are usually small fractions of international guidelines, typically less than 0.01% at most locations accessible to the public. The surveys show that radio and TV transmitters can produce exposures that are comparable with those from mobile phone base stations.

The material published on the NRPB website today (www.nrbp.org/radiation_topics/emf/index.htm) contains the results of 20 surveys in an easily accessible format, along with details of measurement locations and the overall conclusions of the surveys. The surveys are displayed according to regional location and also within four broad categories: homes, workplaces, schools and public utilities. The results are expressed as percentages of the guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) which have been adopted in the UK and in most other countries. Exposures to radio waves near mobile phone base stations and other transmitters where the public has access are usually small fractions of the ICNIRP guidelines. The results of more surveys will be added to the website in due course.

NRPB scientists have been carrying out measurements of the strength of radio wave signals from telecommunications transmitters for many years. The Stewart Report (Independent Expert Group on Mobile Phones, May 2000) used NRPB and other data to assess peoples' exposure to signals from mobile phone handsets and their base stations. The aim of publishing the results of the radio wave surveys on the NRPB website is to provide readily available factual information.

NRPB Chairman, Sir William Stewart said 'Some people worry about the radio waves from mobile phone masts and we want to provide as much clear information as we can on this topic. Many of the concerns can relate to planning matters rather than scientific and health issues. This is a matter we expect to return to when NRPB issues a statement on mobile phones and health later this year.'

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Notes for Editors

1 Independent Expert Group on Mobile Phones (IEGMP). In 1999 the Government asked the Board of NRPB to establish an expert group to examine any possible health effects from exposure to radiofrequency (RF) radiation from mobile phones, base stations and transmitters. The chairman of the Independent Expert Group on Mobile Phones (IEGMP) was Sir William Stewart, FRS. The report by IEGMP on mobile phones and health was published in May 2000 and can be found on the website www.iegmp.org.uk.

2 Previous NRPB measurements in the vicinity of masts. In 2000, NRPB published a report Exposures to radio waves near mobile phone base stations, NRPB-R321 by M Mann, T G Cooper, S G Allen, R P Blackwell and A J Lowe. The results had been made available to IEGMP in the preparation of their report. NRPB-R321 is available on the NRPB website [atwww.nrpb.org/publications/archive/reports/2000/nrpb_r321.htm](http://www.nrpb.org/publications/archive/reports/2000/nrpb_r321.htm)3 NRPB provision of measurement services. Local authorities, schools, businesses, public utilities and other organisations have requested radio wave surveys by NRPB. The measurements are carried out under contract to recover costs, and a report is provided to customers. See the NRPB website at www.nrpb.org/services/index.htm for more information about these and other services.

4 ICNIRP guidelines. The International Commission on Non-Ionizing Radiation Protection published its guidelines in 1998 and they have been adopted in the UK for mobile phone transmissions since 2000. See Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz). *Health Physics* 74(4) 494 (1998).

5 Base Station Audit. Since 2000, the Radiocommunications Agency (now part of the Office of Communications, OfCom) has carried out an audit of base stations to check compliance with ICNIRP guidelines. The results are available on the OfCom website and are consistent with NRPB measurements. www.ofcom.org.uk/consumer_guides/mob_phone_base_stat/audit_info?a=8710.

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Risk and Precaution

27 July 2004

NRPB has published a report 1 of a seminar that examined important terms used to communicate risk to the public, in particular the precautionary approach and the precautionary principle. The report examines the role of scientists and experts in assessing risks and the role of authorities managing the risks. The public demands that organisations involved in assessing risks should be open, transparent and impartial. If this is not achieved, public trust in advice on risks can be undermined significantly.

Precaution in everyday life is usually determined by intuition, experience and observing the behaviour of others. A precautionary approach and the precautionary principle have more specific meanings but are sometimes confused with each other, and with everyday precaution. It would be better to reserve these terms for their more specific meanings in the worlds of science and politics.

Scientists use a precautionary approach when interpreting experimental evidence for risks of harm and when they convert these data into advice on acceptable levels of public or occupational exposure. If the necessary information is uncertain or has to be inferred from experimental data, significant additional caution is needed in setting guidelines or limits. This use of precaution by scientists in assessing risks from radiation and other agents, including chemicals, is not widely known or appreciated.

The precautionary principle is a political term for decisions on preventive action when the scientific evidence is not clear enough for a detailed risk assessment. If the level of harm and the likelihood of occurrence were well known, then a precautionary approach suffices because the government and public can base decisions on evidence. If the level and the likelihood of a risk is not certain, then scientists should advise on the hazards, assess the available evidence of harm, advise on whether and how to apply the precautionary principle and then do research to enable a more reliable assessment of the risks.

The report also examines the various definitions of the word "safe", the role of scientists and experts in assessing risks, the role of public authorities and the need for organisations like NRPB to be open, transparent and impartial. Some practical advice is given on how to ensure that organisations are open.

1 Radiation, Risk and Society Advisory Group. In Terms of Risk. Report of a seminar to help define important terms used in communicating about risk to the public. Doc. NRPB 15(4), 1-13 (2004). Available on the NRPB website (http://www.nrpb.org/publications/documents_of_nrpb/abstracts/absd15-4.htm).

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NRPB Publishes 2003-2004 Annual Report

10 September 2004

The NRPB Annual Report published today includes reviews of its work, a list of publications and the Annual Accounts for 2003/2004.

Dr Roger Cox, Director of NRPB says:

"There have been a number of notable developments during the year. Much emphasis was placed on scientific review work, which provided the foundation for recently published Board advice on limiting exposure to electromagnetic fields. The development of this advice included consultation not only with government departments, relevant agencies and industry but also more broadly via responses to a consultation document posted on the NRPB website. The review took into account a comprehensive report on health effects from radiofrequency electromagnetic fields prepared by the independent Advisory Group on Non-ionising Radiation and input from the work with the International Commission on Non-Ionizing Radiation Protection and the World Health Organisation.

In respect of ionising radiation, NRPB has continued to support work on domestic exposure to radon in the UK, models for assessing the transfer of radionuclides from mother's milk to child have been developed, and two new EC-supported multi-partner programmes have been initiated- one concerning cancer mechanisms and the other on recovery in urban and rural areas following unplanned releases of radionuclides. Members of staff have also worked with the International Commission on Radiological Protection on the development of new recommendations for radiological protection and with the US National Academy of Sciences in the development of revised estimates of the health risks from ionising radiation."

The latest Annual Report contains reviews of other work being undertaken at NRPB including the advice and support given by NRPB to Government and the Devolved Administrations, emergency response, electromagnetic fields, ultraviolet radiation, lasers, ionising radiation effects, e.g. radiation-induced cancer in children and adults and genetic susceptibility to such cancer, along with transgenerational effects, medical exposures, intakes of radionuclides, workplace exposure to radon, environmental assessments, occupational exposure and provision of occupational dosimetry, Radiation Protection Adviser and other commercial services and the overall promotion of public health.

The [Annual Report](#) is now available on the NRPB website and printed copies can be obtained by contacting the NRPB Information Office (Tel: 01235-822742) or email: information@hpa-rp.org.uk.

Press enquiries: E-mail: pressoffice@hpa-rp.org.uk

Mobile Phones, Base Stations and Power Lines - NRPB EMF Awareness Course 2004

6 October 2004

Chilton, Oxfordshire - 11 November 2004

A one-day awareness course on mobile phones, base stations and power lines is being organised by NRPB at its headquarters at Chilton, Oxfordshire on Thursday 11th November 2004.

Key issues to be covered this year include the AGNIR report on health effects of RF radiation, NRPB advice on exposure limitation, and the EU Physical Agents EMF Directive which is due for approval and would come into force in the UK around 2008/2009.

The course is designed for industry and local government health and safety professionals, including those involved with environmental health, planning and public health medicine. Specialists wishing to gain a broader perspective may also be interested in attending. The course aims to help individuals understand the most recent scientific and policy developments, to respond to concerns and meet the requirements of health and safety legislation.

For further information, please see the [brochure and application form](#) on the NRPB website.

To book a place on the course please call NRPB Training on 01235 822701.

Alternatively, should you wish to arrange a customised course for a particular sector activity, please call Liz Rance on 01235 822725.

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NRPB publishes revised At A Glance leaflet on Transport of Radioactive Materials

8 December 2004

NRPB has updated its colour broadsheet Transport of Radioactive Materials, in the At A Glance series, an [animated version](#) of which is available on the NRPB website.

Transport of Radioactive Materials gives a user-friendly introduction to the subject. This second edition summarises the use of radioactive materials to explain why their transport is essential; describes the types of packages and containers used; illustrates, with bar charts, the radiation doses received during routine transport operations and the frequency of incidents between 1990 and 2002; and outlines package labelling and regulation.

Single copies of the broadsheet, which opens out to form a display poster, are available free of charge from the NRPB Information Office: telephone (01235) 822742, fax (01235) 822746, or email information@hpa-rp.org.uk. There is a charge of £0.50 per copy for multiple quantities (plus 10% towards postage and packing). Cheques should be made payable to NRPB or major credit cards are accepted.

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Radiation Doses in Infancy and Cognitive Function in Later Life

7 January 2004

Recent newspaper headlines suggested that new research showed that CT examinations of infants' heads might damage their brains. This response statement summarises the evidence and points out that existing guidelines restrict all medical uses of radiation, and CT in particular, to ensure that the clinical benefit to the patient outweighs any radiation hazard.

A new study from Sweden has reported adverse effects on cognitive function in adulthood among males treated with radiation for skin haemangioma during infancy (Hall *et al*, *BMJ*, **328**, 19-21, 2004). The proportion of boys who attended high school decreased with increasing radiation dose to the brain. Furthermore, there was a negative trend with dose to the brain for three cognitive tests for learning ability and logical reasoning, but not for a test of spatial recognition. The mean brain dose was 50 mGy. The evidence for the effects reported was strongest among those males who received the highest doses, and it is unclear whether there was a dose threshold below which no effects occurred.

This appears to be a well-conducted study, based on a sizeable cohort. Data on exposures and outcomes were collected in an objective manner, so reducing the possibility of bias. In such studies it is always necessary to consider whether factors relating to the original condition may have driven the findings. However in this study, comparisons were made of cognitive function amongst haemangioma patients with differing levels of brain dose, rather than using an external comparison group. Confounding would seem plausible only if the severity of the clinical condition both affected IQ AND was correlated with the brain dose.

Comparison of these results with previous studies is not straightforward, since many of these studies had considered higher doses, exposures received *in utero* rather than in infancy, or may have been subject to confounding by the clinical condition that gave rise to the exposure. However, there does appear to be consistency across studies, in indicating adverse effects of radiation on intellectual development.

Established principles of radiation protection call for unnecessary exposures to be avoided and for all exposures to be kept as low as reasonably practicable. This is to control well-established risks, largely of radiation-induced cancers.

Much the commonest significant doses to infants are from medical procedures. Ordinary X-rays give low doses, but Computed Tomography (CT), which can give more detailed clinical information, involves higher doses. However, CT of the head is not a first line examination for children except in the case of severe head injury. In the UK, guidelines have been produced by the Royal College of Radiologists and by the National Institute for Clinical Excellence. These guidelines specify that CT head scans are not appropriate for minor head injuries, but only in those few cases where there are specific clinical symptoms suggesting the possibility of significant brain injury which may require neuro-surgical intervention.

Nevertheless, if stringent efforts are not made to adjust the CT scanning protocol to the small size of very young patients, the dose to the brain from localised head exposure can possibly exceed 100 mGy, and would fall within the upper range of doses encountered in the Swedish study. Therefore, the results of this study reinforce the need for optimising CT scan protocols to minimise the dose to the patient without losing essential diagnostic information and for restricting such examinations to those cases where there is a clear clinical indication.

Note

The Swedish study discussed the consequences of doses to the brain; where the head is irradiated the doses to other organs and tissues of the infants concerned will generally be much lower. For protection purposes it is common to express the potential harm from inhomogeneous partial body exposures in terms of the "effective dose", a weighted sum of doses to many organs and tissues. The dose to the brain will be much higher than the effective dose from a CT brain scan, since (as the most highly irradiated "remainder" organ) dose to brain is multiplied by a tissue weighting factor of 0.025 to form the major contributor to the effective dose. Provisional NRPB calculations of organ doses from CT head scans on infants suggest that effective doses of about 5 mSv and corresponding brain doses of about 100 mGy would be possible if adult CT scanning protocols were applied to infants aged below 18 months.

NRPB response to 'Health Effects from Radiofrequency Electromagnetic Fields', a report of an independent Advisory Group on Non-ionising Radiation (AGNIR)

14 January 2004

Board Statement

The Board of NRPB is concerned to ensure that, as far as possible, any potential adverse health effects of mobile phone technology on the general public are recognised early and addressed. It therefore asked its independent [Advisory Group on Non-ionising Radiation](#) (AGNIR) to provide for it an update of the scientific evidence relevant to an assessment of the effects of exposure to RF fields which has accumulated since the Stewart Report on [Mobile Phones and Health](#) was published in 2000.

The review of the current scientific evidence contained in the present report 1 [Health Effects from Radiofrequency Electromagnetic Fields, Doc NRPB 14\(2\), 2003](#) is important as one component of the portfolio of issues which needs to be considered to ensure a well rounded response to public concerns. We thank Tony Swerdlow and all members of the AGNIR for the considerable time and effort which has been put in to generating their detailed report.

As part of its ongoing programme, in early 2004 the Board will recommend new exposure guidelines for electromagnetic fields. This will include fields from mobile phone frequencies.

The Board is also aware that there is a substantial ongoing programme of research being carried out both in the UK and abroad, and that the widespread use of mobile phones (about 50 million currently in circulation in the UK) is a relatively recent phenomenon. Additionally, the technology is developing rapidly. Taking such issues into account, in mid to late 2004 the Board expects to review and proffer overall advice to the public on mobile phone technologies and health.

In the interim, the Board considers that the AGNIR review, just published, supports the broad conclusions of the Stewart Report in 2000 that a precautionary approach to the development of mobile phone technology remains a justifiable approach.

Background to the report

The Stewart Report on Mobile Phones and Health, published in 2000 2 recommended that, on the basis of the evidence then available, a precautionary approach to the use of mobile phone technology should be adopted. This recommendation was immediately accepted by Government, as was the recommendation that the issue of possible health effects from mobile phone technology should be the subject of a further review in three years time, or earlier if circumstances demanded it. The Government asked NRPB to undertake this further review and the request to do so

was passed by the NRPB Board to its independent Advisory Group, AGNIR. The work reported here, by AGNIR, examines the recent scientific evidence.

Main conclusions of the AGNIR report

The review by AGNIR on *Health Effects from Radiofrequency Electromagnetic Fields* has examined recent studies related to the assessment of health concerns raised in relation to exposure to RF fields, including those arising from the use of mobile phones. It is published in the *Documents of NRPB 14(2), 2003 1* and covers sources of RF exposure as well as experimental and epidemiological studies. It is principally concerned with research published since completion of the report by the Independent Expert Group on Mobile Phones (IEGMP), the Stewart Report.

The AGNIR review is limited to radiation effects and does not consider other aspects of mobile phone or RF device use such as the use of phones while driving, exposure of patients under medical supervision, or possible interference with medical devices. The review also notes that there are many sources of RF fields - at work, at home and in the environment - but that recent emphasis in health-related studies has been on mobile phones and broadcasting masts.

A number of studies have suggested possible cognitive effects (effects on brain function) of exposure to RF fields from mobile phones, and of the effects of pulse-modulated RF on the movement of calcium ions in cells and tissues of the nervous system. AGNIR has concluded that:

"The overall evidence on cognitive effects remains inconclusive, while the suggestions of effects on calcium efflux have not been supported by more recent, better conducted studies."

In relation to concerns about cancer induction AGNIR has concluded that:

"The biological evidence suggests that RF fields do not cause mutation or initiate or promote tumour formation, and the epidemiological data overall do not suggest causal associations between exposures to RF fields, in particular from mobile phone use, and the risk of cancer."

The results from a number of surveys have become available on exposures to RF fields of members of the public near to base stations. AGNIR has examined these data and concluded that:

"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."

AGNIR also noted that:

"Little has been published specifically on childhood exposures to RF fields and no new substantial studies on this have been published since the IEGMP report."

The overall conclusion of AGNIR is that:

"In aggregate the research published since the IEGMP report does not give cause for concern. The weight of evidence now available does not suggest that there are adverse health effects from exposures to RF fields below guideline levels, but the published research on RF exposures and health has limitations, and mobile phones have only been in widespread use for a relatively short time. The possibility therefore remains open that there could be health effects from exposure to RF fields below guideline levels; hence continued research is needed."

There continues to be public concern about the development of Terrestrial Trunked Radio (TETRA) and the issue of pulsed signals and their possible adverse biological effects. TETRA is a communications standard developed for users, such as the emergency services, who need very resilient systems. A report by AGNIR on [Possible Health Effects from Terrestrial Trunked Radio](#) was published in 2001 ³. A conclusion in the AGNIR 2001 report is that:

"It is notable that the signals from TETRA base stations are not pulsed, whereas those from mobile terminals and repeaters are. Although areas of uncertainty remain about the biological effects of low level RF radiation in general, including modulated signals, current evidence suggests that it is unlikely that the special features of the signals from TETRA mobile terminals and repeaters pose a hazard to health."

Although the present AGNIR report does not specifically consider TETRA signals, no further information was identified that altered the AGNIR's conclusions about the signals given in the 2001 report. The Home Office has established a research programme covering all the recommendations for further work made in the 2001 report.

References

- 1 NRPB (2003). [Health effects from radiofrequency electromagnetic fields](#). Report of an independent Advisory Group on Non-ionising Radiation. Doc NRPB, 14(2), 2003.
- 2 IEGMP (2000). Mobile phones and health. Report of an Independent Expert Group on Mobile Phones. The report is also available on the Expert Group website: www.iegmp.org.uk.
- 3 NRPB (2001). [Possible health effects from terrestrial trunked radio \(TETRA\)](#). Report of an Advisory Group on Non-ionising Radiation. Doc NRPB, 12(2), 5-86, 2001

Alleged beneficial effects from the use of mobile phones by children

23 September 2004

At a recent meeting connected with the Liberal Democrats conference in Bournemouth in September 2004, it was suggested that the radio waves associated with mobile phones could have a beneficial effect on brain function in children. It was claimed that an unnamed British professor had considered that the heating caused by the absorption of the radio waves could increase intercommunication between brain cells, and so facilitate mental processes.

Such a proposition seems unlikely, however. The amount of energy absorbed by the head from typical mobile phones is relatively low, and calculations suggest that only a very small rise in temperature would occur in the brain, localised around the area under the phone. Best estimates using realistic computer generated models put the rise at about 0.1°C in adults. No studies have yet been performed using realistic models of children's heads but this value is unlikely to be very different. Therefore, any heating effect would be very small: people normally experience about a 1°C fluctuation in temperature throughout a day.

A few laboratory studies have suggested that the use of mobile phones by adults may cause mild effects on the brain and marginally increase the speed of reactions to stimuli. However, other, better controlled studies have not confirmed these effects. Nevertheless, these possibilities are being studied in many countries and the results of studies funded in the UK by the Mobile Telecommunications and Health Research programme 1 are expected to appear next year. However the weight of evidence so far does not suggest that large effects can occur.

However, for mobile phones to have any effect, they have to be held next to the head. Many children prefer texting to making voice calls, and with the phone held some distance from the head, any heating seems very unlikely. Also studies have shown that the amount of energy absorbed from a phone is very sensitive to the position of the phone next to the face, and differences in position can have effects on the energy absorbed. It is important to note that mobile phones on sale in the UK comply with exposure guidelines set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

Of course, holding a phone or other objects next to the ear will provide insulation (the principle of ear muffs) and the ear and face may become warm over time.

In brief:

- Effects are unlikely due to the small amount of heating in the brain from a mobile phone;
- Scientific evidence suggesting that mobile phones can affect brain function is inconsistent;
- Strategies which result in the phone being held away from the face removes any possible heating effects;
- Following the publication of the Stewart Report in 2000 the Department of Health has 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.
- Mobile phones on sale in the UK comply with exposure guidelines set by ICNIRP.

Reference

1 The Mobile Telecommunications and Health Research (MTHR) programme website is at:

<http://www.mthr.org.uk/>

European study of radon and lung cancer risks

21 December 2004

A new study of the risk from radon exposure has been published¹, using data on radon and lung cancer from nine European countries. The results from this large and important epidemiological study confirm that high levels of radon pose a hazard in the home. Moreover, it demonstrates a detectable risk at radon gas concentrations below current remedial action levels used in most EU countries, including the UK. NRPB will consider the implications of this study and, following consultation, give advice on whether further protection measures are necessary.

The study includes over 7000 individuals with lung cancer and twice as many controls, substantially more than has been available for any previous analysis, with data from thirteen separate case/control studies pooled and analysed as one large data set. The study is unambiguous in confirming that domestic exposure to radon carries a risk of lung cancer. In particular, the study demonstrates an increased risk of lung cancer at radon concentrations below the present UK Action Level of 200 Bq m⁻³ set in 1990 following a review of the data then available.

Smoking remains the largest single cause of lung cancer but radon is the second most important cause that has been identified. An important aspect of this study is that it takes account not only of individuals' exposure to radon but also uses detailed information on smoking habits. In absolute terms, the risks from radon are larger in smokers than in non-smokers.

In the UK, radon has been recognised as an important public health hazard for many years. The radiation dose from radon to the average member of the UK population is typically over a thousand times their dose from nuclear discharges.

Both the existing UK housing stock and new homes are considered in measures to control the radon risk to the population in areas where radon concentrations are likely to be high. The Building Regulations require that in certain parts of the country anti-radon preventative measures must be incorporated into new houses as they are being built. Public and private initiatives have involved testing almost half a million existing homes with a recommendation that remedial measures are undertaken if radon levels are found to be above the Action Level. Experience has shown that effective remedial measures can be fitted to a typical house for around £1,000.

NRPB will consider the implications of this study on current guidelines for radon preventative and remedial measures and give advice if necessary. A Sub-Group of NRPB's independent Advisory Group on Ionising Radiation, under the Chairmanship of Professor Julian Little, is currently conducting a review of the risks of radon exposure which will include this new study. NRPB will receive advice from this advisory Sub-Group and will then consider, consult and issue advice on any changes that should be made to the UK scheme for controlling radon exposures.

Reference

1 S C Darby et alia. Radon in homes and risk of lung cancer: collaborative analysis of individual data from 13 European case-control studies. See BMJ website at <http://bmj.bmjournals.com/cgi/content/abstract/bmj.38308.477650.63v1> and the paper will appear in published form early in 2005.

Notes for Editors

1. Radon is a natural radioactive gas which is responsible for the greatest radiation exposure of people in the UK. We already know a lot about radon risks, from studies of uranium and other miners who work in areas where levels are very high. Studies in homes are more directly relevant to the general population but, because risks are lower, larger numbers are needed to make precise risk estimates. A review will be undertaken which will integrate information on radon risks from miners, the European pooling and, it is planned, a forthcoming pooling from North America.

The NRPB website at www.nrpb.org contains information about radon including the radon Affected Area maps and how levels can be reduced in the home.

2. Radon can build up inside buildings. Homes and workplaces can easily be tested for radon and, if high levels are found, building alterations made to decrease the radon concentration. The first step to limiting domestic exposure to radon is to find out if the house is in an area where there are a large number of high radon houses. The next step is to arrange a radon test that takes about 3 months. In some areas of the country tests are offered free under programmes run by DEFRA, the territorial governments or local authorities. Tests can also be bought directly from NRPB and other companies. For further information about the DEFRA radon programme please see <http://www.defra.gov.uk/environment/radioactivity/radon> and information about [NRPB radon testing service](#) or Tel 01235 822622.

3. The concept of radon Affected Areas (parts of the country where more than 1% of homes have radon concentrations exceeding the Action Level) was introduced in 1990 to provide guidance to householders and the relevant authorities on the need to test a dwelling for high radon levels. It is recommended that remedial action be taken if radon concentrations are above the Action Level. These measures should be designed to reduce the annual average as low as reasonably practicable, not just to get below the Action Level. The first radon Affected Areas map was published in 1990, followed at intervals with maps of England, Wales and Northern Ireland and parts of Scotland. The complete map of Scotland will be completed by the end of next year.

Interim guidance on radon preventative measures for new dwellings was first promulgated in 1988 and formally published in 1991. More recently, updates have been published for each of the constituent parts of the United Kingdom.

4. Comparative doses from various sources of radiation to groups of the population

Group	Annual dose (mSv)
Average UK citizen from nuclear discharges	0.0002
Sellafield Critical Group (from discharges)	0.6
Average UK citizen (radon)	1.0
Average UK citizen (all sources)	2.5
House at the UK Action Level for radon	10
Legal limit for occupational exposure	20
House with radon at 17,000 Bq m ⁻³ (the highest level so far found)	850

5. The European Pooling of Radon Case/Control studies was supported by Cancer Research UK and the European Commission. The EC funding was under contract FIGH-CT1999-00008 as part of Framework Programme 5 of the Nuclear Fission and Radiation Protection Programme.

Mobile Phones and Cancer

22 December 2004

There has been recent media interest in a study from Germany, which is part of the EU funded REFLEX project (VERUM Foundation, 2004). This has reported effects of radiofrequency (RF) fields on cells in culture and has led to suggestions that mobile phones may cause cancer. It was performed by a partnership of 12 research groups from seven European countries, under the co-ordination of the Verum Foundation in Munich.

The aim of the four-year project was to investigate the effects of low frequency and RF fields on the *in vitro* responses of cells, possibly associated with the development of cancer at the molecular level. A large number of responses were examined in a wide variety of cells types, and included effects on cell proliferation, chromosomal damage and programmed cell death (apoptosis) as well as gene and protein expression profiles. RF field exposures were performed at levels roughly equivalent to the maximum advised for humans in existing exposure guidelines. Optimised exposure systems and thorough dosimetry were provided for the entire project by a very well respected laboratory.

The results presented in the REFLEX project need to be considered in the context of existing published studies. It is well accepted from the totality of the available evidence that RF fields do not possess sufficient energy to cause direct damage to DNA. Many research groups worldwide have investigated the molecular and cellular effects of RF fields using *in vitro* cell systems. After reviewing the available evidence, the independent Advisory Group on Non-ionising Radiation in a report to the Board of NRPB (AGNIR, 2003) concluded that 'although there has been a wide range of diverse exposures and biological models investigated, no consistent pattern has emerged from the cellular studies of RF exposure'. It was noted that positive findings have not been confirmed by other independent studies, similar experiments fail to confirm each other or may even show contradictory results. Overall it concluded that

'In aggregate the research published since the IEGMP report does not give cause for concern. The weight of evidence now available does not suggest that there are adverse health effects from exposures to RF fields below guideline levels, but the published research on RF exposures and health has limitations, and mobile phones have only been in widespread use for a relatively short time. The possibility therefore remains open that there could be health effects from exposure to RF fields below guideline levels; hence continued research is needed.'

In a Board response (NRPB, 2004) to the AGNIR report it was concluded that a precautionary approach to the use of mobile phone technologies, as had been recommended in the Stewart report (IEGMP, 2000), remains a justifiable approach.

Some results from the REFLEX project appear to challenge the AGNIR conclusions. For example, genotoxic effects were observed in fibroblasts, granulosa cells and HL60 cells. In various assays, RF-exposed cells demonstrated an increase in single

and double strand DNA breaks, and in micronucleus frequency; chromosomal aberrations were also seen in fibroblasts. Changes in the expression of specific genes, and alterations to proteins in human cell lines were also seen. There was no evidence that RF fields affected cell proliferation, apoptosis or immune function.

The reported effects appear to show very high levels of specificity with regard to cell type, exposure condition and the biological endpoint under consideration. Taken together, the results may suggest that certain types of exposure can cause genetic damage in certain cell types. However, if RF fields do cause genotoxic or carcinogenic effect, a consistent pattern of responses would be expected. Similarly these responses would be expected to be consistent in different cell types exposed to the same fields. Evidence of a consistent dose-response relationship would also strengthen the plausibility of any response.

While some responses do seem to have been repeated by different laboratories, others do not appear to have been seen consistently across the project. Also some only occurred in one cell type and not in others, and some changes were observed at one field intensity but not at higher or lower intensities.

Overall this inconsistency does not suggest that robust responses have been observed and the extent to which experimental artefacts may be operating is unclear. The physiological significance of some of the reported changes, for example in the changes in gene and protein expression, were commented on by the authors themselves and their biological relevance questioned.

In summary, the REFLEX project provides some novel observations regarding the potential of RF fields to affect cellular and molecular processes *in vitro*. The results will no doubt stimulate further highly focussed research to confirm or refute the findings. In due course, it is expected that AGNIR and other review bodies will examine the REFLEX project report, as well as any associated articles that may appear in the peer-reviewed literature.

The Board will be issuing further advice on mobile phones and health early in 2005.

References

- AGNIR (2003). [Health Effects from Radiofrequency Electromagnetic Fields. Report of an independent Advisory Group on Non-ionising Radiation.](#) Doc NRPB, 14(2), 1-178.
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