MTHR Research Programme: a summary

No. of studies:	**19**
Human studies on biology of mobile phone use:	7
Non-human studies on biology of mobile phone use:	3
Studies on psychology of mobile phone use:	3
Non-health studies of mobile phones:	1
Studies on how to study mobile phone use, *eg* dosimetry:	4
Studies on mobile phone base stations:	1
Studies that include TETRA signals:	**3**
Studies involving human biology and TETRA handsets:	1
Studies involving dosimetry and TETRA handsets:	2
Studies on TETRA base stations:	0

Studies, sorted by mobile phone use (18), and base stations (1)

1: Mobile phone use

A Case-Control Study of Brain Tumours and Acoustic Neuromas in Relation to Use of Mobile Phones

Researcher: Institute of Cancer Research

> This Project is a case-control study comparing mobile phone use and other radio-frequency radiation exposure, and in addition other potentially confounding exposures such as ionising radiation and genes, between cases (i.e. patients who have the study cancers) and controls (subjects who do not have these cancers). This project plans to recruit a 1000 brain tumour and acoustic neuroma patients and 1000 controls in the south-east of England. The brain tumour study will contribute to international combined analyses co-ordinated by the International Agency for Research on Cancer.

UK Case-Control Study of Adult Brain Tumours

Researcher: Information and statistics division, NHS Scotland

This is a population based case-control study. It is conducted by identifying newly diagnosed patients with brain tumours from four areas in England and Scotland. The patients (with permission) help the study by giving details of their past use of mobile phones, other information about their past occupations and medical histories and also donate a blood sample. People without brain tumours are chosen at random from the general population but to be of the same age, sex and residence as the patient group, and are asked identical information. The information from patients are then contrasted with that for the public as a whole. This will help to ascertain, for example, if their past use of mobile phone is the same as, or different to, that of the general public. Other possible causes of brain tumours are examined in the same way.

Cohort Study of Mobile Phone Users (Pilot Study)

Researcher: Imperial College (Epidemiology)

The initial part of the study is a one-year pilot investigation to establish the feasibility and methods for a large long-term ('cohort') study of the health effects of exposure to radio frequency radiation from use of mobile phones. Due to the large cohort size envisaged for the main study, new methodology for collecting data using modern communications will need to be explored. Similarly, the exposures related to mobile telephony are notoriously difficult to study in epidemiological research. Therefore, novel procedures will be developed and evaluated.

A Case Study of Leukaemia in Relation to Use of Mobile Phones

Researcher: Institute of Cancer Research

To address the possibility that mobile phone exposure may cause cancers in man, it is essential to investigate whether risk of cancer is raised in human populations according to their phone exposure. This is what this project sets out to do for leukaemia cancers for which the possibility of an association needs to be clarified.

The project is a case-control study comparing mobile phone use and other radio-frequency radiation exposure, and in addition other potentially confounding exposures such as ionising radiation and genes, between cases (i.e. patients who have the study cancers) and controls (subjects who do not have these cancers). The study plans to recruit 900 leukaemia patients and 900 controls, aged 18 to 59 years in the south-east of England.

Mobile Cellular Communication and Cognitive Functioning

Researcher: Dept of Psychology, University of Essex.

A series of double-blind laboratory controlled experiments, conducted on adult volunteers, will assess the effect of concurrent exposure to

radiofrequency electromagnetic fields (REF) emitted by the antenna of mobile phones on memory and attention. REF will be generated in the laboratory using a signal source device covering the standard frequencies used by GSM and analogue mobile phones.

Recent studies have suggested that the use of mobile phones may affect memory and attention in humans. However, a closer scrutiny of these studies suggests that these findings could simply reflect a statistical artefact. Therefore, the present research intends to overcome the limitations of previous studies providing a thorough evaluation of the impact of the use of GSM and analogue phones on attention and memory in adults.

The Effects of Mobile Phone Radiation on Blood Pressure

Researcher: Royal Hallamshire Hospital, Sheffield

The principal aim of this study is to determine whether the electromagnetic fields from mobile phones increase the blood pressure of a group of 120 normal volunteers. Subjects will receive five different types of electromagnetic exposure using the standard MTHR human exposure system (sham, carrier wave at GSM frequency, modulated GSM, carrier wave at TETRA frequency and modulated TETRA) during which their blood pressure and cardiac activity will be monitored. Blood samples will be analysed for catechols (which are markers of sympathetic nervous system activity). 24-hour ambulatory blood pressure monitoring will be used to assess the duration of any effects.

Comment: this looks really useful, especially because it relates to heart and stroke. (Personally I feel it may have some relevance to 'microwave sensing' as well.) How does simulated TETRA compare with the real thing? They are not using a TETRA mast, and if the NRPB insist that base stations do not pulse at 70Hz and 17.65Hz, then this equipment will not pulse! Unless of course they are testing the handset signal, which definitely does. I hope they transmit realistic digital signals such as experienced in actual use.

Study to Evaluate the Effects of Mobile Telephone Usage on Labyrinthine Function.

(*ie* does extended use of a mobile phone make you lose your balance?)

Researcher: University College, London, National Hospital for Neurology and Neurosurgery, Neuro-otology Dept.

Method: using mobile-phone-like devices that may or may not be emitting GSM signals at 'normal' levels, testing for normal levels of hearing and balance response, and after undeclared exposure to the device.

Comment: Sounds very sensible. 30 minutes exposure is rather beyond the IEGMP Stewart Report recommendation for using a mobile phone though!

The Effect of Mobile Phone Use on Symptoms and Neuroendocrine Function in 'Normal' and 'Hypersensitive' Users

Researcher: Kings College, Mobile Phone Research Unit (Self-described as: 'Area of study: Psychobiological effects of mobile phone exposure')

'As you may know, there has been some concern that using a mobile phone may have some effects on health. In particular there have been some suggestions that mobile phones may cause short-term symptoms such as headaches and dizziness and affect a person's hormone levels. Our research aims to find out whether these effects are true or not.'

Comment: Expect a psychobiologists' answer.

Conversations in Cars: The Relative Hazards of Mobile Phones

Researcher: Transport Research Laboratory

£65,000 to see if carrying on a conversation with a remote person, possibly asking you questions and demanding you reply immediately, on a mobile phone distracts your attention from the road!

The Effects of Radiofrequency Radiation on Brain Physiology and Function

Researcher: NRPB

The project will investigate if the radiofrequency signals (microwaves) used by mobile phones can affect the brain and alter the way it works. To achieve this, the project will look for changes in the molecular control of brain cells, changes in the electrical activity within specific areas of the brain, and for changes in the performance of learning and memory tasks. This integrated study is not possible using people, and so will use mice. All work with animals will be subject to ethical approval and be regulated under the Animals (Scientific Procedures) Act 1986.

Comment: lucky mice. Let's hope that the frequency and power windows relevant to man are there in mice, and attended to in the investigation, and that thermal and geomagnetic influences are taken into account. BUT: 'Previous results suggest that microwaves at the levels used by mobile phones may only cause small effects on the brain. It is therefore essential to eliminate as far as possible other potential influences that may mask or alter in some way the effects the microwaves are having. Another challenge is the controlled delivery of precise doses of microwaves.' Isn't part of the problem that we are in an environment where the mobile phone in environmental context is what matters? Such as power levels in weak signal areas, power levels when calling? Power levels in trains with phones all around?

Cellular and Sub-Cellular Effects of Microwave Radiation in Simple Model Organisms

Researcher: University of Nottingham Life and Environmental Sciences

> An intriguing extension to the study that revealed stress response in nematode worms exposed to microwave signals at a sub-thermal level. Examining effects on specific genes, this may at least further indicate the biological response of living cells to microwaves within mobile phone frequencies.

The Effect of Pulsed Radiofrequency Electromagnetic Fields on Redox Signalling and Calcium Homeostasis

Researcher: Babraham Institute, Cambridge

> Are calcium and nitric oxide signalling influenced by mobile phone frequencies? An attempt using high-throughput assaying to settle the issue of calcium efflux. Nitric oxide may also explain headache *etc.*
>
> Comment: no indication of frequencies to be used or signal strengths, not of pulse frequencies or amplitudes. Let's hope the same power and frequency windows as experienced in life are used, under life conditions.

Measurement of the Dielectric Properties of Biological Tissue in Vivo at Microwave Frequencies

Researcher: Camelia Gabriel

> This project deals with the determination of the dielectric properties of human and animal tissues in the mobile telecommunications frequency range. It is an attempt to derive improved dosimetry for mobile phone use.

Interaction of Emerging Mobile Telecommunications Systems with the Human Body

Researcher: Dept of Electronics, University of York

> Modelling (computer and physical) to determine EM absorption from various mobile technologies, including hands-free equipment.

Assessment of the SAR in the Head from TETRA Handsets

Researcher: NRPB

> SAR measurement for the head using TETRA handsets. The novel aspects of this work are to produce an accurate model of a TETRA handset and then perform calculations of the energy absorbed in the head from this handset. The NRPB approach to electromagnetic field calculations is to use a computer

code that has been developed in-house to enable the flexibility to update and tailor the software to particular applications. A further advantage of the NRPB approach is that it is a complementary, using calculations and measurement to validate the accuracy of the numerical model of the handset.

Comment: does the model TETRA pulse, and does the model head respond biologically differently to pulsed rather than static fields? If not, it has limited value. BUT: 'The proposal addresses the IEGMP research recommendation for improvements in dosimetry. The calculated energy absorbed in the head from TETRA handsets will be compared with international guidelines on basic restrictions to assess compliance.' Seems to imply ICNIRP compliance is more in mind than measuring *in vivo* effects.

Traceability for Mobile Telecommunications and Health Research in the UK

Researcher: National Physical Laboratory

Dosimetry development. Includes TETRA and GSM handsets. Aim to support research requiring accurately calibrated dosimetry.

Hypersensitivity Symptoms Associated with Electromagnetic Field Exposure

Researcher: University of Essex, Dept of Psychology

Description: The first part of the project will investigate whether some people are particularly sensitive to the type of electromagnetic fields generated by mobile phones and their associated base-stations and masts. The concept of the 'electromagnetic hypersensitivity syndrome' (EHS) is controversial and we will attempt to understand this syndrome in more detail by means of a large questionnaire-based survey, in addition to talking in detail to people who believe that they are hypersensitive to electromagnetic fields. The second part of the project (due to start around August, 2004) will involve an experimental study in which we will test people who are hypersensitive to electromagnetic fields, as well as those who are not, under double-blind conditions. This means that people will sometimes be tested when a base-station is turned 'on' and emitting a standard electromagnetic field and when the base-station is turned 'off' and is not emitting an electromagnetic field. The electromagnetic field emitted by the base-station (we will test GSM and possibly UMTS signals) is standard and well below recommended guidelines (i.e., several thousand times weaker than a standard mobile phone). This study will allow us to establish in a scientifically-valid way whether mobile-phone base-stations really are affecting people's health and feelings of well-being.

Progress: We are conducting a large questionnaire based survey with the aim of gaining more information about EHS, which will hopefully result in us being able to develop a diagnostic tool that can be used to identify individuals who are sensitive to electromagnetic fields. We are still in the

process of doing this. What we have just mailed out a questionnaire (very similar to the one you completed) to 20,000 randomly selected individuals who live in within a 20 mile radius of Colchester. The purpose of this questionnaire is again to try and gain more information about EHS so that we can try and develop a diagnostic tool for EHS. One of the results of this survey will be to inform us of how common EHS is in the general population. This survey is not an epidemiological survey of the type that you are refereeing to as epidemiological surveys concerning mast have many problems that have yet to be resolved before an accurate epidemiological survey can be done.

Comment: what is missing is any indication about expression of EHS. EHS has been around much longer than microwave communications, and manifests itself in different ways. It has been implicated in domestic supply frequencies, electricity transmission lines, computer VDUs etc. Whether mobile mast sensitivity is true EHS, or 'microwave syndrome' as Spanish researchers have called it, is not clear. Similarly the survey does not discriminate on grounds of proximity to mobile phone sources, type of emission, history of exposure etc. So the sample for testing will be a highly diverse. The parameters for testing these EHS people are as unclear. Using an electromagnetically shielded room, individuals will be exposed to linear sources of 'GSM-like' signals. Interpreting the results of a diverse sample of individuals, exposed to atypical electromagnetic environments, is unlikely to offer any explanation of physiological responses to mobile base stations. And it is only GSM. More people feel susceptible to UMTS and TETRA. TETRA is specifically excluded.

Communicating Uncertainty: Mobile Telecommunication Health Risks

Researcher: Psychology Dept, University of Surrey

Do informed people worry more about health? If you can't confirm that mobile phones are safe, how do you tell people so they don't get more worried?

This work will result in a detailed understanding of how people respond to uncertain or conflicting information. This is vital in order to ensure that information is made available in a way that best helps people make informed decisions about risks. The research will help policy makers, scientists, industry and special interest groups in their communication of uncertain information. The survey work will help the Department of Health evaluate how effective previous communication in this area has been. The research will also inform debates and policy development around mobile telecommunications regulation.

Comment: interesting in the light of the industry's abject failure to use the Department of Health leaflets on safe use of mobile phones, and their failure to provide SAR ratings for mobile phones and a means to understand them

2: Base Stations

Case-Control Study of Cancer Incidence in Early Childhood and Proximity to Mobile Phone Base Stations

Researcher: Imperial College (Epidemiology)

The Stewart Report has highlighted both public concern and scientific uncertainty regarding possible health effects of mobile telephony, including base stations. In particular, residential proximity to mobile phone base stations is an aspect of mobile phone technology that generates high public concern (Stewart report, p 24). While levels of RF radiation associated with mobile phone base stations are, as noted above, thought to be low (and in some circumstances may be indistinguishable from background), the Stewart Report noted that 'the possibility of harm from (base station) exposures insufficient to cause important heating effects of tissues cannot yet be ruled out with confidence..' The study will determine whether or not childhood cancer cases occur more commonly near mobile phone base stations than would be expected from the national distribution of births, but of itself it will not be able to say whether any excess risk near mobile phone base stations is causally linked to base station emissions.