



**MTHR**  
Mobile Telecommunications and Health Research

## Current Findings and Research Priorities

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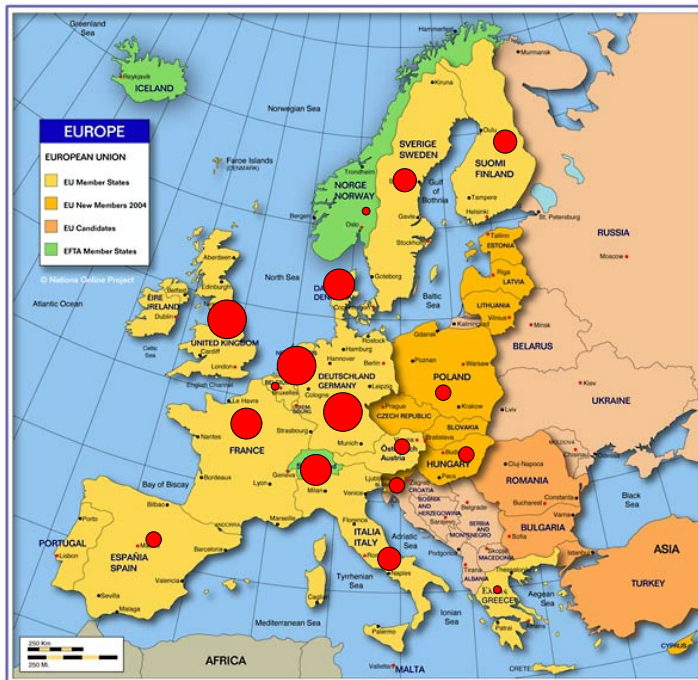
(MTHR and University of Nottingham)

## Research on Mobile Phones and Health

- **Much of the research done in Europe**

## Plan of talk

- **Comparison of 3 national programmes: French, German and UK.**
- **Current Findings and Research Priorities**



## UK Programme (MTHR)

### (Mobile Telecommunications & Health Research)

- 1999: UK Government established a committee: *Independent Expert Group on Mobile Phones* (=Stewart Committee) to
  - review research on possible health effects,
  - **recommend what more research was needed**
  - advise government, industry and public.

## UK Programme (MTHR)

- Established in Feb 2001
- Funded jointly by Government and Industry
- Funds: 11 M€
- Managed by independent scientific committee with 3 non-UK members
- 28 projects funded (23 completed)
- First projects started in Dec 2001
- NB UK also has a separate government programme on TETRA (emergency services)

## French Programme

### (Fondation Santé et Radiofréquences)

- Established in 2005 (earlier programmes: 1998, COMOBIO (2.8M€); 2003, ACI (650 k€))
- Funded jointly by Government and Industry
- Funds: 4.8M€
- Managed by an independent scientific committee with 2 non-French members. (An administrative committee is legally responsible for programme)
- 21 projects funded so far

## German Programme (DMF)

- Established by German government in 2002
- Jointly funded by Government and Industry
- Funds: 17 M€
- Managed by Federal Office for Radiation Protection
  - advice on research priorities from:
    1. radiological protection board (SSK)
    2. international expert workshops etc
- 54 research projects funded.
  - international call for applications : studies not only in Germany but also in Austria, Denmark, France and Switzerland

## Priorities of the UK, French and German programmes

- Broadly similar but some interesting differences
- UK : main emphasis on possible health effects in people. 12 epidemiology and volunteer projects; only 3 cellular or animal projects and 1 on risk communication.
- French: 3 epidemiology and volunteer projects, 10 cellular or animal projects and 3 on risk communication. Relatively few projects on dosimetry compared with the UK and German programmes.
- German: 15 epidemiology and volunteer projects but 10 cellular or animal projects and 7 on risk communication.

## MTHR: published research includes studies of:

1. Cancers of Brain and Nervous System
2. Brain Function
3. Electrical Hypersensitivity
4. Biological Mechanisms
5. Base stations
6. Risk Communication
7. Mobile Phones and Driving

### 1. Cancers of the Brain and Nervous System

Position in 2001: few studies had looked for association between these cancers and mobile phone use



#### MTHR funded epidemiology

- 2 case-control studies of brain cancers
  - (part of international *Interphone* study)
- a pilot cohort study

### Glioma

- Results of 5 studies of glioma totalling 1522 cases (includes 1 UK study) (Lahkola et al, *International Journal of Cancer*, **120**, 1769, 2007)
- No overall increase in risk
- Use for > 10 years on same side of head as tumour suggests an increased risk
  - OR =1.39 (95% CI =1.01-1.92)
  - So only just significant. Also possibility of bias.
- Results “leave open the possibility that long-term use of mobile phones may increase the risk of glioma..”

## Acoustic Neuroma

- Results of 6 studies of acoustic neuroma totalling 678 cases (includes 2 UK studies): (Schoemaker et al, *British Journal of Cancer*, **93**, 842,2005)
- No overall increase in risk
- Use for > 10 years on same side of head as tumour suggests an increased risk
  - OR =1.8 (95% CI =1.1-3.1)
  - So again only just significant. Again possibility of bias.
- However....

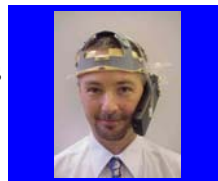
## Meningioma

- Results of 5 studies of meningioma totalling 1209 cases (includes 1 UK study): (Lahkola et al, *Int Journal of Epidemiology*, epub doi:10.1093/ije/dyn155).
- No overall increase in risk even after 10 years

## 2. Brain Function

Position in 2001: 2 studies had suggested phone signals affected cognitive function eg response times

MTHR funded: brain function studies on volunteers (consistent protocols and exposure systems)



- 5 studies used GSM phones, 2 also used TETRA handsets
  - examined reactions to wide range of cognitive and physiological functions.
  - no evidence for any reaction to phone signals
- 1 study used GSM and 3G base stations
  - no evidence for any reaction to base station signals

## 3. Electrical Hypersensitivity

Position in 2001: few systematic studies on phones and base stations; some conflicting reports. No study of prevalence in UK

MTHR funded: studies of electrical hypersensitivity - volunteer studies of exposures from phones and base stations

- Programme includes the largest volunteer studies to date
- Questionnaire study of prevalence in UK
  - 1 to 4% of people reported that they are electrically hypersensitive
  - proportion of women reporting this was twice that of men
- However, 2 volunteer studies using GSM mobile phones both found
  - no evidence for association between symptoms and phone signals
- Volunteer study using GSM and 3G base station signals found
  - no evidence for association between symptoms and base station signals

## Brain Function (including hypersensitivity)

### Phones

- Cognitive function –168 volunteers (Russo et al, *Bioelectromagnetics* **27**, 215, 2006)
- Blood pressure – 120 volunteers (Barker et al, *Bioelectromagnetics* **28**, 433, 2007)
- Unpleasant symptoms- 120 volunteers includes 60 EHS (Rubin et al, *British Medical Journal*, **332**, 886, 2006)
- Inner ear function – 29 volunteers includes 9 EHS (Bamiou et al, *Bioelectromagnetics*, **29(2)**, 108, 2007)
- Electrical Activity –54 volunteers (Butler and Preece, *Bioelectromagnetics* - submitted)

## Brain Function (including hypersensitivity)

### Base Stations

- Cognitive function –176 volunteers includes 56 EHS (Eltiti et al, *Environmental Health Perspective* **115**, 679, 2007)

## 4. Biological Mechanisms

Position in 2001: reports that RF signals activated genes and caused "calcium efflux": could the pulsing of RF signals enhance interaction with tissue?

MTHR funded: mechanistic studies

- Extension to work on gene activation including detailed dosimetry
  - RF raised sample temperature by 0.2C – sufficient to explain the effects originally attributed to a non-thermal mechanism.
- Study to see whether calcium concentration in a wide range of cells is affected by pulsed RF signals.
  - not yet published
  - study funded by a Home Office programme found no effects
- Pulsing of RF only likely to affect interaction if tissue can demodulate the signals to produce low frequency currents. A very sensitive study to look for this has recently finished-no results available yet.

## 5. Base Stations

Position in 2001: no reliable studies of either short term or long term health effects. Little information on exposures from microcell and picocell base stations

MTHR funded:

- Volunteer study to look for short term effects: see hypersensitivity.
- Epidemiological study of young children (ongoing)
- Technical assessment of a personal exposure meter Measurements near 20 microcell and picocell base stations.
  - power densities generally greater than from macrocell base stations for distances along the ground of less than 50 m. Greatest measured = 8.6% of ICNIRP guidelines

## Current Findings

### MTHR findings (September 2007)

- No evidence for immediate effects from handsets (GSM and TETRA) – 5 studies
- No evidence for immediate effects from base stations (GSM and 3G) – 1 study
- No evidence that symptoms experienced by electrically hypersensitive people are caused by signals from handsets or base stations.

### MTHR findings (September 2007)

- Epidemiological studies of brain tumours
  - no association between incidence and exposures of <10 years
  - cannot rule out possibility of association for some tumours for exposures >10 years
- Replication studies of biological effects reported earlier
  - gene expression – no effects seen
  - Ca efflux – not yet published (no effects seen in Government TETRA study)

### Findings of programmes elsewhere

#### Epidemiology- many published studies including Interphone studies

- No clear associations found in most studies although possible “hints” in some studies for >10 years (stronger in some of Hardell group’s work).
- NB also**
- Parotid gland tumours – heavy users: association with ipsilateral use (Sadetzki et al 2008)
    - OR =1.58 (95% CI =1.11-2.24) & 1.49 (95% CI= 1.05, 2.13)

## Findings of programmes elsewhere

### Volunteer studies

- Broadly consistent with UK findings

### Animal Studies

SSI (2008), Sienkiewicz (to be published)

- “Little compelling evidence of biological effects”
- “No clear evidence of health effects”

## Findings of programmes elsewhere

### Cellular Studies

SSI (2008)

- Large number of studies on: reactive oxygen species, genotoxicity, apoptosis, gene expression, immunology and enzyme activity.
- Mostly negative including attempts to replicate genotoxic effects reported from REFLEX.

## Priority areas for the UK

Research of last few years in many countries has reduced many uncertainties **but some remain:**

- Long term effects of mobile phones on adults.
  - cancer symptoms rarely detectable until 10 – 15 years after initial cause, few people have used their phones that long
  - epidemiological studies of people exposed for >10 years do not rule out possibility of increased risk of some brain tumours
- Effects of mobile phones on children
  - effects on children of environmental agents eg. lead, tobacco smoke, UV and ionising radiation are often greater than those on adults
  - very few mobile phone health studies on children
- **Both are top WHO priority areas**

## Future UK Programme (MTHR2)

Funds ~ 7 M€ for 5 years

1. A UK component for an international cohort study of mobile phone users - COSMOS (underway - 4 M€)
  - cohort study not subject to bias
  - can also study many diseases: brain tumours, neuro-degenerative diseases (Parkinson's, Alzheimer's ..) etc.
  - proposed study involves around 200,000 people
  - Denmark, Finland, Netherlands, Sweden and UK

## Future UK Programme (MTHR2)

2. Epidemiological studies to look for associations between RF exposure and health effects in children (**applications being considered.**)
3. Volunteer studies of electrical hypersensitivity in relation to TETRA radios and base stations (**underway**)

## Future German Programme

Funds: ~ 6.5 M€ for 5 years

- Programme still being discussed –
- Likely priorities similar to the UK's: TETRA emissions, children and long term effects.
- However not participating in international cohort study (COSMOS): response rate in pilot study was <5% .

## French Programme

- Programme ends Dec 2009
- 4<sup>th</sup> call in Dec 2007 (1 M€) included
  - risks to children
  - long-term effects
    - no applications to take part in COSMOS
  - levels of population exposure
  - cumulative exposure to different sources
  - chronic exposure to very low doses
- No decisions yet about what will happen after 2009.