



**MTHR**  
Mobile Telecommunications and Health Research

# An Update of the MTHR Programme

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# Summary of Talk

- Short reminder of principal results published by 2007 (MTHR1)
- Progress report on work ongoing in 2007 (MTHR1)
- Progress report on MTHR2

# First Programme (MTHR1)

- 11 M€: 28 projects funded
- First projects started in December 2001
- Report on **published** work in September 2007
  - [www.mthr.org.uk/documents/MTHR\\_report\\_2007.pdf](http://www.mthr.org.uk/documents/MTHR_report_2007.pdf)
- UK also has a separate programme on TETRA (emergency services): “TETRA programme”

# MTHR1 findings (September 2007)

## Volunteer studies

- No evidence for immediate effects from GSM phones –5 studies
- No evidence for immediate effects from base stations (GSM and UMTS) –1 study
- No evidence that symptoms experienced by electrically hypersensitive people are caused by signals from phones or base stations-4 studies (part of above 6).



# MTHR1 findings (September 2007)

- Epidemiological studies of brain tumours and acoustic neuroma
  - 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 attributable to non-thermal mechanisms



## MTHR1: recent results and progress reports

6 major studies had not finished by 2007

- Case-control study of leukaemia (phones)
- Case-control study of cancer incidence in young children (masts)
- Electrical activity of the brain
- Effects of RF on brain physiology of mice
- Demodulation of RF signals by biological tissue
- Effect of pulsed RF on calcium efflux

# Progress reports: MTHR1

- Case-control study of leukaemia (phones) – Swerdlow
  - Data collection completed in October –800 cases
  - Analysis underway.
  - Submission to journal expected in 2010

# Progress reports: MTHR1

- **Case-control study of cancer incidence in young children (aged 0-4) (masts) –Elliott**
- Exposure metrics –residence at time of birth:
  1. Distance from nearest mast & power output of mast
  2. Modelled power density ( $\text{mW}/\text{m}^2$ )
  3. Model checked by measurements.
    - 1400 cases, 5600 controls
    - Submitted to journal



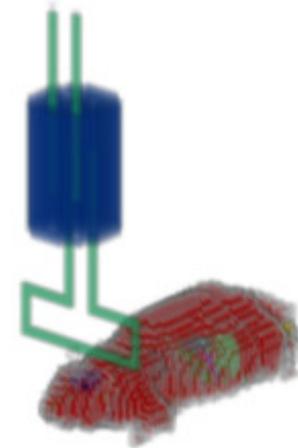
## Recent results: MTHR1

- **Electrical activity of the brain (TETRA phones) – Butler**
  - EEG studies of brain activity in response to various stimuli
  - Results reported at conferences: no differences found during TETRA exposure
  - Work completed and submitted to journal in 2007 but not published and unlikely to be.
  - Report will appear on the MTHR website by the end of 2009 or early in 2010

# Recent results: MTHR1

## Effects of RF on brain physiology of mice – Sienkiewicz

- Exposure to head from RF sources (TETRA, GSM and UMTS)
  - Assessments of gene and protein expression in the hippocampus, cortex, and thalamus.
  - Effects on learning behaviour etc
  - No effects of exposure found in any of the studies (BEMS reports).



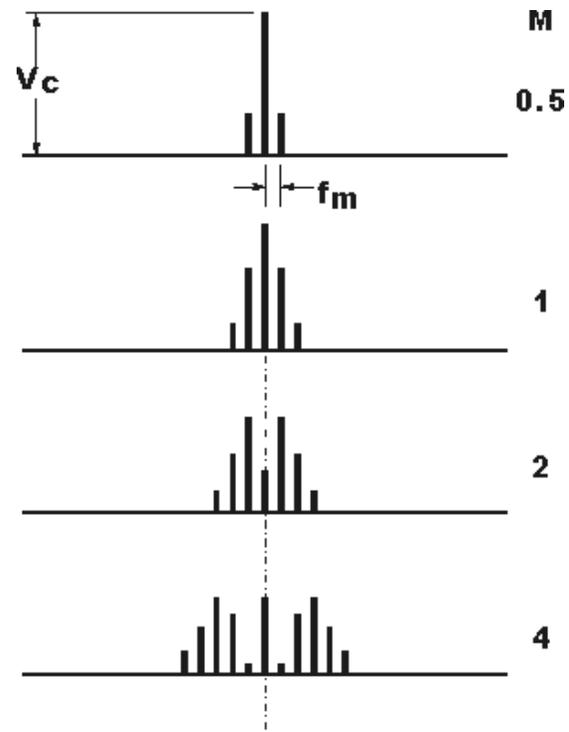
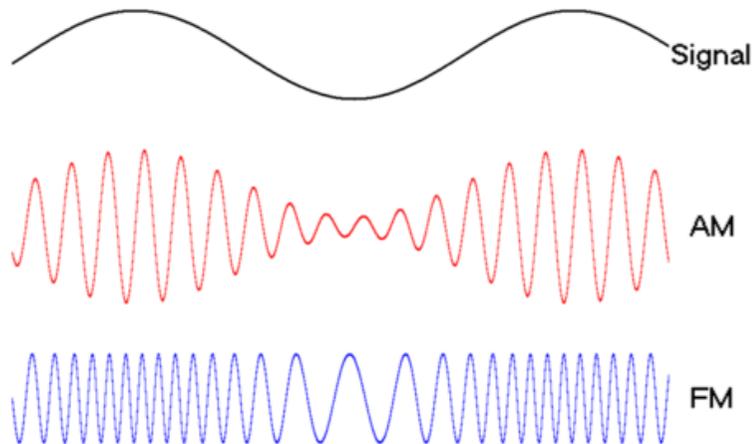
To be submitted to a journal in 2010.

# Recent results: MTHR1

- Demodulation of RF signals by biological tissue – Excell

Modulation

Frequencies present (linear material)



# Recent results: MTHR1

## Demodulation of RF signals by biological tissue – Excell (PI)

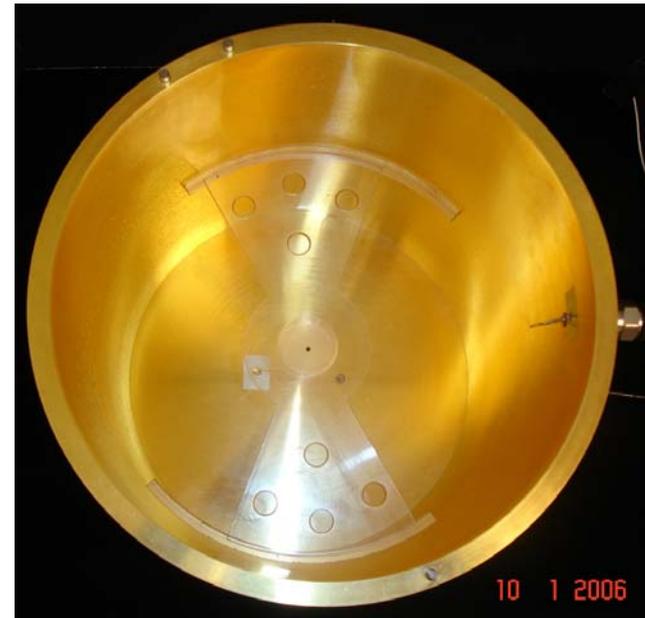
NB Experiments carried out by Kowalczyk at the HPA labs in UK;  
collaboration with Balzano & Davis from U of Maryland

- When modulated signals pass through “non-linear” material (material’s electrical conductivity increases with electric field), currents at the modulation frequencies are generated: low frequency currents. **Also currents at 2 x the carrier frequency**
- The central nervous system is very sensitive to low frequency currents.
- How do we determine if a material is non-linear?
- Detect currents/signals at 2 x the carrier frequency.

## Recent results: MTHR1

### Demodulation of RF signals by biological tissue – Excell

- Feed cavity with RF at  $f$ .  
Detect RF at  $2f$  using a very sensitive cavity that resonates at  $f$  and  $2f$ . (Balzano)
- Result: no  $2f$  signal detected from any cells or tissue that were examined.



## Recent results: MTHR1

### Demodulation of RF signals by biological tissue – Excell

- Conclusions.
  - None of the tissues examined could demodulate RF signals
  - Investigation of health effects from RF signals with different modulation schemes has low priority
- Work completed. To be submitted to journal in 2010

# Recent results: MTHR1

## Effect of pulsed RF on calcium efflux – Bootman

- Earlier studies and some recent studies suggested RF signals, pulsed around 16Hz, caused Ca ions to leave cells. Not replicated by other studies.
- Bootman study used fluorescence techniques to monitor Ca levels and automated imaging so a large number of different types of tissue could be studied.
  - No effects found
  - To be submitted to a journal in 2010.

NB: Results consistent with Tattersall study funded by UK TETRA programme.

## Present Programme (MTHR2)

- 3 projects funded
- 1 more, on children, may be funded
- Funds ~ 6 M€ for 5 years

# COSMOS (MTHR2)

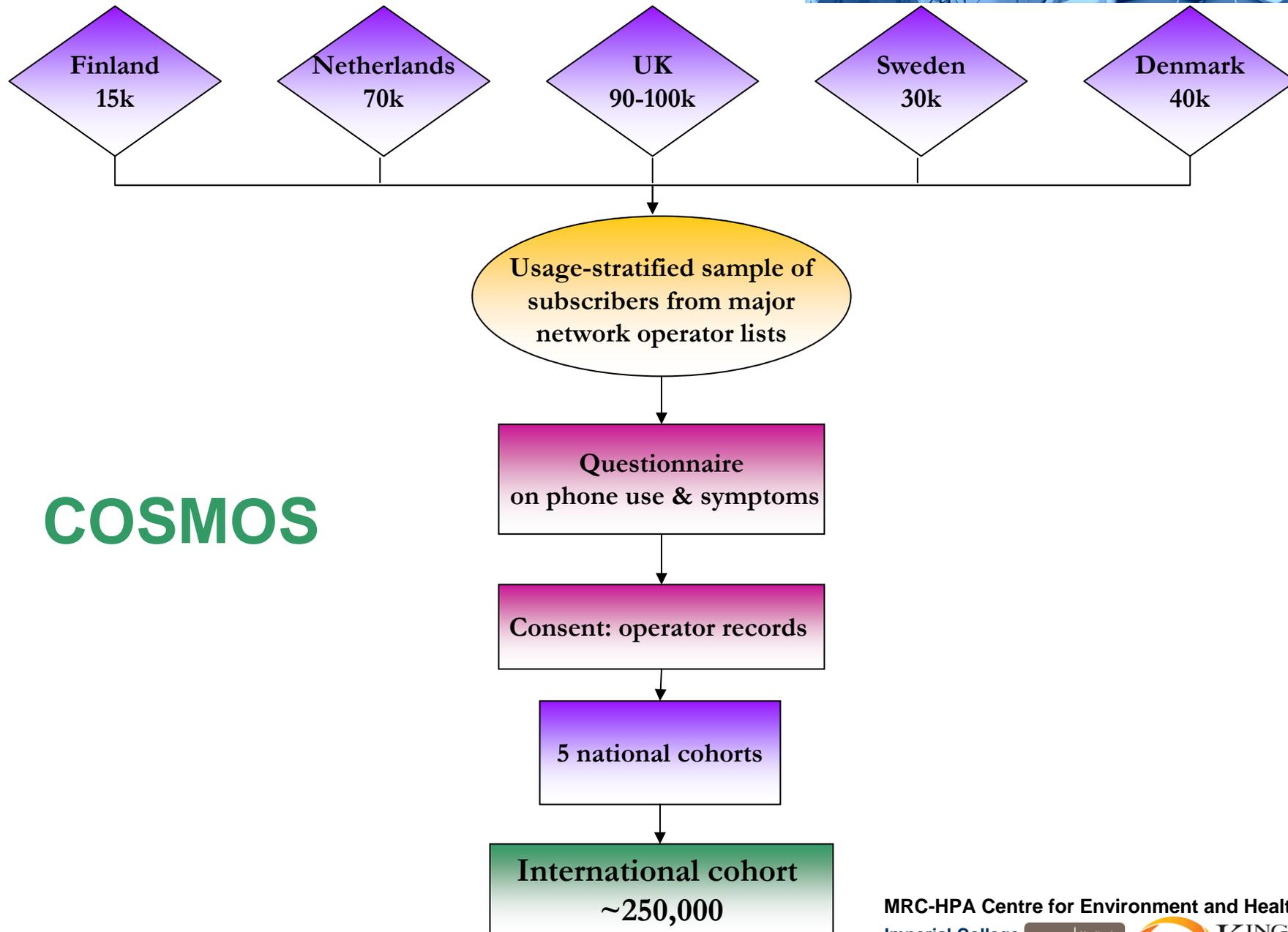
A UK component for an international cohort study of mobile phone users - COSMOS (- 4 M€)

- cohort study not subject to bias
- can study many diseases:
- international cohort~ 250,000 people:

# COSMOS (MTHR2)

## Health outcomes

HEALTH OUTCOME	MAIN SOURCES OF INFO
<b>CANCERS</b> Brain & acoustic neuroma Leukaemias Salivary gland Eye and skin	Cancer registers Hospital discharge registers
<b>NEUROLOGICAL DISEASE</b> Multiple sclerosis (MS) Motor neurone disease Alzheimer's & Parkinson's disease Cerebro-vascular disease	National registers Mortality registers Hospital discharge registers
<b>SPECIFIC SYMPTOMS</b> Health-related quality of life, sleep disorder, headache, tinnitus, depression	Questionnaire baseline & repeat (using validated indices)



# COSMOS

# COSMOS (MTHR2)

- 4500 Pre-test invitations in UK completed May-August 2009
- 5.1% response
- 2 million invitations will be sent out in 2010

# TETRA study -phones (MTHR2)

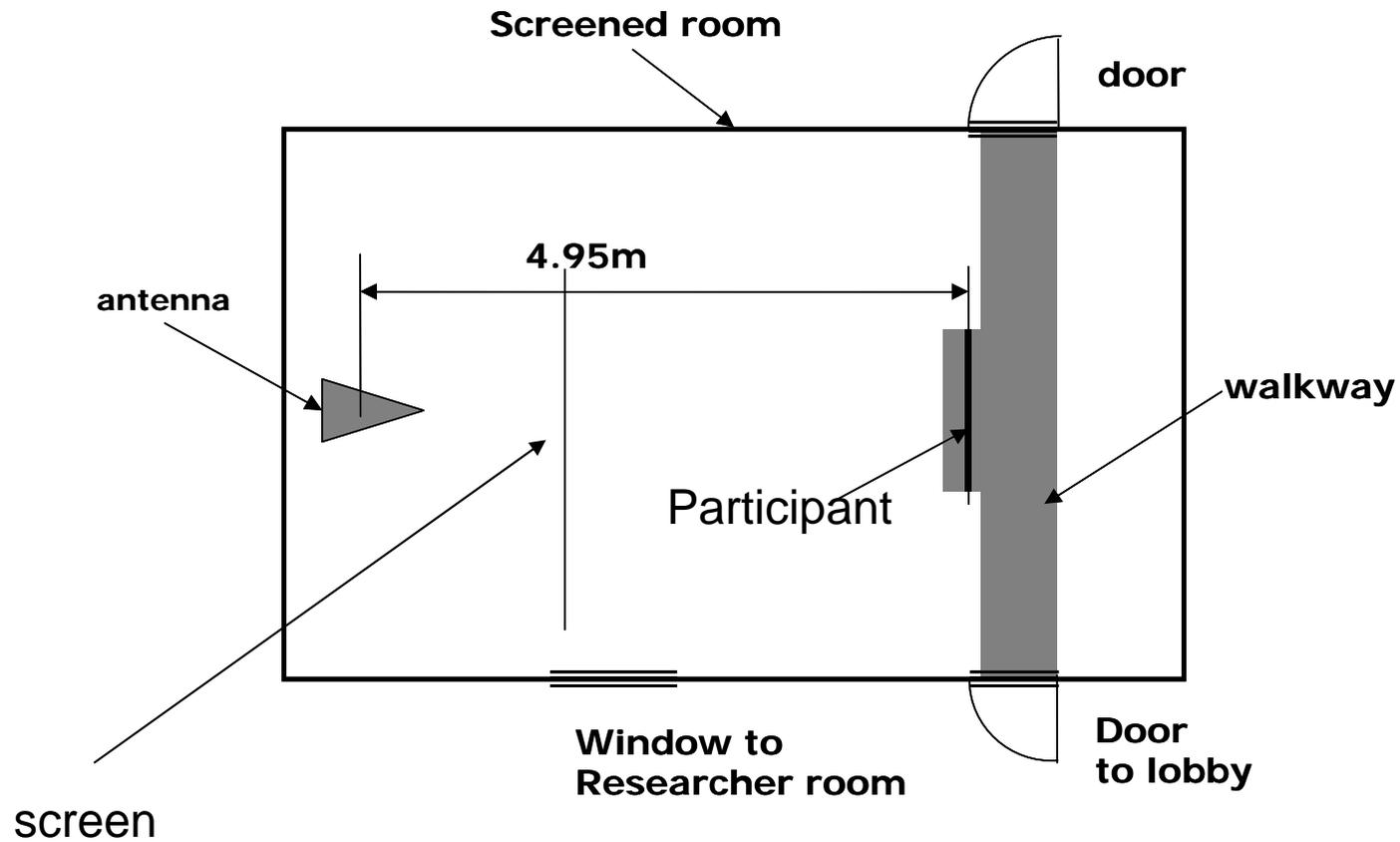
- **Effect of TETRA radiofrequency fields on symptoms in police officers – Wessley (~350 k€)**
  - **Identical to the Wessley study using GSM phones**
  - **Double-blind study of adverse symptoms when exposed to TETRA signal, unmodulated RF signal or sham.**
  - **60 police officers who attribute headaches etc to TETRA were tested and 60 who don't.**
  - **Testing completed, paper written apart from statistical analysis**
  - **To be submitted to a journal in 2010.**

# TETRA studies –masts (MTHR2)

## Hypersensitivity Symptoms associated with Electromagnetic Field Exposure to TETRA fields (masts) -Fox (~350 k€)

- Identical in approach to Fox study using GSM and UMTS base station signals
  - 48 sensitive and 132 control volunteers were tested (double-blind) to see if TETRA affected:
    - heart rate, skin conductance and blood –pressure
- Also tested:
- various indicators of “well-being”

# Testing room plan



## TETRA studies –masts (MTHR2)

- **Evidence suggests that:**
- TETRA base station signal does not have a negative impact on health and well-being in either sensitives or controls.
- People cannot detect the presence of a base station signal above chance.
- In line with evidence on GSM and UMTS base station signals.
- Paper submitted to journal

# Studies of Children (MTHR2)

- Children are known to be more vulnerable to other external factors (pollutants, uv radiation etc). May be more vulnerable to mobile phone radiation?
- 2 major international case-control studies on brain tumours in children and adolescents are underway
  - CEFALO: Denmark, Norway, Sweden and Switzerland. Started 2006.
  - MOBI-KIDS: 13 countries. Started 2009
- To complement these studies MTHR2 wishes to support a cohort study of mobile phone use amongst children
  - focus on symptoms (e.g, headaches, dizziness, sleeplessness) and cognitive function)

# Conclusions

- Only MTHR1 studies published so far that might suggest possible health effects are epidemiological studies of people using phones for more than 10 years.
- The results of the remaining MTHR1 studies and 2 of the 3 MTHR2 studies should be published in a journal or on the MTHR website by the end of 2010.
- The international COSMOS study has only recently started (UK part is funded by MTHR2)
- MTHR2 may fund a cohort study of children's illnesses



# UK TETRA Programme

- Ca efflux- no effects
- Cognitive studies-no effects
- Cohort study of health of police officers.
  - Started 2006; to report in 2020