



# Potential Health Implications from Mobile Communication Systems

## Short Term Mission project: Mobile & Children

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# ■ Agenda



- Goal of short term mission project
- Different working groups
- Conclusions

# ■ COST281 project



- **European COST281 project decided to identify the need for further research about EMF and children**
  - COST 281 project: Potential Health Implications from Mobile Communication Systems (coordination of European research)
  - In Rome on May 5, 2002 a short term mission (STM) related to Mobile Phones and Children was defined
  - The goal of the STM was to cover all EMF aspects of the use of mobile phones by children (from SAR to risk communication)
- **Objectives**
  - To collect publications related to mobile communication and children and to review the literature
  - To determine and to report the areas where scientific knowledge is missing
  - To identify potential need for additional research in this area

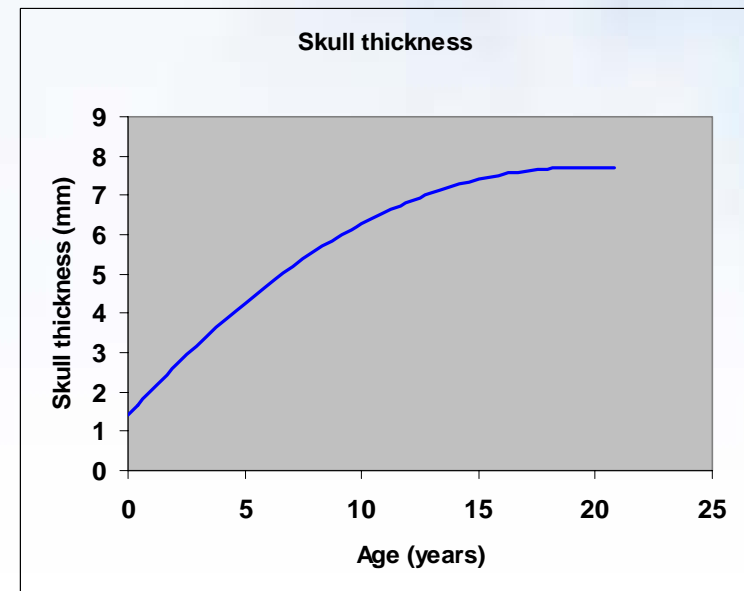
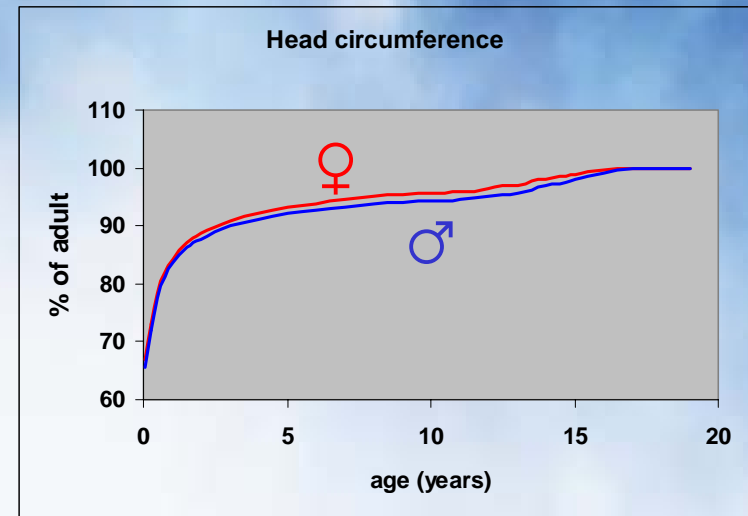
# ■ COST281 project: working groups



**Six working groups have been defined:**

- **WG 1: Anatomical properties and biophysical and biochemical mechanisms in children**
- **WG 2: Dielectric properties**
- **WG 3: Dosimetry**
- **WG 4: Biological Studies**
- **WG 5: Patterns of usage of mobile phones**
- **WG 6: Risk communication to children**

- Extensive report “Growth in infancy and childhood with tables” from Reißerweber J., Nov 2003 (report supported by FGF)
- Conclusions
  - Growth of head and brains is mainly in first 5 years
  - Thickness of skull is growing fast during first decade with increasing calcification (decreasing conductivity). From 10 year on a very slow growth is observed.
  - Myelination is in advanced state in all subcortical areas at the end of 2nd year and slowly continues until adulthood



# ■ WG 2: Dielectric properties



## ■ Results obtained

- Until recently only age-dependent results in rats are publicly available
- Dielectric constant and conductivity decreases with age  $\Rightarrow$  impact on absorption must be investigated

## ■ Open areas

- How to extrapolate the results to humans?
- How much variation from individual to individual?

- **Absorption could be different due to**
  - Different head shapes and sizes
  - Different tissue shapes and sizes
  - Different dielectric properties of tissues
- **Results from different research groups show contradictions due to**
  - Different child head models (scaled heads, MRI model)
  - Different antenna models
  - Different positions of antenna with respect to head models
  - Different normalisation of SAR (constant power, constant current)
  - Different numerical tools

- **Conclusions very difficult to make due to lack of new studies**
  - A comparison can only be done if the configuration is unambiguously defined
  - More children head models required
- **Open areas**
  - Influence of age-dependent dielectric constants on SAR
  - Influence of higher elasticity of child's ear in comparison to adult's ear (distance of phone to brains will be smaller for child's head)

## Animal studies

- More than 50 studies are published relating to exposed animals (birds, mice, rats and monkeys) prenatally and/or during early development.
  - There is a time correlation between development of the central nervous system in humans and animals, thus these results could have important implications for human CNS development.
  - Most studies used SAR levels far in excess of what result from exposure to emissions from mobile phones to adults or children.
  - There are some relevant studies using mobile telephony signals but not all were designed specifically to address CNS development.
- Open areas
  - Further analysis of results is needed

# ■ WG 4: Biological studies



## EEG and behaviour studies

- Over 90 studies, only limited number related to children
- Studies performed
  - EEG studies: definitively an effect is found but is hazardous?
  - Behavioural studies
    - ◆ Reaction time studies: if reaction is seen, it is a positive reaction
    - ◆ Subjective symptoms studies (e.g. TNO study): contradictory results
- No real differences between adults and children is seen
- Ethical question on using children in these studies

# ■ WG 5: Mobile usage patterns



## ■ Results

- Different reports on mobile usage patterns are collected (Recent ones must be added)
- Differences in service use (telephone, SMS, MMS, mobile internet, game playing) between children and adults have been clearly identified
- Number of calls per day (NC) and duration of calls (DC) can lead to numbers for specific absorption per call (SAC) and specific absorption per day (SAD)
  - ◆ E.g. call duration of adolescents can be longer

## ■ Open areas

- Distribution of NC and DC as a function of age is not available and will be very much time and culture dependent
- If SAC and SAD are available: is there a relation to a potential health effect?

## ■ Results

- Almost nothing substantive is available with regard to EMF risk communication to adolescents and children
- Links to primers, publications, reports and websites are available in the draft report

## ■ Open areas

- Primers on health communications need to be converted in material suitable for different age groups
- An EMF risk communication strategy and material for children and adolescents are missing and need to be further developed

# ■ Conclusions



- **Papers and reports have been collected in COST 281 short term mission project on Mobile & Children**
- **The project has been structured with 6 working groups covering all aspects with respect to Mobile phones and Children**
- **Open areas for further investigation have been identified**
- **A summary report will be presented at the next COST 281 meeting in Paris (September 22-24)**

# ■ Acknowledgments



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