# Health risk assessment of wireless communication

# (LaVita - programme)

## The Finnish Research Programme (2000 – 2003)

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### 1. Background

The present Finnish research programme "Health risk assessment of wireless communication" is a continuation of the two previous research projects carried out in Finland during 1994-2000. The first programme “Biological effects of electromagnetic fields” was conducted in 1994-1997 as a part of the European COST 244 Action. Within this project, methods for assessing the absorption of radiowaves in the human head were developed both by numerical modelling and by measurements in a phantom. In addition, neurophysiological effects in human volunteers and carcinogenesis *in vivo* were studied.

The second national research programme, “Electromagnetic fields from mobile telephones as a possible health risk” was conducted in 1998 - 2000 as a part of the European COST 244bis Action. This project included studies on computational modelling of electromagnetic exposure, possible cancer-related effects of EMF exposure using both epidemiological methods and animal studies, and development of exposure systems for animal and cell culture studies. In addition, subjectively perceived hypersensitivity symptoms were investigated during the use of mobile phones, and *in vitro* (cell culture) methods for testing the relationship between bioeffects and modulation parameters were developed within this programme.

The present project ("LaVita") is included in the European COST 281 Action, called "Potential Health Implications from Mobile Communication Systems". The main objective of this Action is to obtain a better understanding of possible health impacts of emerging technologies, especially related to communication and information technologies.

## 2. Objectives of the LaVita- project

The aims of the present research programme are as follows:

- to study possible effects of RF electromagnetic fields on cognition (memory and attention) and brain function
- to examine possible effects of RF fields on human circulatory responses (blood pressure)
- to evaluate physiological effects of RF fields on persons wearing cardiac pacemakers
- to develop reliable biomarkers for studying RF field effects
- to study basic cellular responses to RF exposure and their possible relationship to cancer
- to improve dosimetry and modelling of RF exposure of humans and cell cultures
- to provide tumour microarrays for the international study of mobile phones and brain tumours
- to investigate the effects of RF fields on function of the inner ear (hearing and balance)

## 3. Titles and contact persons of the Sub-Projects

- The effects of radiofrequency electromagnetic fields on cognition and brain function

  *Professor Heikki Hämäläinen*
  *Centre for Cognitive Neuroscience,*
  *University of Turku*
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- Human circulatory responses during exposure to radiofrequency wireless communication

  *Dr Harri Lindholm*
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- Effects of cellular phones on cardiac pacemaker wearers

  *Professor Maila Hietanen*
  *Finnish Institute of Occupational Health, Helsinki*
  *e-mail: maila.hietanen@ttl.fi*

- Activity of the enzyme ODC in cell cultures following RF exposures at 835 and 900 MHz

*Dr Jonne Naarala*
*Department of Environmental Sciences,*
*University of Kuopio*
*e-mail: jonne.naarala@uku.fi*

- Budding yeast (Saccharomyces cerevisiae) as a model organism for studying the biological effects of radiofrequency fields

*Dr Jonne Naarala*
*Department of Environmental Sciences,*
*University of Kuopio*
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- Development of *in vitro* dosimetry and biomarkers to study *in vivo* RF-EMF biological effects

*Professor Dariusz Leszczynski*
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- Dynamic adaptive modelling of the human body for radiofrequency radiation absorption

*Professor Jaakko Malmivuo*
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*Tampere University of Technology*
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- Numerical simulation of RF exposure conditions by the FDTD method

*Dr Kalevi Laukkanen*
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- Case-control study of brain tumour etiology

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- Possible health effects of electromagnetic fields from mobile phones on hearing and balance

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## 4. Funding partners