



EUROPEAN  
COMMISSION

European  
Research Area

## PROJECT PRESENTATION (PP)

### Breast CT

**Contract number:**

**213153**

Author(s):

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Start date of project: **01/01/08**

Duration: **30** months



## **Introductory paragraph**

Early and accurate diagnosis of breast cancer in women is a pending challenge. Digital x-ray mammography is considered today's state of the art in diagnosis although severe insufficiencies are acknowledged. Conventional film-screen mammography, digital tomosynthesis, ultrasound, nuclear medicine and magnetic resonance imaging are also in use or under investigation. There is a general consensus that 3D imaging could offer significant advantages.

### **1. Nature and scope of the project**

This project focuses on the development of a dedicated CT scanner for the female breast using novel technology and optimization strategies. It is our intention to provide proofs of concept and results on breast CT.

To achieve the proposed goals three European scientific institutes of international reputation and a manufacturer with the respective know-how have formed a consortium (details are given below). The setup and the composition of the consortium shall prevent complete focusing on one modality and ensure that we are not blinded to new and alternative approaches. The three academic partners represent internationally renowned and established centers for modern radiological imaging with a broad background.

### **2. Activities**

The project covers eight scientific work packages. These work packages cover different aspects of breast imaging important for the development of a dedicated breast CT system:

- Simulation studies for breast CT imaging with respect to the optimisation of image quality
- Determination of applied dose assessed by simulation and measurements
- Assessment of image quality in breast CT by measurements and phantom studies
- Evaluation and optimisation of tomosynthesis as an alternative approach for breast imaging
- Quality assurance for 2D and 3D breast imaging
- Assessment of alternative diagnostic approaches
- Dedicated software design and development customized with respect to the breast CT system
- Patient setup and mechanical design of prototype system

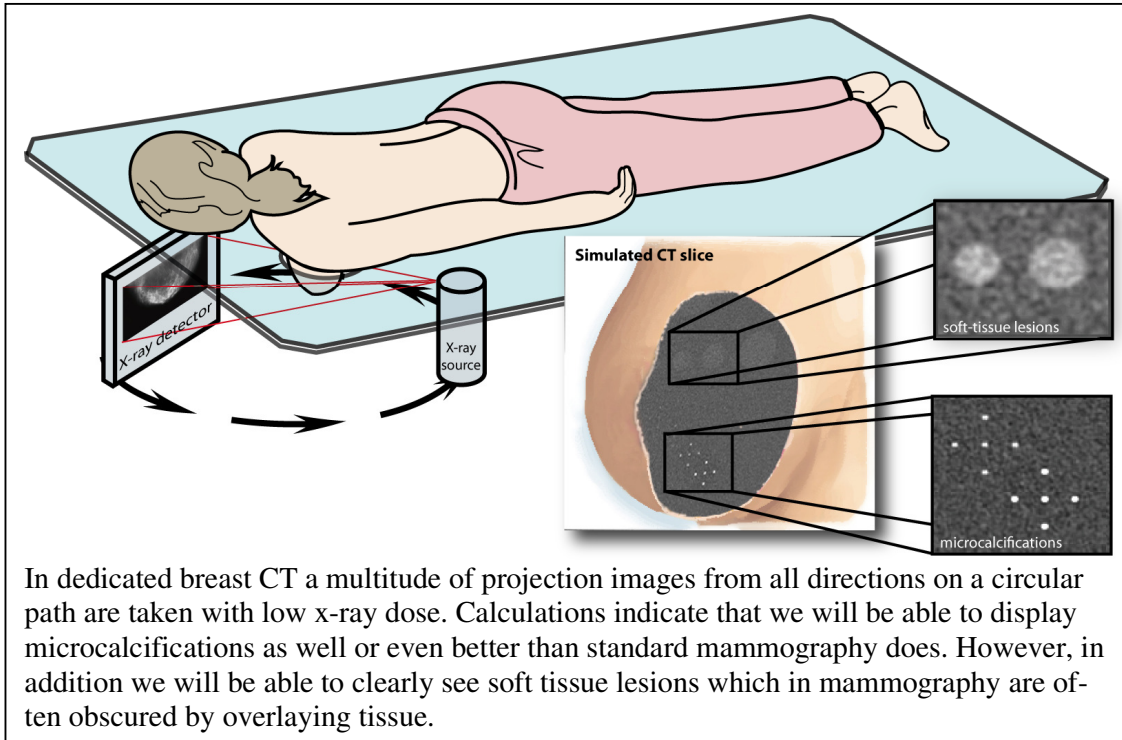
### **3. Expected results**

Progress beyond the state of the art is expected by increased spatial resolution for the imaging and characterization of microcalcifications, by improved low-contrast soft-tissue lesion detectability and by improved dose efficiency.

Our preliminary simulation results indicate that tumor detectability should be higher than in digital x-ray mammography. This would be an essential improvement since the central screening goal is tumor detection at a stage as early as possible. The improved diagnostic performance should be achieved at reduced or at least at equivalent patient dose compared to standard two-view mammography. Dose has to be assessed by determining the surface dose,

the average glandular dose and the integral dose in anthropomorphic phantoms by measurements and Monte Carlo calculations. Our preliminary investigations indicated that a reduction of dose appears realistically possible even for the increased diagnostic performance.

The costs for the fabrication of a prototype system are estimated at 200.000 Euro. Such a system will be available potentially in four years, but not for the project within the 30 months.



#### 4. Societal impact

The aim of the project is to improve diagnostic performance in breast cancer screening with respect to technology, image quality, dose efficiency and clinical routine. It is expected that dedicated breast CT scanners represent a method for breast cancer screening with improved reliability and diagnostic performance compared to conventional methods. Additionally, a higher comfort for the patient is provided due to the positioning without breast compression and improved workflow.

The consortium expects to be able to develop knowhow, concepts and finally products which will be very innovative and thereby competitive on the world market.

#### 5. Information about important public events

A scientific workshop on breast CT imaging open to the partners and to outside experts shall be held in Erlangen during the final quarter of the project.

#### 6. Project website address and contact person

<http://www.imp.uni-erlangen.de/BreastCT>

Prof. Dr. Willi A. Kalender

## Project details

### Project type (funding instrument):

Collaborative projects (Small or medium-scale focused research projects)

### List of partners:

1. IMP - Institute of Medical Physics, University of Erlangen, Germany
2. KUL - Katholieke Universiteit, Leuven, Belgium
3. EMC - Erasmus Medical Center, Rotterdam, Netherlands
4. VAMP - Verfahren und Apparate der Medizinischen Physik GmbH, Erlangen, Germany

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EC contribution (€): 2,049,997.00