

# VIRTUAL HEART MODELS: MULTI-PHYSICS APPROACHES TO COMPUTATIONAL CARDIOLOGY

## Fact Sheet

### Project Information

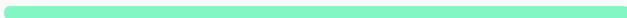
VHEART

Grant agreement ID: 294161

Status  
Closed project

Start date  
1 September 2011

End date  
31 August 2015



Funded under  
FP7-PEOPLE

Overall budget  
€ 100 000

EU contribution  
€ 100 000

Coordinated by  
**MIDDLE EAST TECHNICAL  
UNIVERSITY**  
 Turkey

## Objective

Heart disease is the number one cause of death in industrialized nations. Despite the broad class of treatment techniques such as medication, surgery and tissue-engineered therapies, heart disease remains to be one of the most frequent, disabling, and life-threatening diseases. In Europe it accounts for almost half of overall annual mortality rate. In the European Union (EU) alone, cardiovascular disease causes over 2 million deaths per year. The cost of cardiovascular disease to the EU economy is €192 billion per year. As opposed to the traditional trial-and-error based therapies, a systematic, personalized simulation-aided approach offers a great potential for understanding, diagnosing, and treating heart failure through the sound understanding of functional and structural changes in the infarcted tissue and the computational tools of multi-scale solid mechanics. The proposed research aims: (1) to develop multi-scale models of computational cardiac electrophysiology, (2) to model the fully coupled electromechanics of the heart through a novel micro-

model the fully coupled electromechanics of the heart through a novel micro-structurally based kinematic approach, (3) to couple the electromechanical computational tool with the ionic models of cardiac electrophysiology, (4) to employ the new multi-scale tools of computational cardiology to explore the underlying complex mechanisms of heart diseases and thereby guide personalized cardiac therapies. The anticipated outcomes are: (A) a multi-scale computational electrophysiological tool that incorporates multi-physics ionic models in the implicit bidomain framework, (B) a better understanding of underlying physiological reasons for electrophysiological cardiac disease such as arrhythmia, left and right bundle blocks, (C) a novel, micro-structurally based, computationally efficient, modular electromechanical computational tool, (D) a virtual test environment for the patient-specific optimization of cardiac therapies and surgical procedures.

## Field of science

/medical and health sciences/clinical medicine/surgery

/natural sciences/computer and information sciences/computational science/multiphysics

/medical and health sciences/basic medicine/pharmacology and pharmacy/pharmaceutical drug

/natural sciences/physical sciences/classical mechanics/solid mechanics

/social sciences/sociology/demography/mortality

/medical and health sciences/clinical medicine/cardiology

/medical and health sciences/clinical medicine/surgery/surgical procedure

## Programme(s)

## Topic(s)

## Call for proposal

FP7-PEOPLE-2011-CIG

## Funding Scheme

MC-CIG - Support for training and career development of researcher (CIG)

## Coordinator



**MIDDLE EAST TECHNICAL UNIVERSITY**

Address

**Dumlupinar Bulvari 1**

Activity type

**Higher or Secondary**

EU contribution

**€ 100 000**

06800 Ankara

 Turkey

[Website](#) 

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Education Establishments

[Contact the organisation](#) 

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