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	Activity type	EU contribution
Dumlupinar Bulvari 1	**Higher or Secondary**	**€ 100 000**

06800 Ankara
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Education Establishments

Website

Contact the organisation

Administrative Contact

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