Influence of Epicardial Adipose Tissue on Cardiac Deformation

Motivation
Epicardial adipose tissue (EAT) refers to deposits of fat that exists on the surface of the myocardium and is contained entirely beneath the pericardium. Under physiological conditions EAT constitutes approximately 20% of myocardial mass and is found to be most concentrated in the atrioventricular and interventricular grooves. Therefore, veins and arteries are typically embedded in EAT, thus EAT interacts and constrains the movement in these areas. In most cases, solid mechanics models do not include EAT and only consist of the atria, ventricles, major veins and arteries. Consequently, the influence of EAT on cardiac deformation is not well understood.

Tasks
You will augment an already existing model of the human heart with varying degrees of epicardial adipose tissue in the atrioventricular and interventricular grooves. With these new models, you will conduct a simulation study using our in-house solid mechanics software CardioMechanics. Finally, you will evaluate the deformation of the heart based on strain, atrioventricular plane displacement, and circulatory function.

Technical aspects
Experience with programming using C++/Matlab/Python is beneficial but not necessary
Create and manipulate finite element meshes of the human heart
Conduct finite element simulations

Field of Research
Cardiac Modelling
Electrophysiology
Mechanics

Project
Dynamics of cardiac electrophysiological depolarization waves

Areas
Mesh Manipulation
Applied Mathematics
Software Development

Fields of Study
Electrical Engineering
Physics
Computer Sciences
Mechanical Engineering

Starting Date
As soon as possible

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