

Data for identification of orthotropic material parameters for acute, necrotic, fibrotic and remodelling myocardial infarcts in the rat

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The provided material represent the data used to identify the parameters of an orthotropic constitutive model for rat myocardial infarcts in the acute (0 day), necrotic (7 day), fibrotic (14 day) and remodelling phases (28 day). The study employed inverse methods to optimise the material parameters for Fung orthotropic material (ABAQUS CAE 6.12-2, Dassault Systèmes, Providence, RI, USA) utilizing experimental biaxial stress-strain data [1] and genetic algorithms toolbox in SCILAB 5.4 (Scilab Enterprises S.A.S, Versailles, France). The complete description of the methods can be found in the main article **Sirry, MS, Dubuis L, Davies NH, Liao J, Franz T. Identification of orthotropic material parameters for acute, necrotic, fibrotic and remodelling myocardial infarcts in the rat.** 2019, BIORXIV/2019/754754.

The data include four folders representing each infarct group (0, 7, 14 and 28 day). The finite element CAE file (*Inverse Model Initiation*) was used to initiate ABAQUS input files for each of the four infarct group (Note: model dimensions were specific for each infarct group). Within each folder, the following is provided:

1) Main SCILAB script file (identif_main.sce)

This is the main script governing and guiding the optimisation process. This includes building of a working directory (RUN), copying all required data to this directory, assigning the material parameters, initiating the finite element analysis, extracting computational results, fitting to experimental data, calculating objective function (error) and printing the results (Note: Attention should be paid to all file paths used in the scripts). Further descriptions and definitions are provided within the script.

2) DATA folder

This folder contains the backbone data used in the automated optimisation process. These include the biaxial experimental stress-strain data (.dat), ABAQUS input files (.inp), list of finite elements and nodes (.txt) and the user-defined material orientation (ORIENT) subroutine (.for). With exception to the fibre orientation subroutine, these data are specific to each infarct group.

3) SOURCES folder

This folder contains SCILAB and python scripts. These scripts were called in the main SCILAB script to perform several tasks. Python scripts were used to extract results from ABAQUS output (.odb) files. SCILAB scripts (functions) were used to calculate results, objective (cost) function and calculating results.

References

1. Sirry, M.S., et al., *Infarcted rat myocardium: Data from biaxial tensile and uniaxial compressive testing and analysis of collagen fibre orientation.* Data in Brief, 2016. **8**: p. 1338-1343.