**2018 IMAG Futures Meeting – Moving Forward with the MSM Consortium (March 21-22, 2018)**

*Pre-Meeting Abstract Submission Form*

*\*Please submit to the NIBIB IMAG mailbox (*[NIBIBimag@mail.nih.gov](mailto:NIBIBimag@mail.nih.gov)*) by* ***January 8th, 2018***

*\*Save your abstract as “MSM PI Last Name \_ 2018 IMAG Futures Pre-Meeting Abstract”*

**PI(s) of MSM U01: Kenneth S. Campbell and Jonathan F. Wenk**

**Institution(s): University of Kentucky**

**MSM U01 Grant Number: HL133359**

**Title of Grant:** Multiscale modeling of inherited cardiomyopathies and therapeutic interventions

**Abstract**

Which MSM challenges are you addressing from the IMAG 2009 Report and how?

<https://www.imagwiki.nibib.nih.gov/content/2009-imag-futures-report-challenges>

(indicate which challenge (#) you’re addressing)

*You may insert images by copying and pasting below*

Challenge 4, Novel methods to fuse biological and/or behavioral processes and mechanisms to model outcomes as a result of various interventions  
  
Our project goal is to develop a predictive multiscale model of the heart that will improve understanding of familial cardiomyopathies and that can be used to help screen potential new therapies for cardiac disease. Specifically, we are developing, validating, and calibrating a model that uses data quantifying molecular-level myosin function to predict how hearts remodel over time. We will test the computational model initially using data from wild-type mice and from transgenic animals that develop cardiac hypertrophy because of a mutation in a protein that regulates myosin motor function. Additional tests will then be performed using drugs that enhance or inhibit myosin-level contractile function.

Are you using machine learning and or causal inference methods and how?

*You may insert images by copying and pasting below*

No

Please briefly describe significant MSM achievements made (or expected).

*You may insert images by copying and pasting below*

We expect to develop an open-source multiscale model of the heart that spans from millisecond level molecular kinetics to organ-level growth that occurs over weeks and months. We anticipate that our model will be among the first in which cell-level function as well as structure evolves over time in response to genetic and/or pharmaceutical interventions.

Please suggest any new MSM challenges that should be addressed by the MSM Consortium moving forward.

*You may insert images by copying and pasting below*

1) Develop standard methods to assess sensitivity to model parameters  
 2) Develop a database of multiscale models analogous to PubMed or RefSeq

What expertise are on your team (e.g. engineering, math, statistics, computer science, clinical, industry) and who?

*Please list as “Expertise – Name, email”*

*Physiology – Kenneth S. Campbell,* [*k.s.campbell@uky.edu*](mailto:k.s.campbell@uky.edu) *Engineering – Jonathan F. Wenk,* [*jonathan.wenk@uky.edu*](mailto:jonathan.wenk@uky.edu) *Engineering – Lik Chaun Lee, lclee@msu.edu  
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