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

*Pre-Meeting Abstract Submission Form*

**PI(s) of MSM U01:** R. Laubenbacher, B. Mehrad

**Institution(s):** UConn Health, University of Florida

**MSM U01 Grant Number:** 1U01EB024501-01

**Title of Grant:** Modular design of multiscale models, with an application to the innate immune response to fungal respiratory pathogens

**Abstract**

This project addresses Challenge 5)  *Reproducible and reusable multiscale models that will be integrated and adopted into model-poor fields.* An important obstacle to the reproducibility of models is the complex and changing nature of computing environments. Reusability of multi-scale models is often limited by the complexity of the code base, which makes modifications difficult. Model adoption is often limited by barriers to use. This project addresses these challenges through the development of a highly modular software architecture that minimizes dependencies among submodels, and packages submodels, together with their complete computational environment, within lightweight software containers that facilitate modular design. The model is coupled with a user interface that allows a non-modeler to use the model for exploratory computational experiments. The biomedical application area is the innate immune response to respiratory fungal infections, a disease type for which there is no extensive modeling environment available. The model will integrate high-throughput molecular data, tissue-level data, as well as organism-level measurements.

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

No

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

We have made progress in defining the lung tissue geometry to be used, and a prototype implementation of our earlier tissue-level model in the new architecture paradigm. Furthermore, we have collected transcriptomics data from several of the relevant immune cell types.

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

MSM should support training and education projects.

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

Math and biology – R. Laubenbacher, [laubenbacher@uchc.edu](mailto:laubenbacher@uchc.edu)

Biology and math – B. Adhikari, [badhikari@uchc.edu](mailto:badhikari@uchc.edu)

Medicine, math, and computer science – R. Posner, [rposner@uchc.edu](mailto:rposner@uchc.edu) (clinical)

Computer science – A. Hosny, [abdelrahman@axware.co](mailto:abdelrahman@axware.co)

Scientific visualization – W. Schroeder, [will.schroeder@kitware.com](mailto:will.schroeder@kitware.com) (industry)

Pulmonary immunology – B. Mehrad, [Borna.Mehrad@medicine.ufl.edu](mailto:Borna.Mehrad@medicine.ufl.edu) (clinical)