**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*) by* ***January 8th, 2018***

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

**PI(s) of MSM U01: James Schwaber, Rajanikanth Vadigepalli**

**Institution(s): Thomas Jefferson University**

**MSM U01 Grant Number: HL133360**

**Title of Grant:** Multiscale Model of the Vagal Outflow to the Heart

**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*

#1 Next-generation multiscale models that integrate between different scientific fields (e.g. cardiovascular and neuroscience) and predict integrated functions

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

*You may insert images by copying and pasting below*

 We have employed a combination of transfer function and ordinary differential equation-based models of the closed loop cardiovascular control circuits. Going forward we are considering hybrid models containing ODE and agent-based descriptions of individual neurons and neuronal populations, with parameters largely derived from targeted neurophysiological and organismal physiological experiments.

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

*You may insert images by copying and pasting below*

 We developed a new computational model of the closed loop cardiovascular control through a multi-input multi-output control network in the brainstem. We explored how the neuronal adaptation in the brainstem contributes to the maintenance of cardiovascular homeostasis following cardiac injury. We are incorporating multi-scale signaling and electrophysiological descriptions of brainstem neurons in this closed loop control systems model.

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*

 Develop freely accessible and rigorous didactic/training resources on various MSM methods and illustrative applications

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

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

 *Neuroscience – James Schwaber,* *James.Schwaber@jefferson.edu* *Systems Engineering, Bioinformatics – Rajanikanth Vadigepalli,* *Rajanikanth.Vadigepalli@jefferson.edu* *Clinical Trainee – Jonathan Gorky,* *Jonathan.Gorky@jefferson.edu* *Physiology – Robert Rogers,* *NeuroRegalia@hotmail.com*

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