

Robert A. McDougal, Ph.D.

Education:

- 2015 M.S. Computational Biology and Bioinformatics. Yale University. New Haven, Connecticut.
- 2011 Ph.D. Mathematics. The Ohio State University. Columbus, Ohio.
- 2006 M.S. Mathematics. The Ohio State University. Columbus, Ohio.
- 2004 B.S. Mathematics, minor in Computer Science. University of Maryland Baltimore County. Catonsville, Maryland.

Career/Academic Appointments:

- 2019-present Assistant Professor, Department of Biostatistics Division of Health Informatics, Yale University, New Haven, Connecticut.
- 2016-2019 Associate Research Scientist, Department of Neuroscience and Yale Center for Medical Informatics, Yale University, New Haven, Connecticut.
- 2013-2016 Postdoctoral Fellow, Department of Neuroscience (previously Neurobiology) and Yale Center for Medical Informatics, Yale University, New Haven, Connecticut.
- 2012-2013 Postdoctoral Associate, Department of Neurobiology, Yale University, New Haven, Connecticut.
- 2011-2012 Postdoctoral Associate, Department of Computer Science, Yale University, New Haven, Connecticut.

Professional Service:

Tutorial, Workshop, and Session chairing

- 2019 “Neuroscience and Sensory Modalities” session chair at NLM Informatics Training Conference 2019.
- 2018 Tutorial co-organizer for Organization for Computational Neurosciences Conference: “Multiscale modeling from molecular level to large network Level (using NEURON, RxD, and NetPyNE)” tutorial (with Salvador Dura-Bernal and William Lytton).
- 2017 Workshop organizer for Organization for Computational Neurosciences Conference: “Reaction-diffusion modeling for neurobiology” workshop (with Avrama Blackwell and William Lytton).

Grant Review

- 2019 Ad hoc member, NIH study section on Neurotransporters, Receptors, Channels and Calcium Signaling (NTRC).
- 2018 Ad hoc member, NIH study section on MSM (PAR-15-085).
- 2017 Member, NIMH Special Review Group ZMH1 ERB-C (04) Data Archives and Standards for the BRAIN Initiative.
- 2015 Ad hoc member, NIH study section on Neurotransporters, Receptors, Channels and Calcium Signaling (NTRC).

Editorial Service

2017 - 2018 Guest Associate Editor, *Frontiers in Neuroinformatics Research*
Topic on: "Reproducibility and Rigour in Computational Neuroscience."

Standard Board

2016 - NeuroML Editorial Board.

Publications:

1. Peer-Reviewed Manuscripts

McDougal R. A., Dalal I, Morse TM, Shepherd GM. Automated metadata suggestion during repository submission (2019). *Neuroinformatics*, 17:361. doi: 10.1007/s12021-018-9403-z. PMID: PMC6494730.

Gleeson P, Cantarelli M, Marin B, Quintana A, Earnshaw M, Piasini E, Birgiolas J, Cannon RC, Cayco-Gajic NA, Crook S, Davison AP, Dura-Bernal S, Ecker A, Hines ML, Idili G, Larson S, Lytton WW, Majumdar A, **McDougal RA**, Sivagnanam S, Solinas S, Stanislovas E, Van Albada SJ, Van Geit W, Silver RA. Open Source Brain: a collaborative resource for visualizing, analyzing, simulating and developing standardized models of neurons and circuits. *Neuron*. 2019. doi:10.1016/j.neuron.2019.05.019

Dura-Bernal S, Suter B, Gleeson P, Cantarelli M, Quintana A, Rodriguez F, Kedziora DJ, Chadderdon GL, Kerr CC, Neymotin SA, **McDougal RA**, Hines M, Shepherd GM, Lytton WW. NetPyNE, a tool for data-driven multiscale modeling of brain circuits. *eLife*. 2019. doi: 10.7554/eLife.44494

Shepherd GM, Marengo L, Hines ML, Migliore M, **McDougal RA**, Carnevale NT, Newton AJH, Surlles-Zeigler M, Ascoli GA. Neuron names: a gene- and

properties-based format, with special reference to cortical neurons. *Frontiers in Neuroanatomy*. 2019, 13:25. doi: 10.3389/fnana.2019.00025

Patoary MNI, Tropper C, **McDougal RA**, Lin Z, Lytton WW. Parallel stochastic discrete event simulation of calcium dynamics in NEURON. *IEEE/ACM Transactions on Computational Biology and Bioinformatics*. 2019, 16(3):1007-1019. doi:10.1109/TCBB.2017.2756930

Newton AJH, **McDougal RA**, Hines ML, Lytton WW: Using NEURON for reaction-diffusion modeling of extracellular dynamics. *Frontiers in Neuroinformatics*. 2018, 12:41. doi:10.3389/fninf.2018.00041

McDougal RA, Morse TM, Carnevale T, Marengo L, Wang R, Migliore M, Miller PL, Shepherd GM, Hines ML. Twenty years of ModelDB and beyond: Building essential modeling tools for the future of neuroscience. *J Comput Neurosci*. 2017, 42(1):1-10. doi:10.1007/s10827-016-0623-7

McDougal RA, Bulanova AS, Lytton WW. Reproducibility in computational neuroscience models and simulations. *IEEE Transactions on Biomedical Engineering*. 2016, 63(10), 2021-2035. doi:10.1109/TBME.2016.2539602

Lytton WW, Seidenstein AH, Dura-Bernal S, **McDougal RA**, Schürmann F, Hines ML. Simulation neurotechnologies for advancing brain research: Parallelizing large networks in NEURON. *Neural Computation*. 2016, 28(10), 2063-2090. doi:10.1162/NECO_a_00876

Marengo L, Wang R, **McDougal RA**, Olender T, Twik M, Bruford E, Liu X, Zhang J, Lancet D, Shepherd G, Crasto C. ORDB, HORDE, ODORactor and other on-line knowledge resources of olfactory receptor-odorant interactions. *Database*. 2016, baw132. doi:10.1093/database/baw132

Neymotin SA, **McDougal RA**, Bulanova AS, Zeki M, Lakatos P, Terman D, Hines ML, Lytton WW. Calcium regulation of HCN channels supports persistent activity in a multiscale model of neocortex. *Neuroscience*. 2016, 316, 344-366. doi:10.1186/1471-2202-15-S1-P108

McDougal RA, Shepherd GM. 3D-printer visualization of neuron models. *Frontiers in Neuroinformatics*. 2015, 9. doi:10.3389/fninf.2015.00018

McDougal RA, Morse TM, Hines ML, Shepherd GM. ModelView for ModelDB: Online Presentation of Model Structure. *Neuroinformatics*. 2015, 13(4), 459-470. doi:10.1007/s12021-015-9269-2

Neymotin SA*, **McDougal RA***, Sherif MA, Fall CP, Hines ML, Lytton WW. Neuronal calcium wave propagation varies with changes in endoplasmic

reticulum parameters: a computer model. *Neural Computation*. 2015, 27(4): 898-924. doi:10.1162/NECO_a_00712

McDougal RA, Hines ML, Lytton WW. Reaction-diffusion in the NEURON simulator. *Frontiers in Neuroinformatics*. 2013, 7:28. doi:10.3389/fninf.2013.00028

McDougal RA, Hines ML, Lytton WW. Water-tight membranes from neuronal morphology files. *J Neuro Meth*. 2013, 220(2): 167-178. doi:10.1016/j.jneumeth.2013.09.011

Gu Y, Barry J, **McDougal R** (*sic*), Terman D, Gu C. Alternative splicing regulates Kv3.1 polarized targeting to adjust the maximal spiking frequency. *J Biol Chem*. 2012, 287(3):1755-1769. doi:10.1074/jbc.M111.299305

* indicates authors that contributed equally.

2. Other Publications

Patoary MNI, Tropper C, **McDougal R**, Lytton WW. Optimizations for Neuron Time Warp (NTW) for stochastic reaction-diffusion models of neurons. In *Proceedings of the 2017 Winter Simulation Conference*, pp 1252-1263. IEEE Press. 2017. doi:10.1109/WSC.2017.8247871

Lin Z, Tropper C, Patoary MNI, **McDougal RA**, Lytton WW, Hines ML. NTW-MT: a multi-threaded simulator for reaction diffusion simulations in NEURON. In *Proceedings of the 3rd ACM SIGSIM Conference on Principles of Advanced Discrete Simulation*, pp. 157-167. ACM, 2015. doi:10.1145/2769458.2769459

Patoary MNI, Tropper C, Lin Z, **McDougal R**, Lytton WW. Neuron time warp. *Proceedings of the 2014 Winter Simulation Conference*. IEEE Press. 2014. doi:10.1109/WSC.2014.7020177

Shepherd G, Morse T, Marenco L, Cheung K, Carnevale T, Migliore M, **McDougal R**, Hines M, Miller P. SenseLab: Integration of Multidisciplinary Neuroscience Data. In: Jaeger D, Jung R. (Ed.) *Encyclopedia of Computational Neuroscience*: SpringerReference (www.springerreference.com). Springer-Verlag Berlin Heidelberg, 2014. doi:10.1007/978-1-4614-6675-8_497

Lytton W, **McDougal R**. Deterministic Reaction-Diffusion Simulators. In: Jaeger D, Jung R. (Ed.) *Encyclopedia of Computational Neuroscience*: SpringerReference (www.springerreference.com). Springer-Verlag Berlin Heidelberg, 2014. doi:10.1007/978-1-4614-6675-8_185

McDougal R, Wang R, Morse T, Migliore M, Marenco L, Carnevale T, Hines M, Shepherd G. ModelDB. In: Jaeger D, Jung R. (Ed.) *Encyclopedia of*

Computational Neuroscience: SpringerReference (www.springerreference.com). Springer-Verlag Berlin Heidelberg, 2014. doi:10.1007/978-1-4614-6675-8_158

3. Submitted Manuscripts

Yuan P, Tong L, Zhang M, Chen F, **McDougal RA**, Chan D, Morse TM, Grutzendler J. Focal sprouting and lysosome entrapment underlie axon conduction failure in Alzheimer's disease.

Talks:

- 2018 Catalyzing multiscale neuroscience research. Yale University Department of Biostatistics seminar. October 31, 2018.
- 2018 Strategies for Parallel NEURON Simulations. Organization for Computational Neurosciences workshop. Seattle, Washington. July 17, 2018.
- 2018 Synergistic computational approaches for catalyzing neuroscience research. University of Oklahoma Computational Biology seminar. March 6, 2018.
- 2018 Enabling reproducible computer modeling for integrating experimental data: insights from computational neuroscience. George Washington University Department of Epidemiology and Biostatistics seminar. January 18, 2018.
- 2018 Knowledge dissemination: model sharing and outreach. Panel speaker. SSH Forum on Modeling and Simulation. International Meeting on Simulation in Healthcare. Los Angeles, CA. January 13, 2018.
- 2017 Multiscale modeling with the NEURON Reaction-Diffusion Module. Multiscale modeling and simulation workshop. Bernstein Conference. Göttingen, Germany. September 12, 2017.
- 2017 Using NEURON to incorporate reaction-diffusion into cellular and network models. Reaction-diffusion modeling for neurobiology workshop. Organization for Computational Neurosciences workshop. Antwerp, Belgium. July 20, 2017.
- 2016 Neuronal calcium dynamics. NeuroMat workshop. University of São Paulo Ribeirão Preto, Brazil. December 8, 2016.
- 2016 The ModelDB repository as a tool for model development. Collaborative Development of Data-Driven Models of Neural Systems conference. Janelia Research Campus. September 19, 2016.

- 2016 NEURON strategies for the simulation and visualization of spatial mathematical neuroscience models. NJIT Mathematical Biology Seminar. February 23, 2016.
- 2014 ModelView: An HTML5 Graphical Tool for Exploring Model Structures. NLM Informatics Training Conference. Pittsburgh, PA. June 17, 2014.
- 2014 ModelView: extracting model structure and presenting it on the web with NEURON. Open Source Brain Conference. Alghero, Italy. May 14, 2014.
- 2011 Novel patterns and dopamine modulation in a model of working memory. Workshop for Young Researchers in Mathematical Biology. Mathematical Biosciences Institute. The Ohio State University. August 30, 2011.

Teaching:

Computational Biology

NEURON summer course (Lecturer: Emory University, August 2018. Wright State University, June 2017. Janelia Research Center, June 2016.)

Multiscale modeling from molecular level to large network level. Instructor for one day tutorial at Organization for Computational Neurosciences annual meeting, July 2018.

BME G 220: Computational neuroscience (Guest lecturer: SUNY Downstate, May 2017.)

NeuroMat course on parallel and GPU programming for neuroscience. (Lecturer: Ribeirão Preto, São Paulo, Brazil. December 2016.)

NEURON one-day course (Lecturer: Various locations. November 2018, November 2017, November 2016, October 2015, November 2014, July 2014.)

Undergraduate summer program in mathematical biology. (Mentor: Mathematical Biosciences Institute at The Ohio State University, Summer 2007.)

Informatics

NURS 922: Introduction to clinical research informatics. (Guest lecturer. Yale University. NoSQL databases. Spring 2018.)

CBB 750: Core topics in biomedical informatics. (Guest lecturer. Yale University. 1.5 weeks on NoSQL databases; 2 weeks on parallel programming. Spring 2017, Spring 2018.)

Mathematics

Accelerated calculus for engineering honors. (TA: The Ohio State University. Level 1: Autumn 2010. Level 2: Winter 2010. Level 3: Spring 2010.)

Calculus and analytic geometry. (Lecturer: The Ohio State University, Level 1: Summer 2005. Level 2: Autumn 2009. TA: The Ohio State University, Level 1: Spring 2005. Level 2: Autumn 2005. University of Maryland Baltimore County, Level 2: Spring 2004.)

Complex analysis. (Grader: University of Maryland Baltimore County, Spring 2003.)

Linear algebra for applications. (Grader: The Ohio State University, Autumn 2008.)

Mathematical analysis for business. (TA: The Ohio State University. Level 2: Autumn 2004. Level 3: Winter 2005.)

Ordinary and partial differential equations. (TA: The Ohio State University, Winter 2008 and Autumn 2007.)

Precalculus mathematics. (TA: University of Maryland Baltimore County, Autumn 2003.)

Curriculum Development

Developing FAIR Data Sharing module as part of the Biomedical Data Science Curriculum Initiative Working Group
<http://dbmi.hms.harvard.edu/education/bmdsci-working-group>

Doctoral Student Supervision

Co-supervisor (with Carl Tropper): Mohammad Nazrul Ishlam Patoary (Computer Science), "Parallel stochastic discrete event simulation of calcium dynamics in NEURON." McGill University 2018.

Conference Posters:

McDougal RA, Newton A, Hines ML, Lytton WW. Building, simulating, and visualizing reaction-diffusion models with NEURON's enhanced rxd module. San Diego CA: Society for Neuroscience, 2018.

Morse TM, **McDougal RA**. Enhancing computational model discovery via network visualization and analysis. San Diego CA: Society for Neuroscience, 2018.

Surles-Zeigler M, Morse TM, **McDougal RA**, Shepherd GM. Integrating gene and protein data into SenseLab databases for neuroinformatics-driven discovery. San Diego CA: Society for Neuroscience, 2018.

Newton A, Seidenstein AH, Hines ML, **McDougal RA**, Lytton WW. Multiscale simulation of spreading depolarization in ischemic stroke. San Diego CA: Society for Neuroscience, 2018.

Neymotin SA, Daniels DS, Peled N, **McDougal RA**, Carnevale NT, Moore CI, Hines ML, Hamalainen M, Jones SR. Human neocortical neurosolver (HNN): a new software tool for interpreting the circuit level origin of human MEG/EEG data. San Diego CA: Society for Neuroscience, 2018.

McDougal RA, Newton AJH, Lytton WW. Building and visualizing reaction-diffusion simulations in NEURON cellular mechanisms. Seattle, Washington: Organization for Computational Neurosciences, 2018.

Newton AJH, Seidenstein AH, **McDougal RA**, Hines ML, Lytton WW. Extracellular reaction-diffusion in the NEURON simulator: modeling ischemic stroke. Seattle, Washington: Organization for Computational Neurosciences, 2018.

Newton AJH, Seidenstein AH, **McDougal RA**, Hines ML, Lytton WW. Expanding NEURON extracellular reaction-diffusion support: simulation of ischemic stroke. Bethesda, MD: IMAG Multiscale Modeling Consortium Meeting, 2018.

McDougal RA, Newton AJH, Patoary MNI, Tropper C, Hines ML, Lytton WW. Parallel stochastic spines in NEURON reaction-diffusion simulations. Washington DC: Society for Neuroscience, 2017.

Morse TM, Wang R, Carnevale NT, Shepherd GM, **McDougal RA**. Pipeline to promote discovery and sharing of computational neuroscience research. Washington DC: Society for Neuroscience, 2017.

Newton A, **McDougal RA**, Hines ML, Miyazaki K, Ross WN, Lytton WW. Modeling electrodiffusion with the NEURON reaction-diffusion module. Washington DC: Society for Neuroscience, 2017.

Seidenstein A, Newton A, **MacDougal (sic) RA**, Lytton WW. Multiscale computer modeling of penumbral zones in brain ischemia. Washington DC: Society for Neuroscience, 2017.

Surles-Zeigler M, Morse TM, **McDougal RA**, Shepherd GM. Integrating molecular markers and gene expression in SenseLab for neuroinformatics-driven discovery. Washington DC: Society for Neuroscience, 2017.

Neymotin SA, Peled N, **McDougal RA**, Carnevale NT, Hines ML, Hamalainen M, Jones SR. Human neocortical neurosolver (HNN): A new computational tool for localizing and interpreting human neocortical dynamics. Washington DC: Society for Neuroscience, 2017.

McDougal R, Lytton W. Accelerating NEURON reaction-diffusion simulations. Antwerp, Belgium: Organization for Computational Neurosciences, 2017.

Newton A, Seidenstein A, **McDougal R**, Lytton W. Multiscale modeling of ischemic stroke with the NEURON reaction-diffusion model. Antwerp, Belgium: Organization for Computational Neurosciences, 2017.

Newton AJH, **McDougal RA**, Tropper C, Seidenstein AH, Lytton WW. Expanding NEURON to bridge electrophysiology, chemical, and network scales: simulations of ischemic stroke. Bethesda, MD: IMAG Multiscale Modeling Consortium Meeting, 2017.

McDougal RA, Tropper C, Hines ML, Lytton WW. Expanding NEURON support for reaction-diffusion models. San Diego CA: Society for Neuroscience, 2016.

Shepherd GM, Morse TM, **McDougal RA**. Automated metadata identification for better model discovery. San Diego CA: Society for Neuroscience, 2016.

Morse TM, **McDougal RA**, Carnevale NT, Marengo L, Wang R, Migliore M, Miller PL, Shepherd GM, Hines ML. Recent advances in ModelDB. San Diego CA: Society for Neuroscience, 2016.

Seidenstein A, **McDougal RA**, Hines ML, Lytton WW. Mosaic multiscale computer modeling of ischemic stroke. San Diego CA: Society for Neuroscience, 2016.

Marengo L, Wang R, **McDougal RA**, Morse TM, Carnevale NT, Miller PL, Shepherd GM. Development of FunctionalConnectomeDB within SenseLab to incorporate and mine functional connectomics data. San Diego CA: Society for Neuroscience, 2016.

Ikeno H, Yamazaki T, Kannon T, Okumura Y, Kamiyama Y, Ishihara A, Inagaki K, Hirata Y, Satoh S, Wagatsuma H, Asai Y, Yamaguchi Y, **McDougal R**, Wang R, Marengo L, Morse T, Shepherd G, Usui S. Development of an on-line simulation environment for computational neuroscience. Wakō, Saitama, Japan: Advances in Neuroinformatics, 2016.

Morse TM, Marengo L, **McDougal RA**, Wang R, Hines ML, Carnevale NT, Cavarretta F, Migliore M, Crasto C, Miller P, Shepherd GM. Advances in SenseLab's interoperable neuroinformatics databases:

FunctionalMicroconnectomeDB and ModelDB. Bonita Springs, FL: AChemS XXXVIII, 2016.

McDougal RA, Neymotin SA, Morse TM, Hines ML, Lytton WW, Shepherd GM. Developing models with NEURON and ModelDB. Columbus, OH: Mathematical Biosciences Institute, Modeling and Computation of Transmembrane Transport Workshop, 2015.

McDougal RA, Hines ML, Lytton WW. Coupling 1D and 3D domains in neuroscience simulations. Bethesda, MD: Multiscale Modeling. National Institutes of Health, 2015.

McDougal RA, Bulanova AS, Hines ML, Lytton WW. Hybrid 1d/3d reaction-diffusion in the NEURON simulator. Chicago IL: Society for Neuroscience, 2015.

Morse TM, **McDougal RA**. Unified real-time searching of keywords and attributes in ModelDB. Chicago IL: Society for Neuroscience, 2015.

Marengo L, Wang R, **McDougal RA**, Morse TM, Carnevale NT, Miller P, Shepherd GM. Exploring data-driven techniques for visual representation of neuronal micro-connectomes. Chicago IL: Society for Neuroscience, 2015.

Tropper C, Lin Z, **McDougal RA**, Hines M, Lytton W. Parallel reaction-diffusion simulation in NEURON. Chicago IL: Society for Neuroscience, 2015.

Seidenstein A, Neymotin SA, Fesharaki A, Hines ML, **McDougal RA**, Bulanova AS, Lytton WW. Neuronal network bump attractors augmented by calcium up-regulation of Ih in a multiscale computer model of prefrontal cortex. Chicago IL: Society for Neuroscience, 2015.

Seidenstein AH, **McDougal RA**, Hines ML, Lytton WW. Parallelizing large networks using NEURON-Python. Prague, Czech Republic: Organization for Computational Neurosciences, 2015.

McDougal RA, Hines ML, Lytton WW. Calcium 'impedance mismatch' – the role of geometry on diffusion dynamics. Washington DC: Society for Neuroscience, 2014.

Morse TM, **McDougal RA**, Wang R, Marengo L, Hines M, Carnevale NT, Miller P, Shepherd GM. Advances in Senselab: ModelView, synaptic connectivity, and structured data submission. Washington DC: Society for Neuroscience, 2014.

Shepherd GM, **McDougal RA**, Wang R, Morse TM, Carnevale NT, Marengo LN, Migliore M, Miller PL. 3D printouts of neurons and microcircuits. Washington DC: Society for Neuroscience, 2014.

Neymotin SA, **McDougal RA**, Hines ML, Lytton WW. Calcium regulation of HCN supports persistent activity associated with working memory: A multiscale model of prefrontal cortex. Washington DC: Society for Neuroscience, 2014.

Bulanova AS, **McDougal RA**, Neymotin SA, Mutai VK, Lytton WW, Hines ML. Integrating Systems Biology Markup Language (SBML) with NEURON. Washington DC: Society for Neuroscience, 2014.

Tropper C, Pataory M, **McDougal RA**, Hines ML, Lytton WW. Stochastic diffusion simulation in NEURON. Washington DC: Society for Neuroscience, 2014.

McDougal RA, Bulanova A, Patoary MNI, Tropper C, Hines ML, Lytton WW. NEURON for multiscale simulations: reaction-diffusion meets electrophysiology. Bethesda, MD: Multiscale Modeling. National Institutes of Health, 2014.

Neymotin SA, **McDougal RA**, Hines ML, Lytton WW. Calcium regulation of HCN supports persistent activity associated with working memory: A multiscale model of prefrontal cortex. Bethesda, MD: Multiscale Modeling. National Institutes of Health, 2014.

McDougal RA, Hines M, Lytton WW. A method for multi-simulator reaction-diffusion with NEURON. Quebec, QC: Organization for Computational Neurosciences, 2014.

Neymotin SA, **McDougal RA**, Hines M, Lytton WW. Calcium regulation of HCN supports persistent activity associated with working memory: a multiscale model of prefrontal cortex. Quebec, QC: Organization for Computational Neurosciences, 2014.

Bulanova A, **McDougal RA**, Neymotin S, Mutai V, Lytton WW, Hines M. Integrating Systems Biology Markup Language (SBML) with NEURON. Quebec, QC: Organization for Computational Neurosciences, 2014.

McDougal RA, Morse TM, Marengo L, Wang R, Hines ML, Carnevale NT, Shepherd GM. ModelView for ModelDB: Exploring model properties in a web browser. San Diego, CA: Society for Neuroscience, 2013.

Morse TM, **McDougal RA**, Wang R, Hines ML, Marengo L, Carnevale NT, Shepherd GM. Using full text, context, and attributes to mine neuroscience models. San Diego, CA: Society for Neuroscience, 2013.

Hines ML, **McDougal RA**, Neymotin SA, Tropper C, Lytton WW. Interfaces in multiscale reaction-diffusion models in the NEURON simulator. San Diego, CA: Society for Neuroscience, 2013.

Sherif MA, **McDougal R**, Neymotin S, Hines M, Lytton WW. Calcium wave propagation varies with changes in endoplasmic reticulum parameters: a computer model. San Diego, CA: Society for Neuroscience, 2013.

Tropper C, Patoary MNI, **McDougal RA**, Hines ML, Lytton WW. Parallel stochastic simulation of neuronal reaction-diffusion equations. San Diego, CA: Society for Neuroscience, 2013.

Neymotin SA, Skolnick Y, Hilscher MM, Moulin T, **McDougal RA**, Hines ML, Lytton WW. Ih tunes theta/gamma oscillations and cross-frequency coupling in an in silico CA3 model. Rhythmic Dynamics and Cognition Conference, MIT, Boston MA. 2013.

McDougal RA, Hines ML, Lytton WW. Reaction-diffusion modeling in the NEURON simulator. Bethesda, MD: Multiscale Modeling. National Institutes of Health, 2012.

Neymotin S, Skolnick Y, **McDougal RA**, Hilscher M, Moulin T, Lytton W. Simulated relations of molecular, cellular, and neuronal network dynamics in a hippocampal network. Bethesda, MD: Multiscale Modeling. National Institutes of Health, 2012.

McDougal RA, Lytton WW, Hines ML. Calcium-electrical interactions: an example of reaction-diffusion in the NEURON simulator. New Orleans, LA: Society for Neuroscience, 2012.

McDougal RA, Lytton WW, Hines ML. Modeling calcium waves and electrical dynamics in neurons. Columbus, OH: Mathematical Biosciences Institute, Workshop for Young Researchers in Mathematical Biology, 2012.

McDougal RA, Skolnick Y, Schaff JC, Lytton WW, Hines ML. Reaction-diffusion modeling in the NEURON simulator. Decatur, GA: Organization for Computational Neurosciences, 2012.

McDougal RA, Lytton WW, Hines ML. Object-oriented reaction-diffusion modeling in the NEURON simulator. Washington DC: Society for Neuroscience, 2011.

McDougal RA, Zeki M, Lyman K, Terman DT. A working memory model based on excitatory-inhibitory interactions and calcium dynamics. San Antonio, TX: Organization for Computational Neurosciences, 2010.

McDougal RA, Best J. A mathematical model for intracellular PER protein dynamics. Sandestin, FL: Society for Research on Biological Rhythms, 2008.

Technical Volunteering:

New Haven Reads: Tutored for summer Web Development course. Summers 2014-2016.

Friends of East Rock Park: Developed an interactive web page to enable voting for their annual photo contest. 2013, 2014, 2016.
<http://ramcdougal.com/photocontest2016/>

Activities:

2018, 2019	Triage Judge, MathWorks Math Modeling (M3) Challenge
2013-2019	Judge, Connecticut STEM Fair (formerly Southern Connecticut Invitational Science & Engineering Fair)
2015-2016	Presenter, Yale Brain Education Day
2016	Presenter, Neuroscience Demos with the Talented and Gifted Program
2013	Judge, New Haven Public School Science Fair

Memberships:

2007-present	Member, American Mathematical Society.
2007-present	Member, Society for Industrial and Applied Mathematics.
2011-present	Member, Society for Neuroscience.
2012-present	Member, Organization for Computational Neurosciences.
2018-present	Member, American Association for the Advancement of Science.
2019-present	Member, American Medical Informatics Association.