Mary M. (Molly) Maleckar

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Education

2008	**Ph.D., Biomedical Engineering**; The Johns Hopkins University (Baltimore, MD)
2002	**B.Sc., Biomedical Engineering**; Tulane University (New Orleans, LA)

Professional Experience

2017 –	**Director**, Models and Theory, The Allen Institute for Cell Science, Seattle, WA.
2015 – 2016	**Senior Scientist**, Computational Cardiac Modeling, Simula Research Laboratory, Oslo, Norway
	Training Coordinator, AFib-TrainNet EU MCSA ITN
	Coordinator, SysAFib ERA CoSysMed European Project
2012 – 2016	**Board Member**, Simula Research Laboratory, Center for Cardiological Innovation (SFI) Board of Directors
2012 – 2015	**Director**, Simula School of Research and Innovation, Oslo, Norway
2011 – 2012	**Deputy Director for Simulation and Modeling**, Center for Cardiological Innovation (CCI), a Norwegian Center for Research Innovation (SFI)
2011 – 2012	**Research Department Head**, Computational Cardiac Modeling, Simula Research Laboratory, Oslo, Norway
2010	**Research Group Leader**, Computational Cardiac Modeling and Center for Biomedical Computing, Simula Research Laboratory, Oslo, Norway
2009	**Postdoctoral Research Fellow**, Center for Biomedical Computing, Scientific Computing, Simula School of Research and Innovation, Oslo, Norway

Grants and Fellowships

2016 – 2019	SysAFib: Systems medicine for diagnosis and stratification of atrial fibrillation
	ERA CoSysMed, European Commission and BIOTEK2021 Research Council of Norway
2015 – 2019	EU Training Network on Novel Targets and Methods in Atrial Fibrillation (AFib-TrainNet), Marie Skłodowska-Curie Actions, European Commission
2015 – 2018	"Risk factors for sudden cardiac death during acute myocardial infarction (MI-RISK)", Novo Nordisk Foundation Interdisciplinary Synergy Grant
2014 – 2015	PREPARE2: Increased science awareness among youth, Simula School of Research and Innovation, PROFORSK, Research Council of Norway
2014	Expert Advisor Policy Fellowship, The Research Council of Norway Brussels Office
2012 – 2013	Can Simulation shed light on a complex disease process?, Simula Research Laboratory/University of California San Diego, IS-BILAT, Research Council of Norway
2011 – 2019	The Center for Cardiological Innovation, Simula Research Laboratory, SFI Program, Research Council of Norway

Pre-print or Under Peer Review

Building a 3D Integrated Cell. Gregory R. Johnson, Rory M. Donovan-Maiye, **Mary M. Maleckar**. Posted December 21, 2017. bioRxiv 238378; doi: `https://doi.org/10.1101/238378`

Three dimensional cross-modal image inference: label-free methods for subcellular structure prediction. Chek Ounkomol, Daniel A. Fernandes, Sharmishtaa Seshamani, **Mary M. Maleckar**, Forrest Collman, Gregory R. Johnson. Posted November 9, 2017. bioRxiv 216606; doi: `https://doi.org/10.1101/216606`

Generative Modeling with Conditional Autoencoders: Building an Integrated Cell. Gregory R. Johnson, Rory M. Donovan-Maiye, **Mary M. Maleckar**. Submitted on 28 Apr 2017. `http://arxiv.org/abs/1705.00092v1`

Peer-reviewed Journal Publications

2018 Ounkomol C, Seshamani S, **Maleckar MM**, Collman F, Johnson GR. Label-free prediction of three-dimensional fluorescence images from transmitted-light microscopy. Nat Methods. 2018 Sep 17. doi: 10.1038/s41592-018-0111-2. [Epub ahead of print]

Maleckar MM, Clark RB, Votta B, Giles WR. The Resting Potential and K(+) Currents in Primary Human Articular Chondrocytes. Front Physiol. 2018 Sep 4;9:974. doi: 10.3389/fphys.2018.00974. eCollection 2018.

Kallhovd S, **Maleckar MM**, Rognes ME. Inverse estimation of cardiac activation times via gradient-based optimization. Int J Numer Method Biomed Eng. 2018 Feb;34(2). doi: 10.1002/cnm.2919. Epub 2017 Aug 23.

2017 Vagos MR, Arevalo H, de Oliveira BL, Sundnes J, **Maleckar MM**. A computational framework for testing arrhythmia marker sensitivities to model parameters in functionally calibrated populations of atrial cells. Chaos. 2017 Sep;27(9):093941.

Behdadfar S, Navarro L, Sundnes J, **Maleckar MM**, Avril S. Importance of material parameters and strain energy function on the wall stresses in the left ventricle. Comput Methods Biomech Biomed Engin. 2017 Aug;20(11):1223-1232. doi: 10.1080/10255842.2017.1347160. Epub 2017 Jul 4.

Maleckar MM, Edwards AG, Louch WE, Lines GT. Studying dyadic structure-function relationships: a review of current modeling approaches and new insights into Ca(2+) (mis)handling. Clin Med Insights Cardiol. 2017 Apr 12;11:1179546817698602.

Belardinelli L, **Maleckar MM**, Giles WR. Ventricular Microanatomy, Arrhythmias, and the Electrochemical Driving Force for Na(+): Is There a Need for Flipped Learning? Circ Arrhythm Electrophysiol. 2017 Feb;10(2):e004955. doi: 10.1161/CIRCEP.117.004955. Erratum in: Circ Arrhythm Electrophysiol. 2017 Mar;10 (3):.

2016 Skibsbye L, Jespersen T, Christ T, **Maleckar MM**, van den Brink J, Tavi P, Koivumäki JT. Refractoriness in human atria: Time and voltage dependence of sodium channel availability. J Mol Cell Cardiol. 2016 Dec;101:26-34.

Grandi E, **Maleckar MM**. Anti-arrhythmic strategies for atrial fibrillation: The role of computational modeling in discovery, development, and optimization. Pharmacol Ther. 2016 Sep 6. pii: S0163-7258(16)30168-1.

Lines GT, Oliveira BL, Skavhaug O, **MM Maleckar**. Simple T wave metrics may better predict early ischemia as compared to ST segment. IEEE Transactions on Biomedical Engineering, 2017 Jun;64(6):1305-1309. doi: 10.1109/TBME.2016.2600198. Epub 2016 Aug 25.

2015 S. Kallhovd, S.U. Gerald, J. Saberniak, K. Haugaa, **MM Maleckar**.Localization and not Extent of Fibrofatty Infiltration is the Primary Factor Determining Conduction Disturbance in a Computational Model of Arrhythmogenic Cardiomyopathy. Proceedings IEEE e-Health and Bioengineering 2015. EHB 2015, November 19-21, 2015, Iasi, Romania.

2014 **Maleckar MM**, Lines GT, Koivumäki J, Cordeiro JM, Calloe K.NS5806 partially restores action potential duration but fails to ameliorate calcium transient dysfunction in a computational model of canine heart failure, 2014 Nov;16 Suppl 4:iv46-iv55.

Koivumäki JT, Clark RB, Belke D, Kondo C, Fedak PW, **Maleckar MM**, Giles WR.Na(+) current expression in human atrial myofibroblasts: identity and functional roles. Front Physiol. 2014 Aug 7;5:275. doi: 10.3389/fphys.2014.00275. eCollection 2014.

Frisk M, Koivumaki J, Norseng PA, **Maleckar MM**, Sejersted OM, Louch WE. Variable t-tubule organization and Ca2+ homeostasis across the atria. Am J Physiol Heart Circ Physiol. 2014 Jun 20.

Koivumäki JT, Seemann G, **Maleckar MM**, Tavi P. In silico screening of the key cellular remodeling targets in chronic atrial fibrillation. PLoS Comput Biol. 2014 May 22;10(5):e1003620. doi: 10.1371/journal.pcbi.1003620. eCollection 2014 May.

Yuan L, Koivumäki JT, Liang B, Lorentzen LG, Tang C, Andersen MN, Svendsen JH, Tfelt-Hansen J, **Maleckar M**, Schmitt N, Olesen MS, Jespersen T. Investigations of the Navß1b sodium channel subunit in human ventricle; functional characterization of the H162P Brugada syndrome mutant. Am J Physiol Heart Circ Physiol. 2014 Apr 15;306(8):H1204-12. doi: 10.1152/ajpheart.00405.2013. Epub 2014 Feb 21.

2013 Li P, Lines GT, **Maleckar MM**, Tveito A. Mathematical Models of Cardiac Pacemaking Function. Frontiers in Physics, 1(20): 2013 http://www.frontiersin.org/Journal/10.3389/fphy.2013.00020/abstract

Wilhelms M, Hetmann H, **Maleckar MM**, Koivumäki J, Dossel O, Seeman G. Benchmarking electrophysiological models of human atrial myocytes, Frontiers in Physiology 3(487), 2013.

2012 Koivumäki J, Christ T, Seemann G, and **Maleckar MM**. Divergent action potential morphology in human atrial cells vs. tissue: underlying ionic mechanisms, In: Computing in Cardiology, ed. by Alan Murray, vol. 39, pp. 121-124, Alan Murray (ISBN: 978-1-4673-2076-4), 2012. Refereed proceedings.

Rose RA, Belke DD, **Maleckar MM**, Giles WR. Ca2+ Entry Through TRP-C Channels Regulates Fibroblast Biology in Chronic Atrial Fibrillation. Circulation 126(17): 2039-41, 2012.

Tveito A, Lines GT, Edwards AG, **Maleckar MM**, Michailova A, Hake J, McCulloch A. Slow Calcium-Depolarization-Calcium waves may initiate fast local depolarization waves in ventricular tissue. Prog Biophys Mol Biol 110(2-3): 295-304, 2012.

Tveito A, Lines G, Rognes ME, and **Maleckar MM**. An analysis of the shock strength needed to achieve defibrillation in a simplified mathematical model of cardiac tissue. International Journal of Numerical Analysis and Modeling 9(3): 644-57, 2012.

Tveito A, Lines G, and **Maleckar MM**. Note on a possible pro-arrhythmic property of anti-arrhythmic drugs aimed at improving gap-junction coupling. Biophys J 102(2): 231-37, 2012.

2011   Niederer SA, Kerfoot E, Benson A, Bernabeu MO, Bernus O, Bradley C, Cherry EM, Clayton R, Fenton FH, Garny A, Heidenreich E, Land S, **Maleckar M**, Pathmanathan P, Plank G, Rodríguez JF, Roy I, Sachse FB, Seemann G, Skavhaug O and Smith NP. N-Version Benchmark Evaluation of Cardiac Tissue Electrophysiology Simulators. Philosophical Transactions of the Royal Society VPH Issue. Philos Transact A Math Phys Eng Sci. 369(1954): 4331-51, 2011.

McDowell K, Arevalo H, **Maleckar MM**, and Trayanova NA. Susceptibility to reentry in the infarcted heart depends on active fibroblast density. Biophysical Journal 101(6): 1307-15, 2011.

Tveito A, Lines G, Skavhaug O, and **Maleckar MM**. Unstable eigenmodes are possible drivers for cardiac arrhythmias. Journal of the Royal Society Interface. 8(61): 1212-6, 2011.

Tveito A, Lines G, Artebrant R, Skavhaug O, and **Maleckar MM**. Existence of excitation waves for a collection of cardiomyocytes electrically coupled to fibroblasts. Mathematical Biosciences 230(2): 79-86, 2011.

2009 –   **Maleckar MM**, Greenstein JL, Giles WR, and Trayanova NA. Electrotonic coupling between human atrial myocytes and fibroblasts alters excitability and repolarization. Biophysical Journal 97(8): 2179-2190, 2009.

Maleckar MM, Greenstein JL, Giles WR, and Trayanova NA. Repolarization in the human atrial myocyte – rate-dependent changes in the action potential waveform. Am J Physiol Heart Circ Physiol 297(4): 1398-1410, 2009.

Maleckar MM, Greenstein JL, Trayanova NA, and Giles WR. Mathematical simulations of ligand-gated and specific cell-type effects in the human atrium. Prog Biophys Mol Biol 98: 161-70, 2008.

Maleckar MM, Woods MC, Sidorov VY, Holcomb MR, Mashburn DN, Wikswo JP and Trayanova NA. Polarity reversal lowers activation time during diastolic field stimulation of the rabbit ventricles: Insight into mechanisms. Am J Physiol Heart Circ Physiol 295(4):H1626-33, 2008.

Bourn DW, **Maleckar MM**, Rodríguez B, Trayanova NA. Mechanistic enquiry into the effect of increased pacing rate on the upper limit of vulnerability. Phil Trans. Royal Soc A, 346:1333-1348, 2006.

Gurev V, **Maleckar MM**, and Trayanova NA. Cardiac Defibrillation and the Role of Mechano-Electric Feedback in Postshock Arrhythmogenesis. The Annals of the New York Academy of Sciences,1080:320-333, 2006.

Selected Conferences and Talks

Maleckar MM. Stem cell organization using label-free imaging and a novel generative model. Biophysical Society Annual Meeting Computational Biology Platform. February 18th, 2018. BPS 2018, San Francisco, CA. Invited talk.

Maleckar MM. Capturing variance: integrating a moving target. Building the Cell 2017 Subgroup Meeting, December 2nd, 2017, ASCB, Philadelphia, PA. Invited talk.

Maleckar MM. Putting the pieces together: Towards supplementing sparse clinical data with multi physics simulation Foundation Teofilo Rossi di Montelera Forum 2015, December 6-9, 2015, Lugano, Switzerland. Invited talk.

Maleckar MM. How many ionic models do we need for modelling of the atria? Atrial Signals 2015, Karlsruhe, Germany, 22.-24. October. Invited talk.

Maleckar MM. Patient-specific modeling: how good do we have to be? TRM Forum 2013, December 1-3, 2013, Lugano, Switzerland. Invited talk.

Maleckar MM, Lines GT, Koivumäki JT, Calloe K, Cordeiro JM. Ca2+-transient dysfunction and ion channel therapy: what can we gather from a computational model of canine heart failure? EHRA Scientific Sessions 2013, 37th Annual Meeting of the ESC Working Group on Cardiac Cellular Electrophysiology, 2013. Poster and presentation.

Maleckar MM. Towards Modeling Arrhythmogenic Cardiomyopathy – Can Simulation Shed Light on a Complex Disease Process? Cardiac Physiome Workshop, San Diego, October 30 – November 2, 2012. Invited talk.

Maleckar MM. Modeling the effects of rotigaptide in atrial tissue: a cautionary tale. 9th International Conference of Numerical Analysis and Applied Mathematics, September 19-25, 2011. Invited talk.

Professional Affiliations

- 2016 – present, Member, American Society for Cell Biology
- 2011 – present, Member, Scandinavian Physiological Society
- 2011 – present, Member, Biophysical Society
- 2011 – present, Member, European Society of Cardiology Working Group on Cellular Cardiac Electrophysiology
- 2012 – present, Member, European Society of Cardiology Working Group on eCardiology
- 2009 – present, Member, Heart Rhythm Society
- 2009 – present, Member, American Association for the Advancement of Science

Other

- English (native); Spanish (C2); Norwegian (B2)
- 10+ years consultation experience in science communication, including presentation, popular, and technical writing.