

PROMOTION RECOMMENDATION  
THE UNIVERSITY OF MICHIGAN  
MEDICAL SCHOOL  
DEPARTMENT OF MOLECULAR and INTEGRATIVE PHYSIOLOGY

Michael M.A. Sutton, Ph.D., associate professor of molecular and integrative physiology, with tenure, Department of Molecular and Integrative Physiology, Medical School, is recommended for promotion to professor of molecular and integrative physiology, with tenure, Department of Molecular and Integrative Physiology, Medical School [also being promoted to research professor, Molecular and Behavioral Neuroscience Institute].

Academic Degrees:

Ph.D.	2002	Yale University
B.S.	1995	Queen's University

Professional Record:

2013-present	Associate Professor of Molecular and Integrative Physiology, University of Michigan
2013-present	Research Associate Professor, Molecular and Behavioral Neuroscience Institute, University of Michigan
2006-2013	Assistant Professor of Molecular and Integrative Physiology, University of Michigan
2006-2013	Research Assistant Professor, Molecular and Behavioral Neuroscience Institute, University of Michigan

Summary of Evaluation:

Teaching: Dr. Sutton is an outstanding educator and in 2014 was given the Basic Sciences Excellence in Teaching award by the University of Michigan Medical School. He has taught Human Physiology, an advanced undergraduate course, and Integrative Neuroscience a graduate student course. From 2008-2012, Dr. Sutton was the course director for Excitable Membranes a graduate level course. He was instrumental in acknowledging that there was a lack in practical lab experience and created a new graduate-level on electrophysiology with Drs. Geoff Murphy, Robert Thompson and Ed Stuenkel, which launched in 2013. He has been an instructor for PIBS 503, a training course on research and lab etiquette and ethics, to the Program in Biomedical Sciences graduate students. This course focuses on facilitating discussions rather than traditional teaching methods. Dr. Sutton's students have consistently rated him as well-organized, clear and knowledgeable. The quality of his mentorship is evidenced by NIH NRSA awards given to his mentees, as well as their appointments in world-renown labs they have moved to, including Harvard, Yale and the Janelia Research Campus.

Research: Dr. Sutton's research focuses on how plasticity mechanisms go awry in neurodevelopmental and neurodegenerative disorders. He was the first to demonstrate a functional role for local protein synthesis in dendrites in homeostatic signaling in hippocampal neurons and his lab is continuing this pioneering work. He has had over 1,500 citations on four of his papers

and is recognized as a leader in the field. Dr. Sutton's laboratory collaborates extensively with 14 other laboratories at the Medical School. He has teamed up with the Iwase lab from the Department of Human Genetics to analyze epigenetic mechanisms contributing to neurodevelopmental delay, focusing primarily on Smith-Magenis syndrome; a developmental disorder affecting multiple organ systems resulting in intellectual disability, lack of speech and language skills, sleep disturbances, behavioral problems and physical abnormalities. Dr. Sutton's current NIH R01 grant will examine molecular mechanisms by which dendritic mTORC1 signaling regulates presynaptic neurotransmitter release. His work which revealed ectodomain shedding of SIRP $\alpha$  induced by neuronal activity plays a key role in synapse formation and stabilization. In Dr. Sutton's PNAS paper, he introduces a new mechanism for the trafficking of AMPA receptors through production of a poorly studied phospholipid, PI (3,5) P2 which will have a large impact on the formation and erasure of memories.

Recent and Significant Publications:

Henry FE, Wang X, Serrano D, Perez AS, Carruthers CJL, Stuenkel EL, and Sutton MA: A unique homeostatic signaling pathway links synaptic inactivity to postsynaptic mTORC1. *Journal of Neuroscience*, 38: 2207-2225, 2018.

Henry FE, Hockeimer W, Chen A, Mysore SP, Sutton MA: Mechanistic target of rapamycin is necessary for changes in dendritic spine morphology associated with long-term potentiation. *Molecular Brain*, 10: 50, 2017.

Johnson-Venkatesh EM, Khan MN, Murphy GG, Sutton MA, and Umemori H: Excitability governs neural development in a hippocampal region-specific manner. *Development* 142: 3879-3891, 2015.

McCartney AJ, Zolov SN, Kauffman EJ, Zhang Y, Strunk BS, Weisman LS, Sutton MA: Activity-dependent PI (3,5) P2 synthesis controls AMPA receptor trafficking during synaptic depression. *Proc Natl Acad Sci USA* 111: 4896-4905, 2014.

Toth A, Terauchi A, Zhang LY, Johnson-Venkatesh EM, Larsen DJ, Sutton MA, and Umemori H: Synapse maturation by activity-dependent ectodomain shedding of SIRP $\alpha$ : *Nature Neuroscience*, 16: 1417-1425, 2013.

Service: Dr. Sutton has provided service institutionally, regionally and nationally. For the University of Michigan, he is currently serving on the Undergraduate Research Opportunities Program (UROP) committee, a member of the Admission Committee for the University of Michigan post-baccalaureate Research Education Program (PREP) and the chair of the Advisory Committee on Primary Research Appointments, Promotions, and Titles (APRAPT) for the Medical School. He is currently serving as the director for the Global Research Engagement Opportunity Program working with UM PhD students and flourishing partnerships with Trinity College Dublin and Tel Aviv University. Dr. Sutton is an instrumental instructor in the Neuroscience Graduate Program for the Department and the Molecular and Behavioral Neuroscience Institute.

External Reviewers:

Reviewer A: “Michael has developed state-of-the-art approaches to investigate synaptic mechanisms and the development of brain circuits. With this technology applied to creative questions his work has discovered novel molecules and mechanisms. Very few laboratories have this type of sophisticated technical expertise and abilities to study synapses and memory...Michael is an exceptionally creative scientist; his findings have changed the way the field thinks about synaptic mechanisms. His success is reflected in his publication record, which is stellar...Michael has also done an extraordinary amount of great work in training students and postdoctoral fellows, teaching and volunteer services.”

Reviewer B: “Dr. Sutton’s research has attained international recognition for scholarly contributions of high significance. Many of these papers are in excellent and high impact journals, including Nature, Nature Neuroscience, Neuron, PNAS and Journal of Neuroscience. Collectively, this work has made significant contributions and advances to neuroscience by revealing new mechanisms for the activity dependent control of synapse development, homeostatic plasticity and mechanisms of local protein synthesis...Dr. Sutton is well known in the international community as an outstanding synaptic neurophysiologist whose research is technically demanding and not surprisingly he has been sought out for many collaborations.”

Reviewer C: “Michael has made significant and unique contributions to our understanding of synaptic plasticity and its molecular underpinning...Work in my own lab, which focuses on homeostatic synaptic plasticity, has benefited a great deal from his discoveries over the years...I cannot emphasize more the importance of the type of studies Michael performs with his research group – they give meanings to big-data and form the foundation for system-circuit level questions.”

Reviewer D: “I am also impressed by Mike’s efforts in institutional service. He participated and/or chaired many committees from science/research review to faculty search and promotion, which must have invaluable impact for the development of Medical School at UM...the phenomenal scientific achievements, sincere service and teaching activity by Mike Sutton clearly demonstrated that he is an outstanding scientist, a great teacher and a valuable colleague, who has all the assets to be continuously successful.”

Reviewer E: “Especially remarkable is his collaborative contribution as co-senior author to a paper on the role of SIRPalpha in synapse function. Again, I know most of his recent work and find the data solid, convincing and important...Dr. Sutton’s teaching efforts and accomplishments are outstanding as reflected by his teaching schedule and especially the Excellence in Teaching award he received in 2014...His services to the University are acknowledged by the Outstanding Faculty Service award he received in 2010. On the national level he is a regular member of the study section SYN, which is the leading study section in synapse function and consists of very accomplished PIs.”

Reviewer F: “I believe that Dr. Sutton will continue to be productive and contribute to our understanding of the signaling pathways underlying local translation and how these pathways regulate synaptic structure and plasticity...Dr. Sutton has a very good research funding record, including two R01s from NIH, fulfilling another requirement for promotion to Professor. I cannot comment on his teaching, but I can say that I have met several of his trainees and have found them

well prepared and excited about their work, which suggests that Dr. Sutton is a good mentor of graduate students and postdoctoral fellows.”

Reviewer G: “Dr. Sutton has made major contributions to our understanding of AMPAR local protein synthesis, degradation and AMPAR trafficking, as well as the role of these processes in synaptic plasticity...Dr. Sutton has also made valuable findings in developmental neurobiology in activity-dependent regulation of synapse and neural circuit formation...I found Dr. Sutton has done an excellent job in training both graduate and undergraduate students. I am impressed that he has taken a large number of undergraduates into his lab for research, which is extremely helpful for the students to set a good foundation to move forward for higher education in graduate school or medical school.”

Reviewer H: “The PNAS paper is particularly important as it introduces a new mechanism for the trafficking of AMPA receptors through production of a poorly studied phospholipid, PI (3,5) P2. Since trafficking of AMPA receptors is a critically important step in the formation and erasure of memories, this work will have a large impact...In my field of study, Dr. Sutton is one of the premier researchers in understanding the role of local translation in neuronal function. He was recently awarded a large RO1 grant, 2016-2010, in this area further demonstrating the strong approval of his peers in this area...Another indication of the stature of Dr. Sutton is his membership of the SYN study section of NIH since 2014. This is a large job and his continued presence on this committee is indicative of the important role Dr. Sutton plays in the larger field of synaptic plasticity.”

Reviewer I: “...Dr. Sutton clearly thinks that inactivity – or activity-dependent mTORC1 activation retrogradely signals back to the pre-synaptic side of the synapse to ultimately affect neurotransmitter release. This hypothesis seems to form the basis of his RO1 that runs until 2020. Any work that comes from this would be highly novel and significant.”

Summary of Recommendation:

Dr. Sutton is a well-known and exceptional scientist who is continuing to make great strides in the field of neuroscience. He has an excellent record of NIH funding and success publishing in top tier journals. He is an exceptional mentor and instructor for learners at all levels. I am pleased to recommend Michael M.A. Sutton, Ph.D. for promotion to professor of molecular and integrative physiology, with tenure, Department of Molecular and Integrative Physiology, Medical School.



Marschall S. Runge, M.D., Ph.D.  
Executive Vice President for Medical Affairs  
Dean, Medical School

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