

PROMOTION RECOMMENDATION  
THE UNIVERSITY OF MICHIGAN  
MEDICAL SCHOOL  
DEPARTMENT OF PHARMACOLOGY

Manojkumar A. Puthenveedu, M.B.B.S., Ph.D. associate professor of pharmacology, with tenure, Department of Pharmacology, Medical School, is recommended for promotion to professor of pharmacology, with tenure, Department of Pharmacology, Medical School.

Academic Degrees

Ph.D.	2004	Carnegie Mellon University
M.B.B.S.	1996	Government Medical College, Calicut, Kerala, India

Professional Record

2017-present	Associate Professor of Pharmacology, with tenure, University of Michigan
2015-2017	Associate Professor of Biological Sciences, Carnegie Mellon University
2009-2017	Adjunct Assistant Professor of Pharmacology, University of Pittsburgh
2009-2017	Adjunct Assistant Professor of Neurobiology, University of Pittsburgh
2009-2015	Assistant Professor of Biological Sciences, Carnegie Mellon University

Summary of Evaluation:

Teaching: Dr. Puthenveedu was recruited by the University of Michigan's Department of Pharmacology to participate in the department's teaching mission in the areas of drug metabolism, pharmacogenomics, cell signaling, and translational research. In that capacity, he has participated in and taught a variety of courses to undergraduate and graduate students, including Introduction to Scientific Communication (PHRMACOL 502), Introduction to Scientific Communication, Principles of Pharmacology (Dent 503), Writing and Publishing Scientific Manuscripts (PIBS 722/PHRMOCOL 722), and CMB short course (CMB 630). Internationally he was part of the Global Enterprise for Micro-Mechanics and Molecular Medicine (GEM4) Summer Institute. Dr. Puthenveedu teaches undergraduate and graduate students, and post-doctoral fellows. His teaching has consisted of classroom instruction, research instruction in the laboratory, participation in graduate student dissertation committee meetings and graduate student seminars. Additionally, Dr. Puthenveedu serves as an academic advisor for ~25 PhD students each year in the Cellular and Molecular Biology (CMB) program where he is also the principal investigator of the T32 Training Grant.

Research: Dr. Puthenveedu has made many significant contributions to the field of molecular pharmacology. His research program focuses on understanding G protein-coupled receptor (GPCRs) function from basic science to drug discovery to clinical trials. His current studies include studying the new idea that signaling is spatially encoded at a sub-cellular level by investigating how GPCRs are localized to specific subcellular compartments; how signaling from these compartments are organized in space and time; and how this organization is disrupted in diseases. His current research activities focus on novel strategies to address opioid addiction, heart disease, and cancer, which are among the most prevalent diseases in society. Dr. Puthenveedu is

an outstanding scientist who has established an international reputation as an expert in the function and trafficking of GPCRs in drug addiction, pain management, and the cardiovascular system. He has been successful in obtaining funding with current grants from the National Institutes of Health (NIH), and private funding from the Howard Hughes Medical Institute, and has one granted patent. He is highly sought out as a scientific collaborator and has an extensive list of national and international speaking invitations, including at top meetings in his field such as the International Narcotics Research Conference and the Gordon Research Conference. He has authored 55 peer reviewed publications in high-quality journals including *Molecular Pharmacology*, *Elife*, and *Nature*.

#### Recent and Significant Publications:

- Kunselman JM, Zajac AS, Weinberg ZY, Puthenveedu MA, “Homologous Regulation of Mu Opioid Receptor Recycling by G  $\beta\gamma$ , Protein Kinase C, and Receptor Phosphorylation,” *Mol Pharmacol* 96(6): 702-710, 2019.
- Shiwarski DJ, Crilly SE, Dates A, Puthenveedu MA, “Dual RXR motifs regulate nerve growth factor-mediated intracellular retention of the delta opioid receptor,” *Mol Biol Cell* 30(5): 680-690, 2019.
- Crilly SE, Ko W, Weinberg ZY, Puthenveedu MA, “Conformational specificity of opioid receptors is determined by subcellular location irrespective of agonist,” *Elife* 10: 2021.
- Kunselman JM, Gupta A, Gomes I, Devi LA, Puthenveedu MA, “Compartment-specific opioid receptor signaling is selectively modulated by different dynorphin peptides,” *Elife* 10: 2021.
- Lott J, Jutkiewicz EM, Puthenveedu MA, “The Synthetic Cannabinoid WIN55,212-2 Can Disrupt the Golgi Apparatus Independent of Cannabinoid Receptor-1,” *Mol Pharmacol* 101(5): 371-380, 2022.

Service: Dr. Puthenveedu has a strong service record institutionally, nationally, and internationally. He is an active participant on many institutional and departmental committees at the University of Michigan, including the Medical Scientist Training Program (MSTP) Operating Committee, Mentoring Others Results in Excellence (MORE) committee, the Pharmacology DEI Task Force, faculty search committees, faculty senate, admissions and awards committees, in panels related to diversity and inclusion, as well as in student awards committees. He has taken on leadership roles in national societies, including the American Society for Pharmacology and Experimental Therapeutics (ASPET), and has served on many national and international, organizing and mentoring committees. Dr. Puthenveedu is the associate editor for *Molecular Pharmacology* and has served on the editorial board for an additional two journals. He has served as an ad hoc reviewer for 25 top-tier scientific journals, such as *Biochemistry*, *Science*, and *PLoS Genetics*. Dr. Puthenveedu has also served ad hoc on numerous national and international study sections such as the NIH, National Science Foundation, American Heart Association, Wellcome Senior Research Fellowship (UK), and the Swiss National Federation. He has served on 25 dissertation committees.

#### External Reviewers:

Reviewer A: “Dr. Puthenveedu’s contributions to your academic community are very impressive...I note that he has served as the PI for two T32 training grants that provide a substantial amount of support for graduate education...I see that he also serves as director of three courses, one of which (Writing and Publishing Scientific Manuscripts) I understand that he

conceived of and established anew. I wish that I had more colleagues in my department who step up to teach like Dr. Puthenveedu.”

Reviewer B: “His work on GPCRs is a topic of clear medical relevance, and it is the focus of hundreds of academic and industrial laboratories across the globe. In this crowded field, he has made original and outstanding contributions in a comparatively short career. He is a talented and highly creative scientist, and is an emerging figure in the signal transduction field... Puthenveedu has demonstrated excellence as a researcher and scholar. His credentials equal that of tenured full professors in the field...”

Reviewer C: “In terms of service to the discipline Manoj has served on several international and NIH study sections, is an Associate Editor or Editorial Board member on highly respected journals (including Traffic and Molecular Pharmacology), and has been a member of the Division of Molecular Pharmacology Executive Committee for ASPET. These are all time-consuming and important duties that reflect well on Manoj’s high standing in the field and citizenship...he is heavily involved in mentoring the next generation of cellular and molecular biologists, both as a program director and mentor to his own numerous graduate and undergraduate students.”

Reviewer D: “Dr. Puthenveedu’s research is supported by extramural funding from the National Institutes of Health. He has successfully garnered and renewed NIH funding, which is very impressive in today’s funding climate. He has a fundable score on a new R01-level grant as Principle Investigator, which will continue to support his research program...he is the PI on a T32 training grant...which is extremely important for the institution rather than directly to Dr. Puthenveedu’s research program, but this highlights Dr. Puthenveedu’s ability to garner extramural support for graduate education. In addition, he has been a sponsor on postdoctoral fellowships from NIH and AHA. This is an impressive list of funding accomplishments, which clearly illustrates his motivation and that his research program is thriving and will likely continue to thrive and expand in the near future and more importantly, will be sustained over time.”

Reviewer E: “In summary, Manoj is in my view an outstanding member of the cell biology and neurosciences communities who has made major contributions to the field throughout his career. He has consistently made great strides in his research, documented by excellent publications, recognition by the field, and major funding. Manoj is considered a major figure in membrane trafficking, is well respected and liked by his peers, and has consistently made important contributions to the field.”

Reviewer F: “Manoj’s lab’s powerful combination of cell biology, imaging and pharmacology has made him a world leader in understanding the localization and function of opioid receptors. His published work in top journals and invitations for seminars/talks and contributed review articles also strongly attests to his importance in the field.”

Reviewer G: “I view Dr. Puthenveedu as an international leader in the field in understanding mechanisms of trafficking of opioid receptors and in how different subcellular locations impact opioid receptor signaling. In my opinion, his scientific contributions have far-reaching and sustained impacts. One aspect of Dr. Puthenveedu’s work that I am most impressed by is the rigor

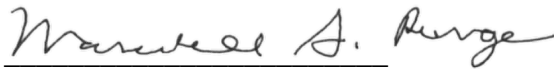
and quantitative analysis he brings to cell biology and imaging studies. This is exemplified in his publications, such as the 2021 eLife paper.”

Reviewer H: “Dr. Pouthenveedu has an impressive number of publications from his own team as well as from several collaborations with leading scientists in the fields. Recent publications in Molecular Pharmacology, Elife, Curr. Opinion in Neurobiology and British Journal of Pharmacology, along with numerous invitations for oral presentations at Conferences, Departmental Seminars and Workshops reflect the originality and quality of his research.”

Reviewer I: “...Manoj has played leadership roles and made critical contributions to the scientific community – he has served on numerous committees and as a grant reviewer many times for NIH and National Science Foundation (NSF); he served on the editorial board of Traffic and currently serves as an Associate Editor for Mol Pharm.”

Summary of Recommendations:

Dr. Puthenveedu is an outstanding researcher who is an internationally recognized expert and leader in the field of GPCRs, opioid pharmacology, and cell biology. He has an exceptional track record of teaching, research, and service, and is highly regarded by his peers and serves the university with distinction. I am pleased to recommend Manojkumar A. Puthenveedu, M.B.B.S., Ph.D. for promotion to professor of pharmacology, with tenure, Department of Pharmacology, Medical School.



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

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