Approved by the Regents
May 16, 2013

PROMOTION RECOMMENDATION
UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF CELL AND DEVELOPMENTAL BIOLOGY

Kristen J. Verhey, Ph.D., associate professor of cell and developmental biology, with tenure, Department of Cell and Developmental Biology, Medical School, is recommended for promotion to professor of cell and developmental biology, with tenure, Department of Cell and Developmental Biology, Medical School.

Academic Degrees:

Ph.D.	1995	Harvard University
B.S.	1987	University of Michigan

Professional Record:

2008-present	Associate Professor of Cell and Developmental Biology, University of Michigan
2002-2008	Assistant Professor of Cell and Developmental Biology, University of Michigan

Summary of Evaluation:

Teaching: Dr. Verhey has an outstanding record in teaching. She was the course director and lecturer in the required PIBS (Program in Biomedical Science) graduate cell biology course (CDB 530), and in this capacity totally revamped the course using active learning techniques in a large lecture format. Her changes have made this course among the most desirable of graduate level courses in the biomedical sciences. Dr. Verhey continues to participate as a lecturer in this course. In addition, Dr. Verhey teaches the M1 class in Medical 501, and is both a lecturer and laboratory instructor in medical histology. In addition she has given lectures in Biophysics 440, the Biophysics of Disease, and was a discussion section leader in Pharmacology 502; Introduction to Scientific Communication. Dr. Verhey also serves on the Cell and Development Biology (CDB) curriculum committee, which oversees all of the teaching in the department. In addition to Dr. Verhey's classroom instruction, she is highly involved in teaching in her laboratory, providing expert guidance and hands on experience to post-doctoral fellows, graduate and undergraduate students. In addition to laboratory experience, she emphasizes the importance of innovative, critical thinking, and helps her trainees develop their abilities to formulate new research projects. She has mentored two post-doctoral fellows and five graduate students (three of whom have already graduated and received their Ph.D. degrees). Several of her graduate students have won prestigious awards and pre-doctoral fellowships. One was the winner of the Norton Gilula Award for Outstanding Graduate Student of the American Society for Cell Biology; one was awarded both an NSF Graduate Fellowship and an NIH NRSA. Her undergraduate student won several awards and did summer international internships at the Pasteur Institute and Weizmann Institute.

Dr. Verhey has served or continues to serve on 23 graduate dissertation committees (not including the students from her lab). In addition she served as the CMB candidacy exam coordinator.

Research: The overall goal of Dr. Verhey's research is to determine the molecular basis of how kinesin motors transport intracellular cargoes to specific cellular locations. She has focused on two highly regulated and polarized structures, the neuronal axon, as well as the primary cilia of several cell types. A hallmark of Dr. Verhey's research is her innovation and risk-taking. She has developed several new techniques, and ideas of how to think about biology. She is a leader in the area of combining concepts in engineering and biophysical studies, with classical approaches in cell biology. Her studies have led to several high profile papers, including two in the very high-ranking journal, *Nature Cell Biology*. Her studies have shed light on diverse areas including how post-translational modification of microtubules indicates the specific tracks that selected kinesins take; and studies of how kinesins that are not occupied by cargoes auto-inhibit themselves; to more divergent studies, where she showed that entry into cilia is restricted by a size-exclusion pore that is highly similar to the nuclear pore complex. This last set of studies was widely recognized, and was featured in the editor's choice section of *Science* magazine, the highest ranked U.S. science journal, as well as being featured as a preview in *Developmental Cell*.

Recent and Significant Publications:

Cai D, McEwen D, Martens JR, Meyhofer E, Verhey KJ: Single molecule imaging reveals differences in microtubule track selection by kinesin motors. *PLoS Biology* 7: e1000216, 2009. PMCID: PMC2749942.

Hammond JW*, Huang C-F*, Kaech S, Jacobson C, Banker G, Verhey KJ: Posttranslational modifications of tubulin and the polarized transport of kinesin-1 in neurons. *Molecular Biology of the Cell* 21:572-583, 2010. *these authors contributed equally to this work

Hammond JW, Blasius TL, Soppina V, Cai D, Verhey KJ: 2010. Autoinhibition of the kinesin-2 motor KIF17 via dual intramolecular mechanisms. *Journal of Cell Biology* 189:1013-1025, 2010.

Dishinger JF, Kee HL, Jenkins PM, Fan S, Hurd TW, Hammond JW, Truong YNT, Margolis B, Martens JR, Verhey KJ: 2010. Ciliary entry of the kinesin-2 motor KIF17 is regulated by importin-β2 and Ran-GTP. *Nature Cell Biology* 12:703-710, 2010.

Kee HL, Dishinger JF, Blasius TL, Liu CJ, Margolis B, Verhey KJ: A size-exclusion permeability barrier and nucleoporins characterize a ciliary pore complex that regulates transport into cilia. *Nature Cell Biology* 14:431–437, 2012.

Service: Dr. Verhey has been exemplary in her service. She serves on the CDB curriculum committee, which oversees all of the teaching in the department. Dr. Verhey spearheaded the department's application for the Provost's Interdisciplinary Faculty Initiative, which resulted in the hire of two faculty. In addition she has served on the department's faculty Search

Committee. She is currently the chair of the CDB Awards Committee. She has also served on the Departmental Graduate Recruitment and Admissions committee. She is an active participant in several interdisciplinary training programs including the CMB and Biophysics training programs. She has served on graduate admissions committees for both programs. In addition, she served as the CMB preliminary exam coordinator. She reviews internal bridging requests for the Office of the Vice President for Research. She is a permanent member of the NIH study section, MSFC, and had previously served as an ad hoc reviewer for two standing NIH study sections, as well as three special emphasis panels. She has also been an external reviewer for NSF. In addition, she is an external reviewer for several high profile international granting agencies. Furthermore, she serves as a reviewer for several prestigious journals, including *Cell, Nature*, *Science*, *Proceedings of the National Academy of Science*, *Developmental Cell*, *Nature Cell Biology*, *Journal of Cell Biology*, and *Journal of Cell Science* as well as several other journals. She is widely sought out as a speaker at international and national conferences as well as public and private academic institutions. Her extensive service demonstrates that Dr. Verhey's knowledge and experience are widely respected and highly sought after.

External Reviewers:

Reviewer A: "The signature of Dr. Verhey [sic] work is the ability to combine first rate biochemistry with excellent cell biology. This approach allows her to make original non-trivial observations and discover the underlying mechanisms....She is at the peak of her career and continues to do beautiful work."

Reviewer B: "[Dr. Verhey's] work has been characterized by insight and creativity coupled to appropriate scientific rigor. In particular, her approaches that use biochemical logic with careful cellular experiments have yielded a great deal of important information and hypotheses about the regulation of kinesin motors in cells."

Reviewer C: "...Kristen's research places her in a select group of scientists [of her cohort] in terms of quality, novelty and significance of her findings. She has pursued subjects that initially were not fashionable and turned them into exciting new areas that attracted other researchers."

Reviewer D: "I think she is one of the very best molecular/cell biologists working on intracellular trafficking, kinesin motors, and, now, on cilia function assembly. Her papers are exceptionally well-done, the molecular biology and cytology is flawless, and each paper has made a step forward."

Reviewer E: "Thus, Kristen has established herself as a first class independent investigator and it is certain that her research will continue to flourish and excel....I predict she will make significant contributions to an important and relevant area of biomedical research and to the scholarly activities of an excellent academic institution."

Summary of Recommendation:

In summary, Dr. Verhey has achieved a consistent record of extraordinary scholarship and funding since coming to Michigan. The high quality of her research is recognized by colleagues

here as well as at other premier institutions. Her expertise on the molecular mechanisms of kinesin transport of cargoes in axons and cilia and her extremely strong publication record are widely acknowledged. She is a superb teacher and mentor. Dr. Verhey has assumed many administrative responsibilities within the University, chairing as well as serving on numerous committees in the Department of Cell and Developmental Biology. I am pleased to recommend Kristen J. Verhey, Ph.D. for promotion to professor of cell and developmental biology, with tenure, Department of Cell and Developmental Biology, Medical School.

James O. Woolliscroft, M.D.
Dean
Lyle C. Roll Professor of Medicine

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