Approved by the Regents
May 20, 2021

PROMOTION RECOMMENDATION
The University of Michigan
College of Pharmacy

Anna A.S. Schwendeman, associate professor of pharmaceutical sciences, with tenure, College of Pharmacy, is recommended for promotion to professor of pharmaceutical sciences, with tenure, College of Pharmacy.

Academic Degrees:

PhD	2000	The Ohio State University, Columbus, OH
BS	1994	Moscow Institute of Physics and Technology, Moscow, Russia

Professional Record:

2021 – present	William I. Higuchi Collegiate Professor of Pharmacy, College of Pharmacy, University of Michigan
2018 – present	Associate Professor, with tenure, Department of Pharmaceutical Sciences, College of Pharmacy, University of Michigan
2015 – 2018	Assistant Professor, Department of Pharmaceutical Sciences, College of Pharmacy, University of Michigan
2012 – 2015	Research Assistant Professor, Department of Medicinal Chemistry, College of Pharmacy, University of Michigan
2009 – 2011	Head of Protein Manufacturing, Cerenis Therapeutics, Ann Arbor, MI
2006 – 2011	Senior Director, Pharmaceutical Sciences, Cerenis Therapeutics, Ann Arbor, MI
2004 – 2005	Associate Research Fellow, Pfizer Global Research and Development, Ann Arbor, MI
2003 – 2004	Director, Pharmaceutical Sciences, Esperion Therapeutics, Ann Arbor, MI
2002 – 2003	Research Investigator, Pharmaceutical Sciences, Esperion Therapeutics, Ann Arbor, MI
2000 – 2002	Scientist, Formulations, Esperion Therapeutics, Ann Arbor, MI

Summary of Evaluation:

Teaching: Professor Schwendeman is an outstanding and very committed teacher and mentor. She has contributed to the teaching mission of the College of Pharmacy through didactic courses for PharmD, graduate, and undergraduate students, implementing innovative teaching methods that engage students in learning the science that drives biopharmaceutical product formulation, development, and approval. She is devoted to presenting modern concepts in dosage form design, including the most advanced technology, and her experience in industry combined with her knowledge of the regulatory aspects of drug development and approval fills a unique niche in our educational programs. Professor Schwendeman is well received by students. Her teaching performance has been consistently excellent, with student ratings averaging 4.63 on a 5-point scale for the median scores received for her performance as an instructor. She has served as a course coordinator for two graduate and one PharmD course and has been instrumental in her department's efforts to revise their portion of the PharmD curriculum and the BS curriculum. Professor Schwendeman is a superb mentor, having advised over 50 students and trainees. She has graduated eight PhD students and currently advises seven PhD candidates and three post-doctoral fellows, in addition to ten past post-doctoral fellows and visiting scientists. Professor Schwendeman currently serves on 20 PhD and candidacy committees, in addition to nine in the past, and she has mentored numerous PharmD and undergraduate students since 2012. Not only does she direct their research projects, but she has implemented a rich publishing and grant writing culture, including a writing

club and other writing resources for members of her group. Professor Schwendeman's dedication and success as a mentor is evidenced by the impressive number of awards and competitive fellowships that her trainees have received.

Research: Professor Schwendeman is a highly recognized and respected eminent scientist in the field of nanoparticle drug formulation design and development, nanoparticle drug targeting, nanoparticle drug regulation, and nanoparticle synthesis and analysis. She is internationally recognized as one of a handful of scientists in the world that have developed self-assembling nanoparticle formulations according to standards of the pharmaceutical industry, and has successfully demonstrated the ability to take them all the way from the preclinical realm to clinical trials for the treatment of cancer, atherosclerosis/cardiovascular disease, autoimmune disease, sepsis, lysosomal storage disorders, and other diseases, as well as for vaccines. Furthermore, in collaboration with many research groups from all different backgrounds in the clinical as well as engineering and other basic science realms, her knowledge, analysis, and approach has made possible many discoveries outside her field that would not have been possible without her intellectual contribution. Her 75 peer-reviewed original research articles are of outstanding quality and appear in reputable journals in pharmaceutical sciences, as well as more broadly relevant high impact journals. She has been continuously invited to give talks at major scientific conferences and at universities all over the world. As her extensive list of grant awards attests, she has been extremely successful at obtaining government, industry, and private foundation support for her research. She was awarded the American Heart Associate Scientist Development Grant (2013); won a translational science competition (Biomedical Innovation Shark Tank-2015); and co-founded a company (EVOQ Therapeutics), which won the 2019 Michigan Innovation Cup. It is evident from her extensive list of publications and patents, that her nanoengineering expertise has enabled major advances well beyond the field of nanotechnology, especially in relation to its most important, practical biomedical applications aimed at improving human health and well-being. As an expert in nanotechnology-based drug delivery and nanoparticle-based formulation design and analysis, together with her abilities to contribute towards a greater understanding of drug transport, distribution, metabolism and excretion in humans starting from nanoparticle-based formulations, she is an absolutely exceptional scientist, researcher and scholar.

Recent and Significant Publications:

Kadiyala P, Li D, Edwards MB, Doherty R, Kuai R, Yu M, Karman N, Moon JJ, Lowenstein PR, Castro MG, Schwendeman A. "High density lipoprotein-mimicking nanodiscs for chemo-immunotherapy against glioblastoma multiforme," *ACS Nano*, 13(2):1365-1384 (2019).

Guo Y, Yuan W, Yu B, Kuai R, Hu W, Morin EE, Zhu T, Benitez R, Zhang J, Moon JJ, Schwendeman A, Chen YE. "Synthetic high-density lipoprotein--mediated targeted delivery of liver X receptors agonist promotes atherosclerosis regression," *EBioMedicine,* 28, 225-233 (2018).

Schultz ML, Fawaz MV, Azaria RD, Kunkel TJ, Hollon TG, Liu EA, Thaddeus J. Kunkel TJ, Halseth TA, Krus KL, Ming R, Morin EE, McLoughlin HS, Bushart DD, Paulson HL, Shakkottai VG, Orringer DA, Schwendeman AS, Lieberman AP. "Synthetic high- density lipoprotein nanoparticles for the treatment of Niemann-Pick diseases," *BMC Medicine*, 17, # 200 (2019).

Li D, Fawaz MV, Morin EE, Ming R, Sviridov D, Tang J, Ackermann R, Olsen K, Remaley AT, Schwendeman A. "Effect of synthetic high-density lipoproteins modification with polyethylene glycol on pharmacokinetics and pharmacodynamics," *Mol Pharm*, 15(1), 83-96 (2018).

Kang J, Kim SY, Vallejo D, Hageman TS, Benet A, Coghlan J, Sen KI, White DR, Tolbert TJ, Weis DD, Schwendeman SP, Ruotolo BT, Schwendeman A."Multifaceted assessment of rituximab biosimilarity: The impact of glycan microheterogeneity on Fc function," *Eur. J. Pharm Biophar*m, 146: 111-124 (2020).

Service: Professor Schwendeman is an outstanding citizen of the College of Pharmacy, university and her profession. She is a member of several professional societies and has served as a session organizer and moderator for numerous meetings. She is recognized as a leader in her field, serving as associate editor for both the *European Journal of Pharmaceutics and Biopharmaceutics* (since 2018) and *Nanomedicine: Nanotechnology Biology and Medicine* (since 2016), as well as an editorial board member for the *Journal of Pharmaceutical Sciences* (since 2013). She has served as a grant reviewer for several agencies, including several NIH study sections, and she is a reviewer for numerous prestigious journals. In addition to serving on college committees, such as the BS Curriculum Committee, Graduate Education Committee, and the PharmD Investigations Committee, she has been instrumental as a faculty diversity ally for Pharmaceutical Sciences, helping to increase program diversity. Of particular importance and significance, she has been the most prominent faculty member in the Department of Pharmaceutical Sciences in terms of her outreach efforts and success at promoting our PhD program to diverse populations of prospective students.

External Reviewers:
Reviewer A: "The funding track record is stellar…Her community service is showcased by her engagement in middle and high school students…She has provided inspiring talks to these students as well as developed demos to try to trigger interest in science and education among youths…She is a very good role model for women in science, and takes this role seriously."

Reviewer B: "…it is obvious that Anna is one of leading researchers in the field. Similarly, based on her student evaluations and the large number of students mentored successfully, Anna is an outstanding teacher. Her service for the field…the University and the community are also exemplary."

Reviewer C: "Dr. Schwendeman played a pivotal role in the early evaluation of the therapeutic potential of synthetic ApoAI mimetics in atherosclerotic disease...As her research has evolved, investigations into the size and lipid composition to enhance drug delivery have advanced the field significantly…Dr. Schwendeman has trained an impressive number of graduate students, postdoctoral fellows and visiting scholars."

Reviewer D: "Anna's ability to effectively collaborate has greatly extended the reach and impact of her work…Her efforts are reflected in a number of awards to her trainees…Alumni of her lab have moved on to leadership positions in industry and academia…Prof. Schwendeman is an international leader in drug delivery community, leading a research program focused on important and impactful areas bridging industry and academia. She carries out impactful research at the interface of basic and translational science."

Reviewer E: "…Anna's work is of exceptional quality…Anna is working at the forefront of new developments in nanomedicine and pharmaceutical biotechnology for the purpose of treating a wide variety of chronic and/or life-threatening diseases…her scientific output strongly indicates that Anna has a keen eye on selecting the right (pharmaceutical) technology for the right indication. There is only one recommendation that I would like to make here: keep going!...I consider Anna as a top scientist in our field."

Reviewer F: "Dr. Schwendeman has been demonstrating exceptional focus on research and stellar performance as an academic scientist and faculty in the area of drug delivery…she is in her prime time as an academic researcher…She published a number of impactful papers in high quality journals and received considerable competitive funding for her research form NIH and other sources…

Without doubt Dr. Anna Schwendeman is at the forefront of the drug delivery field and perhaps ranks among top 2% of researchers at similar stage of career…Both her didactic teaching and mentoring portfolio are outstanding."

Reviewer G: "I am absolutely amazed by the progress she has made…it is truly spectacular…it is clear that Prof. Schwendeman is among the leading experts in the world on the production and application of reconstituted HDL particles…her publication in the flagship journal *Nature Materials* marked a true breakthrough demonstrating the activation of cancer-attacking T-cells at a more than 30-fold higher level than the best available benchmark…It is clear that…the work pioneered by Prof. Schwendeman's group will guide future comparisons…I think it will be quite…enjoyable to follow this wonderful case study of an exceptional academic career."

Reviewer H: "The results of her research on HDL have reached Phase II clinical trials in hundreds of patients; this is certainly an excellent accomplishment for an academic scientist who can potentially translate the laboratory findings to patients…Her research results have been recognized internationally...Many of her students received various awards… Dr. Anna Schwendeman has an outstanding performance in research, service, and teaching."

Reviewer I: "Dr. Schwendeman's scholarly works have been outstanding…since tenure she has published 43 research articles in leading journals for the field. I would point out that this was achieved in approximately 2 years showing impressive productivity...she is recognized as a leader in pharmaceutical sciences and is often invited to speak at prestigious conferences around the world… Dr. Schwendeman is considerably ahead of her peers who work in this area."

Reviewer J: "I firmly believe Anna to be one of the most outstanding investigators currently working in the area of (nano) biomaterials and drug delivery…I am particularly impressed with her publications in leading medical journals which is rare for a pharmaceutical scientist. This truly showcases the collaborative nature of Dr. Schwendeman's work…Dr. Schwendeman is one of the few scientists in this field who are *actually* translating their work into the clinic. This is truly impressive…She is a very involved mentor who is passionate about transferring her knowledge and know-how…I think she would be a superb colleague and an asset to any Pharmaceutical Sciences Department..."

Summary of Recommendation: Professor Schwendeman is an exceptional scientist, an extremely dedicated teacher and mentor, and a tireless citizen of her college and profession. Her pioneering work is at the forefront of new developments in nanomedicine and pharmaceutical biotechnology for the purpose of treating a wide variety of chronic and/or life-threatening diseases, such as cancer, atherosclerosis, diabetes and infectious diseases. It is with great pleasure that I recommend Anna A.S. Schwendeman for promotion to professor of pharmaceutical sciences, with tenure, College of Pharmacy.

Bruce A. Mueller
Interim Dean, College of Pharmacy

May 2021