Approved by the Regents May 15, 2014

PROMOTION RECOMMENDATION
UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF PEDIATRICS AND COMMUNICABLE DISEASES
DEPARTMENT OF MOLECULAR AND INTEGRATIVE PHYSIOLOGY

Carey N. Lumeng, M.D., Ph.D., assistant professor of pediatrics and communicable diseases, Department of Pediatrics and Communicable Diseases, and assistant professor of molecular and integrative physiology, Department of Molecular and Integrative Physiology, Medical School, is recommended for promotion to associate professor of pediatrics and communicable diseases, with tenure, Department of Pediatrics and Communicable Diseases, and associate professor of molecular and integrative physiology, without tenure, Department of Molecular and Integrative Physiology, Medical School

Academic Degrees:

2000	Ph.D.	University of Michigan
2000	M.D.	University of Michigan
1992	A.B.	Princeton University

Professional Record:

2008-present	Assistant Professor of Pediatrics and Communicable Diseases, and Assistant Professor of Molecular and Integrative Physiology, University of Michigan

Summary of Evaluation:

Teaching: Teaching is a central component of Dr. Lumeng's career as a physician-scientist. As a clinician, he is involved in the teaching of medical students and house officers in the context of his outpatient and inpatient care at Mott Children's Hospital. Dr. Lumeng's most extensive clinical teaching role is the training of pediatric pulmonary fellows, with whom he interacts with at least one half-day per week in a continuity clinic. He teaches graduate students in didactic lectures in Physiology and has helped design and conduct small group exercises for first-year medical students, where he has received strong reviews for his teaching. In his role as a scientist, he has served on preliminary examination and dissertation committees for more than 15 Ph.D. graduate students in Molecular and Integrative Physiology, Cellular and Molecular Biology and the Graduate Program in Immunology. Dr. Lumeng's most prominent research teaching occurs in his laboratory where he is the primary mentor for two Ph.D. graduate students, two post-doctoral fellows and a junior faculty member in Pediatrics. He has one graduated post-doctoral fellow who was awarded an NIH NRSA Award.

Research: Dr. Lumeng's research program focuses on the link between obesity and inflammation and how this contributes to metabolic disease. His interest in this field stemmed from a desire to understand the association between obesity and pulmonary health. Over time, this has led him to seek insight into the mechanisms by which obesity modifies immune responses. Dr. Lumeng's major contributions to the field of obesity research have been in understanding the nature and function of adipose tissue macrophages. His most significant discovery is that obesity induces a phenotypic switch in the activation state of macrophages in adipose tissue towards a pro-inflammatory macrophage type. He and his colleagues have published several studies demonstrating that obesity alters the pattern of monocyte trafficking to adipose tissue. Data from their lab are the cornerstone of the current model of adipose tissue inflammation linking obesity and insulin resistance. The impact of his research is supported by a publication record of highly cited papers, invited reviews in high impact journals, and invitations to give seminars throughout the world. Extramural support for his research has come from the NIH (PI on NIDDK-funded K08, R03, R01, and R21 awards) and the American Diabetes Association (Career Development Award). Their lab is continuing to work on identifying the mechanisms by which obesity alters macrophages function, the regulation of adipose tissue macrophages in healthy states, and the interaction between macrophages and lymphocytes in adipose tissue. Future studies will extend their work from rodent models to humans, investigate how bone marrow stem cells contribute to obesity-induced inflammation, and reveal the mechanisms that generate adipose tissue fibrosis.

Recent and Significant Publications:

Lumeng CN, DelProposto JB, Westcott D, Saltiel AR: Phenotypic switching of adipose tissue macrophages with obesity is generated by spatiotemporal differences in macrophage subtypes. *Diabetes* 57:3239–3246, 2008.

Westcott D, DelProposto J, Geletka L, Wang T, Kanakadurga S, Saltiel A, Lumeng CN: MGL1 promotes adipose tissue inflammation and insulin resistance by regulating 7/4hi monocytes in obesity. *Journal of Experimental Medicine* 206:3143-3156, 2009.

Morris DL, Oatmen KE, Wang T, DelProposto JL, Lumeng CN: CX3CR1 deficiency does not influence trafficking of adipose tissue macrophages in mice with diet-induced obesity. *Obesity* 20:1189-1199, 2012.

Lumeng CN, Liu J, Geletka L, Delaney C, DelProposto J, Desai A, Oatmen K, Martinez-Santibanez G, Julius A, Garg S, Yung RL: Aging is associated with an increase in T cells and inflammatory macrophages in visceral adipose tissue. *J Immunol* 187:6208-6216, 2011.

Morris DL, Cho KW, DelProposto J, Oatmen K, Geletka L, Martinez-Santibanez G, Singer K, Lumeng CN: Adipose tissue macrophages function as antigen presenting cells and regulate adipose tissue CD4+ T cells in mice. *Diabetes* Published online before print March 14, 2013.

Service: On an institutional level, Dr. Lumeng has served on multiple committees that have contributed to the university community. On the Medical School level, he participates on the Operating Committee for the Medical Scientists Training Program. For the Department of Pediatrics, he serves on the Research Advisory Committee and the Advisory Committee for the NIH K12 Child Health Research Center Program. Dr. Lumeng is a member of the Pediatric Pulmonary Division Graduate Education Committee. He also participated in peer review for internal grants of the Michigan Diabetes Research Training Center, Cardiovascular Center and Department of Pediatrics. On a national level, Dr. Lumeng has been a peer reviewer for multiple journals including *Science*, *Cell*, *Nature Medicine* and the *Journal of Clinical Investigation.* He has been an ad hoc member of three NIH study sections and contributed to peer review for European and Asian funding agencies. He served on the program committee for the annual meeting of The Obesity Society and was the program chair of the 2012 meeting (2800 attendees). Dr. Lumeng continues to serve this organization as a member of the board of managers for Obesity Week 2013, an international meeting on obesity research and treatment.

External Reviewers:

Reviewer A: "Dr. Lumeng has excelled in teaching, research, and patient care and in so doing, has developed a national reputation as evidenced by his invitations to write review articles in prestigious journals such as the *Journal of Clinical Investigation* and *Nature Medicine.* In addition, his work has been continuously funded by the National Institutes of Health and other funding organizations."

Reviewer B: "...Dr. Lumeng has already accomplished some remarkable scholarly contributions to the literature, some of which have become landmark references in the discipline. His CV shows evidence of outstanding extramural competitive funding..."

Reviewer C: "Dr. Lumeng's work focuses on the roles of adipose tissue macrophages in obesity induced adipose tissue inflammation. He has done some of the seminal work in this field, helping to clarify the phenotypic switches that macrophages undergo in response to obesity....His first-authored work was seminal to the field, putting him into the top category of researchers in the field."

Reviewer D: "...Dr. Lumeng is an exceptional research scientist and outstanding colleague. He is a creative and resourceful individual that has made and is continuing to make cutting-edge findings on the cell and molecular basis of central hormone action critical to our understanding of obesity, insulin resistance and diabetes through the control of adipose tissue inflammation, energy expenditure and peripheral tissue metabolism. He is certainly a burgeoning star in this area and is an exceptional role model for students, fellows and junior faculty."

Reviewer E: "...I have no doubt that Dr. Lumeng is extremely well-qualified and deserving of promotion to Associate Professor with Tenure. This is based on the fact that he has 1) achieved national/international stature as an investigator as reflected by his scientific impact, continuous funding and publication record, 2) that this stature has been recognized by his peers through multiple invitations to present at national/extramural meetings, 3) that he has made significant contributions as a thought leader in national societies including The Obesity Society and the

American Diabetes Association, and that 4) through teaching and clinical services he has made substantive contributions to the institutional missions of the University of Michigan."

Summary of Recommendation:

Dr. Cary Lumeng has made substantial contributions to the research, teaching and service missions of the Medical School. I enthusiastically recommend Cary N. Lumeng, Ph.D. for promotion to associate professor of pediatrics and communicable diseases, with tenure, Department of Pediatrics and Communicable Diseases, and associate professor of molecular and integrative physiology, without tenure, Department of Molecular and Integrative Physiology, Medical School.

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

May 2014