Approved by the Regents May 15, 2014

PROMOTION RECOMMENDATION
UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF RADIOLOGY
COLLEGE OF ENGINEERING
DEPARTMENT OF BIOMEDICAL ENGINEERING

Craig J. Galbán, Ph.D., assistant professor of radiology, Department of Radiology, Medical School, and assistant professor of biomedical engineering, Department of Biomedical Engineering, College of Engineering and Medical School, is recommended for promotion to associate professor of radiology, without tenure, Department of Radiology, Medical School, and associate professor of biomedical engineering, without tenure, Department of Biomedical Engineering, College of Engineering and Medical School.

Academic Degrees:

Ph.D.	1999	Florida State University
B.S.	1995	Florida State University

Professional Record:

2008-present	Assistant Professor of Radiology, and Assistant Professor of Biomedical Engineering, University of Michigan
2007-2011	Research Investigator, Department of Biomedical Engineering
2006-2008	Research Investigator, Department of Radiology, University of Michigan

Summary of Evaluation:

Teaching: Dr. Galbán provides teaching in both informal (small group) and formal (large group) settings. As a faculty member in the Center for Molecular Imaging (CMI), Dr. Galbán teaches graduate students and post-doctoral fellows rotating in the CMI, including both local and international students. One student who is currently doing his Ph.D. thesis research under Dr. Galbán's guidance has already published three papers in peer-reviewed journals. On average, two or three undergraduates also work in Dr. Galbán's laboratory each year. Dr. Galbán has served on the dissertation committees of two graduate students, one from the College of Pharmacy and the second from the College of Engineering. In large group teaching, Dr. Galbán provides lectures on the basic physics of magnetic resonance imaging, critical thinking with an emphasis on diagnostic imaging, and tumor imaging. He has taught in formal courses in the Department of Nuclear Engineering and Radiological Sciences (NERS 852) and the Department of Biological Chemistry (BC 597). Dr. Galbán's knowledge of the field and excellent communication skills have contributed to his effectiveness as an educator.

Research: Dr. Galbán is a faculty member in the Center for Molecular Imaging where techniques which interrogate at the cellular level enable a prediction of tissue behavior and specifically, response to therapy, long before clinical manifestations become apparent.

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Dr. Galbán is developing quantitative imaging techniques to more accurately enable these assessments to be made. He is applying a novel, voxel-based imaging analysis algorithm called Parametric Response Mapping (PRM) to lung CT images to not only image but also quantify the previously invisible component of chronic obstructive pulmonary disease (COPD). This work is a major advance in the field and has resulted in two publications in *Nature Medicine* in which Dr. Galbán is the first-author. (The accompanying commentary in the journal attests to its overall significance.) An application to the Institutional Review Board (IRB) has been submitted to study the clinical utility of this technique for diagnosing disease progression and treatment response in patients with COPD. With the success of parametric response mapping for COPD, Dr. Galbán is working to develop a unified analytic technique for diagnosing and monitoring pulmonary diseases. An example of this approach is the development of a CT based biomarker for the early detection of bronchiolitis obliterans syndrome (BOS) in patients that develop graft versus host disease following bone marrow translation or lung transplantation. Currently, patients with BOS are diagnosed too late for treatment to be effective. Further expansions of paramagnetic response mapping to differentiate pulmonary diseases such as infection or fibrosis from BOS are needed. The initial results of his work are encouraging and publication of this technique is planned. The quality of Dr. Galbán's research is outstanding. It is documented not only in his numerous high quality publications in journals with a high impact factor, including *Nature Medicine*, but also by his outstanding external funding. He is the Core B director of a ten million dollar grant on "Brain Tumor Therapeutic Efficacy by Quantitative Magnetic Resonance Imaging." He is also the Core B director in the grant "*In vivo* Imaging of Neoplasia" which has almost ten million dollars in NIH funding. He plays similar critical roles in three other NIH grants and is the principal investigator in a grant from the Pierce Fund for Breast Cancer Research.

Recent and Significant Publications:

Galbán CJ, Chenevert TL, Meyer CR, Tsien C, Lawrence TS, Hamstra DA, Junck L, Sundgren PC, Johnson TD, Ross DJ, Rehemtulla A, Ross BD: The parametric response map is an imaging biomarker for early cancer treatment outcome. *Nature Medicine* 15:572-576, 2009.

Galbán CJ, Bhojani MS, Lee KC, Meyer CR, Van Dort ME, Kuszpit KK, Koeppe RA, Ranga R, Moffat BA, Johnson TD, Chenevert TL, Rehemtulla A, Ross BD: Evaluation of treatment-associated inflammatory response on diffusion-weighted magnetic response imaging and 2-[^{18}F]-fluro-2-deoxy-d-glucose-positron emission tomography imaging biomarkers. *Clin Cancer Res* 16:1542-1552, 2010.

Galbán CJ, Chenevert TL, Meyer CR, Tsien C, Lawrence TS, Hamstra DA, Junck L, Sundgren PC, Johnson TD, Galbán S, Sebolt-Leopold JS, Ross BD: Prospective analysis of parametric response map-derived MRI biomarkers: identification of early and distinct glioma response patterns not predicted by standard radiographic assessment. *Clin Cancer Res* 17:4751-4760, 2011.

Galbán CJ, Han MK, Boes JL, Chughtai KA, Meyer CR, Johnson TD, Galbán S, Rehemtulla A, Kazerooni EA, Martinez FJ, Ross BD: Computed tomography-based biomarker provides unique

signature for diagnosis of COPD phenotypes and disease progression. *Nature Medicine* 18:1711-1715, 2012.

Hoff BA, Kozloff KM, Boes JL, Brisset JC, Galbán S, Van Poznak CH, Jacobson JA, Johnson TD, Meyer DR, Rehemtulla A, Ross BD, Galbán CJ: Parametric response mapping of CT images provides early detection of local bone loss in a rat mode of osteoporosis. *Bone* 51:78-84, 2012.

Service: Dr. Galbán provides service on both a local and national level. At the university of Michigan, he serves as the director of the small animal imaging core for the Center for Molecular Imaging (CMI). The core services over two hundred users with six different imaging technologies and a broad range of research applications. Dr. Galbán is responsible for assisting these investigators in determining which techniques would be most appropriate for their research and assuring that the studies are done appropriately. On a national level, he serves as a manuscript reviewer for nine different journals and serves on the editorial board of *Cancer Research.* This is the flagship journal of the American Association for Cancer Research and is arguably the leading cancer research journal. Dr. Galbán has served as a grant for several granting organizations including NIH K-series.

External Reviewers:

Reviewer A: "Dr. Galban is involved with an impressive number of grant-funded research projects. He is a principal investigator on two of these projects, co-investigator or consultant on two projects, and core director on the remaining three projects. These grants represent a broad portfolio of relevant, innovative research."

Reviewer B: "Craig Galban has served on a respectable number of committees of national and international scientific societies. He has an impressive track record as a reviewer for scientific journals and grant. His list of mentees and junior faculty that he has mentored is impressive. As the Director of the Small Animal Imaging Core at [the] Center of Molecular Imaging at his institution, he is at the core of a pivotal hub of translational science."

Reviewer C: "Dr. Galban has developed a critical new technique in using Parametric Response Mapping to increase resolution and sensitivity in identifying unique structural features on CT images....This approach is extremely innovative and will allow characterization of the magnitude of disease in specific lung microdomains. I expect this to open important new diagnostic opportunities in the field of COPD....I anticipate the Parametric Response Mapping approach pioneered by Dr. Galban to have a profound impact on the field of COPD over the next several years."

Reviewer D: "Were Dr. Galban to be up for promotion here [at my institution] with the same track record he has at Michigan, I feel that he not only would be promoted quite easily but that there would also be a few left wondering why his promotion hadn't been grated three or so years earlier."

Reviewer E: "...Dr. Galban provides an important service to the community of scholars at the University of Michigan and elsewhere by directing both the small animal imaging core and the center for molecular imaging. That provides state-of-the-art small animal imaging instrumentation and expertise on six different imaging technologies over 250 users....In addition he is also sought after by his peers to serve as a visiting lecturer and is frequently invited to present his work at the local, national and international meetings. Finally and most importantly he accomplishes all of these goals while actively participating in the peer review process of some of the leading journals in his field."

Reviewer F: "Dr. Galban's parametric response approach, specifically applied to COPD, resulted in a clear paradigm shift in our approach to this condition. In the short time since the Nature Medicine publication, almost every major COPD imaging research group, including a group I met with today, have adopted or adapted his group's approach. He himself is adapting the method for use in evaluation of bronchiolitis obliterans and bone loss, as well as his previous work with gliomas. He has several pending patents in this area. This clearly represents a major advance."

Summary of Recommendation:

Dr. Galbán provides excellent service to the University of Michigan research community. We have been delighted with the many contributions Dr. Galbán has made to the Departments of Radiology, Biomedical Engineering, the University of Michigan, and the field of medicine through his innovative research. We enthusiastically recommend Craig J. Galbán, Ph.D. for promotion to associate professor of radiology, without tenure, Department of Radiology, Medical School, and associate professor of biomedical engineering, without tenure, Department of Biomedical Engineering, College of Engineering and Medical School.

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

David C. Munson, Jr.
Robert J. Vlasic Dean of Engineering
College of Engineering

May 2014