

PROMOTION RECOMMENDATION  
UNIVERSITY OF MICHIGAN MEDICAL SCHOOL  
DEPARTMENT OF RADIOLOGY

Ruth C. Carlos, M.D., Assistant Professor of Radiology in the Department of Radiology, Medical School, is recommended for promotion to Associate Professor of Radiology, with tenure, Department of Radiology, Medical School.

Academic Degrees:

M.S.	2001	University of Michigan, School of Public Health
M.D.	1993	University of Chicago
A.B.	1989	University of Chicago

Professional Record:

2001-Present	Assistant Professor of Radiology, University of Michigan
1998-2001	Lecturer, Department of Internal Medicine, University of Michigan

Summary of Evaluation:

Teaching: Within the department, Dr. Carlos provides valuable mentoring for residents, fellows, and junior faculty interested in health outcomes research. Her previous experience as a GERRAF (General Electric-Association of University Radiology Research Academic) fellow and Robert Wood Johnson fellow have provided unique training and experience which enable her to serve as a role model and provide specific expertise to these trainees. Comments from residents and junior faculty who have been mentored by Dr. Carlos include: "Dr. Carlos has been an excellent mentor. Three years ago, I was a junior faculty who was overcome with too many projects...A chance encounter with Dr. Carlos would turn me around...Soon I could see the projects coming together and taking shape. Next, they were being accepted for publication." "I highly respect her and I see her as a role model with respect to research and clinical work." "It is quite clear to me that Ruth is one of the best mentors within the Department of Radiology, and the most important influence on my career development to date."

Research: As a fellow, Dr. Carlos worked on extending the clinical applications of magnetic resonance (MR) angiography and originating the clinical application of MR cholangio-pancreatography. During this time, she noted variations in the probability that a patient would have a clinical condition based on differences in practice and referral patterns, and became interested in improving the quality and cost effectiveness of clinical care for common conditions that may be affected by new imaging technologies.

As a Robert Wood Johnson clinical scholar, Dr. Carlos studied the clinical and economic effectiveness of emerging radiological technologies and completed a masters degree in clinical research design and statistical analysis. Her work focused on using decision models to analyze the cost effectiveness of diagnostic imaging strategies for renal vascular hypertension and post

menopausal bleeding. She determined that standard preference based utilities do not adequately account for the reassurance value of a negative test in patients with post menopausal bleeding. Thus, the value of non-decisional aspects of diagnostic information is underestimated. Her research began to evolve toward the examination of the contribution of diagnostic information to health related quality of life specifically and health care in general.

Dr. Carlos received the prestigious General Electric-Association of University Radiology Research Academic Fellow (GERRAF) award. Her principal research during this period focused on measuring the added value of diagnostic information to women with post menopausal bleeding by capturing the utilities of health states related to having diagnostic information. She also received funding from the University of Michigan's Executive Vice-President for Medical Affairs (EVPMA) Collaborative Health Services Research for Practice Improvements Program to study the clinical and economic impact of incidental findings after MR angiography for hypertension. This last project highlighted the potential effect of diagnostic information on behavior, in this instance, physician practice. Most of the incidental findings were designated as benign abnormalities not requiring additional imaging. Nevertheless, additional imaging has been ordered to further work up the noted incidental finding.

Throughout her career, Dr. Carlos has studied the value of diagnostic testing. Although initially limited to the economic value, she has expanded her research to encompass the psychological value and ultimately the value of diagnostic testing as a mode of improving health behavior.

#### Recent and Significant Publications:

Carlos RC, Fendrick AM, Patterson SK, et al: Associations in breast and colon cancer screening behavior in women. *Acad Radiol* 12:451-458, 2005.

Carlos RC, Underwood W III, Fendrick AM, et al: Behavioral associations between prostate and colon cancer screening. *J Am Coll Surg* 200:216-223, 2005.

Carlos RC, Axelrod DA, Ellis JH, et al: Incorporating patient-centered outcomes in the analysis of cost-effectiveness: Imaging strategies for renovascular hypertension. *AJR* 181:1653-1661, 2003.

Carlos RC, Kim HM, Hussain HK, et al: Developing a prediction rule to assess hepatic malignancy in patients with cirrhosis. *AJR* 180:893-900, 2003.

Carlos RC, Hussain HK, Song JH, et al: Gadolinium-ethoxybenzyl diethylenetriamine pentaacetic acid as an intrabiliary contrast agent: Preliminary assessment. *AJR* 179:87-92, 2002.

Service: Dr. Carlos is a well trained diagnostic radiologist with fellowship training in magnetic resonance imaging. She holds a NIH KO7 mentored investigator grant, which provides 75% support. Thus, only approximately 20% of her time is assigned to clinical service, which is focused on MR imaging of the abdomen and pelvis.

Dr. Carlos provides service to the Department of Radiology, the University of Michigan and the field of radiology on a national level. She serves on the departmental committee to select candidates from our department to compete for national awards and is a member of our MR

Research Operations Steering Committee. On a national level Dr. Carlos has been active in a number of radiology organizations. For the American College of Radiology she is a member of the Quality Task Force and has served as a representative to the National Quality Forum. She served as a member and is now Chair of the Diagnostic Radiology In-service Exam Question Writing panel. Ruth serves on several committees for the American Roentgen Ray Society and the Radiological Society of North America. She has served as a Director-at-Large and is now a member of the Executive Board of the Radiology Alliance for Health Services Research. She has chaired the program committee for their annual meeting and is now a member of the program committee for the Association of University Radiologists.

#### External Review:

Reviewer A: "...I am confident in stating that Dr. Carlos's many publications are of the highest quality. In her recent scholarly publications, she is strongly contributing to issues pertaining to the greater public health. Ruth is quickly becoming one of the thought-leaders in Health Services Research."

Reviewer B: "...I believe Dr. Carlos is among a small handful of clinical researchers in radiology with the expertise, assertiveness, and interest to make significant advances in directing the specialty concerning how to most appropriately employ its technology. She is a funded researcher with limitless potential."

Reviewer C: "Dr. Carlos is one of a small number of people in radiology who have taken on the extraordinarily important task of assessing the value of imaging and the overall process of health care delivery. Her submitted papers are reflective of this interest and, in my view, represent a substantial contribution to the field....Her work is definitely advancing the field."

Reviewer D: "Ruth is one of a small handful of health services researchers in Radiology who has obtained rigorous methodologic training and an advanced degree....Her academic productivity is complimented [sic] by a commendable commitment to service, both at her own institution and to professional medical societies."

Reviewer E: "Dr. Carlos is definitely at the top of her peer group in terms of research quality and productivity....Dr. Carlos [sic] success in publishing and in securing extramural funding puts her into the top rank of academic radiologists."

Reviewer F: "She has been an invited lecturer or lectured at national or international meetings on 53 occasions. This is a testimony to her national and international reputation and also demonstrative of her commitment toward having an impact. She is an excellent lecturer."

Reviewer G: "I consider Ruth to be a very productive and influential investigator in this nascent area of imaging technology assessment. In my judgment, her work in this field has been highly significant, particularly with regards to the development of decision tools and cost-effectiveness analyses."

Summary of Recommendation:

Ruth C. Carlos, M.D., is an exceptionally well trained diagnostic radiologist. In addition to her residency and conventional fellowship in magnetic resonance imaging, Dr. Carlos spent two years as a Robert Wood Johnson fellow and was awarded the prestigious GERRAF award, which provided 50% academic time for two years. As a health services investigator, Dr. Carlos has focused her investigations on the contributions of diagnostic information to health related quality of life. She has gone far beyond the standard cost effectiveness evaluations to examine the downstream clinical effects of diagnostic imaging and diagnostic information in which radiologists do not routinely participate. The quality of her work is aptly demonstrated by the numerous high quality publications in the best peer reviewed journals. She has also been successful in achieving external funding and has been the principal investigator on grants from the NIH, Radiological Society of North America, Association of University Radiologists, and the University of Michigan Collaborative Health Services Research for Practice Improvements Program. An effective lecturer, she is highly sought after as a speaker for both continuing medical education program courses and special lecture series. She is involved in a number of our national radiology organizations and provides significant service to them. As such, she serves as an excellent role model for junior faculty and is a wonderful representative of the University of Michigan. I enthusiastically recommend her promotion to Associate Professor of Radiology, with tenure.



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Allen S. Lichter, M.D., Dean  
*Newman Family Professor  
of Radiation Oncology*

May 2006