

PROMOTION RECOMMENDATION
UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF RADIOLOGY
DEPARTMENT OF NEUROLOGY

Nicolaas Bohnen, M.D., Ph.D., associate professor of radiology, without tenure, Department of Radiology, and associate professor of neurology, without tenure, Department of Neurology, Medical School, is recommended for promotion to professor of radiology, with tenure, Department of Radiology, and professor of neurology, without tenure, Department of Neurology, Medical School.

Academic Degrees:

Ph.D.	1991	University of Limburg, The Netherlands
M.D.	1987	University of Nijmegen, The Netherlands

Professional Record:

2005–present	Associate Professor of Radiology and Neurology, University of Michigan
1998-2005	Assistant Professor of Radiology and Neurology, University of Pittsburgh

Summary of Evaluation:

Teaching: Although Dr. Bohnen's primary appointment is in radiology, he also holds an appointment in neurology. Thus his teaching includes both radiology (nuclear medicine) and neurology. He participates in teaching medical students as well as residents in neurology, physical medicine and rehabilitation, psychiatry, radiology and nuclear medicine. This teaching is done through a combination of formal lectures and teaching on the clinical services. Dr. Bohnen also participates in continuing medical education (CME) courses, giving lectures on neuroimaging of neurodegenerative disorders on a regular basis to practicing physicians at the local, state and national level. He is a regular participant in CME presentations at national meetings through the American Academy of Neurology and the Society of Nuclear Medicine (SNM). Dr. Bohnen is an accomplished investigator and director of the Functional Neuroimaging Cognitive and Mobility Laboratory where he works with a variety of undergraduate and graduate students instructing and mentoring them in research. The quality of Dr. Bohnen's teaching is very good. He is ranked in the second and third quartile of our faculty for the quality of his teaching by the radiology residents on the clinical service and in the formal conference setting, respectively. Typical comments from radiology residents include "asks excellent questions on clinical service," "helpful teaching on reading station," "extremely hard working and a great teacher" and "no way to improve upon perfection."

Research: As a board certified neurologist and nuclear medicine physician, Dr. Bohnen is well qualified to serve as the director of the Functional Neuroimaging Cognitive and Mobility Laboratory. He uses positron emission tomography (PET) to study cholinergic contributions to the clinical phenotype of cognition, mood, falls, smell and sleep in patients with Parkinson's disease. He was the first to report the in vivo cholinergic correlation of depression in Parkinson's disease and dementia. He also showed that falling among patients with Parkinson's disease relates to subcortical cholinergic denervation, a finding that may lead to new therapeutic approaches to treatment. Most recently, he has shown that limbic cholinergic denervation is a determinant of olfactory dysfunction in Parkinson's disease patients. Dr. Bohnen's work has received national recognition as evidenced by his invitations as a keynote speaker for the Parkinson's Study Group Annual Symposium in Baltimore, as distinguished visiting professor at the University of Pittsburgh, as a speaker at the National Institute of Aging-Organized Workshop on Aging and Mobility, and as an invited speaker at an NIH Organized Dementia with Lewy Bodies Biomarker Symposium. The quality of Dr. Bohnen's research is clearly demonstrated by his many peer reviewed manuscripts published in high quality journals and through his extensive external funding, including NIH and VA Merit Awards.

Recent and Significant Publications:

Bohnen NI, Kaufer DI, Hendrickson R, et al: Cortical cholinergic denervation is associated with depressive symptoms in Parkinson's disease and parkinsonian dementia. *J Neurol Neurosurg Psychiatry* 78:641-643, 2007.

Bohnen NI, Kuwabara H, Constantine GM, Mathis CA, Moore RY: Grooved pegboard test as a biomarker of nigrostriatal denervation in Parkinson's disease. *Neurosci Lett* 424:185-189, 2007.

Bohnen NI, Müller MLTM, Kuwabara H, Constantine GM, Studenski SA: Age-associated leukoaraiosis and cortical cholinergic deafferentation. *Neurology* 72:1411-1416, 2009.

Bohnen NI, Müller MLTM, Koeppe RA, Studenski SA, Kilbourn MA, et al: History of falls in Parkinson disease is associated with reduced cholinergic activity. *Neurology* 73:1670-1676, 2009.

Bohnen NI, Müller MLTM, Kotagal V, Koeppe RA, Kilbourn MA, et al: Olfactory dysfunction, central cholinergic integrity and cognitive impairment in Parkinson's disease. *Brain* 2010

Service: Dr. Bohnen provides extensive service not only to the Department of Radiology and the University of Michigan, but also to national professional organizations. Within the Department of Radiology, Dr. Bohnen is a member of the development committee. This committee meets regularly and plans three annual alumni receptions at national meetings. In addition, it is organizing an alumni weekend in Ann Arbor this fall and publishes a semi-annual department newsletter. At an institutional level, Dr. Bohnen serves as a member of the Investigational Review Board and is chair of the RDRC/SHUR committee (Radioactive Drug Research Committee/Sub-Committee on Human Use of Radiation). He is also a member of the research committee for the School of Kinesiology at the University of Michigan. On a national level, Dr. Bohnen has served in many capacities for the Brain Imaging Council of the Society of Nuclear

Medicine (SNM), including president last year. He also serves as chair of the SNM Workgroup for evidence based assessment of the utility of FDG/PET for the diagnosis of Alzheimer's disease. Dr. Bohnen is a member of the Division of Nuclear Medicine and spends approximately 20% of his time performing clinical work within that division. He has a 5/8 appointment at the Veterans Administration Hospital and spends 2/8 of that time on the neurology service. The remainder of his effort is devoted to the multidisciplinary GRECC. He is externally funded on both the VA Merit Award and on two NIH grants.

External Review:

Reviewer A: "A number of his studies are seminal and most likely will be classic...Dr. Bohnen is a pioneer and leader in the development of imaging technology critical for understanding the earliest neurotransmitter alterations present in PD and is widely recognized as the pioneer of this field. His innovative work on olfaction and cholinergic imaging in PD has no precedents."

Reviewer B: "His research is well funded and I am confident that he will continue to do well and he is a great asset as an internationally recognized researcher."

Reviewer C: "He is currently the President of the Brain Imaging Council of the Society of Nuclear Medicine – a high visibility and no doubt demanding position that has been occupied by a succession of distinguished leaders."

Reviewer D: "Dr. Bohnen's scholarship has a significant impact in the field of neuroimaging in PD and resulted in seminal advance in understanding nonmotor symptoms of PD by studying nondopaminergic system changes....He has published extensively in peer-reviewed mainstream neurology and imaging journals."

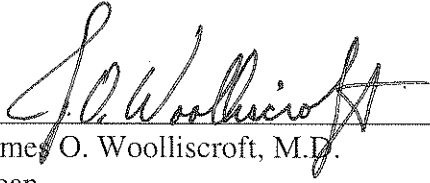
Reviewer E: "Dr. Bohnen has earned a national and international reputation in neuroimaging of Parkinson and related diseases with particular expertise in the pathophysiology of cognitive, psychiatric and motor impairments in these conditions. He continues to provide new insights into the nature of cholinergic and dopaminergic impairments associated with depression, dementia, falling and motor sequencing in Parkinson disease."

Reviewer F: "Nic is the clear leader in the world in imaging of cholinergic function in PD and his work has provided important new insights into the pathogenesis of many of the clinical features of PD that may lead to improved therapy for this condition. His discovery that falls in PD are associated with reduced thalamic cholinergic activity may lead to new therapy for this particularly disabling aspect of PD."

Summary of Recommendation:

Nicholas Bohnen, M.D., Ph.D. is a well trained neurologist and nuclear medicine physician who holds joint appointments in both neurology and radiology. He is an excellent physician working in both the neurology clinic and the nuclear medicine division at the University of Michigan. He is an outstanding investigator with an excellent record of external funding through VA merit awards. He is also supported by the National Institutes of Health as the principal investigator on

an RO1 award and the project director of an NIH PO1 award. His research investigates the cholinergic mechanisms for disorders of cognition, mood, falls, smell and sleep in patients with Parkinson's disease. Several components of his work are seminal contributions to the field that may lead to effective treatments. Dr. Bohnen has an extensive teaching portfolio which includes trainees in both radiology and neurology. For all of these reasons, I am pleased to recommend Dr. Bohnen for promotion to professor of radiology, with tenure, and professor of neurology, without tenure.

A handwritten signature in black ink, appearing to read "J. O. Woolliscroft", written over a horizontal line.

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

May 2011