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## BIOGRAPHICAL SKETCH

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NAME Arvind P. Pathak		POSITION TITLE Assistant Professor of Radiology and Oncology	
APATHAK2			
EDUCATION/TRAINING ( <i>Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.</i> )			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
University of Poona, Pune, India	B.S.	1993	Electronics Engineering
Medical College of Wisconsin and Marquette University, Milwaukee, WI	Ph.D.	2001	Biophysics and Biomedical Engineering
Johns Hopkins University School of Medicine, Baltimore, MD	Post doc	2001-03	Russell H. Morgan Department of Radiology and Radiological Science

### A. Personal Statement

Dr. Pathak is Assistant Professor of Radiology and Oncology. Dr. Pathak is an expert in MRI and optical imaging of tumors and in co-registration and image data analysis. Dr. Pathak will assist JHU TMEN investigators in MR and optical imaging.

### B. Positions and Honors

#### Positions and Employment

2005 Assistant Professor, Departments of Radiology and Oncology, The Johns Hopkins University School of Medicine.

2003-05 Instructor, Russell H. Morgan Department of Radiology and Radiological Science, The Johns Hopkins University School of Medicine.

2001-03 Postdoctoral Fellow, Russell H. Morgan Department of Radiology and Radiological Science, Johns Hopkins University School of Medicine.

1996-01 Functional Imaging Fellow, Dept. of Biomedical Engineering, Marquette University and Biophysics Research Institute, Medical College of Wisconsin, Milwaukee, WI.

#### Other Experience and Professional Memberships

1996 International Society for Magnetic Resonance in Medicine (ISMRM).

2004 American Association of Cancer Research (AACR)

#### Honors and Awards

2010-11 Johns Hopkins Institute for Nanobiotechnology Junior Faculty Pilot Project Award

2009-12 Susan Komen Career Catalyst Award in Breast Cancer – Susan G. Komen For the Cure Foundation (One of fifteen national awardees)

2007, 08, 10 Provost's Undergraduate Research Award – awarded by Johns Hopkins University

2005 Elmer L. Lindseth Lectureship, Dept. of Biomedical Engineering, Case Western Reserve University

2004 The Andrew Moissoff Young Investigator Award from the Lymphatic Research Foundation

2004 The Susan G. Komen Breast Cancer Foundation Young Investigator Scholarship/Awarded by the Lymphatic Research Foundation

2002 The Bill Negendank Young Investigator Award First Place for Outstanding young investigators in the field of cancer MR, Awarded by the International Society for Magnetic Resonance in Medicine (ISMRM)

2001 Journal Publication Award, Medical College of Wisconsin Cancer Center Trainee Paper Competition

1998-03 Student Stipend Awards - International Society for Magnetic Resonance in Medicine (ISMRM)

- 1997-00 Whitaker Foundation Functional Imaging Fellowship, Dept. of Biomedical Engineering, Marquette University and Biophysics Research Institute, Medical College of Wisconsin
- 1996 Student Travel Award – Bioengineering Section of the American Society of Mechanical Engineering
- 1994-96 Research Assistantship, NSF, Dept. of Biomedical Engineering, Marquette University

**C. Selected Peer-reviewed Publications** (Selected from over 30 peer-reviewed publications).

**Most relevant to the current application**

1. Pathak AP, Schmainda KM, Ward BD, Linderman JR, Rebro KJ, and Greene AS. MR-derived Cerebral Blood Volume Maps: Issues Regarding Histological Validation and Assessment of Tumor Angiogenesis. *Magnetic Resonance in Medicine*, 2001; 46(4): 735-747.
2. Pathak AP, Rand SD, and Schmainda KM. The Effect of Brain Tumor Angiogenesis on the *In vivo* Relationship between the Gradient Echo Relaxation Rate Change (R2\*) and Contrast Agent (MION) Dose. *Journal of Magnetic Resonance Imaging*, 2003; 18(4): 397-403.
3. Pathak AP. MR Susceptibility-based Perfusion Imaging of Tumors Using Iron Oxide Nanoparticles, Wiley Interdisciplinary Reviews: Nanomedicine and Nanobiotechnology. 2008; (1):84-97. Review, Not NIH Funded.
4. Pathak AP, Hochfeld WE, Goodman SL, Pepper MS. Circulating and imaging markers for angiogenesis, *Angiogenesis*. 2008; 11(4):321-335. PMC Journal - In Process.
5. Pathak AP, Ward BD, and Schmainda KM. A Novel Technique for Modeling Susceptibility-Based Contrast Mechanisms for Arbitrary Microvascular Geometries: The Finite Perturber Method. *Neuroimage*; 2008; 40(3):1130-1143. PMID2408763.

**Additional recent publications of importance to the field (in chronological order)**

1. Pathak AP, Gimi B, Glunde K, Ackerstaff E, Artemov D and Bhujwala ZM. Molecular and Functional Imaging of Cancer: Advances in MRI and MRS. *Methods in Enzymology: Imaging in Biological Research, Part B*, 2004; v386:1-58.
2. Pathak AP, Bhujwala ZM and Pepper MS. Visualizing Function in the Tumor-Associated Lymphatic System. *Lymphatic Research in Biology*, 2004; 2(4):165-72.
3. Pathak AP, Artemov D, and Bhujwala ZM. A Novel System for Continuous *In vivo* Monitoring of Contrast Dynamics in a Mouse Tumor Model. *Magnetic Resonance in Medicine*, 2004; 51(3):612-615.
4. Pathak AP, Artemov D, Ward DB, Jackson DG, Neeman M, and Bhujwala ZM. Characterizing extravascular fluid transport of macromolecules in the tumor interstitium by MRI. *Cancer Research*, 2005; 65(4):1425-32.
5. Pathak AP, Artemov D, Neeman M, and Bhujwala ZM. Lymph node metastasis in breast cancer xenografts is associated with increased regions of extravascular drain, lymphatic vessel area and invasive phenotype. *Cancer Research*, 2006; 66(10):5151-58.
6. Raman V, Artemov D, Pathak AP, Winnard PT, Yudina A, Bogdanov A, and Bhujwala ZM. Hypoxic regions are characterized by low vascular volume and high permeability: A combined MR and optical imaging study of a human prostate cancer model. *Cancer Research*, 2006; 66(20):1-8.
7. Raman V, Pathak AP, Glunde K, Artemov D and Bhujwala ZM. Magnetic Resonance Imaging and Spectroscopy of Transgenic Models of Cancer. *NMR Biomed*. 2007 May; 20(3):186-99.
8. Penet M, Pathak AP, Raman V, Ballesteros P, Artemov D and Bhujwala ZM. Noninvasive Multi-parametric Imaging of Metastasis-Permissive Microenvironments in a Human Prostate Cancer Xenograft. *Cancer Research*, 2010 Nov 15; 69(22):8822-9. PMID2783669.

**D. Current Research Support**

**Ongoing Research Projects**

2P50CA103175-06A2 (Bhujwala)

09/22/11 - 07/31/16

NCI JHU ICMIC Program

This center grant funds an *in vivo* Cellular and Molecular Imaging Center at Johns Hopkins. The program consists of four research components, four developmental projects, one career development award and four resources.

R01CA138264 (Popel) 02/13/09-12/31/13

NCI  
Experiment-Based Multiscale Models of Angiogenesis in Breast Cancer  
The major goal of this project is to develop predictive multiscale models of breast cancer. Mouse model xenografts of human breast cancer will be used; multiscale imaging studies and molecular studies will provide the foundation for models validation.

**Completed Projects Within Last Three Years**

NCI P30CA06973 (Nelson) 05/01/06-04/30/12

Cancer Center Support Grant - Functional Imaging Core  
The goal of this project is to provide an imaging resource for the Sidney Kimmel Comprehensive Cancer Center. The Core provides molecular and functional imaging services using MR, PET and optical imaging, trains and assists investigators in the use of imaging technologies, guides investigators in the use of the most relevant imaging technologies for the proposed project and assists in developing new concepts in image analysis and visualization.

KG090640 (Pathak) 03/01/09-02/28/12

Susan G. Komen Career Catalyst Grant  
Developing Non-invasive, *In vivo* Biomarkers to Guide Antiangiogenic Therapy in Breast Cancer using MRI  
The major goal of this project is to develop non-invasive, *in vivo* biomarkers of angiogenesis and antiangiogenic therapy in breast cancer.

NCI P50CA103175-05S1 (Bhujwalla) 08/01/03-07/31/11 NCE

JHU ICMIC Program  
This center grant funds an *in vivo* Cellular and Molecular Imaging Center at Johns Hopkins. The program consists of four research components, developmental projects, career development awards and five resources.

R21CA128793 (Pathak) 04/01/08-03/31/11

NCI  
A Lectin-Contrast Agent for Multimodality Molecular Imaging of Tumor Angiogenesis  
The major goal of this project is to develop a novel optical- and MRI-visible contrast agent based on a lectin platform for imaging tumor angiogenesis *in vivo*.

R21 EB008162 (Kato) 06/01/08-05/31/10

NCI  
Noninvasive Monitoring of *In vivo* Drug Release  
The major goal of this project is to develop a nano-particulate contrast agent/drug carrier that enables the tracking of both, the drug carrier and the anti-cancer drug using two different MRI contrast mechanisms.

RSD0718 (Pathak) 07/01/07-06/30/09

RSNA Research Seed Grant Vascular Phenotyping of Brain Tumors Using Magnetic Resonance Microscopy  
The major goal of this project is to provide functional imaging support to the Johns Hopkins Cancer Center.