

## BIOGRAPHICAL SKETCH

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NAME Michael T. McMahon	POSITION TITLE Assistant Professor of Radiology		
eRA COMMONS USER NAME (credential, e.g., agency login) McMahonMT			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
University of Richmond, Richmond, VA	B.Sc.	1993	Physics
University of Illinois at Urbana-Champaign	Ph.D.	1999	Chemical Physics

### A. Personal Statement

During my career I have focused on NMR/MRI technology, both pulse sequences and theory. This includes calculation of NMR properties (such as chemical shift, dipolar coupling, chemical exchange rate) using density functional theory, molecular mechanics, density matrix theory and Bloch equation simulations. The current proposal is on the design of CEST detectable drug delivery vehicles for MRI based monitoring of delivery and release of drug. My work over the past six years has focused on CEST contrast agents, and includes publications on the design of new peptide CEST contrast agents through optimization of the exchange rates of NH, NH<sub>2</sub> and OH protons, on the development of experiments to both quantify chemical exchange rates (QUEST/QUESTP) and screen compounds for CEST contrast quickly, tune liposomes to maximize their CEST contrast, and on development of imaging schemes to detect CEST contrast agents robustly both *in vitro* and *in vivo*. For this project, I will have the overall responsibility for the MRI acquisition and data analysis for the animal and cell studies to be performed at KKI.

### B. Positions and Honors

#### Positions and Employment

1993-95 Graduate Assistant, University of Illinois at Urbana-Champaign  
1995-98 Graduate Fellow, University of Illinois at Urbana-Champaign  
1999 Graduate Assistant, University of Illinois at Urbana-Champaign  
Advisor: Eric Oldfield, Professor, Department of Chemistry and Biophysics  
1999-01 Postdoctoral Associate, Massachusetts Institute of Technology  
2001-03 NIH Postdoctoral Fellow, Massachusetts Institute of Technology  
Advisor: Robert G. Griffin, Director, Francis Bitter Magnet Laboratory  
2003-06 Research Associate, Radiology, Johns Hopkins Univ. School of Medicine  
2003-06 Research Associate, Kennedy Krieger Institute  
2006 Assistant Professor, Radiology, Johns Hopkins Univ. School of Medicine  
2006- Assistant Professor, Kennedy Krieger Institute

#### Awards Honors

1995-98 NIH Cellular and Molecular Biophysics Training Grant Fellowship  
2001-03 NIH/NIGMS Postdoctoral Fellowship  
2006-11 NIH/NIBIB K01 Career Development Award,

#### Memberships, Committees, Boards

2003 Member, International Society for Magnetic Resonance in Medicine (ISMRM)  
2005 Member, ISMRM, Molecular Imaging Study Group  
2005 Member, Society for Molecular Imaging (SMI)  
2008 Molecular and Cellular Imaging Study Group Poster Award Committee, ISMRM  
2010 Program Director-Elect, Molecular Imaging Study Group, International Society For Magnetic Resonance in Medicine

## C. Selected Peer-reviewed Publications

### Most relevant to the current application

1. M.T. McMahon, A.A. Gilad, J. Zhou, J.W.M. Bulte, P. van Zijl, Measuring the pH Dependence of Chemical Exchange in Cationic-Polymer Chemical Exchange Saturation Transfer Agents, *Mag. Res. Med.*, 2006; 55, 836-847.
2. A.A. Gilad, M.T. McMahon, P. Walczak, P.T. Winnard Jr., V. Raman, H.W.M. van Laarhoven, C.M. Skoglund, J.W.M. Bulte, P.C.M. van Zijl, Artificial reporter gene providing MRI contrast based on proton exchange, *Nat. Biotech.*, 2007; 25, 217-219.
3. M.T. McMahon, A.A. Gilad, M.A. DeLiso, S.M. Cromer Berman, J.W.M. Bulte, P.C.M. van Zijl, New Multi-Color Polypeptide DIACEST Contrast Agents for MR Imaging, *Mag. Res. Med.*, 2008; 60, 803-812 PMID2614370.
4. J.I. Friedman, M.T. McMahon, J.T. Stivers, P.C.M. van Zijl, Indirect detection of labile solute proton spectra via the water signal using frequency-labeled exchange (FLEX) transfer, *J. Am. Chem. Soc.*, 2010; 132 (6), 1813-5 PMID2822835.
5. G. Liu, A.A. Gilad, J.W.M. Bulte, P.C.M. van Zijl, M.T. McMahon, High-Throughput Screening of Chemical Exchange Saturation Transfer MR Contrast Agents, *Cont. Media & Mol. Imag.* 2010 May;5(3):162-70. PMID2898906.

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

1. M.T. McMahon, A.C. deDios, N. Godbout, R. Salzmann, D.D. Laws, H. Le, R.H. Havlin, E. Oldfield, An Experimental and Quantum Chemical Investigation of CO Binding to Heme Proteins and Model Systems: A Unified Model Based on C-13, O-17, Fe-57 Nuclear Magnetic Resonance, Fe-57 Moessbauer and Infra-Red Spectroscopy, *J. Am. Chem. Soc.*, 1998; 120, 4784-4797.
2. M.T. McMahon, E. Oldfield Determination of Order Parameters and Correlation Times in Proteins: A Comparison Between Bayesian, Monte Carlo and Simple Graphical Methods, *J. Biomol. NMR* 1999; 13(2), 133-137.
3. R. Salzmann, M.T. McMahon, N. Godbout, L.K. Sanders, M. Wojdelski, E. Oldfield, Solid-State NMR, Crystallographic and Density Functional Theory Investigation of Fe-CO and Fe-CO Analog Metalloporphyrins and Metalloproteins, *J. Am. Chem. Soc.* 1999; 121, 3818-3828.
4. W. Arnold, L.K. Sanders, S.R. Wilson, M.T. McMahon, N. Godbout, E. Oldfield, Experimental and Theoretical Charge Density Distributions in L-Asparagine Monohydrate, *J. Am. Chem. Soc.* 2000; 122, 4707-4717.
5. C.M. Rienstra, L. Tucker-Kellogg, C.P. Jaroniec, M. Hohwy, B. Reif, M.T. McMahon, B. Tidor, T. Lozano-Perez, and R.G. Griffin De Novo Determination of Peptide Structure with Solid-State MAS NMR Spectroscopy *PNAS* 2002; 99, 10260.
6. C.P. Jaroniec, C.E. MacPhee, V.S. Bajaj, M.T. McMahon, C.M. Dobson, R.G. Griffin Structure of a Peptide in an Amyloid Fibril *PNAS*, 2004; 101(3),711-716.
7. M.A. Smith, J. Gillen, M.T. McMahon, P.B. Barker, X. Golay, Simultaneous Water and Lipid Suppression for *in vivo* Brain Spectroscopy in Humans, *Mag. Res. Med.* 2005; 54, 691-696.
8. J.M. Zhao, Y. Har-el, M.T. McMahon, J. Zhou, A. Dean Sherry, G. Sgouros, J.W.M. Bulte, P.C.M. van Zijl, Size-induced enhancement of chemical exchange saturation transfer (CEST) contrast in liposomes *J. Am. Chem. Soc.*, 2008; 130, 5178-5184 PMID2759111.
9. A.A. Gilad, P. Walczak, M.T. McMahon, H. Bin Na, J.H. Lee, K. An, T. Hyeon, P.C.M. van Zijl, J.W.M. Bulte, MR Tracking of Transplanted Cells with Positive Contrast using Manganese Oxide Nanoparticles, *Mag. Res. Med.*, 2008; 60, 1-7. PMID2575033.
10. A.A. Gilad, H.W.M. van Laarhoven, M.T. McMahon, P. Walczak, A. Heerschap, M. Neeman, P.C.M. van Zijl, J. W.M. Bulte, Feasibility of Dual Contrast Enhancement Using CEST Contrast Agents and Supermagnetic Iron Oxide Particles, *Mag. Res. Med.*, 2009; 61(4), 970-974. PMID2743130.

## D. Research Support

### Ongoing Research Support

2P50CA103175-06A2 (Bhujwalla)  
NCI JHU ICMIC Program

09/22/11 - 07/31/16

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.

1R01EB012590-01(McMahon)

09/22/10-08/31/14

NIBIB

DIACEST Islet Cell Capsules for Immunoprotection, MR Detection, and pH Sensing

The goal of this project is to identify cell capsules for the protection of the immune system, use for MR detection and pH sensing.

**Completed Projects Within Last Three Years**

K01 EB006394 (McMahon)

08/01/06-7/31/11

NIBIB

Developing New Multicolor Polypeptide MR Contrast Agents for Stem Cell Tracking

The goal for this project is to identify new contrast agents to be utilized in stem cell tracking.

R21 EB008769-01A1 (Gilad)

06/01/09-05/31/11

NINDS

Imaging of gene delivery in the central nervous system

The goal of this project is to explore gene delivery imaging in the central nervous system.

R21 NS065284 (Gilad)

02/15/2009-02/15/11

NINDS

Monitoring Neuronal Activity and Inducible Gene Expression using MRI

The goal of this project is by using MRI, monitor neuronal activity and inducible gene expression.