RUILIANG BAI, PHD

National Institutes of Health, NICHD
Section on Quantitative Imaging and Tissue Sciences
Phone: (+01) 202-368-6188
Email: ruiliang.bai@nih.gov

Education

Ph.D. University of Maryland, College Park, Aug. 2015
Biophysics Graduate Program at UMD
Graduate Partnerships Program at NIH
Dissertation: Quantitative study of water dynamics in biomimetic models and living tissue by NMR and MRI: perspectives on neuronal activity
Advisor – Peter J. Basser (NIH) & Robert Briber (UMD)
*nominated as candidate for UMD Distinguished Dissertation Award

B.S. Hunan University, Changsha, Jul. 2010
Applied Physics, Lida School of Fundamental Science
Minors: Mathematics, Biology

Research Experience

Postdoctoral Fellow
National Institutes of Health, Bethesda Sep. 2015 – present
Advisor – Peter J. Basser

Pre-doctoral Fellow
National Institutes of Health, Bethesda Jul. 2011 – Aug. 2015
University of Maryland, College Park
Advisor – Peter J. Basser (NIH) & Robert Briber (UMD)

Graduate Research Assistant
Dept. of Chemistry, UMD Mar. 2011 – Jun. 2011
Advisor – Garegin A. Papoian

Graduate Research Assistant
Advanced MRI Section, NIH, Bethesda Oct. 2010 – Mar. 2011
Advisor – Jeff Duyn

Undergraduate Research Assistant
Beijing MRI center, Institute of Biophysics Jan. 2010 – Jun. 2010
Chinese Academy of Science, Beijing
Advisor – Rong Xue

Undergraduate Research Assistant
Dep. of Physics, Hunan University Jun. 2008 – Dec. 2009
Advisor – Quanhui Liu

Teaching Experience

Teaching Assistant
Dept. of Physics, University of Maryland Aug. 2010 – May. 2011
Undergraduate courses – *Introduction to Physics*, *Statistical Thermodynamics, Solid State Physics.*
*nominated as UMD Runner-up Ralph D. Myers Teaching Assistant Award

Honors and Awards

Junior Fellow, *International Society for Magnetic Resonace in Medicine,* 2017.

***Summa cum laude* (Best abstract) Awards**, *International Society for Magnetic Resonance 25th Annual Meeting*, Honolulu, 2017.

Educational Stipend Award, *International Society for Magnetic Resonance 25th Annual Meeting*, Honolulu, 2017.

1st Place Young Investigator Award, *Overseas Chinese Society for Magnetic Resonance in Medicine*, Singapore, 2016.

3rd Place Presentation Award in Diffusion Study Group, *International Society for Magnetic Resonance 24th Annual Meeting*, Singapore, 2016.

***Summa cum laude* (Best abstract) Awards** (two abstracts), *International Society for Magnetic Resonance 24th Annual Meeting*, Singapore, 2016.

NIH Distinguished Graduate Research Award, *National Institutes of Health*, Bethesda, 2015.

Education Stipend Award, *International Society for Magnetic Resonance 23rd Annual Meeting*, Toronto, 2015.

Presentation Award in White Matter Study Group, *International Society for Magnetic Resonance 22nd Annual Meeting*, Milan, 2014.

Education Stipend Award, *International Society for Magnetic Resonance 22nd Annual Meeting*, Milan, 2014.

Jacob K Goldhaber Travel Award, *University of Maryland*, College Park, 2014.

Runner-up Ralph D. Myers Teaching Assistant Award, *University or Maryland*, College Park, 2012.

International Travel Award, *University of Maryland*, College Park, 2011.

Outstanding Bachelor Thesis Award, *Hunan University*, Changsha, 2010.

National Scholarship of China, *Chinese Ministry of Education and Hunan University*, Changsha, 2009

Outstanding Student Scholarship, *Hunan University*, Changsha, 2006 – 2008.

Memberships

International Society for Magnetic Resonance in Medicine (Junior Fellow)
Biophysical Society
Society for Neuroscience

Professional Activities

Chapter Committee, International Society for Magnetic Resonance in Medicine
Trainee Advisory Work Group, International Society for Magnetic Resonance in Medicine

Journals reviewed for

Theranostics, Biomedical Signal Processing & Control, IET Image Processing, Microporous & Mesoporous Materials

Invited Presentations

Measuring transmembrane water exchange in rat brain cortical cells in normal and pathological conditions, *International Society for Magnetic Resonance in Medicine Annual Meeting,* Honolulu, April. 2017

The sensitivity of diffusion MRI in direct detection of neuronal activity: an *in-vitro* assessment, *Diffusion Study Group, International Society for Magnetic Resonance in Medicine Annual Meeting,* Singapore, May. 2016

A framework for accurate determination of the T2 distribution from multiple echo magnitude MRI images, *White Matter Study Group, International Society for Magnetic Resonance in Medicine Annual Meeting,* Milan, May. 2014

Journal publications

R. Bai, P.J. Basser, Characterize myelin-trapped water kinetics and axon diameter in spinal cord. (*in preparation*)

R. Bai, C. Springer, D. Plenz, P.J. Basser, Neuronal activity changes active transcytolemmal water cycling in neuronal tissue. (*in preparation*)

R. Bai, C. Springer, D. Plenz, P.J. Basser, Fast, Na^+/K^+ pump driven, Steady-state Transcytolemmal Water Exchange Found in Neuronal Tissue: A Study of Rat Brain Cortical Cultures, **J. Neurosci.** (*Under Review*)

Z. Zhou, **R. Bai**, J. Munasinghe, L. Nie, X. Chen, T_1-T_2 Dual-Modal Magnetic Resonance Imaging: From Molecular Basis to Contrast Agents, **ACS Nano**. (*in press,* DOI**:** 10.1021/acsnano.7b03075)

H.Chen, X. Tong, L. Lang, O. Jacobson, B. Yung, X. Yang, **R. Bai,** D. Kiesewetter, Y. Ma, H. Wu, G. Niu, X. Chen, Quantification of Tumor Vascular Permeability and Blood Volume by Positron Emission Tomography. **Theranostics.** 7 (9) (2017) 2363-2376 (doi:10.7150/thno.19898)

R. Bai, D. Benjamini, J. Cheng, P.J. Basser, Fast, accurate 2D-MR relaxation exchange spectroscopy (REXSY): beyond compressed sensing, **J. Chem. Phys**. 145 (2016) 154202

R. Bai, C. Stewart, D. Plenz, P.J. Basser, Accessing the sensitivity of diffusion MRI to detect neuronal activity directly, **Proc Natl Acad Sci USA**. 113 (2016) 1728 -1737

R. Bai, A. Klaus, T. Bellay, C. Stewart, S. Pajevic, U. Nevo, et al., Simultaneous calcium fluorescence imaging and MR of ex vivo organotypic cortical cultures : a new test bed for functional MRI, **NMR Biomed**. 28 (2015) 1726-1738.

R. Bai, A. Cloninger, W. Czaja, P.J. Basser, Efficient 2D MRI relaxometry using compressed sensing, **J. Magn. Reson.** 255 (2015) 88–99.

A. Cloninger, W. Czaja, **R. Bai**, P.J. Basser, Solving 2D Fredholm integral from incomplete measurements using compressive sensing, **SIAM J. Imaging Sci**. 7 (2014) 1775–1798.

R. Bai, C.G. Koay, E. Hutchinson, P.J. Basser, A framework for accurate determination of the T2 distribution from multiple echo magnitude MRI images, **J. Magn. Reson**. 244 (2014) 53–63.

R. Bai, P.J. Basser, R.M. Briber, F. Horkay, NMR water self-diffusion and relaxation studies on sodium polyacrylate solutions and gels in physiologic ionic solutions, **J. Appl. Polym. Sci**. 131 (2014) 1–7.

Q.H. Liu, Y. Shen, **R. Bai**, X. Wang, A notable difference between ideal gas and infinite molar volume limit of van der Waals gas, **Eur. J. Phys.** 31 (2010) 671–673.

H.R. Sun, **R. Bai,** S Yang and Q.H. Liu, Quantum-classical correspondence for a charge in a uniform magnetic field, **College Physics**. (Chinese) 29 (2010) 7–8.

Patents

P.J. Basser, **R. Bai**, A. Cloninger, W. Czaja, Magnetic resonance 2D relaxometry reconstruction using partial data. (Filed April 2015, PCT/US2015/026533).

Conference Proceedings and Talks

R. Bai, C. S. Springer, D. Plenz, P.J. Basser, Measuring transmembrane water exchange in rat brain cortical cells in normal and pathological conditions, In ***Proc.***

Intl. Soc. Mag. Reson. Med 25, Honolulu, 2017. (*Oral*, Abstract No. 203).

R. Bai, C. S. Springer, D. Plenz, P.J. Basser, The Vanishing Shutter-Speed Limit, In ***Proc. Intl. Soc. Mag. Reson. Med*** 25, Honolulu, 2017. (Abstract No. 1918).

R. Bai, C. Stewart, D. Plenz, P.J. Basser, The sensitivity of diffusion MRI in direct detection of neuronal activity: an *in-vitro* assessment, In ***Proc. Intl. Soc. Mag. Reson. Med*** 24, Singapore, 2016. (*Oral*, Abstract No. 4534).
*nominated for ISMRM *Summa cum laude* Award

R. Bai, A. Klaus, T. Bellay, C. Stewart, S. Pajevic, U. Nevo, et al., A novel test bed for non-BOLD functional MRI, In ***Proc. Intl. Soc. Mag. Reson. Med*** 24, Singapore, 2016. (Abstract No. 4796).
*nominated for ISMRM *Summa cum laude* Award

E. Mertz, K. Koon, F. Horkay, **R. Bai**, M. Komlosh, et al., Imaging extracellular matrix in human placenta, In ***The Human Placenta Project: 3rd Annual Meeting***, Bethesda, U.S., 2016.

R. Bai, A. Cloninger, W. Czaja, P.J. Basser, Efficient 2D MRI relaxometry using compressed sensing, In ***Proc. Intl. Soc. Mag. Reson. Med*** 23, Toronto, Canada, 2015. (Abstract No. 3256).

F. Horkay, D. Benjamini, U. Eliav, **R. Bai**, et al., Imaging functional properties and composition of cartilage extracellular matrix, In ***NICHD intramural research symposia***, Bethesda, U.S., 2015.

R. Bai, P.J. Basser, Multi-component water dynamics and exchange in brain cortical tissue probed via in-vitro D-T2 2D correlation NMR, In ***Biophysical Society 59th Annual Meeting***, Baltimore, U.S., 2015. (Biophysical Journal; vol. 108, no.2.).

R. Bai, C.G. Koay, E. Hutchinson, P.J. Basser, A framework for accurate determination of the T2 distribution from multiple echo magnitude MRI images, In ***Proc. Intl. Soc. Mag. Reson. Med*** 22, Milan, Italy, 2014. (Abstract No. 4958).

R. Bai, P.J. Basser, Physical limits of magnetic resonance imaging (MRI) on directly detecting neuronal excitation, In ***NIH Graduate Student Symposium,*** Bethesda, U.S., 2013.

R. Bai, F. Horkay and P.J. Basser, NMR relaxation and water self-diffusion studies in sodium polyacrylate solution and gel, In ***Magnetic Resonance in Porous Medium*** 11, Guildford, U.K., 2012.