BIOGRAPHICAL SKETCH

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NAME	POSITION TITLE
Luis Hernandez-Garcia, Ph.D.	Research Associate Professor
eRA COMMONS USER NAME hernan	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of North Carolina, Chapel Hill, NC	B.S.	1992	Applied Science
University of North Carolina, Chapel Hill, NC	M.S.	1994	Biomedical Engineering
University of North Carolina, Chapel Hill, NC	Ph.D.	1998	Biomedical Engineering

A. Positions and Honors

Positions and Employment

1991 Intramural Research Training Assistant, National Institute of Environmental Health Science, Research Triangle Park, North Carolina
1992 - 1993 Lab Technician, University of North Carolina Biochemistry Dept., Chapel Hill, North Carolina
1993 - 1994 Electronics Technician, University of North Carolina Physiology Dept., Chapel Hill, North Carolina
1993 - 1994 Graduate Research Assistant, University of North Carolina School of Nursing, Chapel Hill, North Carolina
1994 - 1995 Graduate Research Assistant, University of North Carolina Magnetic Resonance Imaging facility, Chapel Hill, North Carolina
1995 - 1997 Graduate Research Assistant, Nathan Kline Institute, Orangeburg, New York
1997 - 1999 Research Fellow, Department of Neurosurgery, Wake Forest University School of Medicine, Winston-Salem, North Carolina
1999 – 2006 Assistant Research Scientist, Department of Biomedical Engineering, Univeristy of Michigan, Ann Arbor, Michigan
2006-Present Associate Research Professor, Department of Biomedical Engineering, University of Michigan, Ann Arbor, Michigan

Honors and Awards

1991 Intramural Research Training Assistantship at the National Institute of Environmental Health Science, Research Triangle Park, North Carolina
1992 James Crawford Award in the Applied Sciences curriculum
1995 - 1997 Magnex Scientific Graduate Assistantship in Medical Physics
1997 - 1998 International Society for Magnetic Resonance in Medicine Student Travel Award

Professional Affiliations

Biomedical Engineering Society.
International Society of Magnetic Resonance in Medicine.
Organization for Human Brain Mapping.

B. Selected peer-reviewed publications (in chronological order).

Kadiiska, MGB, Hanna PM, Hernandez L, Mason RP: In vivo evidence of Hydroxyl Radical Formation after Acute Copper and Ascorbic Acid Intake: Electron Spin Resonance - Spin Trapping Investigation. Mol. *Pharmacology*, 42 (2): 723-729, 1993.

Hernandez L, Waag, BJ, Hsiao , HS, Neelon, VM: Development of a New Non-Invasive Monitoring System for Sleeping Subjects. *Physiological Measurement*, 16, 161-167, 1995.

Branch CA, Hernandez L, Yongbi M, Helpern JA: Rapid and Continuous Monitoring of Cerebral Perfusion by MRI Arterial Spin Tagging with Line Scan Assessment, *NMR in Biomedicine* 11, 1-11, 1998.

Bastings EP, Gage HD, Greenberg JP, Hammond G, Hernandez L, Hamilton CA, Moody DM, Singh KD, Ricci PE, Pons TP, Good DC: Co-registration of Cortical Magnetic Stimulation and Functional Magnetic Resonance Imaging. *Neuroreport* 9, 1941-1946, 1998.

Hernandez,L : Validity of the Steady Sate Model for Arterial Spin Tagging Cerebral Perfusion Measurements. Doctoral Dissertation, 1998.

EP Bastings, Y-F Yen, GL Hammond, JH Burdette, HD Gage, JP Greenberg, DM Moody, L Hernandez, DC Good, S Mc Dermott, TP Pons. Serial co-registration of fMRI and TMS mapping during motor recovery after stroke. *Stroke* 2000; 31:290

Weaver KD, Branch CA, Hernandez L, Claramae HM, Quattrocci KB: Effect of Leukocyte-Endothelial Adhesion Antagonism on Neutrophil Migration ans Neurologic Outcome after Cortical Trauma. *The Journal of Trauma*, vol 48, n. 6, pp. 1081 - 1090, 2000

Hernandez L, Badre DT, Noll DN, Jonides J: Temporal Sensitivity of Event Related fMRI. Neuroimage, 17,2,pp.1018-1026 , 2002.

Hernandez, L., Wager, T., and Jonides, J.Introduction to functional neuroimaging. In H. Pashler and J. Wixted (Eds), Stevens. Handbook of Experimental Psychology. New York: John Wiley, 2002, pp. 175-222.

Sylvester CY, Wager TD, Lacey SC, Jonides J, Smith EE, Hernandez L, Nichols TE : Switching Attention and Resolving Interference: fMRI Measures of Executive Functions Neuropsychologia, 41, 357-370, 2004.

Hernandez-Garcia L, Lee GR, Vazquez AL, Noll DC: Fast, Pseudo-Continuous Arterial Spin Labeling for Functional Imaging Using a Two-Coil System. Magnetic Resonance in Medicine ,51,3,p.577-585, 2004

Wager TD, Vazquez AL, Hernandez L, Noll DC: Accounting for nonlinear BOLD effects in fMRI: Parameter estimates and a model for prediction in rapid event-related studies, Neuroimage 2005 Mar;25(1):206-18.

Vazquez AL, Lee GR, Hernadez-Garcia L, Noll DC: Application of selective saturation to image the dynamics of arterial blood flow during brain activation using magnetic resonance imaging, Magnetic Resonance in Medicine, 55, 4, 816-825, 2006

Hernandez-Garcia L, Lee GR , Vazquez AL, Noll DC: Quantification of Perfusion FMRI using a numerical model of Arterial Spin Labeling accounting for dynamic transit time effects. Magnetic Resonance in Medicine, 54, 4, 955-954, 2005.

Mumford JA, Hernandez-Garcia L, Lee GR, Nichols TE: Estimation Efficiency and Statistical Power in Arterial Spin Labeling FMRI. Neuroimage, 33 (1), 103-114, 2006

Wager TD, Hernandez-Garcia L, Jonides J: "Elements of Functional Neuroimaging", in Cacioppo, J. T., Tassinary, L. G., & Berntson, G. G: Handbook of psychophysiology (3rd ed ed.). New York: Cambridge University Press.(2007)

Vazquez AL, Cohen ER, Gulani V, Hernandez-Garcia L, Zheng Y, Lee GR, Kim SG, Grotberg JB, Noll DC: Vascular Dynamics and BOLD fMRI: CBF Level Effects and Analysis Considerations. Neuroimage, 32 (4), 1642-1655, 2006.

Lee GR, Hernandez-Garcia L, Noll DC: Functional Imaging With Turbo-CASL: Transit Time and Multislice Imaging Considerations. Magnetic Resonance in Medicine, 57(4), 661-669, 2007.

Hernandez-Garcia L, Ulfarsson M, Scott DJ: Detection of Hierarchical relationships between brain regions from Functional MRI data : Dominance and Granger Causality, IEEE-TMI , in review, 2007.

Matre D, Tran T, Hernandez L, Casey KL: Convergent and Specific Forebrain Responses to Selective A-delta and C fiber Stimulation in Humans . J. Neuroscience, in review.

Hernandez-Garcia, L., Lee, S., & Grissom, W. (2007). An approach to MRI-based dosimetry for transcranial magnetic stimulation. Neuroimage, 36(4), 1171-1178.

Hernandez-Garcia, L., Lewis, D. P., Moffat, B., & Branch, C. A. (2007). Magnetization transfer effects on the efficiency of flow-driven adiabatic fast passage inversion of arterial blood. NMR Biomed, 20(8), 733-742.
Hernandez-Garcia L, Peltier SJ, Grissom W: "FMRI Harware" in Filippi: fMRI Techniques and Protocols, Humana Press. In press
Hall T, Lee GR, Hernandez-Garcia L: Magnetic Resonance Imaging of Histotripsy Lesions in Porcine Liver, Magnetic Resonance in Medicine, in review.
Hernandez-Garcia L, Vazquez AL, Rowe DB: Complex analysis of arterial spin labeling based FMRI signals, Neuroimage, in review

C. Research Support

ACTIVE

"Fast, Quantitative, Perfusion based functional MRI" (30%)
National Institutes of Health, (R01 EB004346-01) (L. Hernandez-Garcia) 05/30/05-05/30/08
This project proposes a system to perform rapid event related fMRI experiments using arterial spin labeling techniques with optimum SNR and speed. The project also aims to develop a quantitative model for the ASL signal under dynamic conditions of perfusion and transit time, and to study the noise properties of ASL time series data.

"MRI Parellel Excitation for Neuroimaging Applications" (20%)
National Institutes of Health, RFA : PAR-04-023, (PI: Noll) 1/1/08 - 12/31/12
A Bioengineering Research Partnership is proposed for the development of parallel excitation technology to improve fMRI studies in orbitofrontal cortex, with a specific emphasis on neuroimaging or loss related processes in patients with OCD. This project is motivated by the large signal voids caused by magnetic susceptibility differences between tissue and air in the nasal sinuses. These artifacts are ubiquitous in fMRI for many inferior brain structures and the frontal pole. This project is further motivated by the upward trend in MRI towards using higher magnetic field systems, which improves sensitivity in many parts of the brain, but also exacerbates the susceptibility artifacts. This project will develop parallel excitation techniques to remove these artifacts at all field strengths. Success in this project will lead to valuable new methods for probing the whole brain with equal sensitivity, thus aiding the study of of brain regions implicated in OCD among other disorders.

"Dosimetry and Improved Targeting for Transcranial Magnetic Stimulation" (15% pending)
National Institutes of Health, R21 Application # 2930644 (PI: Hernandez) 7/1/08–6/30/10
This project is a step toward a new generation of Transcranial Magnetic Stimulation techniques to stimulate the desired brain regions with greater precision and accuracy, with minimal stimulation of unwanted regions. The project consists of the development of computational and imaging techniques to measure the fields generated by TMS stimulation. Using these techniques, the project will optimize design parameters of TMS devices considering shielding techniques and novel electromagnetic lenses made of meta-materials

"Imaging Feedback to Guide Ultrasonic Tissue Fractionation for Cancer Therapy" (15%)
National Institues of Health R01 CA134579 (PI: Cain) 7/1/08 – 6/31/13
Histotripsy is the controlled use of ultrasound cavitation to mechanically fractionate tissue volumes non-invasively under image guidance. The effects can be easily seen and characterized by histological analysis and chronic animal studies where some clinical "outcome" can be determined. In this project, we will develop methods to predict clinical outcome from image parameters available both during and after treatment. This will provide an answer to the critical question for most noninvasive ablative technologies, i.e., when should the treatment be stopped and what will be the spatial extent of the desired treatment? Development of these image guidance techniques could result in a significant transformation in the effectiveness of ablative therapies in a wide range of clinical applications, e.g., prostate cancer, benign prostatic hyperplasia (BPH), breast cancer, fibroadenomas of the breast, liver cancer and metastases, kidney cancer, uterine fibroids, thrombolysis, cardiac ablations for arrhythmia control, lung and brain cancer (under certain conditions), treatment of infected wounds and abscesses, etc.

PENDING

"Fast ASL Techniques for FMRI " (40% pending)
National Institutes of Health (R01 application , 2R01EB004346-04 (PI: Hernandez) 7/1/08 – 6/31/13
We will build on our previous success and experience with ASL based FMRI in order to make further inroads in three areas: temporal resolution, signal-to-noise-ratio (SNR) and statistical analysis techniques. We will integrate and optimize recent technical advances, such as pseudo-continuous inversion pulses, into our own fast, continuous, ASL acquisition technique ("Turbo-CASL") and modify our dynamic model to suit the acquisition technique. We will also develop and evaluate techniques for modeling and removing cardiac and respiratory noise from ASL data. Finally, we propose a statistical framework to take advantage of the phase information (which is typically discarded!) in ASL data and boost the sensitivity of the technique to neuronal activation.

"Development and use of rtfMRI for self-control of nicotine craving" (20% Y1-2, 15% Y3-5)
National Institutes of Health (NINDS 1 R21 DA026077-01) PI: Peltier

COMPLETED
"Signal Recovery in Susceptibility Based Functional MRI"
National Institutes of Health R01 DA15410-01 (Noll) 7/1/02-6/30/07
This project involves the development of methods for improved imaging in inferior frontal cortex, inferior and medial temporal lobes, and brain stem areas. My role in the project as a co-investigator is to design and conduct the fMRI human and phantom experiments and implement the correction techniques proposed in the project. I am also expected to contribute to the theoretical development of the susceptibility correction techniques.

"Elimination of Head Movement Artifact in fMRI" (20%)
National Institutes of Health, (PI: D. Noll) 09/30/03-9/28/08
The long-term goal of this project is to develop image acquisition protocols, reconstruction approaches and post-processing methods that will improve on the effectiveness of head movement correction in fMRI.

"Mechanisms in Chronic Multisymptom Illnesses."
Dept. of Defense DAMD, 17 00 2 0018 (DJ Clauw) 2/01/00 -7/31/05
This multi-phase investigation seeks to identify physiological and psychological factors contributing to the spectrum of illness known as CMI. Part 1 involves cross-sectional investigations of physiological responses to experimentally induced stressors. Part 2 involves pharmaceutical and non-pharmaceutical treatment trials for CMI. This includes web-based and telemedicine implementations of cognitive behavioral therapy (CBT) and exercise protocols

"Forebrain mechanism in chronic non-neuropathic pain" (10%)
(National Institutes of Health 5R01AR46045-02 (P.I.: Casey) 9/30/00-8/31/03
The major goal of this project is to identify mechanisms for pain perception differntiate between pain responses in normal subjects and patients who suffer from chronic neuropathic pain. This project also aims to differentiate the neural substrates of the slow and fast pain responses. My role on the project as co-investigator is to design and conduct the functional MRI experiments described in the project. I am also responsible for the fMRI data processing and analyses.

"Modeling the BOLD Response Accounting for Perfusion Effects: Simultaneous BOLD imaging and two-coil Arterial Spin Labeling"
UM Center for Biomedical Engineering Research. (PI: Hernandez), 1/1/2000 – 1/1/2001
The BOLD effect is a combination of several phenomena associated with increased brain activity that result in a subtle signal change (~5-10 %). These phenomena include an increase in blood flow to the active region, and a change in the T2* relaxation constant, due to the increase in deoxy-hemoglobin. In this project we propose a model that treats the vascular bed as an expandable compartment, where changes in blood flow affect the volume of the compartment. Blood flow is an essential parameter of our model and a direct measurement would help assess its validity. Here we propose an implementation of the ASL method to measure the blood flow component of the BOLD effect, rapid and continuously that will help us verify our model, and that can be employed for ASL-based functional imaging experiments.