CHRISTINE DELORENZO PH.D. -- CURRICULUM VITAE

Work Experience

09/2012 -   Assistant Professor & Director, Brain Imaging Division, Department of Psychiatry and Behavioral Science, Stony Brook University, Long Island, NY Assistant Professor, Department of Biomedical Engineering, Stony Brook University, Long Island, NY

09/2012 -   Adjunct Assistant Professor, Division of Molecular Imaging and Neuropathology, Columbia University, New York, NY

04/2011 – 09/2012 Assistant Professor of Clinical Neurobiology, Division of Molecular Imaging and Neuropathology, Columbia University, New York, NY

Academic Training

01/2008 – 04/2011   Postdoctoral Research Fellow, Division of Molecular Imaging and Neuropathology, Columbia University, New York, NY
·Implemented image processing techniques (including image segmentation and registration) for quantification of Positron Emission Tomography (PET) images. ·Determined binding characteristics of three new PET tracers, including one developed at the Columbia University Medical Center (CUMI-101). ·Ran a pilot PET study (as the PI) of a new tracer that targets brain monoamine oxidase-A (MAO-A). ·Analyzed first *in vivo* test-retest study of a tracer targeting the metabotropic glutamate receptor subtype 5.

Education

09/2001 – 08/2007   PhD, Biomedical Engineering
Yale University, New Haven, CT
Thesis Title: Image-Guided Intraoperative Brain Deformation Recovery
·Investigated brain deformation during neocortical epilepsy electrode implantation and tissue resection surgeries using literature review and consultation with clinicians. ·Determined that a cost-effective solution, monitoring cortical deformation with stereo vision technology, was currently unreliable due to difficulties in obtaining accurate camera calibration parameters. ·Developed a mathematical Bayesian model that takes advantage of game theoretic constructs to update camera calibration parameters while recovering intraoperative brain deformation. ·Created a biomechanical brain model using finite element analysis to predict the effects of cortical deformation on deep brain structures. ·Achieved an 81% improvement in intraoperative cortical tracking, as determined by *in vivo* testing.

09/1999 – 08/2002   MS, Engineering Sciences
Thayer School of Engineering, Dartmouth College, Hanover, NH
Thesis Title: Monitoring Tumor Size and Photodynamic Therapy (PDT) Effects with Electrical Impedance Spectroscopy (EIS).
·Analyzed the feasibility of using electric current to determine tissue composition in an *in vivo* animal model. ·Used sterile cell culture techniques to cultivate pancreatic carcinoma and glioma tumor cell lines. ·Monitored *in vivo* tumor growth using ultrasound. ·Used computer aided

design software (ProENGINEER) along with a rapid prototyping machine to design and construct ABS plastic stabilizers for repeatable tumor cell injections and electrode placement. ·Developed and tested a passive probe strategy, using electromagnetic and electrostatic field simulation software (Maxwell), to avoid detecting high impedance skin keratin, thus preventing the need for extensive skin preparation. ·Verified measured results using circuit models and tissue histology. ·Greatly improved EIS accuracy in detecting tissue pathophysiology due to PDT radiation effects or tumor growth.

09/1995 – 06/1999   BA with Honors, Major: Engineering Sciences
                      Dartmouth College, Hanover, NH

Honors

2007   Prize Teaching Fellowship Recipient for Outstanding Teaching Performance, "The Prize Teaching Fellowships recognize outstanding performance and promise as a teacher. They are considered among the most important honors that Yale bestows upon graduate students." http://yalecollege.yale.edu/content/faculty-fellowships-and-prizes

2007   Robert E. Apfel Graduate Fellowship Award Winner for creativity in research and contributions to the community

2001   Radiation Research Society Student Travel Award Winner

2000   S. Russell Stearns Fellowship Recipient

1998   Charles E. and Thomas E. Wilson 1935 Memorial Scholarship Recipient

1997   Selected as Presidential Scholar in Engineering

Professional Organizations and Societies

Membership:
2012 -   Member, Biological Psychiatry

2009-2010   Member, International Society for Cerebral Blood Flow & Metabolism

2002-2008   Member, Institute of Electrical and Electronics Engineers (IEEE)

Editorial:
2012-   Associate Editor, Frontiers in Neuropharmacology

2010-   Reviewer for The Journal of Nuclear Medicine

2007-2009   Reviewer for Medical Image Computing and Computer Assisted Intervention

2006-2009   Reviewer for Medical Image Analysis

Fellowship and Grant Support
Present Support:

2012-2013   <u>Uncovering Biomarkers of Major Depressive Disorder Using Multimodal Imaging</u> **(**Irving Institute for Clinical and Translational Research Grant)
Due to its variability in presentation, course, and treatment response, it is likely that depression is not a single disorder. Because of this, the National Institute of Mental Health (NIMH) has proposed a new system in which depression subtypes are defined based on categories of pathophysiology. This novel system has the potential to improve diagnosis and allow for individualized treatment; however, it requires knowledge of specific systems that are disrupted within each depression subtype. Brain imaging can provide non-invasive assessment of brain structure and function in depression. However, since one imaging modality can only provide a limited view of the brain, a clinically relevant biomarker relating to depression diagnosis has yet to be discovered. In this grant, we combine several imaging modalities, using advanced machine learning and statistical classification techniques that have been successful in integrating large amounts of information in other fields. Using these techniques may allow a deeper understanding of the pathophysiology of depression and will lay the foundation for developing a neurobiologically based system of classifying depression subtypes; potentially improving both diagnosis and treatment.

2011-2015   <u>Characterization of a New Metabotropic Glutamate Receptor Subtype 5 PET Ligand</u> (K01MH091354-01A1)
Role: Principal Investigator
This grant involves characterizing the novel Positron Emission Tomography (PET) radioligand, 3-(6-Methyl-pyridin-2-ylethynyl)-cyclohex-2-enone-O-^{11}C-methyl-oxime ([^{11}C]ABP688), an antagonist of the metabotropic glutamate receptor subtype 5 (mGluR5), in humans. A large body of diverse evidence implicates mGluR5 in the pathophysiology of depression. Quantification of mGluR5 variation by [^{11}C]ABP688 could serve many purposes, from a possible indicator of depression or other disorders, to a potential monitor of treatment effectiveness in an individual, to providing personalized information prior to treatment about potential therapeutic outcomes. However, as with any newly developed PET tracer, [^{11}C]ABP688 must be properly characterized in humans in order to provide accurate quantification of its target. Specifically, I plan to: (1) determine the optimal modeling techniques and scanning time for [^{11}C]ABP688, to ensure reliable and accurate quantification; (2) examine methods to calculate a full plasma input function without an arterial line, improving subject comfort and decreasing scan cost; (3) investigate sensitivity of [^{11}C]ABP688 to endogenous glutamate to determine if this ligand can be used to monitor glutamate level variations in neurologic and psychiatric disorders; and (4) compare mGluR5 distribution and density in depressed and control subjects.

Past Training Support:

2008-2010   5T32MH015144-31 NIMH Training in Affective Disorders (Steven Roose)
The goal of this grant was to train investigators for a career of clinical or basic research focused on major mental disorders - affective, anxiety, eating and memory disorders.

2004-2007   2T15LM007056-21 NIH/NLM Bioinformatics Research Training (Perry Miller)
The goal of this work was to integrate data from many different sources (preoperative images/intraoperative information) to aid neurosurgical procedures related to neocortical epilepsy.

Teaching Experience and Responsibilities

2008-   Laboratory Manager for Dr. Ramin Parsey, Molecular Imaging and Neuropathology Department, Columbia University. Responsibilities include teaching an introduction to medical imaging module of in-house course, interviewing and hiring junior laboratory members, teaching junior laboratory members positron emission tomography (PET), magnetic resonance imaging (MRI), and Diffusion Tensor Imaging (DTI) concepts, and introducing interns to PET and MRI basics.

2002-2007   Teaching Assistant of BME 355, Introduction to Biomedical Engineering, Yale University, for junior and senior undergraduate biomedical engineering majors. ·Designed and prepared experiments. ·Performed introductory lectures and supervised four-hour labs twice a week. ·Solely responsible for teaching the section on ultrasound image formation. ·Helped shape grading policy, graded students' laboratory write-ups and tutored students individually.

Publications

Peer reviewed articles:

2013

1. DeLorenzo C, Delaparte L, Thapa-Chhetry B, Miller JM, Mann JJ, Parsey RV. Prediction of selective serotonin reuptake inhibitor response using diffusion-weighted MRI. *Frontiers in Neuropharmacology.* In press, 2013.

2012

2. Gray NA, Milak MS, DeLorenzo C, Ogden TO, Huang YY, Mann JJ: Antidepressant Treatment Reduces Serotonin-1A Autoreceptor Binding in Major Depressive Disorder, Biological Psychiatry, In Press, 2012

3. *DeLorenzo C, Papademetris X, Staib LH, Vives KP, Spencer DD, Duncan JS: Volumetric Intraoperative Brain Deformation Compensation: Model Development and Phantom Validation, IEEE Transactions on Medical Imaging, 31(8)1607-19

2011

4. *DeLorenzo C, Milak MS, Brennan KG, Kumar JSD, Mann JJ, and Parsey RV. *In vivo* positron emission tomography imaging with [^{11}C]ABP688: Binding variability and specificity for the metabotropic glutamate receptor subtype 5. European Journal of Nuclear Medicine, 38(6):1083-94, 2011

5. *DeLorenzo C, Lichenstein S, Schaefer K, Dunn J, Marshall R, Organisak O, Robertson B, Mann JJ, and Parsey RV. SEP-225289 Serotonin and Dopamine Transporter Occupancy: A Positron Emission Tomography Study. The Journal of Nuclear Medicine, 52(7):1150-5, 2011

6. *DeLorenzo C, Kumar JSD, Mann JJ, and Parsey RV. *In Vivo* Variation in Metabotropic Glutamate Receptor Subtype 5 Binding Using Positron Emission Tomography and [^{11}C]ABP688. Journal of Cerebral Blood Flow & Metabolism, 31(11):2169-80, 2011

2010

7. *DeLorenzo C, Papademetris X, Staib LH, Vives KP, Spencer DD, Duncan JS: Image-Guided Intraoperative Cortical Deformation Recovery Using Game Theory: Application to Neocortical Epilepsy Surgery, IEEE Transactions on Medical Imaging, 29(2):322-338, 2010 (PMC2824434)

8. Milak MS, DeLorenzo C, Zanderigo F, Prabhakaran J, Kumar JSD, Vattoly MJ, Mann JJ, and Parsey RV. In vivo quantification of human Serotonin 1A receptor using [11C]CUMI-101, an agonist positron emission tomography radiotracer. Journal of Nuclear Medicine, 51(12):1892-900, 2010

2009

9. *DeLorenzo C, Klein A, Mikhno A, Gray N, Zanderigo F, Mann JJ, Parsey RV: A New Method for Assessing PET-MRI Coregistration, Proceedings of SPIE - Medical Imaging, vol. 7259, Orlando, Florida, 72592W, 2009 [Peer reviewed conference proceedings]

10. Papademetris X, DeLorenzo C, Flossmann S, Neff M, Vives KP, Spencer DD, Staib LH, and James S. Duncan. From Medical Image Computing to Computer Aided Intervention: Development of a Research Interface for Image Guided Navigation. The International Journal of Medical Robotics and Computer Assisted Surgery, 5(2):147-157, 2009

11. *DeLorenzo C, Kumar JS, Zanderigo F, Mann JJ, and Parsey RV. Modeling considerations for in vivo quantification of the dopamine transporter using [(11)C]PE2I and positron emission tomography. Journal of Cerebral Blood Flow & Metabolism, 29(7):1332-1345, 2009 ***Cover Article*** (PMC2757108)

2007

12. *DeLorenzo C, Papademetris X, Vives KP, Spencer DD, Duncan JS: A Realistic Brain Phantom for 3D Deformation Recovery, International Symposium on Biomedical Imaging (ISBI) 2007, Washington DC, 9-12 [Peer reviewed conference proceedings]

13. *DeLorenzo C, Papademetris X, Vives KP, Spencer DD, Duncan JS: A Comprehensive System for Intraoperative 3D Brain Deformation Recovery, Medical Image Computing and Computer Assisted Intervention (MICCAI) 2007, Brisbane, Australia, 553-561 [Peer reviewed conference proceedings]

14. *DeLorenzo C, Papademetris X, Staib LH, Vives KP, Spencer DD, Duncan JS: Nonrigid Intraoperative Cortical Surface Tracking Using Game Theory, Mathematical Methods in Biomedical Image Analysis (MMBIA) 2007, 1-8 [Peer reviewed conference proceedings]

2006

15. *DeLorenzo C, Papademetris X, Vives KP, Spencer D, Duncan JS: Combined Feature/Intensity-Based Brain Shift Compensation Using Stereo Guidance. International Symposium on Biomedical Imaging (ISBI) 2006, Washington DC, 335-338 [Peer reviewed conference proceedings]

16. *DeLorenzo C, Papademetris X, Vives KP, Spencer D, Wu K, Duncan JS: Nonrigid 3D Brain Registration Using Intensity/Feature Information, Medical Image Computing and Computer Assisted Intervention (MICCAI) 2006, Copenhagen, Denmark, 932-939 [Peer reviewed conference proceedings]

2004

17. Osterman KS, Hoopes PJ, DeLorenzo C, Gladstone DJ, Paulsen KD: Non-invasive assessment of radiation injury with electrical impedance spectroscopy. Physics in Medicine and Biology. 49(5):665-683, 2004

2001

1. Kerner TE, Hartov A, Osterman KS, DeLorenzo C, Paulsen, KD: An improved data acquisition method for electrical impedance tomography. Physiological Measurement. 22(1):31-38, 2001

Abstracts:
2012

1. *DeLorenzo C, Miller JMM, Milak MS, Thapa-Chhetry B, Mann JJ, and Parsey RV. Evaluation of White Matter Tracts in Depressed Subjects who Do Not Remit to Selective Serotonin Reuptake Inhibitors. Biological Psychiatry, April 2012.

2010

2. *DeLorenzo C, Lichenstein S, Schaefer K, Dunn J, Marshall R, Organisak O, Robertson B, Mann JJ, and Parsey RV. PET Evaluation of Serotonin and Dopamine Transporter Occupancy Associated with Administration of a Potential Triple Monoamine Reuptake Inhibitor, SEP-225289. Biological Psychiatry, May 2010.

3. *DeLorenzo C, Kumar JSD, Goebl NA, Vandenhende F, Tauscher JT, Mann JJ, and Parsey RV. In Vivo Variation in Metabotropic Glutamate Receptor Subtype 5 Binding Using [^{11}C]ABP688. Neuroreceptor Mapping, 2010.

2007

4. *DeLorenzo C, Papademetris X, Duncan J, Vives KP: The Use of Stereoscopic Brain Surface Tracking to Compensate for Brain Shift during the Use of Intraoperative Imaging Guidance Systems Based on Preoperative Multimodal Imaging, Annual Meeting of the Congress of Neurological Surgeons, September 2007

2001

5. *DeLorenzo C, Osterman KS, Hoopes PJ, Paulsen KD: Monitoring Tumor Size and Photodynamic Therapy Effects with Electrical Impedance Spectroscopy, Radiation Research Society, San Juan, Puerto Rico, August 2001