

BIOSKETCHES

(alphabetical after PI)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Paulsen, Keith D.	POSITION TITLE Professor		
eRA COMMONS USER NAME (credential, e.g., agency login) KDPAULSEN			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Duke University, Durham, NC	B.Sc.	1981	Biomedical Engineering
Dartmouth College, Hanover, NH	M.Sc.	1984	Biomedical Engineering
Dartmouth College, Hanover, NH	Ph.D.	1986	Biomedical Engineering

A. Personal Statement

I have 25 years of experience successfully competing for and conducting NIH-funded research at Dartmouth. Over this time, we have developed the infrastructure and collaborative partnerships with multiple medical specialties and commercial entities that have allowed us to translate in-house technical developments into early-stage clinical testing on a regular basis. During my academic career, I have served as the primary thesis advisor of almost 30 PhD graduates and mentored more than a dozen post-doctoral fellows and numerous junior faculty including Brian Pogue, Alex Hartov and Paul Meaney, all of whom are now full professors at Thayer with successful careers. I have led program-level NIH-funded research in breast imaging for more than 10 years and serve in multiple leadership positions for infrastructure and programs having the core mission of facilitating and executing NIH-funded research at Dartmouth. I am currently acting as Deputy Director for the Dartmouth Center for Cancer Nanotechnology Excellence (DCCNE) as well. I am very excited to work with my colleague, Sohail Mirza, MD, on the proposed COBRE for the Center for Surgical Innovation. We have an extraordinary opportunity to involve a large number of junior, mid-career and senior clinicians, engineers and scientists in innovative research made possible by the new Advanced Surgical Center. The opportunities to pursue advanced technology that enable new surgical procedures and interventions are only limited by our imagination and creativity. The degree of multi-disciplinary interaction and integration across the spectrum of the research projects we can propose is also extremely rich. Historically, surgical innovation and advancement has started in a single specialty, and its migration to the significant benefit of other specialties has typically been slow, in part because of the time required for the new surgical specialty becomes aware of the advances being made elsewhere. Despite the risk of appearing too diffuse in developing our plans for CSI:Dartmouth, we have purposely chosen research projects and themes which involve many surgical specialties to take full advantage of the significant cross-pollination that we expect to occur and consider this aspect of the proposed COBRE to be a decided strength of the Center.

B. Positions and Honors

Positions and Appointments

1986-1988	Assistant Professor, Dept. of Electrical and Computer Eng., U. of Arizona, Tucson, AZ
1987-1988	Joint Asst. Prof., Dept. of Radiation Oncology, U. of Ariz. Health Sci. Center, Tucson, AZ
1988-1994	Assistant Professor, Thayer School of Engineering, Dartmouth College, Hanover, NH
1993-2007	Co-Director, Radiobiology and Bioengineering Research Program, NCCC, DHMC
1994-2000	Associate Professor, Thayer School of Engineering, Dartmouth College, Hanover, NH
2000-	Professor, Thayer School of Engineering, Dartmouth College, Hanover, NH
2006-	Director, Advanced Imaging Center, Norris Cotton Cancer Center, DHMC
2006-	Professor of Radiology, Dartmouth Medical School, Hanover, NH
2007-	Co-Director, Cancer Imaging and Radiobiology Research Program, NCCC, DHMC
2008-	Robert A. Pritzker Chair in Biomedical Engineering, Thayer School, Hanover NH
2010-	Scientific Director, Advanced Surgical Center, Dartmouth-Hitchcock Medical Center
2010-	Associate Director of Translational Programs for SYNERGY, Dartmouth's Center for Clinical and Translational Science, Dartmouth College, Hanover, NH
2010-	Deputy Director, Dartmouth Center for Cancer Nanotechnology Excellence (DCCNE)

National Advisory Committees

1987-1989	Ad Hoc Technical Review Group, National Cancer Institute
1989	Special Review Committee, National Cancer Institute
1991	Computational Engineering Review Panel, National Science Foundation
1993-1995	Member, Special Study Sections, National Institute of Health
1995-1998	Member, Radiological Sciences Review Panel, U.S. Army Breast Cancer Res. Program
1996-2000	Member, Radiation Study Section, National Institutes of Health
2002-2006	Member, Diagnostic Imaging Study Section (now BMIT), National Institutes of Health
2003-2006	Member, National Research PAVEPAWS Low-Level Phased Array RF Energy, National Academy of Sciences
2003-2006	Member, Panel E: Biophysics, Imaging & Radiobiology, National Cancer Institute of Canada
2007	Chair, ZRG1 SBIB-L, Special Emphasis Panel, NIH/CSR
2008	Member, ZRG1 SBIB-S, P41 Special Emphasis Panel, NIH/CSR Chair, ZRG1 SBIB-S, P41 Special Emphasis Panel, NIH/CSR Chair, ZRG1 SBIB-I, P41 Special Emphasis Panel, NIH/CSR Member, ZRG1 SBIB-S, Special Emphasis Panel, NIH/CSR
2009	Member, ZCA SRRB-C, P01 Special Emphasis Panel, NIH/CSR Chair, ZRG1 SBIB-S, P41 Special Emphasis Panel, NIH/CSR Member, ZRG1 SBIB-V, Special Emphasis Panel, NIH/CSR Member, ZEB1 OSR-D, Special Emphasis Panel, NIH/CSR Member, ZRR1 BT-9, Special Emphasis Panel, NIH/CSR Member, ZRG1 F15-L, Special Emphasis Panel, NIH/CSR Chair, ZRG1 SBIB-U, Special Emphasis Panel, NIH/CSR
2010	Member, ZCA1 PCRB-A Clinical, NIH, Rockville MD, (May 15, 2010) Member, ZEB1 OSR-B (O1) 1 NIBIB Special Emphasis Panel, Bethesda MD Member, ZRG1 BCMB-A (51) R RFA RM09-022: Transformative R01 Roadmap Review, NIH/CSR Member, NT, Neurotechnology Study Section, NIH/CSR, Washington DC Member, ZRG1 NT-B (09) F, Neurotechnology 2 Overflow, NIH/CSR, Washington, DC Member, ZRG1 ETTN-B (85) S, ARRA: Neurotechnology-4 Competitive Revisions, NIH/CSR, Member, ZRG1 SBIB-V (56) R PAR-08-147: Quick Trials on Imaging & Image-Guided Intervention, NIH/CSR
2011	Chair, ZRG1 SBIB-S, P41 Special Emphasis Panel, NIH/CSR, January 2011 Member, ZCA1 GRB-P(01), Discovery, Imaging and Therapeutics P01 Review, NIH/CSR Chair, ZRG1 SBIB-S, P41 Special Emphasis Panel, NIH/CSR, September 2011 Member, NCI Subcommittee I—Career Development, NIH/NCI, October 2011 Member, ZCA1 PCRB-A(A1)B Clinical Research-Loan Repayment Program, NIH/NCI
2012-Present	Member, NCI-I Subcommittee I, Career Development Review Group, NIH/NCI Member, ZRG1 SBIB-X(50)5, Special Emphasis Panel, Academic Industrial Partnerships, NIH/CSR Chair, ZRG1 SBIB-X(57)R, Special Emphasis Panel, Academic Industrial Partnerships, NIH/CSR
2013	Chair, ZRG1 SBIB-Z(57), Special Emphasis Panel, Academic Industrial Partnerships, NIH/CSR Chair, ZEB1 OSR-C(M3), P41 BTRC Special Emphasis Panel, NIH/NIBIB Member, 2013-08 NIH-NIBIB Loan Repayment Program, NIH/NIBIB Member, 2013-08 ZCA1 PCRB-A(A1)S Clinical Research-Loan Repayment Program, NIH/NCI

C. Selected Peer-reviewed Publications (Most recent 15, selected from 330+ peer-reviewed papers)

1. Michaelsen K, Krishnaswamy V, Pogue BW, Brooks K, Defreitas K, Shaw I, Poplack SP, **Paulsen KD**. Characterization of materials for optimal near-infrared and x-ray imaging of the breast." *Biomed Opt Express*. 2012 Sep 1;3(9):2078-86. Epub 2012 Aug 10. PMID: 23024902
2. Mastanduno MA, Jiang S, Diflorio-Alexander R, Pogue BW, **Paulsen KD**. "Automatic and robust calibration of optical detector arrays for biomedical diffuse optical spectroscopy." *Biomed Opt Express*. 2012 Oct 1;3(10):2339-52. Epub 2012 Aug 31. PMID: 23082277
3. Weaver, J. Pattison, A., McGarry, M., Perreard, I., Swienckowski, J., Eskey, C., Lollis, S.S., **Paulsen, K.D.**, "Brain Mechanical Property Measurement Using MRE with Intrinsic Activation", *Physics in Medicine and Biology*, 57, 22, 7275-7287, 2012

4. Valdes PA, Leblond F, Jacobs VL, Wilson BC, **Paulsen KD**, Roberts DW. "Quantitative, spectrally-resolved intraoperative fluorescence imaging". *Sci Rep*. 2012;2:798. Epub 2012 Nov 12. PMID: 23152935
5. Roberts DW, Valdés PA, Harris BT, Hartov A, Fan X, Ji S, Pogue BW, Leblond F, Tosteson TD, Wilson BC, **Paulsen KD**. *Adjuncts for Maximizing Resection: 5-ALA*. (Clin Neurosurg. 2012;59:75-8). PMID: 22960516
6. Valdés PA, Moses ZB, Kim A, Belden CJ, Wilson BC, **Paulsen KD**, Roberts DW, Harris BT. Gadolinium- and 5-aminolevulinic acid-induced protoporphyrin IX levels in human gliomas: an ex vivo quantitative study to correlate protoporphyrin IX levels and blood-brain barrier breakdown. *J Neuropathol Exp Neurol*. 2012 Sep;71(9):806-13. doi: 10.1097/NEN.0b013e31826775a1. PMID: 22878664
7. McGarry MD, Van Houten EE, Johnson CL, Georgiadis JG, Sutton BP, Weaver JB, **Paulsen KD**. "Multiresolution MR elastography using nonlinear inversion" *Med Phys*. Oct; 39(10):6388-96, 2012.
8. Johnson CL, McGarry MD, Van Houten EE, Weaver JB, **Paulsen KD**, Sutton BP, Georgiadis JG., "Magnetic resonance elastography of the brain using multishot spiral readouts with self-navigated motion correction". *Magn Reson Med*. 2012 Sep 21. doi: 10.1002/mrm.24473. [Epub ahead of print]
9. Golnabi AH, Meaney PM, **Paulsen KD**, "Tomographic microwave imaging with incorporated prior spatial information," *IEEE Transaction on Microwave Theory and Techniques*, vol. 61, pp. 2129-2136, 2012.
10. Jensen PD, Meaney PM, Epstein N, **Paulsen KD**, "Cole-Cole parameter characterization of urea and potassium for improving dialysis treatment," *IEEE Antennas and Wireless Propagation Letters*, vol. 11, pp. 1598-1601, 2012.
11. Meaney PM, Goodwin D, Zhou T, Golnabi A, Pallone M, Geimer SD, Burke G, **Paulsen KD**, "Clinical microwave tomographic imaging of the calcaneus: pilot study," *IEEE Transactions on Biomedical Engineering*, vol. 59, pp. 3304-3313, 2012.
12. Krishnaswamy V, Laughney AM, Wells WA, **Paulsen KD**, Pogue BW. Scanning in situ spectroscopy platform for imaging surgical breast tissue specimens. *Opt Express*. 2013 Jan 28;21(2):2185-94. doi: 10.1364/OE.21.002185. PMID: 23389199
13. Johnson CL, McGarry MD, Gharibans AA, Weaver JB, **Paulsen KD**, Wang H, Olivero WC, Sutton BP, Georgiadis JG. Local mechanical properties of white matter structures in the human brain. *Neuroimage*. 2013 May 1. pii: S1053-8119(13)00448-5. doi: 10.1016/j.neuroimage.2013.04.089. [Epub ahead of print]
14. Laughney AM, Krishnaswamy V, Rice TB, Cuccia DJ, Barth RJ, Tromberg BJ, **Paulsen KD**, Pogue BW, Wells WA. System analysis of spatial frequency domain imaging for quantitative mapping of surgically resected breast tissues. *J Biomed Opt*. 2013 Mar;18(3):036012. doi: 10.1117/1.JBO.18.3.036012. PMID: 23525360
15. Meaney PM, Kaufman PA, Muffly LS, Click M, Poplack SP, Wells WA, Schwartz GN, di Florio-Alexander RM, Tosteson TD, Li Z, Geimer SD, Fanning MW, Zhou T, Epstein NR, **Paulsen KD**., Microwave imaging for neoadjuvant chemotherapy monitoring: initial clinical experience. *Breast Cancer Res*. 2013 Apr 24;15(2):R35. [Epub ahead of print]

D. Research Support.

D. Research Support.

Ongoing Research Support

R01 CA69544-10 (Paulsen)

09/22/2008 - 07/31/2014

NIH/NCI

Frequency Domain Optical Imaging of Breast Cancer

This project is developing an MR-compatible NIR imaging system for simultaneous MR and NIR breast examination.

Role: PI

R01 CA139449-01 (Paulsen)

04/01/2009 – 03/31/2014

NIH/NCI

Optical Imaging Fused with Tomosynthesis for Improved Breast Cancer Detection

This project is an academic-industrial partnership proposal under PAR-07-214 to develop and validate optical imaging fused with breast tomosynthesis for improved breast cancer detection and diagnosis

Role: PI

1R01NS052274-01A2 (Roberts)

09/01/2007 – 08/31/2013

NIH/NINDS

Coregistered Fluorescence-Enhanced Resection of Malignant Glioma

The goal of this project is to develop and evaluate coregistered fluorescence guided resection of malignant glioma.

Role: Co-PI

R01CA159324 (Paulsen)

04/04/2011 – 03/31/2016

NIH/NCI

Preoperative Image Updating for Guidance During Brain Tumor Resection

This academic-industrial partnership will develop and evaluate a system for updating preoperative images in the operating room during brain tumor resection.

5 P30 CA023108-31 Israel (PI)

12/01/2008 - 11/30/2013

NIH/NCI

Cancer Center Support (CORE) Grant

This grant provides for the continuation of NCI recognition of comprehensive status and of Cancer Center Support Grant funding for the Norris Cotton Cancer Center (NCCC) at Dartmouth-Hitchcock Medical Center (DHMC). Dr. Paulsen is the Co Director of the Cancer Imaging and Radiobiology Research Program for the Cancer Center.

Role: Investigator

Completed Research Support

5 P01 CA080139-08 (Paulsen)

05/01/2006 - 04/30/2012

NIH/NCI

Alternative Breast Cancer Imaging Modalities

This is a program which is aimed at developing and evaluating four alternative breast imaging modalities.

Role: PI

4 R33 CA102938-04 (Paulsen)

05/05/2005 - 07/31/2010

NIH/NCI

MR Microwave Absorption and Tomography Imaging

This project is evaluating the feasibility of microwave absorption and tomography imaging using MR.

Role: PI

5 R01 EB004632-04 (Paulsen)

09/22/2005 - 07/31/2010

NIH/NIBIB

Advanced Magnetic Resonance Elastography

This project is developing and evaluating advanced methods for imaging viscoelasticity and poroelasticity with MR.

Role: PI

5 R01 EB002082-13 (Paulsen)

08/25/2005 - 06/30/2010

NIH/NIBIB

Modeling of Brain Deformation during Surgery

This is the competing continuation of a project which is developing modeling methods for compensation of brain deformation during image-guided neurosurgery.

Role: PI

BIOGRAPHICAL SKETCH

NAME Ackerman, Margaret Ellen	POSITION TITLE Assistant Professor
eRA COMMONS USER NAME (credential, e.g., agency login) meackerman	

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 <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Brandeis University, Waltham, MA	BS	05/03	Chemistry
Brandeis University, Waltham, MA	MS	05/03	Biochemistry
Massachusetts Institute of Technology, Cambridge, MA	PhD	02/10	Molecular Engineering
Massachusetts General Hospital and Harvard University	Post- doctorate	12/09	HIV Immunology

A. Personal Statement

The Ackerman laboratory conducts interdisciplinary research at the interface of biomedical and engineering sciences: developing high throughput tools to evaluate the antibody response in disease states ranging from infection to cancer in order to aid in therapeutic antibody and vaccine design and development, and to understand the protective mechanism of antibodies using approaches grounded in fundamental engineering principles utilizing protein evolution, molecular biology, and mathematical modeling.

B. Positions and Honors**Positions and Employment**

- 2003-2004 Adjunct Faculty, Department of Chemistry, College of Charleston, Charleston, SC
2004-2009 Graduate Research Fellow and Ph.D. Candidate under the direction of K. Dane Wittrup, Ph.D., Departments of Chemical and Biological Engineering, Massachusetts Institute of Technology, Cambridge, MA
2009-2011 Postdoctoral Fellow under the direction of Galit Alter, Ph.D. and Darrell Irvine, Ph.D., Ragon Institute of MGH, MIT, and Harvard, Massachusetts General Hospital and Harvard University, Boston, MA
2011-present Assistant Professor, Thayer School of Engineering, Dartmouth College, Hanover, NH
2012-present Assistant Professor, Microbiology and Immunology, Geisel School of Medicine, Hanover, NH

Awards and Honors

- 2002-2003 United States Goldwater Scholar
2003 Nathan O. Kaplan Prize in Biochemistry, Brandeis University, Waltham, MA
2006-2009 MIT-Portugal Fellow, Massachusetts Institute of Technology, Cambridge, MA
2007-2009 Antibody Society Annual Meeting Scholarship Winner
2010-2011 Harvard University Center for AIDS Research Fellow

C. Selected peer reviewed publications.

1. Ackerman, M.E., Chalouni, C., Schmidt, M.M., Raman, V.V., Ritter, G., Old, L.J., Mellman, I., and Wittrup, K.D. 2008. A33 antigen displays persistent surface expression. *Cancer Immunol Immunother* 57:1017-1027. PMC2836164
2. Ackerman, M.E., Pawlowski, D., and Wittrup, K.D. 2008. Effect of antigen turnover rate and expression level on antibody penetration into tumor spheroids. *Mol Cancer Ther* 7:2233-2240. PMC2831054
3. Ackerman, M., Levary, D., Tobon, G., Hackel, B., Orcutt, K.D., and Wittrup, K.D. 2009. Highly avid magnetic bead capture: an efficient selection method for de novo protein engineering utilizing yeast surface display. *Biotechnol Prog* 25:774-783. PMC2837102
4. Orcutt, K.D., Ackerman, M.E., Cieslewicz, M., Quiroz, E., Slusarczyk, A.L., Frangioni, J.V., and Wittrup, K.D. 2009. A modular IgG-scFv bispecific antibody topology. *Protein Eng Des Sel*. PMC2841541
5. Hackel BJ, Ackerman ME, Howland SW, Wittrup KD. Stability and CDR composition biases enrich binder functionality landscapes *J Mol Biol*. 2010 Aug 6;401(1):84-96. PMID: 20540948
6. Ackerman, M.E., Moldt B, Wyatt RT, Dugast AS, McAndrew E, Tsoukas S, Jost S, Berger CT, Sciaranghella G, Liu Q, Irvine DJ, Burton DR, Alter G. A robust, high-throughput assay to determine the phagocytic activity of clinical antibody samples. *J Immunol Methods*. 2011 Mar 7;366(1-2):8-19. PMC3050993
7. Lamppa JW, Ackerman ME, Lai JI, Scanlon TC, Griswold KE. Genetically engineered alginate lyase-PEG conjugates exhibit enhanced catalytic function and reduced immunogenicity *PLoS One*. 2011 Feb 14;6(2):e17042. PMC3038863
8. Levary DA, Parthasarathy R, Boder ET, Ackerman ME. Protein-protein fusion catalyzed by sortase A *PLoS One*, 2011 Apr 6;6(4):e18342 PMC3071835
9. Dugast AS, Tonelli A, Berger CT, Ackerman ME, Sciaranghella G, Liu Q, Sips M, Toth I, Piechocka-Trocha A, Ghebremichael M, Alter G. "Decreased Fc receptor expression on innate immune cells is associated with impaired antibody-mediated cellular phagocytic activity in chronically HIV-1 infected individuals." *Virology*. 2011 Jul 5;415(2):160-7. Epub 2011 May 12 PMC3112178
10. Ackerman ME, Lai, JI, Pastan I, Wittrup KD. "Exploiting bias in a non-immune human antibody library to predict antigenicity." *Protein Eng Des Sel* 2011, Nov;24(11):845-53 PMID: 21908549 11. McAndrew E.G., Dugast A.S., Alter G., Ackerman M.E., "Determining the phagocytic activity of clinical antibody samples." *J Vis Exp.*, 2011 Nov30;(57).pii: 3588 doi:10.3791/3588
12. Brown E.P., Licht A.F., Dugast A.S., Choi I, Bailey-Kellogg C, Alter G, Ackerman M.E. "High-throughput, multiplexed IgG subclassing of antigen-specific antibodies from clinical samples." *J Immunol Methods*. 2012 Dec 14;386(1-2):117-23
13. Bolton GR, Ackerman ME, Boesch AW. "Separation of nonfucosylated antibodies with immobilized FcγRIII receptors." *Biotechnol Prog* 2013 Mar 6.
14. Ackerman ME, Dugast AS, McAndrew EG, Tsoukas S, Licht AF, Irvine DJ, Alter G. "Enhanced phagocytic activity of HIV-specific antibodies correlates with natural production of immunoglobulins with skewed affinity for FcγR2a and FcγR2b" *J Virol*. 2013 Mar 6
15. Ackerman ME, Crispin M, Yu X, Baruah K, Boesch AW, Harvey DJ, Dugast AS, Heizen EL, Ercan A, Choi I, Streeck H, Nigrovic PA, Bailey-Kellogg C, Scanlan C, Alter G. "Natural variation in Fc glycosylation of HIV-specific antibodies impacts antiviral activity" *J Clin Invest*. 2013 Apr 8.

Invited Talks and Posters at National and International Meetings, Conferences and Symposia

1. Ackerman, M.E., and Wittrup, K.D., "A33 Antigen Displays Persistent Surface Expression" Conference on Cancer Therapy with Antibodies and Immunoconjugates, Parsippany, NJ, Oct 2006. and Keystone Symposia, Antibodies as Drugs, Lake Louise, AB, Feb 2007 (poster)
2. Ackerman, M.E., and Wittrup, K.D., "Effect of Antigen Turnover Rate and Expression Level on Antibody Penetration into Tumor Spheroids" IBC Antibody Engineering, San Diego, CA, Dec 2007 (poster)
3. Ackerman, M.E. and Wittrup, K.D., "A Highly Efficient Selection Method for de novo Protein Engineering" American Chemical Society, Philadelphia, PA, Aug 2008 (poster)
4. Ackerman, M.E., and Wittrup, K.D., "Sortassembly: sortase A catalyzed in vitro assembly of fusion proteins" American Institute of Chemical Engineers, Society for Biological Engineering, International Conference on Biological Engineering, Santa Barbara, CA, Jan 2009 (poster)
5. Ackerman, M.E., Lai, J, Pastan, I., Wittrup, K.D. "An in vitro assay to predict clinical B-cell immunogenicity of therapeutic proteins" Immunogenicity Summit, Philadelphia, PA, Oct 2009 (poster)

6. Ackerman, M.E., Quiroz, E., Smith-Jones, P., Larson, S., Wittrup, K.D., "Pretargeted radioimmunotherapy of the A33 antigen in a mouse model of colon cancer" IBC Antibody Engineering, San Diego, CA, Dec 2009 (poster)
7. Ackerman, M.E., Dugast, AS, McAndrew E, Alter G. "A High-throughput assay to determine the phagocytic activity of clinical antibody samples" AIDS Vaccine 2010, Atlanta, GA, Sep 2010 (poster)
8. Ackerman, M.E., Yu, B., Scanlan, C., Alter, G., "Tuning the Antibody Response: Natural Modulation of Antibody Glycosylation and Effector Function in HIV Infection" Keystone Antibodies as Drugs, Keystone, CO, Feb 2011
9. Ackerman, M.E., Yu, B., Scanlan, C., Alter, G., "How antibodies provide specificity to the innate immune system to fight HIV" American Association of Immunologists, San Francisco, CA, May 2011
10. Ackerman, M.E., Alter, G., "Natural Modulation of Antibody Glycosylation and Effector Function" EUROPRIME Antibodies Beyond Binding, Strasbourg, France, May 2011
11. Ackerman, M.E., Alter, G., "Leveraging Antibody Fc for more effective vaccines" Global Health Research Congress, Seattle, WA, June 2011
12. Ackerman, M.E., Yu, B., Scanlan, C., Alter, G., "Tuning the Antibody Response: Natural Modulation of Antibody glycosylation and Effector Function in HIV Infection" Glycobiology, San Francisco, CA, May 2011 (poster)
13. Ackerman, M.E., Alter, G., "Discovery platform for inducing potent ADCC recruiting antibodies in vivo." Collaboration for AIDS Vaccine Discovery, Seattle, WA Dec 2011
14. Ackerman, M.E., Alter, G. Bailey-Kellogg, C. "Profiling humoral immunity: determining antibody innate immune recruiting capacity" AIDS Vaccine, Boston, MA Sep 2012
15. Ackerman, M.E., Alter, G., "A walk on the dark side of antibodies" Collaboration for AIDS Vaccine Discovery, Seattle, WA Dec 2012
16. Ackerman, M.E., Alter, G., "Parsing Humoral Immunity: Array technology to profile natural modulation of antibody function" AiChE Society for Biological Engineering, International Conference of Bioluminescence Engineering, Ft. Lauderdale, FL Jan 2013
17. Ackerman, M.E., Alter, G., "Array technology to profile natural modulation of antibody function" GTC Immunotherapeutics and Immunomonitoring, San Diego, CA Jan 2013

D. Research Support

Current

1. OPP1032817 (Ackerman, Alter) 11/15/2011-09/30/2014
 Collaboration for AIDS Vaccine Discovery
 Bill & Melinda Gates Foundation
 Leveraging Antibody Effector Function
 This proposal aims to develop high throughput tools to both study and induce antibodies with specific effector functions in the setting of HIV infection.
2. 1R01AI102691 (Ackerman) 07/18/2012-06/30/2016
 NIH/NIAID
 Applying High Performance Protein Engineering Tools to HIV Immunogen Design
 This proposal aims to apply protein engineering technology to evolve viral proteins that are more effective vaccine immunogens.

Completed

1. 2P30AI060354-07 (Ackerman) 09/01/2010-08/31/2011
 NIH/NIAID HU CFAR
 Phagocytic Activity of Antibodies in HIV-1 Infection
 This proposal aims to develop high throughput tools to study the ability of antibodies from clinical samples to recruit phagocytic effector cells.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME James B. Ames MD, MS		POSITION TITLE Assistant Professor of Orthopedic Surgery The Geisel School of Medicine at Dartmouth Dartmouth-Hitchcock Medical Center	
eRA COMMONS USER NAME (credential, e.g., agency login)			
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
Harvard University	A.B.	6/1995	History
Geisel School of Medicine at Dartmouth	M.D.	6/2004	Medicine
The Dartmouth Institute for Health Policy and Clinical Practice	M.S	6/2008	Evaluative Clinical Sciences
		7/2011	Sports Medicine

A. Personal Statement

The goal of the proposed research is to investigate the efficacy of intra-operative image guidance in appropriate bony resection in arthroscopic treatment of femoroacetabular impingement (FAI) in the hip. It has been reported that the most common cause for revision surgery for FAI is incomplete resection of the impingement lesions. The ‘correct’ amount of bony resection is currently unknown.

I have a background both in clinical research methods as well as specific surgical training in hip arthroscopy. This is a very young field which is expanding at a rapid pace. As with most new fields the evidence base is thin with most studies in hip arthroscopy and FAI consisting of case series.

When completed, this study will add significantly to our knowledge of FAI and it’s appropriate surgical treatment.

B. Positions and Honors

Positions and Employment

- 2004-2010 Resident, Department of Orthopedic Surgery, Dartmouth-Hitchcock Medical Center, Lebanon, NH
- 2010-2011 Sports Medicine Fellow, The Steadman-Philippon Research Institute, Vail, CO
- 2011- Assistant Professor, Department of Orthopedic Surgery, Dartmouth-Hitchcock Medical Center, Lebanon, NH

Other Experience and Professional Memberships

- 2010 Member, American Association of Orthopedic Surgery (AAOS)
- 2010 Candidate Member, American Orthopedic Society for Sports Medicine (AOSSM)
- 2011 United States Ski Team: Member of physician coverage pool.

Honors

- 2004 Freddy Fu Outstanding Medical Student Award
- 2010 Resident Writer’s Award, The American Journal of Orthopedics.

C. Selected Peer-reviewed Publications

1. Ames JB, Horan MP, van der Meijden OA, Leake MJ, Millett PJ. Association Between Acromion Index Size and Outcomes Following Arthroscopic Repair of Full Thickness Rotator Cuff Tears. *The Journal of Bone and Joint Surgery*. October 2012. 94(20):1862-1869
2. Ames JB, Millett PJ. Combined posterior osseous Bankart lesion and posterior humeral avulsion of the glenohumeral ligaments: a case report and pathoanatomic subtyping of "floating" posterior inferior glenohumeral ligament lesions. *The Journal of Bone and Joint Surgery*. October 2011. 93(20):e118(1)-(4).
3. Ames JB, Lurie JD, Tomek IM, Zhou W, Koval KJ. Does surgeon volume for total hip arthroplasty affect outcomes after hemiarthroplasty for femoral neck fracture? *The American Journal of Orthopaedics*. March 2008. 2010 Aug;39(8):E84-9.

D. Research Support

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME David Axelrod MD eRA COMMONS USER NAME (credential, e.g., agency login)	POSITION TITLE Assistant Professor Of Surgery Section Chief, Solid Organ Transplant Surgery		
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Harvard University	BA	1987-1991	History and Science
Duke University	MD, MBA	1992-1996	Medicine, Management

NOTE: The Biographical Sketch may not exceed four pages. Follow the formats and instructions on the attached sample.

A. Personal Statement:

Dr. David Axelrod is currently the Section Chief of Transplant Surgery at Dartmouth Medical School. His training has included clinical training in transplantation and research training in health services research and economic analysis. He also has expertise in kidney and pancreas transplantation. His professional responsibilities include leadership of the national pancreas transplant committee and directorship of the business practice committee which educates transplant leaders on health care delivery organizations. He is the author of over 50 publications in the area of transplantation economics and outcome research. Dr. Axelrod lectures nationally on transplant outcomes and economics and serves as an editor and reviewer for the leading specialty journals as well as JAMA and the New England Journal of Medicine.

B. Positions and Honors. List in chronological order previous positions, concluding with your present position. List any honors. Include present membership on any Federal Government public advisory committee.

Positions and Employment:

1996-1999 Intern and Resident in General Surgery, University of Michigan
 1999-2001 Robert Wood Johnson Foundation Clinical Scholar – Fellowship University of Michigan
 2001-2003 Resident and Chief Resident in General Surgery University of Michigan
 2003-2005 Lecturer in Surgery, Transplant Surgery Fellow, Northwestern University
 2005-2012 Assistant Professor of Surgery, Section Chief of Transplant Surgery, Dartmouth Medical School
 2012-present Associate Professor of Surgery and The Dartmouth Institute, Dartmouth Medical School

Other Experience and Professional Memberships

American College of Surgeons

Portal Editor- Surgical Outcomes 2007-present

Surgical Outcomes Club

Co-Founder and Executive Committee Member 2007-11

United Network for Organ Sharing

National Pancreas Transplant Committee- Region 1 representative 2007-2009, Vice Chairman 2009-2011, Chairman 2011-present

Chairman Pancreas Donor Profile Index Subcommittee 2008-present

Member Pancreas Outcome Modeling Subcommittee 2007-present

US Department of Health and Human Services

CMS- Medicare Coverage Advisory Committee 2007- present

American Society of Transplant Surgeons

Vanguard Committee: member 7/2006 to present Co-chair 5/2007- 3/09

Transplant Fellowship Curriculum Committee: member 10/2006 to present

Program Director/Principal Investigator (Last, First, Middle): PI Name
Reimbursement Committee- Vice Chairman 2008-2010
Business Practice Committee- Chairman 2009-present

Honors

2003 Collier Surgical Society Traveling Fellowship
2005 Young Investigator Award- American Transplant Congress
2006 American Society of Transplant Surgeons- Vanguard Prize
2007 American College of Surgeons Health Policy Scholarship for Surgeons
2010 Harmes Scholarship for Surgical Research. Dartmouth Hitchcock Medical Center

C. Selected peer-reviewed publications (in chronological order). Do not include publications submitted or in preparation. For publicly available citations, URLs or PMC submission identification numbers may accompany the full reference; copies of publicly available publications are not accepted as appendix material.

1. **Axelrod DA.** Gheorghian A. Schnitzler MA. Dzebisashvili N. Salvalaggio P.S. Tuttle-Newhall J. Segev DL. Gentry S. Hohmann S. Pomfret EA. Merion RM. Lentine KL. Economic implications of broad organ sharing. *Am J Transplant.* 2011;11: 798-807.
2. Salvalaggio PR, Dzebisashvili N, Macleod KE, Lentine KL, Gheorghian A, Schnitzler MA, Hohmann S, Segev DL, Gentry SE, **Axelrod DA.** The interaction among donor characteristics, severity of liver disease, and the cost of liver transplantation. *Liver Transpl.* 2011;17: 233-42.
3. Hayashi PH, **Axelrod DA,** Galanko J, Salvalaggio PR, Schnitzler M. Regional differences in deceased donor liver transplantation and their implications for organ utilization and allocation. *Clin Transplant.* 2011; 25: 156-63.
4. Buchanan P, Dzebisashvili N, Lentine KL, **Axelrod DA,** Schnitzler MA, Salvalaggio PR Liver transplantation cost in the model for end-stage liver disease era: looking beyond the transplant admission. *Liver Transpl.* 2009;15:1270-7.
5. **Axelrod, DA.** Schnitzler M. Salvalaggio PR. Swindle J. Abecassis MM. The Economic Impact of the Utilization of Liver Allografts with High Donor Risk Index. *Amer J Transplantation.* 2007; 7:990-7.
6. **Axelrod DA.** Al-Saden, P. McNatt G. Sumner S. Dixler I. Vaci M. Abecassis MM. The economic impact of MELD on liver transplant centers. *Amer J Transplantation* 2005; 5:2297-301
7. Schnitzler MA, Johnston K, **Axelrod D,** Gheorghian A, Lentine KL. Associations of renal function at 1-year after kidney transplantation with subsequent return to dialysis, mortality, and healthcare costs. *Transplantation.* 2011; 91:1347-56.
8. Lentine KL, Schnitzler MA, Xiao H, Davis CL, **Axelrod D,** Abbott KC, Salvalaggio PR, Burroughs TE, Saab G, Brennan DC. Associations of recipient illness history with hypertension and diabetes after living kidney donation. *Transplantation.* 2011;91(11):1227-32
9. **Axelrod DA.** Dzebisashvili N. Schnitzler MA Salvalaggio PS. Segev DL. Gentry S. Tuttle-Newhall JE. Lentine KL. The interplay of socioeconomic status, distance to center, and inter-donor service area travel on kidney transplant access and outcomes. *Clin J Amer Soc Neph.* 2010;5:2276-88.
10. Lentine KL. Schnitzler MA. Xiao H. Saab G. Salvalaggio PR. **Axelrod DA.** Davis CL. Abbott KC. Brennan DC. Racial variation in medical outcomes among living kidney donors. *N Engl J Med.* 2010;363:724-32.
11. **Axelrod DA.** Dzebisashvili N. Schnitzler MA Salvalaggio PS. Segev DL. Gentry S. Tuttle-Newhall JE. Lentine KL. The interplay of socioeconomic status, distance to center, and inter-donor service area travel on kidney transplant access and outcomes. *Clin J Amer Soc Neph.* 2010; 5: 2276-88.
12. **Axelrod DA.** McCullough KP. Brewer Ed. Becker BN. Segev DL. Rao PS. Kidney and Pancreas Transplantation in the United States, 1999-2008: The Changing Face of Living Donation. *Am J Transplant.* 2010;10(4 Pt 2):987-1002.
13. **Axelrod DA,** Sung RS, Meyer KH, Wolfe RA, Kaufman DB. Systematic Evaluation of Pancreas Allograft Quality, Outcomes and Geographic Variation in Utilization. *Am J Transp* 2010; 10(4):837-45
14. **Axelrod DA** Guidinger MK, Finlayson S, Schaubel D, Goodman DC, Chobanian MC, Merion RM. Access to Heart, Liver, and Kidney Transplantation For Residents of Rural and Urban Areas in the U.S. *JAMA.* 2008; 299:202-7.
15. **Axelrod DA.** Kalbfleisch JD. Sun RJ. Guidinger MK. Biswas P. Levine GN. Arrington CJ. Merion RM. Innovations in the assessment of transplant center performance: Implications for quality improvement. *Amer J Transplant.* 2009; 9 (4 pt 2): 959-69.

D. Research Support. List selected ongoing or completed (during the last three years) research projects (federal and non-federal support). Begin with the projects that are most relevant to the research proposed in this application. Briefly indicate the overall goals of the projects and your role (e.g. PI, Co-Investigator, Consultant) in the research project. Do not list award amounts or percent effort in projects.

Axelrod, DA. Goodman D. Finlayson S. Schnitzler M. The impact of distance and time of travel on the clinical and financial outcomes following organ transplantation. Hitchcock Foundation. \$20,000 PI 1/08

NIH RC1- 1RC1DK086450-01 Reducing geographic disparity in transplant access: Clinical and economic impact. Co-investigator and PI subcontract. Collaboration with St, Louis University Center for Outcomes Research, Johns Hopkins, Dartmouth, and University of Washington. Conceptualized and designed grant. Total funding: \$1 million

Axelrod DA. Goodman DA. Assessment of Geographic Variation in Access to Transplant Care and Outcome from End Stage Organ Failure through the Development of Transplant Referral Regions. Harmes Scholarship. 2011. Total Funding \$55,000.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Richard J. Barth, Jr. MD	POSITION TITLE Associate Professor of Surgery
eRA COMMONS USER NAME (credential, e.g., agency login) RJBARTH01	

EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Princeton University	AB	1981	
Harvard Medical School	MD	1985	Medicine
New England Deaconess, Harvard Medical		1985-1988	Surgery Resident
National Cancer Institute		1988-1990	Surgical Oncology Fellow
New England Deaconess, Harvard Medical		1991-1992	Surgery Resident

A. Personal Statement: I am a Surgical Oncologist with interests in the use of new technology for tumor resection and delineation of margins, intraoperatively. I have worked with faculty at the Thayer School on research associated with the detection, diagnosis, therapy monitoring and removal of breast cancer. The proposed COBRE for the Center for Surgical Innovation will open many doors for additional collaborations such as these to explore novel technology and intraoperative imaging to improve surgical oncology. I am particularly interested in the use of intraoperative fluorescence to indentify surgical margins for tumor resection. We have begun to develop a protocol for breast surgery. In addition, I am investigating the use of image-guidance to improve completeness of resection in breast lumpectomy. The availability of intraoperative MRI will significantly help us develop and validate other more cost-effective approaches as well as to determine the accuracy of intraoperative MR. I am delighted to serve as a mid-career mentor for junior faculty led projects in the COBRE but I also see it as a vehicle that will significantly enhance my own research opportunities. I was also PI of an NCI funded clinical trial which utilized a dendritic cell vaccine to immunize patients after resection of colorectal cancer metastatic to the liver (ref 14). I have also been an investigator in several clinical trials in pancreatic cancer (ref 6,7).

B. Positions:

Dartmouth Medical School Hanover, New Hampshire	Assistant Professor of Surgery	1993-1998
Dartmouth Medical School Chief, Division of Surgical Oncology	Associate Professor of Surgery Dartmouth-Hitchcock Medical Center	1999-2012 2001-2012
Chief, Section of General Surgery	Dartmouth-Hitchcock Medical Center	2003-2012

Honors:

Princeton University:

Academic Excellence Award, Biochemical Sciences	1981
Freshman First Honor Prize (awarded to the student with the highest GPA in the class after Freshman year)	1981

Harvard Medical School:

Administrative Chief Resident Deaconess-Harvard Surgical Service	1992
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Dartmouth Medical School:

American Cancer Society Career Development Award	1995
Surgery Chief Residents' Award for Teaching Excellence	1998
Alma Hass Milham Award (for clinical excellence and compassion in patient care)	1998
Alpha Omega Alpha	1999

Society of University Surgeons	1999
Surgery Chairman's Award (for combining excellence in clinical care, research and teaching)	2000
The Arthur Naitove Distinguished Teaching Award	2001
The Dartmouth-Mosenthal Surgical Fellowship	2002
Finalist, Leonard Tow Humanism in Medicine Award	2005, 2006
Editorial Board, J. of Immunotherapy	1997-2013
Editorial Board, Annals of Surgical Oncology	2003-2009
Leading Physician, Breast Surgery, NH Magazine	2008

C. Selected Peer-reviewed Publications (from 61)

1. **Barth RJ**, Danforth DN, Venzon DJ, et al. Level of axillary involvement by lymph node metastases in breast cancer is not an independent predictor of survival. *Arch Surg* 1991, 126:574-577. *Pub Med* 20213309
2. Camp BJ, Dyhrman ST, Memoli VA, Mott LA and **Barth RJ**. In situ cytokine production by breast cancer tumor infiltrating lymphocytes. *Annals of Surgical Oncology* 1996, 3:176-84. *Pub Med* 8646519
3. **Barth RJ**. Histologic features predict local recurrence after breast conserving therapy of phyllodes tumors, *Breast Cancer Research and Treatment* 1999, 57:291-5. *Pub Med* 10617306
4. Gibson G, Lesnikoski B, Yoo J, Mott L, Cady B, **Barth RJ**. A comparison of ink directed and traditional whole cavity re-excision for breast lumpectomy specimens with positive margins, *Annals of Surgical Oncology* 2001, 8:693-704. *Pub Med* 11597009
5. **Barth RJ**, Gibson G, Carney P, Mott L, Becher R, Poplack S. Detection of breast cancer by screening mammography allows patients to be treated with less toxic therapy, *Am J Roentgenology* 2005, 184: 324-9. *Pub Med* 15615996
6. Pipas, JM, **Barth RJ**, Zaki B, Tsapakos M, Bettmann M, Cates J, Suriawinata A, Ripple G, Sutton J, Gordon S, McDonnell C, Perez R, Redfield N, Meyer L, Marshal J, Cole B, Colacchio T. Docetaxel/gemcitabine followed by Gemcitabine and external beam radiotherapy in patients with pancreatic adenocarcinoma, *Ann Surg Onc* 2005, 12: 1-10. *Pub Med* 16252135
7. Greer S, Pipas J, Sutton J, Zaki B, Tsapakos M, Colacchio T, Gibson J, Wiener, D, Ripple,G, **Barth RJ**. Effect of neoadjuvant therapy on local recurrence after resection of pancreatic adenocarcinoma. *J Am Coll Surg* 2008, 206: 451-7. *Pub Med* 18308215
8. Gorechlad J, McCabe E, Higgins J, Likosky D, Lewis P, Rosenkranz K, **Barth RJ**. Screening for Recurrences in Patients Treated with Breast Conserving Surgery: Is there a Role for MRI? *Annals of Surgical Oncology* 2008, 15:1703-9. *Pub Med* 18266039
9. Collins E, Moore C, Clay K, Kearing S, O'Connor A, Llewellyn-Thomas H, **Barth RJ**, Sepucha K. Can women with early stage breast cancer make an informed decision for mastectomy?, *J Clin Oncology* 2009, 27:519-25. *Pub Med* 19114703
10. Halter R, Zhou T, Meaney P, Hartov A, **Barth RJ**, Rosenkranz K, Wells W, Kogel C, Borsic A, Rizzo E, Paulsen K. Correlation of in vivo and ex vivo tissue dielectric properties to validate electromagnetic breast imaging: initial clinical experience. *Physiological Measurement* 2009, 30: S121-36. *Pub Med* 19491436
11. **Barth RJ**, Wells W, Mitchell S, Cole B. A prospective, multi-institutional study of adjuvant radiation therapy after resection of malignant phyllodes tumors, *Ann Surg Onc* 2009, 16:2288-94. *Pub Med* 19424757
12. Bauman, L, **Barth RJ**, Rosenkranz K. Breast conservation in women with multifocal-multicentric breast cancer: is it feasible?, *Ann Surg Onc* 2010, 17 Suppl. 3: 325-329. *Pub Med* 20853054
13. Wang, J, Jiang S, Li Z, diFlorio-Alexander R, **Barth R**, Kaufman P, Pogue B, Paulsen K. *In vivo* quantitative imaging of normal and cancerous breast tissue using broadband diffuse optical tomography, *Medical Physics* 2010, 37(7) 3715-24. *Pub Med* 20831079
14. **Barth RJ**, Fischer D, Wallace P, Channon J, Noelle R, Gui J, Ernstoff M. A randomized trial of ex vivo CD40L activation of a dendritic cell vaccine in colorectal cancer patients: tumor-specific immune responses are associated with improved survival, *Clin Cancer Res* 2010, 16:5548-56. *Pub Med* 20884622

15. Davis, K, **Barth R**, Gui J, Dann E, Eisenberg B, Rosenkranz K. The use of MRI in the pre-operative planning for women with newly diagnosed DCIS: risk or benefit? *Annals of Surgical Oncology* 2012, 19: 3270-4.
16. Laughney A, Krishnashwamy v, Rizzo E, Schwab M, **Barth R**, Pogue B, Paulsen K, Wells W. Spectroscopic imaging distinguishes morphological patterns that inform pathology in tissues relevant to surgical margin assessment, *Clinical Cancer Research*, in press.
17. Rosenkranz K, Tsui E, McCabe E, Gui J, Underhill K, **Barth R**. Increased rates of long term complications after MammoSite brachytherapy compared to whole breast radiation therapy, *J Am Coll Surg*, in press.

D. Research Support, current

Dartmouth Center for Clinical and Translational Science Grant.

“A study to evaluate the use of supine MRI images in breast conserving surgery”.

Principal Investigator, 12/1/10-12/1/13.

This study is designed to determine if an image obtained from a supine MRI can be transformed in the Operating Room setting to localize and excise breast cancer more accurately than wire localization.

Norris Cotton Cancer Center Clinical Research Grant

“A randomized phase II study of the effect of a low calorie diet on patients undergoing liver resection”,

Principal Investigator, 1/1/12-1/1/14.

This prospective randomized study is designed to confirm beneficial results we obtained from a cohort study of the effect of a pre-operative diet on hepatic steatosis and blood loss.

Research Support, recent past

2 PO1 CA080139-06A1 (Paulsen, Keith, PI) Alternative Breast Cancer Imaging Modalities,

Co-investigator, 5% effort, 9/05-4/31/12.

This project evaluated the use of infrared, microwave and electrical impedance in the diagnosis of breast cancer.

Norris Cotton Cancer Center Research Grant.

“A pilot study of US guided cryoablation of small unifocal invasive ductal breast cancer using MRI to evaluate tumor viability and immunologic assays to identify and characterize a cryoablation induced immune response.”

Principal Investigator, 5/1/07-5/1/08.

This study evaluated whether cryoablation of breast cancer in patients induced an anti-tumor immune response.

2 P30 CA023108-27 (Israel, Mark A., P.I.) Norris Cotton Cancer Center Support Grant

Co-investigator, 10% effort, 12/1/2003-12/1/2009.

This supported my work as Co-Director of the Immunotherapy Research Program of the Cancer Center.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Bauer, David Frederick	POSITION TITLE Assistant Professor of Surgery and Pediatrics		
eRA COMMONS USER NAME (credential, e.g., agency login)			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
The Johns Hopkins University	B.S.	12/1999	Neuroscience
University of Michigan Medical School	M.D.	05/2004	Medicine
University of Alabama at Birmingham	Residency	06/2012	Neurosurgery
Seattle Children's Hospital	Fellowship	06/2013	Pediatric Neurosurgery

A: Personal Statement

B: Positions and Honors

Positions and Employment

7/2012 – present Assistant Professor, Surgery and Pediatrics, Geisel School of Medicine at Dartmouth; Pediatric Neurosurgeon, Children's Hospital at Dartmouth

7/2011 – 6/2012 Clinical Instructor, Pediatric Neurosurgery, Seattle Children's Hospital / University of Washington Department of Neurosurgery

Other Experience and Professional Memberships

2012-present Reviewer: Dartmouth-Hitchcock Foundation Grant

2011-present Reviewer: Journal of Clinical Anatomy (2 to 3 reviews per year)

2009–present Joint AANS/CNS Pediatric Section, Associate Member

2007–present American Orthopedic Spine North America, Member

2006–present American Association of Neurological Surgeons, Associate Member

2006–present Congress of Neurological Surgeons, Associate Member

2006–present Joint AANS/CNS Brain Tumor Section, Associate Member

2006–present Joint AANS/CNS Spine/Peripheral Nerve Section, Associate Member

2000–present American Medical Association, Member

Honors

2012 Harmes Scholar: Dartmouth-Hitchcock Department of Surgery Research Grant

2009 **Augustus McCravey & First Place Clinical Science Resident Paper Award**
Southern Neurosurgical Society Annual Meeting

2008 **Most Outstanding Basic Science Research Award**
UAB, Department of Surgery, Resident Research Day

2007–2009 **NIH T-32 Ruth L. Kirschstein Postdoctoral Training Grant**

2001 **University of Michigan Medical School Summer Research Fellowship**

1998 **Howard Hughes Medical Institute Undergraduate Research Fellowship**
Johns Hopkins University

1997 **Howard Hughes Medical Institute Undergraduate Research Fellowship**
Johns Hopkins University

C. Selected Peer-reviewed Publications

1. Menendez JY, **Bauer DF**, Shannon CN, Fiveash J, Markert JM. Stereotactic radiosurgical treatment of brain metastasis of primary tumors that rarely metastasize to the central nervous system. *J Neurooncol*. 2012 Sep;109(3):513-9.
2. **Bauer DF**, Razdan S, Bartolucci, Markert JM. Meta-analysis of hemorrhagic complications from ventriculostomy placement. *Neurosurgery*. 2011 Aug;69(2):255-60.
3. **Bauer DF**, McGwin J, George R, Melton S, Markert JM. The relationship between INR and development of hemorrhage with placement of ventriculostomy. *Journal of Trauma*. 2011 May;70(5):1112-7.
4. Tubbs RS, **Bauer D**, Chambers MR, Loukas M, Shoja MM, Cohen-Gadal AA. A novel method for cerebrospinal fluid diversion utilizing the sternum: a cadaveric and animal study. *Neurosurgery*. 2011 Feb;68(2):491-4.
5. **Bauer DF**, McGwin J, George R, Melton S, Markert JM. The risk factors for conversion to permanent ventricular shunt in patients receiving therapeutic ventriculostomy for traumatic brain injury. *Neurosurgery*. 2011 Jan;68(1):85-8.
6. **Bauer DF**, Waters AM, Tubbs RS, Rozzelle CJ, Wellons JC, Blount JP, Oakes WJ. Safety and efficacy of scheduled non-narcotic analgesic medications in children undergoing craniotomy for brain tumor. *Neurosurgery*. 2010 Aug;67(2):353-6.
7. **Bauer DF**, Tubbs RS, Chambers MR. Study of the effects of flexion on the position of the conus medullaris: follow-up study using MR imaging in non-human primates. *Child's Nervous System*. 2009 Aug;25(8):977-9.
8. Parker JN, **Bauer DF**, Cody JJ, Markert JM. Oncolytic viral therapy of malignant glioma. *Neurotherapeutics*. 2009 Jul;6(3):558-69. Review.
9. **Bauer DF**, Shoja MM, Loukas M, Oakes WJ, Tubbs RS. Study of the effects of flexion on the position of the conus medullaris. *Child's Nervous System*. 2008 Sep;24(9):1043-5.
10. **Bauer DF**, Tubbs RS, Acakpo-Satchivi L. Mycoplasma meningitis resulting in increased production of cerebrospinal fluid: case report and review of the literature. *Child's Nervous System*. 2008 Jul; 24(7):859-62. Review.
11. **Bauer DF**, Tubbs RS, Acakpo-Satchivi L. The Seldinger technique for ventricular catheter exchange: a technical note. *Child's Nervous System*. 2008 Jun;24(6):753-5.
12. Blount JP, Tubbs RS, Wellons JC, Acakpo-Satchivi L, **Bauer D**, Oakes WJ. Spinal cord transection for definitive untethering of repetitive tethered cord. *Neurosurgical Focus*. 2007; 23(2):1-4. Review.
13. **Bauer DF**, Youkilis A, Schenck C, Turner CR, Thompson BG. The falcine trigeminocardiac reflex: case report and review of the literature. *Surgical Neurology*. 2005 Feb;63(2):143-148. Review.

D. Research Support

Completed Research Support

T32 Markert (PI) 07/2007 to 6/2009

Characterization of an anti-glioma vaccine

Goal was to characterize a glioma vaccine using irradiated modified herpes infected murine glioma in an orthotopic model of intracranial glioma.

Role: Post Doctoral Fellow

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Belden, Clifford John		POSITION TITLE Associate Professor of Radiology Interim Chair, Department of Radiology, Dartmouth Hitchcock Medical Center		
eRA COMMONS USER NAME (credential, e.g., agency login)				
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>				
INSTITUTION AND LOCATION		DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Rensselaer Polytechnic Institute		B.S.	1984-1986	Biology
Albany Medical College		M.D.	1986-1990	Medicine

A. Personal Statement.

My area of expertise is diagnostic radiology, and more specifically neuroradiology and head and neck radiology. The proposed project builds on recent efforts correlating glioblastoma gene expression array data with MR features by expanding the area of investigation to head and neck cancer. We will use quantitative MR imaging techniques along with both genome-wide expression analysis and individual gene sequencing to identify non-invasive markers of tumor biology, ultimately leading to methods to identify changes in gene expression that occur in response to targeted molecular therapy.

B. Positions and Honors.

Positions and Employment

1990-1991 Medicine Internship, Albany Medical Center, Albany, NY
1991-1992 Residency, Ophthalmology, University of Florida, Gainesville, FL
1992-1996 Residency, Diagnostic Radiology, University of Florida, Gainesville, FL
1996-1998 Fellowship, Neuroradiology, John Hopkins University, Baltimore, MD
1997-1998 Instructor Department of Radiology, John Hopkins University Baltimore, MD
2001-2002 Adjunct Assistant Professor Department of Radiology, University of Texas Health Science Center, San Antonio, TX
2003-2008 Associate Professor of Radiology, Albany Medical Center, Albany, NY
2008-2011 Assistant Professor Department of Radiology, Dartmouth Medical School
Hanover, NH
2011-present Associate Professor of Radiology and Neurology, Dartmouth Medical School, Hanover, NH

Other Experience and Professional Memberships

1993-Present Radiologic Society of North America
1994-1995 Chief Resident, Department of Radiology, University of Florida, Gainesville, FL
1998-1999 Staff Neuroradiologist, Brooke Army Medical Center, Ft. Sam Houston, TX
1998-2001 Assistant/Associate Residency Program Director, San Antonio Uniformed Services Health Education Consortium, Ft. Sam Houston, TX
1999-Present American Society of Neuroradiology
1999-2002 Chief of Neuroradiology, Brooke Army Medical Center, Ft. Sam Houston, TX
2000-2002 Institutional Review Board, Army Medical Center, Ft. Sam Houston, TX
2001-Present Supraglottic Protocol Team, ACR Imaging Network, American College of Radiology
2003-2008 Director of Cardiovascular Imaging, Albany Medical Center, Albany, NY
2004 Corrective Action and Appeals Committee, Albany Medical Center, Albany, NY
2005-2008 Vice Chairman Department of Radiology, Albany Medical Center, Albany, NY

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Other Experience and Professional Memberships(cont.)

- 2006-Present American College of Physician Executives
2009-Present Administrative Investment Oversight Committee, Dartmouth-Hitchcock Medical Center, Lebanon, NH
2009-Present Committee for Protection of Human Subjects, Dartmouth-Hitchcock Medical Center, Lebanon, NH
2009-Present Membership Committee, American Society of Neuroradiology (Chairman, 2011)
2011-Present Interim Chairman of Radiology, Dartmouth-Hitchcock Medical Center, Lebanon, NH

Honors

- 1990 Valedictorian, Albany Medical College
1993 Certificate of Merit, RSNA
1993 Cum Laude Award, RSNA
1996 American Society of Head and Neck Radiology Radiologist-in-Training Award
1996 RSNA Roentgen Resident/Fellow Research Award
1997 Summa Cum Laude, Exhibit American Society of Neuroradiology
1998 Resident Teacher Award, Johns Hopkins University
2001 Teacher of the Year Award, Radiology, Brooke Army Medical Center
2003 *Radiology* Editor's Recognition Award for Reviewing with Special Distinction
2003 Certificate of Merit, RSNA
2004 *Radiology* Editor's Recognition Award for Reviewing with Special Distinction
2006 Teacher of the Year Award, Radiology, Albany Medical College
2009 Magna Cum Laude Award, ASNR
2009 Summa Cum Laude Award, ASNR

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

1. Manjunath, **Belden**, Lepow, "Sepsis in Infants Under Two Months of Age," presented at NY Academy of Pediatrics, May, 1988.
 2. Smoot, **Belden**, and Catalano, "Amblyopia and Anisometropia," presented at Academy of Research in Vision and Ophthalmology, May, 1990.
 3. Huda, **Belden**, Williams, "Imaging Performance versus film optical density," presented to the Canadian Society of Medical Physics, September, 1994.
 4. Qu, Huda, **Belden**, "Subjective vs. Objective Assessment of Radiographic Image Quality," presented at the American Association of Physics in Medicine, July, 1994.
 5. **Belden**, Mukherji, Mancuso, Castillo, "CT imaging of the normal development of the nasal cavity and paranasal cavity in children under two years of age" presented at RSNA, November, 1994.
 6. **Belden**, "Report from the ACR," presented at the AUR, April, 1995
 7. **Belden**, Brogden Panel Member, "Downsizing resident responsibilities." presented at AUR, April, 1995.
 8. Huda, **Belden**, Webb, Palmer, "Visibility of tubes and catheters in portable ICU chest examinations with computed radiography." presented at the Canadian Association of Radiologists, June, 1995.
 9. Huda, Sloane, **Belden**, Williams, Cumming, Palmer, "Radiographic Mottle in Pediatric Chest Examinations using Computed Radiography." presented at the American Roentgen Ray Society, May, 1995.
 10. **Belden**, Huda, Webb, Palmer, "Visibility of tubes and catheters in portable ICU chest examinations with computed radiography," presented at RSNA, November, 1995.
 11. **Belden**, Kotzur, Mancuso, Mukherji. "The Nasal Cavity and Choana: Normal CT Appearance and Development in Children Under 2 Years of Age." presented at American Society of Head and Neck Radiology, April, 1996.
 12. **Belden**, Kotzur, Mancuso, Mukherji. "The Anterior Skull Base: Normal CT Appearance and Development in Children Under 2 Years of Age." presented at American Society of Head and Neck Radiology, April, 1996.
 13. **Belden**, Mancuso, Kotzur. "Anterior Nasal Cavity Stenosis." presented at American Society of Head and Neck Radiology, May, 1997.
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14. Bryan, Soliyappan, Eckel, **Belden**, Kashima. "Virtual Imaging of the Head and Neck." presented at the International Congress of Head and Neck Radiology, October, 1997.
15. Soliyappan, Bryan, **Belden**, Eckel, Kashima. "Interactive 3D Reconstruction and Volumetric Visualization Using Conventional Rotational Fluoroscopic Systems." presented as Hot Topic, RSNA, November, 1997.
16. **Belden**, Weg, Minor, Zinreich. "CT Evaluation of Bony Dehiscence of the Superior Semicircular Canal as a Cause of Sound- and/or Pressure-Induced Vertigo." Presented, Radiologic Society of North America, November 1998.
17. York, **Belden**. "The effect of diet on 1H-Spectroscopy." Presented at the American Society of Neuroradiology, April 27, 2001.
18. **Belden**, Weg, Minor, Zinreich. "Utility of 0.5mm CT images for the diagnosis of the superior canal dehiscence syndrome." Presented at the American Society of Neuroradiology, April 23, 2001.
19. Pongnapang, Clarke, Rubal, Lane, **Belden**. "Methods for Determining Myocardial Blood Volume & Flow using Contrast-Enhanced MRI." Presented at AAPM, 2001.
20. Mukherji S, Toledano A, **Belden C**, et al. "Interobserver Reliability of CT-Derived Primary Tumor Volume Measurement In Patients With Supraglottic Carcinoma." Presented RSNA 2004.
21. Mukherji SK, Toledano AY, **Belden C**, Schmalfluss IM, Cooper JS, et al. Interobserver reliability of computed tomography-derived primary tumor volume measurement in patients with supraglottic carcinoma. *Cancer* 2005; 103(12); 2616-2622.
22. Penc SF, Gillen RW, **Belden CJ**, and Zimmerman EA. "Unusual Presentation of Sporadic Creutzfeldt-Jakob Disease: Visual Field Cut and Long Duration." Presented American Neurologic Association, 2006.
23. Cooper JS, Mukherji SK, Toledano AY, **Belden C**, Schmalfluss IM, et al. An Evaluation of the Variability of Tumor-Shape Definition Derived by Experienced Observers from CT-Images of Supraglottic Carcinomas (ACRIN protocol 6658). *Int J Radiat Oncol Biol Phys* March 2007; 67 (4) 972-975.
24. Sanders GP, Linley S, Ramsey DS, Abbott R, Puzas JE, Glennon JC, DiRisio DJ, **Belden C**, Ledet EH. The Effects of Chronic Cyclic and Static Loading on the Rabbit Lumbar Spine: An In Vivo Pilot Study. Presented at the 55th Annual Meeting of the Orthopaedic Research Society. Las Vegas, NV. February 22-25, 2009.
25. Belden CJ, Pastel DA, Gosselin BJ, Paydarfar JA, Black CC. Hypopharynx: Patterns of Cancer Spread. Exhibited at American Society of Neuroradiology, May 16-21, 2009. (Magna Cum Laude award winner)
26. Belden CJ, Pastel DA, Gosselin BJ, Paydarfar JA, Black CC. Hypopharynx: Detailed Imaging Anatomy with Clinical and Pathologic Correlation. Exhibited at American Society of Neuroradiology, May 16-21, 2009. (Summa Cum Laude award winner)
27. Ravi V, **Belden CJ**, Gosselin BJ, Paydarfar JA, Addante RR, Black CC, Pastel DA. Oral Cavity Cancer: A Review of Patterns of Spread. *Neurographics*, 2011; 1(1); 59-64.
28. **Belden CJ**, Valdes PA, Ran C, et al. Genetics of Glioblastoma: A Window into Its Imaging and Histopathological Variability. Accepted for publication. *Radiographics*, May 2011.

C. Research Support

- PI, Magnetic resonance imaging features that predict the biologic behavior of head and neck cancer, 4/2011
Radiology Department Seed Funds, RSNA
\$26,000
- Co-Investigator, Pre-Operative Image Updating for Guidance during Brain Tumor Resection, 5/2011-11/2016
\$506,234, (K. Paulsen, PI)
5% effort
- Co-Investigator, Center for Comparative Effectiveness Research in Cancer Imaging, 2010-11
"Pilot study for a registry of incidentally detected thyroid nodules"
\$49,000.00 (L. Davies, PI)
5% effort
- PI, RSNA Seed Grant, 2000
"Serial Volumetric and Spectroscopic Changes Following Closed Head Injury."
\$24,800.00
-

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Eunice Y Chen		POSITION TITLE Assistant Professor	
eRA COMMONS USER NAME (credential, e.g., agency login) EYCHEN			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Stanford University, Stanford, CA	B.S.	09/88-01/92	Microbiology and Immunology
Stanford University Medical School, Stanford, CA	M.D.	09/94-06/01	Medicine/Otolaryngology-Head and Neck Surgery
Stanford University Medical Center, Stanford, CA	Ph.D.	09/94-06/01	Cancer Biology

A. Personal Statement

This project focuses on the development and translational application of intraoperative functional imaging by biplanar fluoroscopy. From my training as an otolaryngologist-head and neck surgeon, I have extensive clinical experience in the diagnosis and treatment of head and neck cancers which, despite advances in diagnostic and therapeutic modalities, still carries a 57% 5-year relative survival rate (http://seer.cancer.gov/publications/survival/surv_head_neck.pdf). In addition, my research background includes the investigation of tumor hypoxia and molecular prognostic markers of a variety of human cancers. One of my thesis projects focused on the activation of growth factor receptors and signaling pathways by a hypoxic stimulus. Since I started at Dartmouth-Hitchcock, I have established collaborative relationships with Dr. Harold Swartz, who is the Radiology Department's Director of Scientific Research and the Director of the Electron Paramagnetic Resonance (EPR), in two funded projects using EPR oximetry to investigate the role of hypoxia in radiation-induced fibrosis and surgical wound healing with tissue flaps and with Dr. P. Jack Hoopes in proposals implementing iron oxide nanoparticle hyperthermia for cancer treatment. In addition, I am co-investigators with Dr. Kimberly Samkoe in a funded project developing hypoxia-targeted and fluorescently tagged nanoparticles for theranostic purposes. Both Dr. Hoopes and Dr. Swartz have had successful collaborations with Dr. Keith Paulsen in the past and have been my mentors for the past 2.5 years as I have started my career path toward becoming an independent surgeon-scientist with the goal of promoting translational research to improve the prognosis and outcomes of head and neck cancer patients.

B. Positions and Honors

Positions and Employment

- | | |
|--------------|--|
| 2001-2002 | Intern, General Surgery, Stanford University Medical Center, Stanford, CA |
| 2002-2006 | Resident, Otolaryngology-Head and Neck Surgery, Stanford University Medical Center, Stanford, CA |
| 2006-2007 | Fellow and Instructor, Pediatric Otolaryngology-Head and Neck Surgery, Seattle Children's Hospital, University of Washington, Seattle, WA |
| 2007-2008 | Acting Assistant Professor, Pediatric Otolaryngology-Head and Neck Surgery, Seattle Children's Hospital, University of Washington, Seattle, WA |
| 2009-present | Assistant Professor, Pediatric Otolaryngology-Head and Neck Surgery, Dartmouth-Hitchcock Medical Center, Lebanon, NH |

Other experience and professional memberships

2002-present	Member, American Academy of Otolaryngology-Head and Neck Surgery
2007-present	American Board of Otolaryngology Certification
2009-present	Member, New England Otolaryngology Society
2010-present	Member, American Society of Pediatric Otolaryngology
2006-present	Journal reviewer-Cancer Research, Otology and Neurotology, Otolaryngology-Head and Neck Surgery, Laryngoscope

Honors

Feb 1997	Student Travel Award, Lorne Cancer Conference entitled "Growth Factors, Signaling, and Cancer." Lorne, Victoria, Australia
Mar 1999	First Place, Medical Device Invention Challenge, Medical Device Network and Office of Technology Licensing, Stanford University, Stanford, CA
Aug 2009	Triological Society Career Development Award. Centralized Otolaryngology Research Efforts (CORE) Grants, American Academy of Otolaryngology-Head and Neck Surgery. Alexandria, VA.
Jan 2012	Dow Crichlow Career Development Award. Department of Surgery, Dartmouth-Hitchcock Medical Center, Lebanon, NH

C. Selected Peer-reviewed Publications

Most relevant to the current application

1. Koong AC, Chen EY, Lee AS, Brown JM, Giaccia, AJ. Increased cytotoxicity of chronic hypoxic cells by molecular inhibition of GRP78 induction. *Int J Radiat Oncol Biol Phys*, 28:661-666, 1994. PMID: 8113109
2. Koong AC, Chen EY, Giaccia AJ. Hypoxia causes the activation of nuclear factor-kappa B through the phosphorylation of I kappa B alpha on tyrosine residues. *Cancer Res*, 54:1425-1430, 1994. PMID: 8137243
3. Koong AC, Auger EA, Chen EY, Giaccia AJ. The regulation of GRP78 and messenger RNA levels by hypoxia is modulated by protein kinase C activators and inhibitors. *Radiat Res*, 138:S60-S65, 1994. PMID: 8146329
4. Koong AC, Chen EY, Kim CY, Giaccia AJ. Activators of protein kinase C selectively mediate cellular cytotoxicity to hypoxic cells and not aerobic cells. *Int J Radiat Oncol Biol Phys*, 29:259-265, 1994. PMID: 8195017
5. Chen Y, Shi G, Xia W, Kong C, Zhao S, Gaw AF, Chen EY, Yang GP, Giaccia AJ, Le QT, Koong AC. Identification of hypoxia-regulated proteins in head and neck cancer by proteomic and tissue array profiling. *Cancer Res*, 64:7302-7310, 2004. PMID: 15492250

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

1. Mazure NM, Chen EY, Yeh P, Laderoute KR, Giaccia AJ. Oncogenic transformation and hypoxia synergistically act to modulate vascular endothelial growth factor expression. *Cancer Res*, 56:3436-3440, 1996. PMID: 8758908

2. Mazure NM, Chen EY, Laderoute KR, Giaccia AJ. Induction of vascular endothelial growth factor by hypoxia is modulated by a phosphatidylinositol 3-kinase/Akt signaling pathway in Ha-ras-transformed cells through a hypoxia inducible factor-1 transcriptional element. *Blood*, 90:3322-3331, 1997. PMID: 9345014
3. Chen EY, Fujinaga M, Giaccia AJ. Hypoxic microenvironment within an embryo induces apoptosis and is essential for proper morphological development. *Teratology*, 60:215-225, 1999. PMID: 10508975
4. Zundel W, Schindler C, Haas-Kogan D, Koong A, Kaper F, Chen E, Gottschalk AR, Ryan HE, Johnson RS, Jefferson AB, Stokoe D, Giaccia AJ. Loss of PTEN facilitates HIF-1-mediated gene expression. *Genes Dev*. 14:391-396, 2000. PMCID: PMC316386
5. Laderoute KR, Alarcon RM, Brody MD, Calaoagan JM, Chen EY, Knapp AM, Yun Z, Denko NC, Giaccia AJ. Opposing effects of hypoxia on expression of the angiogenic inhibitor thrombospondin 1 and the angiogenic inducer vascular endothelial growth factor. *Clin Cancer Res*. 6:2941-2950, 2000. PMID: 10914744
6. Chen EY, Mazure NM, Cooper JA, Giaccia AJ. Hypoxia activates a growth factor receptor/PI 3-kinase/Akt pathway that results in GSK-3 inactivation. *Cancer Res*, 61:2429-2433, 2001. PMID: 11289110
7. Le QT, Shi G, Cao H, Nelson DW, Wang Y, Chen EY, Zhao S, Kong C, Richardson D, O'Byrne KJ, Giaccia AJ, Koong AC. Galectin-1: a link between tumor hypoxia and tumor immune privilege. *J Clin Oncol*. 23:8932-8941, 2005. PMID: 16219933
8. Le QT, Chen E, Salim A, Cao H, Kong CS, Whyte R, Donnington J, Cannon W, Wakelee H, Tibshirani R, Mitchell J, Richardson D, O'Byrne KJ, Koong AC, Giaccia AJ. An evaluation of tumor oxygenation and gene expression in patients with early stage non-small cell lung cancers. *Clin Cancer Res*. 12:1507-1514, 2006. PMID: 16533775
9. Fleming JN, Hostikka SL, Chen EY, Schwartz SM, Perkins JA. Plasmacytoid dendritic cells and interferon levels are increased in lymphatic malformation. *Otolaryngol Head Neck Surg*. 139:671-676, 2008. PMID: 18984262
10. Chen EY, Hostikka SL, Oliaei S, Duke W, Schwartz SM, Perkins JA. Similar histologic features and immunohistochemical staining in microcystic and macrocystic lymphatic malformations. *Lymphatic Research Biol*. 7:75-80, 2009. PMID: 19534631

D. Research Support

Current

Dow-Crichlow Career Development Award in Surgery (Principal Investigator), 1/1/2012-12/31/2013
 Department of Surgery, Dartmouth Hitchcock Medical Center
 Goal: Identification and treatment of hypoxic tumors with nanoparticle hyperthermia using murine and spontaneous pet animal head and neck cancer tumor models.

SYNERGY Pilot and Collaborative Studies Award (Co-investigator), 2/1/2011-8/31/2013
 Dartmouth Center for Clinical and Translational Science (SYNERGY)
 Goal: Theranostics for head and neck cancer using hypoxia-targeted, fluorescent antibody-labeled nanoparticles (HyFAN).

Completed

American Cancer Society Institutional Research Grant (Principal investigator), 4/1/2010-3/30/2013
 Norris Cotton Cancer Center and American Cancer Society
 Goal: Using tissue oxygen profiling to optimize wound healing in irradiated tissue.

Dartmouth Center of Cancer Nanotechnology Excellence (DCCNE) Pilot Award (Co-investigator),
10/1/2011-9/30/2012

DCCNE/NCI

Goal: Modulation of hypoxia to enhance nanoparticle uptake and tumor pO₂ guided radiotherapy with magnetic hyperthermia.

Triological Society Career Development Award (Principal investigator), 8/1/2010-7/31/2012

Triological Society (American Laryngological, Rhinological, and Otological Society)

Goal: Tissue oxygenation and optimizing intervention for wound healing.

Dartmouth Center for Clinical and Translational Science Pilot Project Award (Co-investigator), 6/1/2009-
5/31/2012

Goal: Tissue pO₂ levels in radiation-induced fibrosis.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME John P. Collier	POSITION TITLE Myron Tribus Professor of Engineering Innovation Director, Cook Design Center and Director of Dartmouth Biomedical Engineering Center		
eRA COMMONS USER NAME (credential, e.g., agency login)			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Dartmouth College	A.B.	1972	Engineering Sciences
Thayer School of Engineering, Dartmouth College	B.E.	1973	Engineering
Thayer School of Engineering, Dartmouth College	M.E.	1975	Engineering
Thayer School of Engineering, Dartmouth College	D.E.	1977	Engineering

A. Personal Statement

For over 3 decades, I have been investigating the design and analysis of orthopedic prostheses. Our lab has studied extensively implant/host interfaces and the growth and repair of cartilage. We have been responsible for seminal discoveries in the stability and wear of polyethylene components used in commonly deployed hip and knee implants. In 1987, I started the Dartmouth Biomedical Engineering Center (DBEC) and remain its Director. In collaboration with Dr. Michael Mayor, long-time orthopedic surgeon and biomedical engineer at Dartmouth, we founded (and have continued) the nation's first orthopedic implant retrieval laboratory which continues to collect and analyze a large repository of surgically-implanted and retrieved specimens. I have mentored numerous undergraduate and graduate students (many of whom now hold leadership positions within the industry and academia) and remain committed to the nurturing and development of young minds in all aspects of the engineering of improved orthopedic implants. Doug Van Citters, PhD, came through the DBEC program and we have been fortunate to retain him on our faculty at Thayer. Professor Van Citters is a very talented Assistant Professor whose training and research interests are ripe for nurturing and advancement through the proposed COBRE mechanism to create the Center for Surgical Innovation at DHMC. While I have not historically been funded by the NIH, my considerable experience with industry-sponsored research from leading orthopedic implant manufacturers will bring an important perspective to the mentoring of Dr Van Citters and the other surgeons and engineering investigators involved. I look forward to a participating in this exciting initiative.

B. Positions and Honors

Academic

1976-1984	Research Associate, Thayer School of Engineering, Dartmouth College
1978-1987	Director of Research & Development, The Cook Engineering Design Center, Thayer School of Engineering, Dartmouth College
1979-present	Senior Lecturer, Thayer School of Engineering, Dartmouth College
1984-1986	Research Assistant Professor, Thayer School of Engineering, Dartmouth College
1986-1993	Research Associate Professor, Thayer School of Engineering, Dartmouth College
1987-present	Director of Dartmouth Biomedical Engineering Center, Thayer School of Engineering, Dartmouth College
1993-present	Professor of Engineering, Thayer School of Engineering, Dartmouth College
1993-present	Adjunct Professor of Orthopaedics, Dartmouth Medical School

Industrial

1977-1980	Consultant to Canadian Oxygen, Ltd.
1980-present	Consultant to DePuy Division of BOEHRINGER MANNHEIM CORPORATION
1990-present	Consultant to DuPont I.E. DeNemours & Co.

Honors

- 1994 Winner of the Otto Aufranc Award for the most outstanding paper submitted to The Hip Society.
- 1996 Winner of the ASEE Theo Pilkington Outstanding Educator Award in recognition of outstanding teaching across the engineering curriculum, and to professionals ranging from high school science teachers to orthopedic surgeons.
- 1996 The B.F. Goodrich Collegiate Inventors Program Award - faculty advisor.
- 1997 Holder of the Myron Tribus Chair in Innovation Professorship
- 2010 The Carnegie Foundation for the Advancement of Teaching and the Council for Advancement and Support of Education (CASE) have named John Collier, Dartmouth's Myron Tribus Professor of Engineering Innovation, the 2010 New Hampshire Professor of the Year. Collier was selected from more than 300 top professors in the United States.

Professional Society Activities

- * Society for Biomaterials
- * Orthopaedic Research Society
- * American Academy of Orthopaedic Surgeons
- * Hip Society

C. Most Recent Peer-Reviewed Publications (from more than 70 papers)

1. Currier BH, Currier JH, Mayor MB, Lyford KA, Van Citters DW, Collier JP: Clinical Performance of Highly Cross-linked Crossfire Liners—A retrieval study. *Journal of Bone and Joint Surgery*. 89: 2023-2029, 2007.
2. Tower SS, Currier JH, Currier BH, Lyford KA, Van Citters DW, Mayor MB: Rim Cracking of the Cross-linked Longevity™ Polyethylene Acetabular Liners in Total Hip Arthroplasty. *Journal of Bone and Joint Surgery*. 89: 2212-2217, 2007.
3. Atwood SA, Currier JH, Mayor MB, Collier JP, Van Citters DW, Kennedy FE: Clinical Wear Measurement on LCS® Rotating Platform Knee Bearings. *Journal of Arthroplasty*. 23(3): 431-40, 2008.
4. Currier, B.H., Currier, J.H., Mayor, M.B., Collier, J.P., Lyford, K.A., Van Citters, D.W., Evaluation of Oxidation and Fatigue Damage of Retrieved Crossfire™ Polyethylene Acetabular Cups, *Journal of Bone and Joint Surgery – Amer.*, November 2010.
5. Kennedy, FE, Van Citters, DW, and Collier, JP; Tribological Characteristics of Polyethylene Bearings of Knee Prostheses. *International Journal of Surface Science and Engineering*, 4(2): 166-174, 2010.
6. Currier, BH, Van Citters, DW, Currier JH, and Collier, JP 2010. In Vivo Oxidation in Remelted Highly Cross-linked Retrievals. *Journal of Bone and Joint Surgery – American Volume* 92A, 2409-2418.
7. Van Citters, DW, Huot, JC and Collier, JP: Ultra High Molecular Weight Polyethylene as a Knee Bearing Material. *Joint Replacement Arthroplasty*. Ed by BF Morrey, Churchill Livingstone, 2010.
8. Huot, JC, Van Citters, DW, Currier JH, Currier BH, Mayor MB and Collier, JP 2010. Evaluating the suitability of highly cross-linked and remelted materials for use in posterior stabilized knees. *Journal of Biomedical Materials Research Part B-Applied Biomaterials*, 95B, 298-307.
9. Huot, JC, Van Citters, DW, Currier JH and Collier, JP. 2011. The effect of radiation dose on the tensile and impact toughness of highly cross-linked and remelted ultrahigh-molecular weight polyethylenes. *Journal of Biomedical Materials Research Part B-Applied Biomaterials*, 97B, 327-333.
10. Currier, JH, Mayor, MB, Collier, JP, Currier, BH and Van Citters, DW. 2011. Wear Rate in a Series of Retrieved RP Knee Bearings. *Journal of ASTM International*, 8.
11. Huot, JC, Van Citters, DW, Currier JH and Collier, JP. 2011. The effect of radiation dose on the tensile and impact toughness of highly cross-linked and remelted ultrahigh-molecular weight polyethylenes. *Journal of Biomedical Materials Research Part B-Applied Biomaterials*, 97B, 327-333.
12. Van Citters DW, Huot, JC, Currier JH, Currier BH, Collier JP. *Polyethylene for Total Joint Replacements*, in *Joint Replacement Arthroplasty*, Fourth Edition. B.F Morrey, Editor: Lippincott. 2011.
13. Currier JH, Porter EC, Mayor MB, Collier JP, Van Citters DW: Damage and Wear: An Important Distinction in Rotating Platform Knee Bearings. *Journal of ASTM International*. 2011: Vol 8, No.2.
14. Berry DJ, Currier JH, Mayor MB, Collier JP. Knee Wear Measured in Retrievals: A Polished Tray Reduces Insert Wear. *Clin Orthop Rel Res*. (Published online Feb 2012; print in press).

15. Berry DJ, Currier BH, Mayor MB, Collier JP. Gamma-irradiation Sterilization in an Inert Environment: A Partial Solution. *Clin Orthop Rel Res.* (Published online Jan 2012; print in press).

D. Research Support

ACTIVE:

DePuy Inc., A Johnson and Johnson Company	7/1/12 - 6/30/2013	2.0 summer
DBEC Retrieval Laboratory	\$585,122	4.5 academic

Goal: This long-running and annually-renewed contract supports the DBEC and its orthopedic implant research and development to study retrieved hip and knee implants to identify the modes of failure and to use that insight to design and fabricate better components with greater longevity. The studies have most recently focused on the performance of the bearings in these devices. In knees, the material is polyethylene and we are studying why even the newest, cross linked polyethylene bearings show oxidation in vivo where they don't oxidize on the shelf. In the hip, the most popular designs of the last decade included metal-on-metal bearings which, based on simulator studies, should have hydrodynamic lubrication and not wear in vivo. Unfortunately, the nearly two hundred retrievals of these that we have all show contact between the cup and femoral head leading to high wear.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Scott Christian Davis	POSITION TITLE Research Scientist, Dartmouth College		
eRA COMMONS USER NAME (credential, e.g., agency login) SC_DAVIS			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Middlebury College, Middlebury, VT	B.A. Honors	1993-1997	Physics
University of Virginia, Charlottesville VA	M.Sc.	1997-1999	Mechanical Engineering
Dartmouth College, Hanover, NH	Ph.D.	2003-2008	Biomedical Engineering
Dartmouth College, Hanover, NH	Post Doc.	2008-2011	Biomedical Engineering

A. Personal Statement

This pipeline in the COBRE grant will investigate the clinical potential of co-registering real-time fluorescence guided surgery images and intra-operative MR/CT. At Dartmouth, I have almost ten years experience developing optical systems to image and quantify low levels of fluorescence from often overwhelming background signals in living tissue. Currently, I am a key contributor in the development of a novel time-gated fluorescence guided surgical (FGS) imaging system which facilitates intra-operative imaging without the need to dim the operating room lights.

At Dartmouth, I developed a hybrid MRI-hyperspectral fluorescence molecular tomography (FMT) system composed of 16 Acton Research spectrometers operating in parallel. This involved developing system hardware, software automation, spectral analysis methods to extract low levels of molecule-specific fluorescence from dominant background signals, MRI image segmentation and processing, and completing extensive calibration and validation experiments. The system has been used extensively for volumetric imaging of small animals including protoporphyrin IX (PpIX) fluorescence, and has been used in a clinical trial for noninvasive optical image of breast cancer. This system is also a key enabler in the development of a novel method to quantify receptor density in tumors by comparing the kinetics of two fluorescent dyes injected simultaneously, a technique which we recently reported in PNAS. Determining the optimal methods to combine the MRI and optical data was a major focus of this research is directly applicable to accomplishing the stated aims of the pipeline.

I was also a key contributor in developing several other in vivo fluorescence tomography systems, including a hybrid micro-CT/FMT system for small animal imaging, a high frequency ultrasound-coupled FMT system for imaging (PpIX) in human skin tumors and a sub-surface fluorescence tomography imaging system for intra-surgical tumor resection guided by PpIX fluorescence. Additionally, I developed five point-probe instruments for quantifying the concentration of photosensitizer for photodynamic therapy (PDT) dosimetry in both interstitial and surface-probe geometries. Two of these systems were sold to Galderma Inc. for a clinical trial and the remaining instruments are currently being used in clinical trials at Dartmouth and the Cleveland Clinic.

I have extensive expertise in modeling light transport in tissue, algorithm development and I recently developed a method to determine depth of fluorescent objects in tissue using deformations in the emission spectrum for surgical guidance. My expertise and the resources available at Dartmouth are ideal for completing the objectives of the project successfully.

B. Positions and Honors

Positions and Employment

- 09/97–09/99 Graduate Research and Teaching Assistant, Department Mechanical and Aerospace Engineering, Univ. of Virginia, Charlottesville, VA.
- 10/99–10/02 Group Manager of Client Services/Technical Support, Burlee.com, Burlington, VT.

- 09/03- 06/08 Graduate Research Assistant, Thayer School of Engineering, Dartmouth College, Hanover NH. Fall 2006 & 2007 Teaching Assistant: Numerical Methods in Computation, Thayer School of Engineering, Dartmouth College, Hanover NH.
- Fall 2006 Teaching Assistant: Medical Imaging, Thayer School of Engineering, Dartmouth College, Hanover NH.
- Fall 2008 Guest Lecturer: Medical Imaging, Thayer School of Engineering, Dartmouth College, Hanover NH.
- 06/08 –11/11 Research Associate (post-doctoral fellow), Thayer School of Engineering, Dartmouth College, Hanover NH.
- 11/11 – Research Scientist, Thayer School of Engineering, Dartmouth College, Hanover NH.

Honors

- 1993 -1997 College Scholar (highest ranking), Middlebury College, all semesters
- 1997 Physics Departmental Honors, Middlebury College
- 1997 Magna Cum Laude, Middlebury College
- 1997 - Phi Beta Kappa
- 1997 - 1999 Dean's Scholarship and Chairman's Scholarship, University of Virginia
- 2003 - 2004 Thomas Kelvin Burnap Fellowship, Dartmouth College
- 2005 AACR Edward A. Smuckler Memorial Pathobiology of Cancer Workshop
- 2006 - 2008 DOD BCRP Pre-doctoral Traineeship Award
- 2008 Research in Progress Workshop Best Presentation Award, Dartmouth College
- 2010 Best Poster Award Nominee in Session: Molecular Imaging TN Disease Models, ISMRM
- 2009 - 2013 DOD BCRP Post-doctoral Traineeship Award

Other Experience and Professional Memberships

- 2005 - 2006 Member, American Association of Cancer Research (AACR)
- 2008 - 2009 Member, International Society of Magnetic Resonance in Medicine (ISMRM)
- 2010 - Member, Optical Society of America (OSA)
- 2010 Organizing committee member and session chair, Image Guided Spectroscopy Conference and Workshop, Thayer School of Engineering, Dartmouth College
- 2011 Organizing committee member and session chair, Engineering in Medicine: Redesigning Cancer Imaging and Therapy Symposium, Thayer School of Engineering, Dartmouth College
- 2011 - Member of the Dartmouth College Irradiation Safety Committee

C. Selected Peer-reviewed Publications

Most relevant to the current application (in chronological order)

1. Pogue BW, **Davis SC**, Song XM, Brooksby BA, Dehghani H, Paulsen KD, "Image analysis methods for diffuse optical tomography," J. Biomed Optics, 99(3):033001:1-12 (2006).
2. **Davis SC**, Dehghani H, Wang J, Jiang S, Pogue BW, Paulsen KD, "Image-guided diffuse optical fluorescence tomography implemented with Laplacian-type regularization," Optics Express, 15(7):4066–4082 (2007). PMC19532650
3. **Davis SC**, Pogue BW, Springett R, Leussler C, Mazurkewitz P, Tuttle SB, Gibbs-Strauss SL, Jiang S, Dehghani H, Paulsen KD, "Magnetic resonance-coupled fluorescence tomography scanner for molecular imaging of tissue," Review of Scientific Instruments, 79-064302-1-10 (2008). PMC2678791
4. **Davis SC**, Pogue BW, Tuttle SB, Dehghani H, Paulsen KD, "Spectral distortion in diffuse molecular luminescence tomography in turbid media," Journal of Applied Physics 105(10):1020241-8 (2009). PMC2821414
5. Dehghani H, Eames ME, Yalavarthy PK, **Davis SC**, Srinivasan S, Carpenter CM, Pogue BW, Paulsen KD, "Near-infrared optical tomography using NIRFAST: Algorithms for numerical model and image reconstruction algorithms," Communications in Numerical Methods in Engineering, 25(6):711-732 (2009).
6. **Davis SC**, Samkoe KS, O'hara JA, Gibbs-Strauss SL, Payne HL, Hoopes PJ, Paulsen KD, Pogue BW, "MRI-coupled fluorescence tomography quantifies EGFR activity in brain tumors," Academic Radiology 17(3):271-276 (2010). PMC2823000
7. **Davis SC**, Samkoe KS, O'hara JA, Gibbs-Strauss SL, Paulsen KD, Pogue BW, "Comparing implementations of MR-guided fluorescence molecular tomography for diagnostic classification of brain tumors," Journal of Biomedical Optics 15(5):051602-10 (2010). PMC2951993

8. Gruber JD, Paliwal A, Krishnaswamy V, Ghadyani H, Jermyn M, O'Hara JA, **Davis SC**, Kerley-Hamilton JS, Shworak NW, Maytin EV, Hasan T, Pogue BW. "System development for high frequency ultrasound-guided fluorescence quantification of skin layers," *J Biomed Opt.* 15(2):026028 (2010).
9. Leblond F, **Davis SC**, Valdes PA, Pogue BW, "Preclinical Whole-body Fluorescence Molecular Imaging: Review of Instruments, Methods and Applications," *Journal of Photochemistry and Photobiology B: Biology* 98(1):77-94 (2010).
10. Leblond F, **Davis SC**, Valdés PA, Kim A, Ovanesyan Z, Wilson BC, Hartov A, Pogue BW, Paulsen KD, Roberts DW, "Analytic expression of fluorescence-ratio detection provides a direct estimate of depth in multi-spectral sub-surface imaging," *Physics in Medicine and Biology* 56(21):6823-6837 (2011).
11. Pogue BW, **Davis SC**, Leblond F, Mastanduno MA, Paulsen KD, "Implicit and explicit prior information in near-infrared spectral imaging: accuracy, quantification and diagnostic value" *Philosophical Transactions of the Royal Society B: Biological Sciences* 369(1955): 4531-4557 (2011).
12. Samkoe KS, Sexton KJ, Tichauer KM, Hextrum SK, Pardesi O, **Davis SC**, Srinivasan S, O'Hara JA, Hoopes PJ, Hasan T, Pogue BW, "AsPC-1 tumors exhibit high vascular delivery of EGF, but low receptor binding rate, as compared to normal pancreas," *Molecular Imaging and Biology* (published online ahead of print, August, 2011).
13. Flynn BP, D'Souza AV, Kanick SC, **Davis SC**, Pogue BW, "White light-informed optical properties improve ultrasound-guided fluorescence tomography of photoactive protoporphyrin IX," *Journal of Biomedical Optics* 18(4): 046008, 1-10 (2013).
14. Zhang R*, **Davis SC***, Demers JL, Glaser AK, Vinogradov S, Gladstone DJ, Pogue BW, "Intensity and Lifetime Reconstruction of Oxygenation-Sensitive Phosphorescence Excited by Čerenkov Radiation during EBRT," (* denotes equal contributions) *Journal of Biomedical Optics Letters* 18(5):050503 (2013).
15. **Davis SC**, Samkoe KS, Tichauer KM, O'hara JA, Sexton KJ, Pogue BW, "Dynamic dual-tracer MRI-guided fluorescence tomography to quantify receptor density in vivo," *Proceedings of the National Academy of Sciences* (Published Online May 13, 2013).

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

1. **Davis SC**, Pogue BW, Dehghani H, Paulsen KD, "Contrast-detail analysis characterizing diffuse optical fluorescence tomography image reconstruction," *Journal of Biomedical Optics*, 10(5):1-3, (2005).
2. Pogue Dehghani H, **Davis SC**, Jiang SD, Pogue BW, Paulsen KD, Patterson MS, "Spectrally resolved bioluminescence optical tomography," *Optics Letters*, 31(3):365–367 (2006).
3. Kepshire DS, **Davis SC**, Dehghani H, Paulsen KD, Pogue BW, "Sub-surface diffuse optical tomography can localize absorber and fluorescent objects but recovered image sensitivity in non-linear with depth," *Applied Optics*, 46(10):1669–1678 (2007).
4. Kepshire D, **Davis SC**, Dehghani H, Paulsen KD, Pogue BW, "Fluorescence tomography characterization for sub-surface imaging with protoporphyrin IX," *Optics Express*, 16(12):8581-8593 (2008). PMC2696352
5. Wang J, **Davis SC**, Srinivasan S, Jiang S, Pogue BW, Paulsen KD, "Spectral tomography with diffuse near-infrared light: Inclusion of broadband frequency-domain spectral data," *Journal of Biomedical Optics* 13(4), 041305-1 to 041305-10 (2008).
6. Dehghani H, **Davis SC**, Pogue BW, "Spectrally resolved bioluminescence tomography using the reciprocity approach," *Medical Physics*, 35(11):4863-4871 (2008).
7. **Davis SC**, Pogue BW, Dehghani H, Paulsen KD, "Tissue drug concentration determines whether fluorescence or absorption measurements are more sensitive in diffuse optical tomography of exogenous contrast agents," *Applied Optics* 48(10), D262-D272 (2009). PMC2762213
8. Li Z, Krishnaswamy V, **Davis SC**, Srinivasan S, Paulsen KD, Pogue BW, "Video-rate near infrared tomography to image pulsatile absorption properties in thick tissue," *Optics Express*, 17(14):12043-12056 (2009).
9. Gibbs-Strauss SL, Samkoe KS, O'Hara JA, **Davis SC**, Hoopes PJ, Hasan T, Pogue BW, "Detecting Epidermal Growth Factor Receptor Tumor Activity In Vivo During Cetuximab Therapy of Murine Gliomas," *Academic Radiology* 17(1):7-17 (2010). PMC2790554
10. Li Z, Krishnaswamy V, Jiang S, **Davis SC**, Srinivasan S, Paulsen KD, Pogue BW, "Rapid magnetic resonance-guided near-infrared mapping to image pulsatile hemoglobin in the breast," *Optics Letters* 35(23):3964-3966 (2010).
11. Axelsson J, **Davis SC**, Gladstone DJ, Pogue BW, "Čerenkov emission induced by external beam radiation stimulates molecular fluorescence," *Medical Physics Letters* 38(7):4127-4132 (2011).

12. Glaser AK, Zhang R, **Davis SC**, Gladstone DJ, Pogue BW, "Time-gated Cherenkov emission spectroscopy from linear accelerator irradiation of tissue phantoms," Optics Letters 37(7):1193-1195 (2012).

D. Research Support

Ongoing Research Support

R01 CA139449

Paulsen (PI)

05/01/09 – 02/28/14

NIH/NCI "Optical Imaging Fused with Tomosynthesis for Improved Breast Cancer Detection"

This project is an academic-industrial partnership proposal under PAR-07-214 to develop and validate optical imaging fused with breast tomosynthesis for improved breast cancer detection and diagnosis.

Role: Investigator

Completed Research Support as PI (in the last 3 years)

W81XWH-09-1-0661

Davis (PI)

09/01/09 – 01/31/13

(DOD Fellowship for post-doc) "Intra-operative Molecular Imaging for Rapid Assessment of Tumor Margin"

This is a post-doctoral research traineeship award funded by the DOD's breast cancer research program. The primary objective of this project is to explore the feasibility of assessing tumor margin status during surgery using targeted fluorescence-labeled tracers.

Role: PI

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Clifford Joseph Eskey		POSITION TITLE Associate Professor of Radiology, Neurology, and Surgery	
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Mass. Institute of Technology, Cambridge, MA	B.S.	1985	Chemical Engineering
Carnegie Mellon University, Pittsburgh, PA	Ph.D.	1992	Chemical Engineering
University of Pittsburgh, Pittsburgh, PA	M.D.	1993	Medicine

A. Personal Statement

Dr Eskey is an Associate Professor of Radiology, Neurology and Surgery with an academic practice in interventional neuroradiology. He also holds a PhD degree in Chemical Engineering. Dr Eskey has been Director of Interventional Radiology at Dartmouth Hitchcock since 2005 and Director of the Division of Neuroradiology since 2007, and participates in clinical and preclinical research studies involving neuroimaging and intervention. He worked with Drs Weaver and Paulsen on their intrinsically-activated MRE approach for brain imaging and has assisted Dr Hoopes in performing interventional procedures in cerebrovascular studies in animal brains. He will exploit his clinical knowledge and preclinical experience to perform the blockage interventions in the canine occlusion studies in Aim 3 of the proposed project.

B. Positions and Employment

1994-1998 Radiology Residency, Massachusetts General Hospital
1998-1999 Neuroradiology Fellowship, Massachusetts General Hospital
1999-2000 Clinical Associate in Radiology, Massachusetts General Hospital
1999-2000 Instructor, Harvard Medical School, 1999-2000
2000-present Staff neuroradiologist, Dartmouth Hitchcock Medical Center
2000-2007 Assistant Professor of Radiology, Dartmouth Medical School
2007-present Associate Professor Radiology, Neurology, and Surgery, Dartmouth Medical School

Other Positions and Professional Licensure

1998 American Board of Radiology Diplomate
1999-2000 Massachusetts State Medical Licensure
2000-present New Hampshire State Medical Licensure
2000 Certificate of Added Qualification in Neuroradiology
2005-present Director, Interventional Neuroradiology
2007-present Director, Division of Neuroradiology

Honors

1984 Chevron Scholarship, Department of Chemical Engineering, Massachusetts Institute of Technology
1985-1986 R.K. Mellon Foundation Fellowship, University of Pittsburgh/Carnegie Mellon M.D./Ph.D. Program
1986 C.C. Guthrie Award in Physiology, University of Pittsburgh School of Medicine
1986 W.S. McEllroy Award in Biochemistry, University of Pittsburgh School of Medicine
1987-1993 Culpepper Fellowship, University of Pittsburgh/Carnegie Mellon M.D./Ph.D. Program
1987 Alpha Omega Alpha, University of Pittsburgh School of Medicine

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

Detre, J. A., Eskey, C. J. and Koretsky, A. P. Measurement of Cerebral Blood Flow in Rat Brain by ^{19}F -NMR Detection of Trifluoromethane Washout. *Magn. Reson. Med.*, 15: 45-57, 1990.

Eskey, C. J., Koretsky, A. P., Domach, M. M. and Jain, R. K. ^2H NMR Imaging of Tumor Blood Flow: Spatial and Temporal Heterogeneity in a Tissue-Isolated Mammary Adenocarcinoma. *Cancer Res.*, 52:

- 6010-6019, 1992.
- Meehan, T.C., Eskey, C.J., Koretsky, A.P., Domach, M.M. Cultivator for NMR Studies of Suspended Cell Cultures. *Biotechnol. Bioeng.*, 40: 1359-1366, 1992.
- Eskey, C. J., Koretsky, A. P., Domach, M. M. and Jain, R. K. Role of Oxygen vs. Glucose in Energy Metabolism in a Mammary Carcinoma Perfused *Ex vivo*: Direct Measurement by ^{31}P NMR. *Proc. Natl. Acad. Sci.*, 90:2646-2650, 1993.
- Schrader, M. C., Eskey, C. J., Simplaceanu, Y. and Ho, C. A Carbon-13 Nuclear Magnetic Resonance Investigation of the Metabolic Fluxes Associated with Glucose Metabolism in Human Erythrocytes. *Biochem. Biophys. Acta.*, 1182:162-178, 1993.
- Eskey, C. J., Wolmark, N., McDowell, C. L., Domach, M. M., Jain, R. K. Residence Time Distributions in Tumors: Implications for Drug Delivery and Blood Flow Measurement. *J. Natl. Cancer Inst.*, 86:293-299, 1994.
- Bramson, R.T., Shiels, W.E., Eskey, C.J., Hu, S.Y. Intraluminal Colon Pressure Dynamics with Valsalva Maneuver during Air Enema Study. *Radiology*, 202:825-828, 1997.
- Eskey, C.J., Tatter, S.B., Lev, M.H. Cerebral CT Venography in Surgical Planning for a Tentorial Meningioma. *JCAT*, 22:530-532, 1998.
- Kelly, P.J., Stein, J., Shafqat, S., Eskey, C., Doherty, D., Chang, Y., Kurina, A., and Furie, K.L. Functional Recovery After Rehabilitation for Cerebellar Stroke. *Stroke*, 32: 530-534, 2001.
- Eskey, C.J., Ogilvy, C.S. Decreased Incidence of Traumatic Tap with Fluoroscopy-guided Lumbar Puncture: Implications for the Diagnosis of Subarachnoid Hemorrhage. *Am J Neurorad*, 22: 571-576, 2001.
- Sanelli, P.C., Gonzalez, R.G., Tong, S.T., Eskey, C.J. Marked variation in relative vertebral artery size and position within the transverse foramen: Implications for CT angiography. *JCAT*, 26:462-470, 2002.
- Rosand, J., Eskey, C., Chang, Y., Gonzalez, G., Greenbery, S.M., Koroshetz, W.J., Dynamic Single-Section CT Demonstrates Reduced Cerebral Blood Flow in Acute Intracerebral Hemorrhage. *Cerebrovasc Dis*, 14:214-220, 2002.
- Hein P, Eskey CJ, Dunn JF, Rhodes CH, and Hug EB. Diffusion-weighted Imaging in the Follow-up of Treated High-Grade Gliomas: Tumor Recurrence vs. Radiation Injury. *AJNR*. 25:201-209, 2004.
- Hu MM, Eskey CJ, Tong SC, Nogueira RG, Pomerantz S, Rabinov JD, Pryor JC, Hirsch JA. Kyphoplasty for vertebral compression fracture via a uni-pedicular approach. *Pain Physician* 8:363-7, 2005.
- Duhaime AC, Saykin AJ, McDonald BC, Dodge CP, Eskey CJ, Darcey TM, Grate LL, and Tomashosky P. Functional Magnetic Resonance Imaging of the Primary Somatosensory Cortex in Piglets. *J Neurosurg (Pediatrics)* 104:259-264, 2006.
- Tong SC, Eskey CJ, Pomerantz SR, Hirsch JA. Skyphoplasty: a Single Institution's Initial Experience. *JVIR* 17:1025-1030, 2006.
- Fadul CE, Kominsky AL, Meyer LP, Kingman LS, Kinlaw WB, Rhodes CH, Eskey CJ, Simmons NE. Long-term response of pituitary carcinoma to temozolomide. Report of two cases. *J Neurosurg* 105:621-6, 2006.
- Reddy NJ, Lewis LD, Gardner TB, Osterling W, Eskey CJ, Nierenberg DW. Two Cases of Rapid Onset Parkinson's Syndrome Following Toxic Ingestion of Ethylene Glycol and Methanol. *Clin Pharmacol Ther* 81: 114-121, 2007.
- Mamourian AC, Pluta DJ, Eskey CE, Merlis AL. Optimizing computed tomography to reduce artifacts from titanium aneurysm clips: an in vitro study. *J Neurosurg* 107:1238-1243, 2007
- Nogueira, RN, Dabus GC, Rabinov JD, Ogilvy GS, Hirsch JA, Eskey CJ, Pryor, JC. Preliminary Experience with Onyx Embolization for the Treatment of Intracranial Dural Arteriovenous Fistulas. *AJNR* 29:91-97, 2008.
- Missios S, Quebada P, Forero J, Durham SR, Pekala J, Eskey C, Duhaime AC. Quick-Brain Magnetic Resonance Imaging for Non-Hydrocephalus Indications. *J Neurosurg Ped* 2:438-444, 2008.
- Fadul CE, Kingman LS, Meyer LP, Cole BF, Eskey CJ, Rhodes CH, Roberts DH, Newton HB, Pipas JM. A Phase II Study of Thalidomide and Irinotecan for Treatment of Glioblastoma Multiforme. *J Neurooncol* 90:229-235, 2008.
- Benz BK, Gemery JM, McIntyre JJ, Eskey CJ. Value of Immediate Pre-procedure MR Imaging in Patients Scheduled to Undergo Vertebroplasty or Kyphoplasty. *Spine* 34:609-612, 2009
- Farsad K, Mamourian AC, Eskey CJ, Friedman JA. Computed tomographic angiography as an adjunct to digital subtraction angiography for the pre-operative assessment of cerebral aneurysms. *Open Neurol J* 3:1-7, 2009.
- Abruzzo T, Moran C, Blackham KA, Eskey CJ, Lev R, Meyers P, Narayanan S, Prestigiacomo CJ. Invasive interventional management of post-hemorrhagic cerebral vasospasm in patients with aneurysmal subarachnoid hemorrhage. *J Neurointerventional Surg*. 4:169-77, 2012.

Miller TR, Eskey CJ, Mamourian AC. Absence of abnormal vessels in the subarachnoid space on conventional magnetic resonance imaging in patients with spinal dural arteriovenous fistulas. *Neurosurg Focus* 32:E15, 2012.

Bekelis K, Desai A, Zhao W, Gibson D, Gologorsky D, Eskey C, Erkmen K. Computed tomography angiography: Improving diagnostic yield and cost-effectiveness in the initial evaluation of spontaneous non-subarachnoid intracerebral hemorrhage. *J Neurosurg* 117:761-766, 2012.

Bekelis K, Missios S, Desai A, Eskey C, Erkmen K. MRI/MRA fusion technique for intra-operative navigation during microsurgery for cerebral arteriovenous malformations. *Neurosurg Focus* 32:E7, 1012.

Weaver JB, Pattison AJ, McGarry MD, Perreard IM, Swienckowski JG, Eskey CJ, Lollis SS, Paulsen KD. Brain mechanical property measurement with MRE using intrinsic activation. *Phys Med Biol* 57: 7275-7287, 2012.

D. Research Support

Ongoing Research Support

Bekelis K, Eskey CJ. Congress of Neurologic Surgeons. Cerebral aneurysm inflammation: prospective correlation of the preoperative use of 18F-FDG PET/CT and iron oxide nanoparticle assisted MRI with postoperative histologic results in human subjects. We seek to correlate histologic abnormalities in the wall of cerebral aneurysms with the uptake of ultrasmall iron oxide particles as measured by histology and quantitative MR imaging. I am responsible for protocol creation, image generation, and data analysis.

Recently Completed Research Support

Fadul C, Kauppinen R, Ronan L, Eskey C. Dartmouth Medical School. Multimodal Magnetic Resonance Protocol to Distinguish Tumor Recurrence from Treatment-Related Necrosis in Patients with High Grade Gliomas. This prospective study compares the results of 1.5T and 3.0T MRI scanners with respect to perfusion imaging, DWI, and MR spectroscopy in patients with suspected recurrent glioblastoma multiforme.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
 Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Fossum, Eric R.	POSITION TITLE Research Professor of Engineering Sciences
eRA COMMONS USER NAME (credential, e.g., agency login) ERFOSSUM	

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 <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Trinity College, Hartford, CT	B.S.	05/79	Physics and Engineering
Yale University, New Haven, CT	M.S.	05/80	Engineering and Applied Science (AP)
Yale University, New Haven, CT	Ph.D.	05/84	Engineering and Applied Science (EE)

A. Personal Statement

For this proposal, the main thing I bring, beyond traditional academic strength, is experience in building successful, innovative-technology-based start-ups. Since joining Dartmouth in 2010, in addition to regular research and teaching duties, I have taken on the responsibility for the Thayer School of Engineering’s Ph.D. Innovation Program. This proposal represents a significant expansion of that program across the Dartmouth campus.

I am best known for the invention, development and subsequent commercialization of the CMOS image sensor “camera-on-a-chip” at Caltech’s NASA Jet Propulsion Laboratory and at the spin-off company I co-founded, Photobit. Photobit was eventually acquired by Micron Technology, a major semiconductor manufacturer in the US. This technology is now used in billions of cameras including nearly all camera-phones, webcams, DSLRs and many other applications under license to Caltech. For this invention I was awarded the honor of National

I was personally involved in two of the early medical applications enabled by the invention – the swallowable “pill camera” (a.k.a. capsule endoscopy) for GI tract imaging, and intra-oral dental radiography. Both technologies are now well established in medicine. Thus, I also have some experience in the field of medical devices.

I feel fortunate to be working at Dartmouth. Not only can I train the next generation of solid-state image sensor technologists according to the traditional research and graduate education model, but I can also make a contribution to fulfilling the nation’s need for leaders with both technical and entrepreneurial expertise by leading the Ph.D. Innovation Program and sharing my experience in enterprise creation.

B. Positions and Honors

Positions and Employment

1984-1990	Asst./Assoc. Professor, Department of Electrical Engineering, Columbia University, NY NY
1990-1996	Technical Assistant Section Manager for Image Sensor and Focal Plane Technology and Senior Research Scientist Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA
1996-2001	Chairman of the Board and various top management positions including CEO Photobit Corporation, Pasadena, CA
2001-2003	Senior Micron Fellow, Micron Imaging, Micron Technology Inc., Pasadena, California
2003-2005	Consultant, Various organizations. Management, Technical and Intellectual Property.
2005-2007	Chairman of the Board & CEO, Siimpel Corporation, Arcadia & Pasadena, CA
2007-2013	President, International Image Sensor Society (IISS)
2008-	Consultant, Samsung Electronics, Semiconductor R&D Center, South Korea

2010- Research Professor, Thayer School of Engineering, Hanover, New Hampshire

Awards

1970 Boy Scouts of America Eagle Scout and Order of the Arrow
1979 Trinity College Honors in Physics; President's Fellow in Physics; Senior Physics Prize
1984 Yale University Henry Prentiss Becton Prize for Excellence in Engineering and Applied Science
1986 National Science Foundation Presidential Young Investigator Award
1992 JPL Lew Allen Award for Excellence
1996 NASA Exceptional Achievement Medal
1998 Fellow of the Institute of Electrical and Electronics Engineers (IEEE)
1999 Space Technology Hall of Fame
2003 Photographic Society of America Progress Medal for Outstanding Contribution to Photography
2004 Royal Photographic Society Progress Medal and Honorary Fellowship
2009 IEEE Andrew S. Grove Award
2010 Inventor of the Year, New York Intellectual Property Law Association
2011 National Inventors Hall of Fame
2012 National Academy of Inventors (Charter Fellow)
2013 National Academy of Engineering

B. Selected publications and US patents

(Selected from over 250 technical publications and 180 issued patents worldwide, H-index: 52)

Papers

- E.R. Fossum, Active pixel sensors: *Are CCDs dinosaurs?*, in CCD's and Optical Sensors III, Proc. SPIE vol. 1900, pp. 2-14, (1993).
- S.Mendis, S.E. Kemeny and E.R. Fossum, *CMOS active pixel image sensor*, IEEE Trans. Electron Devices, vol. 41(3), pp. 452-453 (1994).
- R.H Nixon, S.E. Kemeny, B. Pain, C.O. Staller and E.R. Fossum, *256x256 CMOS active pixel sensor camera-on-a-chip*, IEEE J. Solid-State Circuits, vol. 31(12) pp. 2046-2050 (1996).
- E.R. Fossum, *CMOS image sensors - electronic camera on a chip*, IEEE Trans. Electron Devices, Special Issue on Solid-State Image Sensors, October 1997 vol. 44(10) pp. 1689-1698 (1997).
- O. Yadid-Pecht, C. Staller, and E.R. Fossum, *Wide intrascene dynamic range CMOS APS using dual sampling*, IEEE Trans. Electron Devices, vol. 44(10) pp. 1721-1723 (1997).
- E.R. Fossum, R. Nixon and D. Schick, *A 37 mm x 28 mm 600k-pixel CMOS APS dental x-ray camera-on-a-chip with self-triggered readout*, in Proc. IEEE International Solid-State Circuits Conference, pp. 172-173, San Francisco, CA February 1998.
- W-J. Kim, Y. Wang, I. Ovsianikov, S-H. Lee, Y.D. Park, C-H. Chung, and E.R. Fossum, *A 1.5Mpixel RBGZ image sensor for simultaneous color and range image capture*, in Proceedings of the 2012 Int. Solid-State Circuits Conference pp. 391-392, San Francisco, CA, USA, February 22, 2012.
- E.R. Fossum, *The Quanta Image Sensor (QIS): concepts and challenges*, in Proc. 2011 Opt. Soc. Am. Topical Meeting on Computational Optical Sensing and Imaging, Toronto, Canada July 10-14, 2011.
- J.J. Helble, C.E. Fraser, and E.R. Fossum, *Dartmouth's Ph.D. Innovation Program*, in 2012 American Soc. for Engineering Education (ASEE) Northeast Section Conference, Lowell, MA USA, April 27, 2012

Patents

- E.R. Fossum and R.H. Nixon, *CMOS active pixel sensor type imaging system on a chip*, No. 5,841,126
- E.R. Fossum, *Active pixel sensors with substantially planarized color filtering elements*, No. 5,990,506
- E.R. Fossum, S. Kemeny and B. Pain, *Active pixel sensor with multiresolution readout*, No. 5,949,483
- E.R. Fossum, S. Mendis, B. Pain, R. Nixon and Z.Zhou, *Active pixel sensor having intra-pixel charge transfer with analog-to-digital converter*, No. 6,021,172
- V. Berezin, A Krymski and E.R. Fossum, *Lock-in pinned photodiode photodetector*, No. 6,239,456
- R.C. Gee, P.P-K. Lee, T-H Lee and E.R. Fossum, *Active pixel image sensor using a pinned photodiode*, No. 6,320,617

C. Research Support

Ongoing Research Support

NSF grant#1112753 Ray (PI) 09/01/11-08/31/14

Partnerships for Innovation PFI – Cognitive Signal Processing

Role: Co-PI \$599,990.00

The purpose of this research is to translate mobile sensors for sensory enhancement. The program allows partnerships with students and small business to develop and translate these discoveries.

Rambus, Inc. Fossum (PI) 1/1/2012-12/31/2014

Role: PI

Research into quanta image sensor (QIS) technology. Basic semiconductor device, circuit, and system concept and performance issues are under investigation.

Completed Research Support

Samsung Electronics Fossum (PI) 9/21/2011-9/20/2012

Global Research Outreach (GRO).

Role: PI

The purpose of this work is the investigation of 3D Time Of Flight (TOF) Image Sensor Technology Applications to Medicine.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Freeman, Richard B.		POSITION TITLE	
eRA COMMONS USER NAME rbfreeman		Chair, Department of Surgery William N. and Bessie Allyn Professor of Surgery	
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Franklin & Marshall College, Lancaster, PA	B.A.	1979	Biology
Jefferson Medical College, Philadelphia, PA	M.D.	1983	Medicine

A. Personal Statement

For twenty years, I have focused on transplant outcomes research and developing patient-centered, evidence-based policy for organ allocation in the US. Increasingly I have realized, as all health care resources become more constrained, that the methods used and lessons learned in the transplantation work are applicable in all of Medicine and especially in Surgery. For surgery's role to be correctly defined in an accountable care world, we must train Surgeon scientists skilled in evidence based inquiry in order to adequately inform the shared decision-making processes around surgical care of the future. I look forward to encouraging my faculty to participating in the Center for Surgical Innovation because the investigations that can take place within the Advanced Surgical Center can impact device and interventional innovation, but also the safe and cost-effective practice of surgery.

Positions and Honors

2010-present Chair, Department of Surgery and William N. and Bessie Allyn Professor of Surgery, Dartmouth-Hitchcock Medical Center
2008-09 Vice Chair for Research and Director of Surgical Research Labs
2004-09 Professor of Surgery, Tufts University School of Medicine
1997-04 Associate Professor of Surgery, Tufts University School of Medicine
1990-97 Assistant Professor of Surgery, Tufts University School of Medicine
1989-90 Henry Fellow in Transplantation, Harvard Surgical Service, New England Deaconess Hospital, Boston, MA
1986-87 Instructor in Surgery, Aberdeen University, Aberdeen, Scotland
1983-90 Clinical Fellow in Surgery, Harvard Medical School

HONORS (from 25)

2009 Rising Star mentorship Award, International Liver transplant Society
2009 Best Doctors in America Award 2009-2010
2008 Excellence in Teach, Surgery, TUSM Class of 2009
2008 Best Doctors in America Award 2007-2008
2007 Best Doctors in America Award 2006-2007
2006 America's Top Surgeons
2005 Best Doctors in America Award 2005-2006
2003 International Health Professional of the Year

PROFESSIONAL COMMITTEES (from 62)

2007- Board of Directors Transplant Informatics Institute
2007- American Society of Transplant Surgeons Council Member/Chair Legislative Committee
2006- Chairman, Board of Trustees, New England Organ Bank
2006-2008 UNOS/OPTN Board of Directors, at Large Member
2006-2008 UNOS/OPTN Executive Committee, at Large Member

2006- Associate Editor, *American Journal of Transplantation*
 2005-2006 HSS Secretaries Advisory Committee on Transplantation
 2004-2005 Section Chair Donation and Allocation, American Transplant Congress Program Review
 2003 Organizing Committee NIH Conference "Evolving Concepts in Liver Allocation"
 2003-2006 Chairman American Society of Transplant Surgeons, Professional Standards Committee
 2002-2005 Member UNOS/OPTN Ad Hoc Living Donor Committee
 2001-2005 Member Data Working Group Liaison Committee, UNOS/OPTN/SRTR/HRSA, DOT
 2001- Associate Editor, *Liver Transplantation*
 2000-2003 Chairman UNOS/OPTN Liver and Intestine Transplantation Committee
 1999-2000 Vice Chairman UNOS/OPTN Liver and Intestine Transplantation Committee
 1999-2003 Chairman UNOS/OPTN Alternative Allocation Units Committee
 1998-2003 Chairman, UNOS/OPTN Subcommittee for Department of Health and Human Services
 Relations

B. Selected peer-reviewed publications (from a total of 188)

1. **Freeman, R.B.**, Giatras, I., Falagas, M.E., Supran, S., O' Connor, K., Bradley J., Snyderman, D.R., Delmonico, F.L. Outcome of transplantation of organs procured from bacteremic donors. *Transplantation* 1999; 68:1107-111.
2. Sahoo, S., Kang, S., Supran, S., Saloman, R., Wolfe. H.A., **Freeman, R. B.** Tumor Necrosis Factor (TNF) Genetic Polymorphisms Correlate With Infections After Renal Transplantation. *Transplantation* 2000, 69:880-4
3. Gandhi, N., Goldman, D., Kahan, D., Supran, S., Saloman, R., Delmonico, F. O' Connor, K., and **Freeman, R.** Donor cytokine gene polymorphisms are associated with increased graft loss and dysfunction after transplant. *Transplant Proc* 2001; 33:827-8.
4. **Freeman, RB**, Harper AM, Edwards EB. Redrawing organ distribution boundaries: results of a computer simulated analysis for liver transplantation. *Liver Transplantation* 2002; 8:659-66..
5. Jaber BL, Rao M, Guo D, Balakrishnan VS, Perianayagam MC, **Freeman RB**, Pereira BJG. Cytokine promoter gene polymorphisms and mortality in acute renal failure. *Cytokine* 2004; 25:212-219
6. Balakrishnan Vs, Gua D, Rao M, Jaber BL, Tighiouart H, **Freeman RB**, Huang C, King AJ, Perriera BJG. Cytokine gene polymorphisms in hemodialysis patients: Association with comorbidity, functionality, and serum albumin. *Kidney International*, 2004; 65:1449-60.
7. **Freeman RB**, Weisner RH, Harper A, McDairmid SV, Lake J, Edwards E B, Merion R, Wolfe R, Turcotte J, and Teperman, L. The New Liver Allocation System: moving towards evidence-based transplantation policy, *Liver Transplantation* 2002; 8:851-858
8. Wiesner RH, Edwards EB, **Freeman RB**, Harper A, Kim R, Kamath P, Kremers W, Lake J, Howard T, Krom R. Model for end stage liver disease (MELD) and allocation of donor livers. *Gastroenterology* 2003; 124:91-96
9. Roberts JP, Brown RS, Edwards EB, Farmer DG, **Freeman RB**, Wiesner RH, and Merion RM. SRTR Report on the state of transplantation: Liver an intestinal transplantation. *Amer. J of Transplantation*, 2003; 3suppl 4:78-90.
10. Emond JC, **Freeman RB**, Renz JF, Yersiz H, Rogiers X, Busuttill RW. Optimizing the use of donated cadaver livers: Analysis and policy development to increase the application of split-liver transplantation. *Liver Transplantation*, 2002; 8:863-72.
11. Angelis, MA, Cooper JT, **Freeman RB**. Impact of donor infection on outcome of orthotopic liver transplantation. *Liver Transplantation* 2003; 9:451-62.
12. **Freeman RB**, The impact of the model for end stage liver disease on recipient selection for adult living liver donation. *Liver Transplantation* 2003; 9 (Suppl 2):54-9.
13. **Freeman RB**, Wiesner RH, Harper A, Edwards EB, Merion RB, Wolfe R. Results of the first year of the new liver allocation plan. *Liver Transplantation* 2004; 10:7-15.
14. **Freeman, RB**, Steffick D, Guidinger M, Farmer D, Berg C, Merion RM. Liver and intestine transplantation in the united states, 1997-2006. *American J of Transplant* 2008; 8:(Suppl2) 958-976.
15. **Freeman RB**, Jamieson NV, Schaubel DA, Porte RJ, Villamil FR. Who should get the liver graft? *J Hepatology*; 2009; 50:664–673.
16. Pomfret EA, Washburn K, Wald C, Nalesnik MA, Douglas D, Russo M, Roberts J, Reich DJ, Schwartz ME, Miele L, Lee FT, Florman S, Yao F, Harper A, Edwards E, **Freeman R**, Lake J Report of a national conference on liver allocation in patients with hepatocellular carcinoma in the United States. *Liver Transpl.* 2010 Mar;16(3):262-78.

17. Bandara M, Gordon FD, Sarwar A, Knauft ME, Pomfret EA, **Freeman RB**, Wirth JA. Successful outcomes following living donor liver transplantation for portopulmonary hypertension. *Liver Transpl.* 2010 Aug;16(8):983-9.
18. Canter RJ, Patel SA, Kennedy T, D'angelica MI, Jarnagin WR, Fong Y, Blumgart LH, **Freeman RB**, Dematteo RP, Abt PL Comparative Analysis of Outcome in Patients With Hepatocellular Carcinoma Exceeding the Milan Criteria Treated With Liver Transplantation Versus Partial Hepatectomy. *Am J Clin Oncol.* 2010 Oct 8
19. Humar A, Morris M, Blumberg E, **Freeman R**, Preiksaitis J, Kiberd B, Schweitzer E, Ganz S, Caliendo A, Orlowski JP, Wilson B, Kotton C, Michaels M, Kleinman S, Geier S, Murphy B, Green M, Levi M, Knoll G, Segev D, Brubaker S, Hasz R, Lebovitz DJ, Mulligan D, O'Connor K, Pruett T, Mozes M, Lee I, Delmonico F, Fischer S. Nucleic acid testing (NAT) of organ donors: is the 'best' test the right test? A consensus conference report. *Am J Transplant.* 2010 Apr;10(4):889-99
20. Rhee JY, Ruthazer R, O'Connor K, Delmonico FL, Lusk RS, **Freeman RB**. The impact of variation in donation after cardiac death policies among donor hospitals: a regional analysis. *Am J Transplant.* 2011 Aug;11(8):1719-26.
21. Prasad KR, Young RS, Burra P, Zheng SS, Mazzaferro V, Moon D, **Freeman RB**. Summary of candidate selection and expanded criteria for liver transplantation for HCC: A review and consensus statement from the 2010 international consensus conference on liver transplantation for hepatocellular carcinoma. *Liver Transpl.* 2011
22. Siparsky N, Axelrod DA, **Freeman RB**. *Donor Liver Distribution in Medical Care of the Liver Transplant Patient*, 2nd Edition, Clavien PA and Killinberg PG eds. (2011) Blackwell Oxford, UK
42. **Freeman RB**, Selection and timing of liver transplantation. In *Shiff's Diseases of The Liver*, 11th Edition, Shiff, EG and Sorrell M eds. (2011) Lippincott Williams Wilkins, Philadelphia PA.
42. **Freeman RB** Small steps versus big leaps in changing liver distribution policy. *Liver Transpl.* 2011; 7(9):991-2.
43. **Freeman RB** Jr. Variation in health care delivery: the example of exception awards in liver transplantation. *Am J Transplant.* 2011 Nov;11(11):2271-2.

C. Research Support

Ongoing Support

R21 CA131856-01 Freeman (PI)

04/09-03/12

NIDDK

Liver Transplantation for Hepatocellular Carcinoma

The goal of this study is to combine the National Organ Procurement and Transplantation database with detailed pathology of over 3000 cases to assess the long term efficacy of liver transplantation and ablative techniques on the outcome of liver transplantation for patients with hepatocellular carcinoma.

Completed Projects

R21 DK68305-01 Freeman (PI)

07/04-06/06

NIDDK

Liver Transplantation for Hepatocellular Carcinoma

The goal of this study is to use the National Organ Procurement and Transplantation database to assess the efficacy of liver transplantation and ablative techniques on the outcome of liver transplantation for patients with hepatocellular carcinoma.

Principal Investigator/Program Director (Last, First, Middle):

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME

Gerngross, Tillman

POSITION TITLE

Professor of Biochemical Engineering

eRA COMMONS USER NAME

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
Technical University of Vienna, Austria	MS	1989	Biomedical Engineering
Technical University of Vienna, Austria	PhD	1991	Molecular Biology
M.I.T., Massachusetts	Research Scientist	1989-1991	Biomedical Engineering
M.I.T., Massachusetts	Post-doc Fellow	1991-1993	Biomedical Engineering

B. Positions and Honors

Positions and Employment

1993-1998 Metabolix Inc., Cambridge, Massachusetts, Head of Fermentation & Process Development
1998-2002 Assistant Professor of Biomedical Engineering, Thayer School of Engineering, Hanover, NH
2000-2002 Adjunct Assistant Professor, Department of Biological Sciences, Dartmouth College, Hanover, NH
2000-present Co-Founder and Chief Scientific Officer, GlycoFi Inc., Lebanon, NH
2002-2007 Adjunct Associate Professor of Biological Sciences, Dartmouth College, Hanover, NH
2002-2007 Associate Professor of Biochemical Engineering, Thayer School of Engineering, Hanover, NH
2003-2007 Adjunct Associate Professor, Department of Chemistry, Dartmouth College, Hanover, NH
2006-present Venture Partner, SV Life sciences, Boston, MA
2007-present Co-founder and CEO of ADiMaB with Dane Wittrup at MIT
2007-present Professor of Biochemical Engineering, Thayer School of Engineering, Hanover, NH

Awards

1989 Fullbright Fellowship (declined)
2004 Scientific American, GlycoFi receives Top 50 Award for most innovative Manufacturing Technologies
2006 Tibbets Award, by the Small Business Technology Council
2006 Red Herring 100 Award to GlycoFi-Award recognizing the 100 Private North American Firms Driving the Future of Technology
2006 Editors of Nature Biotechnology nominate Professor Gerngross amongst personalities who have made the most significant contribution to biotech in the past 10 years
2007 New Hampshire Entrepreneur of the Year

B. Selected peer-reviewed publications

Gerngross TU, Reilly P, Sinskey AJ, Stubbe J, Peoples OP (1993). Immunocytochemical analysis of the PHB synthase in *Alcaligenes eutrophus* H16: Localization of the synthase enzyme at the surface of PHB granules. *J Bacteriol* 16:5289-5293.
Gerngross TU, Romaniec MPM, Huskisson NS, Demain AL (1993). Sequencing of *cipA*, a clostridium thermocellum cellulase gene encoding the SL protein reveals an unusual degree of internal homology. *Mol Microbiol* 8:325-334.
Gerngross TU, Peoples OP, Sinskey AJ, Csuhai E, Stubbe J (1994). Overexpression and purification of the soluble polyhydroxyalkanoate synthase from *Alcaligenes eutrophus*. *Biochem* 33:9311-9320.
Gerngross TU, Martin DP (1995). Enzyme-catalyzed synthesis of PHB: Formation of macroscopic granules in vitro. *Proc Natl Acad Sci* 92:6279-6283

Principal Investigator/Program Director (Last, First, Middle): Gerngross, Tillman

- Gerngross TU (1999). Can biotechnology move us towards a sustainable society? *Nat Biotechnol* 17:541-544.
- Boynton ZL, Koon JJ, Brennan EM, Clouart JD, Horowitz DM, Gerngross TU, Huisman GW (1999). Reduction of cell lysate viscosity during processing of poly(3-hydroxyalkanoates) by chromosomal integration of the staphylococcal nuclease gene in *Pseudomonas putida*. *Appl Environ Microbiol* 65(4):1524-1529.
- Coulon R, Kurdikar D, Slater S, Fournet L, Paster M, Gruys K, Gerngross TU (2001). Greenhouse gas profile of a plastic material derived from a genetically modified plant. *J Ind Ecol* 4(3):107-122.
- Srinivasan S, Barnard G, Gerngross TU (2002). A novel high-cell density protein expression system based on *Ralstonia eutropha*. *Appl Environ Microbiol* 68:5925-5932.
- Nett JH, Gerngross TU (2003). Cloning and disruption of the PpURA5 gene and construction of a set of integration vectors for the stable genetic modification of *Pichia pastoris*. *Yeast* 20:279-1290.
- Hamilton SR, Bobrowicz P, Bobrowicz B, Davidson RC, Li H, Mitchell T, Nett JH, Rausch S, Stadheim TA, Wischnewski H, Wildt S, Gerngross TU (2003). Production of complex human glycoproteins in yeast. *Science* 301:1244-1246.
- Gerngross TU, Slater S (2003). Biopolymers and the environment. *Science* 299:822-823.
- Srinivasan S, Barnard GC, Gerngross TU (2003). Production of recombinant proteins using multiple-copy gene integration in high-cell density fermentations of *Ralstonia eutropha*. *Biotechnol Bioeng* 84(1):114-120.
- Choi BK, Bobrowicz P, Davidson RC, Hamilton SR, Kung DH, Li H, Miele RG, Nett JH, Wildt S, Gerngross TU (2003). Use of combinatorial genetic libraries to humanize N-linked glycosylation in the yeast *Pichia pastoris*. *Proc Natl Acad Sci* 100(9):5022-5027.
- Gerngross TU (2004). Advances in the production of human therapeutic proteins in yeasts and filamentous fungi. *Nat Biotechnol* 1409-1414.
- Ballew N, Gerngross TU (2004). Production of therapeutic proteins in fungal hosts. *Expert Opin Biol Ther* 4(5):623-626.
- Barnard GC, Henderson GE, Srinivasan S, Gerngross TU (2004). High level recombinant protein expression in *Ralstonia eutropha* using T7 RNA polymerase based amplification. *Protein Expr Purif* 38(2):264-271.
- Gerngross TU (2005). Production of complex human glycoproteins in yeast. *Adv Exp Med Biol* 564:139.
- Reed DC, Barnard GC, Anderson EB, Klein LT, Gerngross TU (2005). Production and purification of self-assembling peptides in *Ralstonia eutropha*. *Protein Expr Purif* 46(2):179-188.
- Barnard G, McCool JD, Wood DW, Gerngross TU (2005). An integrated recombinant protein expression and purification platform based on *Ralstonia eutropha*. *Appl Environ Microbiol* 71(10):5735-5742.
- Banki MR, Gerngross TU, Wood DW (2005). Novel and economical purification of recombinant proteins: Intein-mediated protein purification using *in vivo* polyhydroxybutyrate (PHB) matrix association. *Protein Sci* 14(6):1387-1395.
- Hamilton SR, Li H, Wischnewski H, Prasad A, Kerley-Hamilton JS, Mitchell T, Walling AJ, Davidson RC, Wildt S, Gerngross TU (2005). Intact α 1,2-endomannosidase is a typical type II membrane protein. *Glycobiology* 15(6):615-624.
- Wildt S, Gerngross TU (2005). The humanization of N-glycosylation pathways in yeast. *Nat Rev Micro* 3(2):119-128.
- Hamilton SR, Davidson RC, Sethuraman N, Nett JH, Jiang Y, Rios S, Bobrowicz P, Stadheim TA, Li H, Choi BK, Hopkins D, Wischnewski H, Roser J, Mitchell T, Strawbridge RR, Hoopes J, Wildt S, Gerngross TU (2006). Humanization of yeast to produce complex terminally sialylated glycoproteins. *Science* 313(5792):1441-1443.
- Li H, Sethuraman N, Stadheim TA, Zha D, Prinz B, Ballew N, Bobrowicz P, Choi BK, Cook WJ, Cukan M, Houston-Cummings NR, Davidson R, Gong B, Hamilton SR, Hoopes JP, Jiang Y, Kim N, Mansfield R, Nett JH, Rios S, Strawbridge R, Wildt S, Gerngross TU (2006). Optimization of humanized IgGs in glycoengineered *Pichia pastoris*. *Nat Biotechnol* 24(2):210-215.
- Li H, Miele RG, Mitchell TI, Gerngross TU (2007). N-linked glycan characterization of heterologous proteins. *Methods Mol Biol* 389:139-150.
- Ríos SE, Giaccone EM, Gerngross TU (2007). Rapid screening of chromatography resins for the purification of proteins. *Methods Mol Biol* 389:99-106.
- Hamilton SR, Gerngross TU (2007). Glycosylation engineering in yeast: The advent of fully humanized yeast. *Curr Opin Biotechnol* 18(5):387-392.
- Stadheim TA, Li H, Kett W, Burnina IN, Gerngross TU (2008). Use of high-performance anion exchange chromatography with pulsed amperometric detection for O-glycan determination in yeast. *Nat Protoc* 3(6):1026-1031.

Principal Investigator/Program Director (Last, First, Middle): Gerngross, Tillman

Kainz E, Gallmetzer A, Hatzl C, Nett JH, Li H, Schinko T, Pachlinger R, Berger H, Reyes-Dominguez Y, Bernreiter A, Gerngross T, Wildt S, Strauss J (2008). N-glycan modification in *Aspergillus* species. *Appl Environ Microbiol* 74(4):1076-1078

Gong B, Cukan M, Fisher R, Li H, Stadheim TA, Gerngross T (2009). Characterization of N-linked glycosylation on recombinant glycoproteins produced in *Pichia pastoris* using ESI-MS and MALDI-TOF. *Methods Mol Biol* 534:213-223.

C. Research Support

Ongoing Research Support

2P20RR018787 Stanton (PI) 08/11/2008-04/30/2013 NIH COBRE Cellular and molecular mechanisms of lung disease Faculty mentor to Assistant Professor Karl Griswold Goal: The goals of this application are to increase the number of investigators in New Hampshire who are competitive in securing NIH funding, and to establish a Lung Biology Center that will be nationally recognized and free standing in five years. Role: Mentor

1U54CA151662 Baker (PI) 09/16/2010-07/31/2015 NIH-NCI Dartmouth Center for Nanotechnology Excellence Goal: This project aims to develop nanoparticle-based magnetic hyperthermia for cancer treatment. Role: Co-PI

Completed Research Support

60NANB1D0064 Lynd (PI) 08/01/2001-08/31/2008 DOC-NIST Biocommodity engineering research initiative Goal: Glycoengineering of *E.coli* to perform site specific glycan modifications on recombinantly expressed proteins. Role: Co-PI

Eli Lilly and Company Gerngross (PI) 12/08/2008-12/07/2010 Site-specific PEGylation using Glycoengineered-E. coli Goal: The goal is to oversee the process by which we engineer cells to perform site specific modifications of recombinant proteins. Role: PI

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Green, Alan I.	POSITION TITLE Raymond Sobel Professor of Psychiatry Professor of Pharmacology and Toxicology Chairman, Department of Psychiatry Geisel School of Medicine at Dartmouth		
eRA COMMONS USER NAME AIGREEN			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Columbia College, New York, NY	AB	1965	Pre-Med/History
Johns Hopkins University School of Medicine, Baltimore, MD	MD	1969	Medicine

A. Personal Statement

I have been involved in neuropsychopharmacology research related to schizophrenia for over 20 years and to schizophrenia with co-occurring alcohol/substance use disorder for approximately 13 years. My research program, which involves clinical and neurobiological studies of patients with schizophrenia, particularly those with co-occurring substance use disorders, medication development studies for patients with alcoholism, neuroimaging studies of brain reward circuitry in these patients, and studies of antipsychotics in alcohol drinking animals, has been funded by a series of grants from NIH, NARSAD and industry. My colleagues and I have proposed a neurobiological model suggesting that co-occurring substance use disorder in patients with schizophrenia relates, at least in part, to deficiencies in dopamine-mediated brain reward circuits. Data from our group have suggested that the novel antipsychotic medication clozapine limits alcohol and other substance use in these patients; we have proposed that the unique effects of clozapine in these patients relates to the mechanism of action of the drug, including its effects in brain reward circuits. My on-going studies are continuing to probe the optimal psychopharmacological or neurostimulation strategies for patients with schizophrenia and co-occurring substance use disorders through clinical trials, neuroimaging studies, and a series of investigations in animals.

B. Positions and Honors

Positions and Employment

1969-1970 Intern in Medicine, Beth Israel Hospital, Boston, MA
 1969-1970 Clinical Fellow in Medicine, Harvard Medical School, Boston, MA
 1970-1972 Staff Associate, NIMH, Laboratory of Pre-Clinical Pharmacology
 1971-1973 Special Assistant and Acting Director of Research, Special Action Office for Drug Abuse Prevention, Executive Office of the President, Washington, DC (consultant 1973-1975)
 1972-1982 Clinical Fellow in Psychiatry, Harvard Medical School, Boston, MA
 1973-1975 Resident in Psychiatry, Massachusetts Mental Health Center (MMHC), Boston, MA
 1981-1982 Resident in Psychiatry, Massachusetts Mental Health Center (MMHC), Boston, MA
 1975-1981 Professional leave of absence due to systemic cytomegalovirus infection
 1981-1984 Assistant Clinical Director, Southard Clinic, (MMHC), Boston, MA
 1982-1984 Senior Research Fellow in Psychiatry, Harvard Medical School, Boston, MA
 1983-1993 Program Director, Psychopharmacology Extramural Training Program, (MMHC), Boston, MA
 1984-1994 Assistant Professor of Psychiatry, Harvard Medical School
 1984-1993 Associate Director of Psychopharmacology, (MMHC)
 1987-1999 Administrative Director to Director, Commonwealth Research Center, (MMHC), Boston, MA
 1994-2002 Associate Professor of Psychiatry, Harvard Medical School, Boston, MA
 1999-2002 Center Director, Commonwealth Research Center, Harvard Medical School, Boston, MA
 2002- Raymond Sobel Professor and Chair, Psychiatry, Geisel School of Medicine at Dartmouth
 2005- Professor of Pharmacology and Toxicology, Geisel School of Medicine at Dartmouth
 2010- Director of SYNERGY: The Dartmouth Center for Clinical & Translational Science
 2010- Associate Dean for Clinical and Translational Science, Geisel School of Medicine at Dartmouth
 2012- Associate Vice President for Health Affairs, Dartmouth College

Honors & Professional Memberships

1990	Outstanding Teacher Award, Brockton VA Medical Center, Department of Psychiatry
1998	Outstanding Psychiatrist Award for Research, Massachusetts Psychiatric Society
1999-	Fellow, American Psychiatric Association
2000	Peter Curran Lecturer, Mater Hospital Trust, Belfast, N. Ireland
2001-	Member, American College of Neuropsychopharmacology
2002	Member, ZMHI/NRB w -13R Study Section (NIMH)
2002	Chairman, ZAAI BB22 Study Section (NIAAA)
2004	Master of Arts (Hon.), Dartmouth College
2004	Member, Study Section for RFA-DA-04-016 (NIDA)
2006	Member, Study Section for RFA DA06-002 (NIDA)
2009	Member, NIDA "L" Review Committee
2010	Member, ZMH1ERB-F08 ITVA Conflicts Meeting (NIMH)
2010	Member, ZMH1ERB-F02 S Study Section (NIMH)
2011	Member, ZRG1 BDCN-C (02) M Study Section (NIH)
2011	Fellow, American College of Neuropsychopharmacology

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

- Green AI**, Zimmet SV, Strous RD, Schildkraut JJ (1999). Clozapine for comorbid substance use disorder and schizophrenia: do patients with schizophrenia and schizoaffective disorder have a reward deficiency syndrome that can be ameliorated by clozapine? *Harvard Rev Psychiatry* 6(6):289-296.
- Drake RE, Xie H, McHugo GJ, **Green AI** (2000). The effects of clozapine on alcohol and drug use disorders among schizophrenic patients. *Schiz Bulletin* 26(2):441-449.
- Green AI**, Burgess ES, Dawson R, Zimmet SV, Strous RD (2003). Alcohol and cannabis use in schizophrenia: effects of clozapine vs. risperidone. *Schiz Res* 60:81-85.
- Green AI**, Tohen MF, Hamer RM, Strakowski SM, Lieberman JA, Glick I, Clark WS, HGDH Research Group (2004). First episode schizophrenia-related psychosis and substance use disorders: acute response to olanzapine and haloperidol. *Schiz Res* 66(2-3), 125-135
- Green AI**, Chau DT, Keung WM, Dawson R, Meshulam RI, Schildkraut JJ (2004). Clozapine reduces alcohol drinking in Syrian golden hamsters. *Psych Res* 128:9-20.
- Chau DT, Roth RM, **Green AI** (2004). The neural circuitry of reward and its relevance to psychiatric disorders. *Curr Psychiatry Rep* 6(5):391-9
- Green AI**, Lieberman JA, Hamer RM, Glick ID, Gur RE, Kahn RS, McEvoy JP, Perkins DO, Rothschild AJ, Sharma T, Tohen MF, Woolson S, Zipursky RB, HGDH Study Group (2006). Olanzapine and haloperidol in first-episode psychosis: Two year data. *Schiz Res* 86(1-3):234-243.
- Green AI**, Drake RE, Brunette MF, Noordsy DL (2007). Schizophrenia and Co-Occurring Substance Use Disorder. *American Journal of Psychiatry* 164(3):402-408.
- Brunette MF, O'Keefe C, Zimmet SV, Wojcik JD, Dawson R, **Green AI** (2008). Clozapine, Olanzapine, or Typical Antipsychotics for Alcohol Use Disorder in Patients with Schizophrenia. *J Dual Diagn*, 4(4): 344-54.
- Chau DT, Gulick D, Xie H, Dawson R, **Green AI**. (2009) Clozapine chronically suppresses alcohol drinking in Syrian golden hamsters. *Neuropharmacology* 58(2): 351-356.
- Brunette MF, O'Keefe C, Dawson R, Buckley P, **Green AI** (2009). An open label study of quetiapine in patients with schizophrenia and alcohol disorders. *Mental Health and Substance Use: Dual Diagnosis* 2(3):203-211.
- Whitfield-Gabrieli S, Thermenos HW, Milanovic S, Tsuang MT, Faraone SV, McCarley RW, Shenton ME, **Green AI**, Nieto-Castanon A, LaViolette P, Wojcik J, Gabrieli JD, Seidman LJ. Hyperactivity and hyperconnectivity of the default network in schizophrenia and in first-degree relatives of persons with schizophrenia. *Proc Natl Acad Sci U S A*. 2009;106(4):1279-84. PMID: PMC2633557.
- Henderson MB, **Green AI**, Bradford PS, Chau DT, Roberts DW, Leiter JC (2010). Deep brain stimulation of the nucleus accumbens reduces alcohol intake in alcohol preferring rats during stable drinking and after alcohol deprivation. *Neurosurgical Focus* 29(2):E12-18.
- Chau DT, Ahmed J, Wang TT, Xie H, Dawson R, **Green AI** (2011). Risperidone lessens the ability of clozapine to suppress alcohol drinking in Syrian golden hamsters. *Neuropharmacology*, 61(4): 646-652.
- Brunette MF, Dawson R, O'Keefe CD, Narasimhan M, Noordsy DL, Wojcik J, **Green AI** (2011). A randomized trial of clozapine vs. other antipsychotics for cannabis use disorder in patients with schizophrenia. *Journal of Dual Diagnosis* 7(1-2): 50-63.

D. Research Support
Ongoing Research Support

R21 AA019534 Green (PI) 04/01/2011 – 03/31/2014
NIAAA (No Cost Extension)
Alcoholism and Schizophrenia: A Translational Approach to Treatment
The major goal of this clinical trial is to begin to assess whether risperidone in combination with desipramine will limit alcohol use in patients with schizophrenia and alcohol use disorder.

R01DA032533 (Green) Green (PI) 07/15/2012 – 05/31/2016
NIDA
Clozapine for cannabis use disorder in schizophrenia
This study aims primarily to determine the comparative ability of clozapine and risperidone to decrease cannabis use in patients with schizophrenia and cannabis use disorder. Other subsidiary aims will determine the comparative effects of these medications on psychiatric symptoms, neuropsychological functioning, and quality of life. Lastly, the study will explore whether patients with the val/val genotype at the COMT val158met locus are more likely to respond to clozapine than are those with the met/met or the val/met genotype.

Investigator-initiated Study (Industry) Green (PI) 02/15/2013 – 07/31/2014
Novartis
Iloperidone for alcohol use disorder in schizophrenia
This study aims to assess whether iloperidone will decrease alcohol drinking in the Syrian golden hamster, and to assess whether desipramine added to iloperidone will decrease alcohol drinking in the Syrian golden hamster.

Completed (Past three years)

R01AA018151 Green (PI) 07/01/2010 – 04/30/2013
NIAAA
Deconstructing Clozapine: Toward Medication for Alcoholism in Schizophrenia
The major goals of this study are to elucidate the hypothesis that clozapine's effect in alcohol-preferring rodents, as in patients with schizophrenia and co-occurring alcohol use disorder, relates to its actions on dopamine and norepinephrine systems, and to provide data enabling further research.

R01 DA026799 Green (PI) 08/01/2009 – 12/31/2012
NIDA
Cannabis and Schizophrenia: Self-Medication and Agonist Treatment?
This "proof of concept" study seeks to determine whether a brain reward circuit deficiency in patients with schizophrenia and cannabis use disorder will be normalized when patients are given cannabis or the cannabinoid agonist dronabinol.

NCIG 003 Green (PI) 02/01/2011 – 01/31/2012
NIAAA/Fast Track Drugs and Biologics, LLC
Varenicline for Alcohol Dependence
The major goal of this clinical trial is to assess the efficacy of varenicline in the treatment of heavy drinking alcoholics. Dartmouth is one of 5 sites for this study: Dartmouth, University of Virginia, University of Pennsylvania, Boston University and Johns Hopkins University.

R21 DA029131 Sevy (PI) 07/01/2010 – 06/30/2012
NIDA
Improving Substance Use and Clinical Outcomes in Heavy Cannabis Users
The major goal of this study is to determine the effectiveness of the atypical antipsychotic quetiapine in treating heavy cannabis users at risk for psychosis.
Role: Co-Investigator

R13AA018603-01 Green (PI) 07/01/2009 – 06/30/2011
NIAAA
Integrating Etiologic Models and Optimizing Treatment for Alcohol Disorders in Schizophrenia Patients

This is a two-day conference bringing together a multi-disciplinary group of scientists and scientist-practitioners whose research informs biological, cognitive, and/or psychosocial models of etiology and treatment of alcohol use disorder, schizophrenia, and of co-occurring substance use disorder in schizophrenia.

NCIG-002 Green (PI) 09/01/2009 – 3/31/2011

NIAAA/Fast Track Drugs & Biologics, LLC

A Phase 2, Double-Blind, Placebo Controlled Trial of Levetiracetam XR In Very Heavy Drinkers.

This is a clinical trial to assess the efficacy of Levetiracetam XR (Keppra) in the treatment of heavy drinking alcoholics.

Investigator-initiated Study (Industry) Green (PI) 11/05/2007 – 03/31/2011

Ortho-McNeil Janssen Scientific Affairs

Paliperidone and Alcohol Drinking in Rodents

This study seeks to determine the effect paliperidone has on alcohol drinking in rodents.

Investigator-initiated Study (Industry) Green (PI) 12/23/2004 – 06/30/2010

Janssen Pharmaceuticals Inc,

Risperidone Long-Acting for Alcohol and Schizophrenia Treatment (R-LAST)

This study, undertaken at 4 national sites and led by the PI, seeks to assess the use of alcohol and other substances over the course of 6 months in patients taking Long-Acting Risperidone (Risperdal Consta) as compared to those treated with oral risperidone.

Multi-Center Trial Green (PI) 11/01/2008 – 11/01/2010

Eli Lilly and Co.

A phase 2 study of LY2196044 compared with naltrexone and placebo in the treatment of alcohol dependence.

BIOGRAPHICAL SKETCH

NAME Halter, Ryan J.	POSITION TITLE Research Assistant Professor		
eRA COMMONS USER NAME RHALTER			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Pennsylvania State University, State College, PA	B.S.	1999	Eng. Science & Mechanics
Pennsylvania State University, State College, PA	M.S.	2001	Engineering Mechanics
Dartmouth College, Hanover, NH	Ph.D.	2006	Biomedical Engineering

A. Personal Statement

I have a broad background in developing medical devices, evaluating these devices through bench-top and animal trials, and deploying these technologies in pre-clinical trials. I specifically focus on developing intraoperative and diagnostic technologies that leverage tissue bioimpedance as a means for distinguishing benign from pathological tissues. My specific training and experience has focused on developing hardware systems for gauging *in vivo* and *ex vivo* electrical properties, assessing the biophysical mechanism responsible for a tissue's particular properties, and evaluating the clinical significance of these properties. During my doctoral studies, I developed a multi-spectral electrical impedance tomography (EIT) system for use in breast imaging. This system has been used to image over 200 women as part of other NIH funded studies. During my post-doctoral training I developed a device for gauging electrical properties of *ex vivo* prostate tissue and have amassed a significant database of prostatic electrical properties. A number of manuscripts relating to these electrical properties and their clinical significance have been published in both engineering and clinical journals. I am currently the PI on a NIH funded programs aiming to develop EIT systems for use in surgical margin assessment during prostate surgery (R01 CA143020-01A1) and for monitoring traumatic brain injury (1R21EB011568-01). I have successfully authored IRB-approved research protocols and received IACUC approval for conducting animal trials at our institution. Throughout all of these efforts, I have collaborated closely with other engineers, surgeons, and pathologists at Dartmouth Hitchcock Medical Center (DHMC), and other clinical staff members at DHMC. I developed and teach an upper-level undergraduate/graduate level Surgery for Engineers class that is a project-based course in which students work with engineers and surgeons to develop technologies that improve surgical practice. I am currently the primary advisor for 3 PhD students and 1 MS student, have graduated 1 MS student (as primary advisor), have served as secondary advisors for 2 PhD and 2 MS students who graduated over the last two years, and have advised 3 post-doctoral research associates. My training, my experience in hardware development, my expertise in the electrical properties of tissue, and my engagement in collaborative research as a colleague and an advisor will contribute to the successful completion of the proposed research effort.

B. Positions and Honors

Positions and Appointments

1998-1998	Research Experience for Undergraduate Participant, Cornell University, Ithaca, NY
1999-2001	Graduate Student/Research Assistant/Teaching Assistant, Pennsylvania State University, PA
2001-2002	Commercialization Engineer, Eastman Kodak, Health Imaging Division, Oakdale, MN
2002-2006	Graduate Student/Research Assistant/Teaching Assistant, Dartmouth College, NH
2006-2008	Postdoctoral Fellow, Dartmouth College, NH
2008-	Research Assistant Professor, Thayer School of Engineering, Dartmouth College, NH
2010-	Member, Cancer Imaging and Radiobiology Research Program, NCCC, DHMC
2010-	Adjunct Assistant Professor of Surgery, Dartmouth Medical School, Dartmouth College, NH
2011-	Lecturer, Thayer School of Engineering, Dartmouth College, NH

Honors and Awards

2002-2003	Myron Tribus Fellow, Dartmouth College
2004-2006	Alma Hass Milham Fellowship in Biomedical Engineering, Dartmouth College
2006-2008	CDMRP Postdoctoral Training Grant for Prostate Research, Dept. of Defense
2007-2009	NIH Loan Repayment Program
2007-2008	Norris Cotton Cancer Center Prouty Pilot Project Grant
2008	Best Poster Award Prostate Cancer: Detection and Screening (II):

	American Urological Association (AUA) Annual Meeting, Orlando, FL
2009-2011	CDMRP New Investigator Award for Prostate Research, Dept. of Defense
2009-2011	NIH Loan Repayment Program – Renewal Award
2011	New Hampshire Prostate Cancer Coalition Research Award

Other Experience and Professional Memberships

Member, Institute of Electrical & Electronic Engineers (IEEE)
 Member, International Society for Electrical Bio-Impedance (ISEBI)
 Member, Committee for the Protection of Human Subjects (CPHS) – Dartmouth College’s IRB of record
 Reviewer: Prostate Cancer Foundation of Australia: Research Grant External Reviewer, Aug 2009
 Reviewer: NIH 2012/01 ZEB1 OSR-B (J1) B Medical Technologies to reduce health disparities, Sept 2012
 Reviewer: NIH 2012/10 UGPP Urologic and Genitourinary Physiology and Pathology, June 2012
 Reviewer: NIH 2012/03 ZAI1 MM-I (M1) Predictive biodosimetry, March 2012
 Reviewer: NIH 2012/03 ZEB1 OSR-B (M1) R Medical Technologies to reduce health disparities, March 2012
 Reviewer: NIH 2011/05 ZRR1 BT-7 (01) 1 Biotechnology, Feb 2011
 Reviewer: NIH 2011/05 ZRG1 NT-B (08) F Neurotechnology Overflow, Feb 2011
 Reviewer: NIH 2010/05 ZRG1 SBIB-U (92) S Electromagnetic Devices, Feb 2010
 Reviewer: NIH 2009/10 RFA OD-09-003 Challenge Grants Panel # 23, July 2009

C. Selected peer-reviewed publications

Most relevant to the current application (in chronological order)

1. **Halter RJ**, Hartov A, Paulsen KD, “A broadband high frequency electrical impedance tomography system for breast imaging,” *IEEE Transactions on Biomedical Engineering*, 55(2):650-659, 2008.
2. **Halter RJ**, Schned AR, Heaney JA, Hartov A, Paulsen KD, “Electrical properties of prostatic tissues: II. Spectral admittivity properties,” *Journal of Urology*, 182:1608-1613, 2009.
3. Mishra V, Bouyad H, Schned A, Hartov A, Heaney J, **Halter RJ**, “A real-time electrical impedance sensing biopsy needle,” *IEEE Transactions on Biomedical Engineering*, 59(12): 3327-3336, 2012.
4. Manwaring P, Moodie K, Hartov A, Manwaring K, **Halter RJ**, “Intracranial electrical impedance tomography: A method of continuous monitoring in an animal model of head trauma,” *Anesthesia and Analgesia*, accepted February 2012.
5. Wan Y, Borsic A, Heaney J, Schned A, Baker M, Wason S, Hartov A, **Halter RJ**, “Transrectal electrical impedance tomography of Prostate: Spatially co-registered pathological findings for prostate cancer detection,” *Medical Physics*, accepted April 2013.

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

1. **Halter RJ**, Hartov A, Paulsen KD, “Design and implementation of a high frequency electrical impedance tomography system,” *Physiological Measurements*. 25(1): 379-390, 2004.
2. **Halter RJ**, Hartov A, Heaney JA, Paulsen KD, Schned, AR, “Electrical impedance spectroscopy of the human prostate,” *IEEE Transactions on Biomedical Engineering*, 54(7):1321-1327, 2007
3. **Halter RJ**, Hartov A, Paulsen KD, “Video Rate Electrical Impedance Tomography of Vascular Changes: Preclinical Development,” *Physiological Measurement*, 29(3):349-364, 2008.
4. **Halter RJ**, Schned AR, Heaney JA, Hartov A, Schutz S, Paulsen KD, “Electrical impedance spectroscopy of benign and malignant prostatic tissues,” *Journal of Urology*, 179(4):1580-1596, 2008.
5. **Halter RJ**, Hartov A, Paulsen KD, Schned A, Heaney J, “Genetic and least squares algorithms for estimating spectral EIS parameters of prostatic tissues,” *Physiological Measurement*, 29: S111-S123, 2008.
6. **Halter RJ**, Zhou T, Meaney PM, Hartov A, Barth, Jr RJ, Rosenkranz KM, Wells WA, Kogel CA, Borsic A, Rizzo EJ, Paulsen KD, “Correlation of in vivo and ex vivo tissue dielectric properties to validate electromagnetic breast imaging: initial clinical experience,” *Physiological Measurement*, 30: S121-S136, 2009.
7. **Halter RJ**, Schned AR, Heaney JA, Hartov A, Paulsen KD, “Electrical properties of prostatic tissues: I. single frequency admittivity properties,” *Journal of Urology*, 182:1600-1607, 2009.
8. Borsic A, **Halter RJ**, Wan Y, Hartov A, Paulsen KD, “Electrical impedance tomography reconstruction for three dimensional imaging of the prostate,” *Physiological Measurement*, 31:S1-S16, 2010.
9. Wan Y, **Halter RJ**, Borsic A, Manwaring P, Hartov A, Paulsen KD, “Sensitivity of an ultrasound coupled transrectal electrical impedance tomography system for prostate imaging,” *Physiological Measurement*, 31:S17-S29, 2010.
10. **Halter RJ**, Schned AR, Heaney JA, Hartov A, “Passive bioelectrical properties for assessing high- and low-grade prostate adenocarcinoma,” *The Prostate*, 71:1759-1767, 2011.

D. Research Support

ACTIVE

R21EB011568-01 (Halter)

06/01/10 - 05/31/13

NIH/NIBIB

Title: Electrical Impedance-based Imaging of Brain Compliance in an Animal Model

Goal: The project aims to construct an electrical impedance tomography device and evaluate its efficacy in monitoring traumatic brain injury.

Granite State Technology Innovation Grant (Halter)

02/01/11 – 6/31/13

NHIRC

Title: Pulsatile pressure pumping for cardiopulmonary bypass

Goal: This program aims to assess, in an animal model, if pulsatile pressure pumping during cardiovascular pulmonary bypass provides enhanced end-organ perfusion as compared to conventional continuous flow pumping.

R01CA143020-01A1 (Halter)

05/01/11 – 04/31/15

NIH/NIBIB

Title: Intraoperative Surgical Margin Assessment with Electrical Impedance Spectroscopy

Goal: Develop and characterize an intraoperative tool for detecting and identifying prostate cancer at surgical margins using the bioelectrical properties of tissue to distinguish malignant from benign prostate

PENDING

PC120904 (Halter)

07/01/13 – 06/30/15

DOD CDMRP

Title: Magnetic Resonance based Electrical Property Tomography (MR- EPT) for prostate cancer grade imaging

Goal: The primary objective of this investigation is to develop MR-EPT specifically for prostate imaging and assess its efficacy in imaging disease extent and aggressiveness.

OVERLAP

There is no scientific overlap between the aims and objectives of these programs. Note that all of the funded programs, with the exception of R01CA143020-01A1, will have ended by Summer 2013. If pending proposals (including this one) are awarded, effort on individual programs will be shifted accordingly without significant affect.

BIOGRAPHICAL SKETCH

NAME Hartov, Alexander	POSITION TITLE		
eRA COMMONS USER NAME (credential, e.g., agency login) alex_hartov	Research Professor		
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Northeastern University, Boston MA	BSEE	1984	Electrical Engineering
Dartmouth College, Hanover, NH	M.Sc.	1988	Biomedical Engineering
Dartmouth College, Hanover, NH	Ph.D.	1991	Biomedical Engineering

A. Personal Statement

Dr. Hartov's goal is to combine biomedical instrumentation research with student mentoring and teaching. He has been on the committees of 16 PhD students (6 as supervisor) and 20 MS students (13 as supervisor). Currently supervising 2 PhD candidates. He currently teaches a course on Digital Image Processing and organizes seminars on technology and society which are required for PhD students. Dr. Hartov began research work on image guided neurosurgery while a graduate student, when he developed a method to display a tumor outline during surgery for the "frameless stereotaxic" microscope, in 1988. Since then technology has progressed and Dr. Hartov has further contributed to the field in merging in real-time 3D ultrasound with pre-operative MRI for improved guidance and the use of stereo-vision to capture patient anatomy. Dr. Hartov's other research interests include Electrical Impedance Imaging, particularly for breast cancer screening and prostate cancer screening.

B. Positions

2010/06-present	Director of the MS and PhD program, Thayer School of Engineering, Dartmouth
2008-present	Research Professor of Engineering, Thayer School of Engineering, Dartmouth
2002-2008	Research Associate Professor of Engineering, Thayer School of Engineering
2001-2005	Director R & D (Co-Owner) Hanover Medical Imaging Project LLC
1996-10/02	Research Assistant Professor of Engineering, Thayer School of Engineering Research Assistant Professor, Dept. of Surgery, Dartmouth Medical School Member Research Staff, Norris Cotton Cancer Center, Lebanon, NH
1995-1996	Project Director, Biomedical Engineering, Daat Research Corp., Lebanon NH
1995	Research Assistant Professor, Dartmouth Medical School Research Assistant Professor of Engineering, Thayer School of Engineering, Dartmouth
1993 -1995	Research Associate, DMS. Intraoperative hyperthermia and radiation therapy
1993	Self employed researcher. Small Business Innovative Research (SBIR)
1991-1992	Research Associate, Dartmouth Medical School (DMS)
1986-1991	Graduate Student
1980-1986	Electronics engineer LTX Corp., Westwood, MA

Other Professional activities

2010-12 Member Review Panel – External Evaluation – Ecole Polytechnique de Montreal
 2006-Present Board Member and Secretary, Good Neighbor Health Clinic, White River Junction, free clinic.
 Consulting, medical instrumentation, electronics, image processing and imaging software.
 Review panels NIH
 NIH/NCRR Special Emphasis Panel, Technology Development for Biomedical Applications
 NIH/CSR Medical Imaging Technologies Review Panel
 NIH SBIR/STTR review panel
 NIH/NCI Special Review Panel, Innovative Technologies for Molecular Analysis of Cancer
 Conferences organization:
 SPIE Organizing Committee, Reviewer Poster session 2005 conference.

C. Selected peer-reviewed publications

1. Lunn KE, Paulsen KD, Liu F, Kennedy FE, Hartov A, Roberts DW (2006). "Data-guided brain deformation modeling: Evaluation of a 3-D adjoint inversion method in porcine studies." *IEEE Transactions on Biomedical Engineering* 53(10):1893. [PMID: 17019852]
2. Halter RJ, Hartov A, Heaney J, Schned A, Paulsen KD (2007). "Electrical Impedance of the Human Prostate." *IEEE Transactions on Biomedical Engineering* 54(7):1321. [PMID: 17605363]
3. Poplack SP, Paulsen KD, Hartov A, Meaney PM, Pogue B, Tosteson T, Grove M, Soho S, Wells W (2007). "Electromagnetic breast imaging: pilot results in women with abnormal mammography." *Radiology* 243(2):350. [PMID: 17400760]
4. Halter RJ, Hartov A, Paulsen KD (2008). "A broadband high frequency electrical impedance tomography system for breast imaging." *IEEE Transactions on Biomedical Engineering* 55(2):650. [PMID: 18270001]
5. Hartov A, Roberts DW, Paulsen KD (2008). "A comparative analysis of coregistered ultrasound and magnetic resonance imaging in neurosurgery." *Neurosurgery*, 63(3):91-99 Suppl. S. [PMID: 18424971]
6. Borsic A., R. Halter, Y. Wan, A. Hartov, K.D. Paulsen, "Electrical Impedance Tomography Reconstruction for Three Dimensional Imaging of the Prostate," *Phys Meas.*, 31(8):S1-S16 Sp. Iss., 2010. PMCID: PMC20647619.
7. Hartov A., K.D. Paulsen, S. Ji, K. Fontaine, M. Furon, A. Borsic, D.W. Roberts, "Adaptive Spatial Calibration of a 3D Ultrasound System," *Medical Physics*, 37(5):2121-2130, 2010. PMCID: PMC2871034.
8. Roberts D.W., P.A. Valdés, B.T. Harris, K.M. Fontaine, A. Hartov, X. Fan, S. Ji, S.S. Lollis, B.W. Pogue, B.C. Wilson, K.D. Paulsen, "Coregistered fluorescence-enhanced tumor resection of malignant glioma: relationships between δ -aminolevulinic acid-induced protoporphyrin IX fluorescence, magnetic resonance imaging enhancement, and neuropathological parameters: Clinical article," *J Neurosurgery*, 114(3):595-603, 2011. PMCID: PMC2921008.
9. Wan Y., R.J. Halter, A. Borsic, P. Manwaring, A. Hartov, K.D. Paulsen, "Sensitivity Study of an Ultrasound Coupled Transrectal Electrical Impedance Tomography System for Prostate Imaging," *Phys. Meas.* 31(8):S17-29, 2010. PMCID: PMC20647618.
10. Ji S., D.W. Roberts, A. Hartov, K.D. Paulsen, "Real-time Interpolation for True 3-Dimensional Ultrasound Image Volumes," *J Ultrasound Med*, 30(2):243-252, 2011.
11. Valdes P.A., F. Leblond, A. Kim, B.T. Harris, B.C. Wilson, X. Fan, T.D. Tosteson, A. Hartov, S. Ji, K. Erkmen, N.E. Simmons, K.D. Paulsen, D.W. Roberts. "Quantitative fluorescence in intracranial tumor: implications for ALA-induced PpIX as an intraoperative biomarker," *J Neurosurg*, 115(1):11-7, 2011. PMCID: PMC3129387.
12. Forsyth J., A. Borsic, R.J. Halter, A. Hartov, K.D. Paulsen, "Optical breast shape capture and finite element mesh generation for electrical impedance tomography," *Physiol Meas*, 32(7):797-809, 2011.
13. Leblond F., S.C. Davis, Z. Ovanesyan, P.A. Valdés, A. Kim, B.C. Wilson, A. Hartov, B.W. Pogue, K.D. Paulsen, D.W. Roberts, "Analytic expression of fluorescence-ratio correlates with depth in multi-spectral sub-surface imaging," *Phys Med Biol*, 56(21):6823-37, 2011.
14. Ji S., Roberts D.W., Hartov A., Paulsen K.D., "Intraoperative patient registration using volumetric true 3D ultrasound without fiducials", *Medical Physics*. 39(12), 7540-7552, (2012)
15. Roberts DW, Valdés PA, Harris BT, Hartov A, Fan X, Ji S, Pogue BW, Leblond F, Tosteson TD, Wilson BC, Paulsen KD. *Adjuncts for Maximizing Resection: 5-ALA*. (Clin Neurosurg. 2012;59:75-8). PMID: 22960516

D. Research Support.

Research Support

Current

1 R01 NS052274-01A2 Roberts (PI)

09/01/2007 – 08/31/2013

NIH/NCI

Co-Registered Fluorescence-Enhanced Resection of Malignant Glioma

This project is developing co-registered fluorescence resection techniques and procedures for resection of malignant glioma.

R01CA159324 (Paulsen)

04/04/2011 – 03/31/2016

NIH/NCI

Preoperative Image Updating for Guidance During Brain Tumor Resection

This academic-industrial partnership will develop and evaluate a system for updating preoperative images in the operating room during brain tumor resection.

Completed

5R01CA124925-02 Hartov (PI)

07/24/2007 - 05/31/2011

NIH/NCI

Prostate Cancer Screening with Electrical Impedance Measurements

This project proposes to design, build and test an imaging device which will combine conventional intracavitary ultrasound with electrical impedance tomography. The device is intended to improve diagnostic for prostate cancer and to aid in treatment decisions by differentiating between different types of prostate cancers.

5 P01 CA080139-08 Paulsen (PI)

05/01/2006 - 04/30/2012

NIH/NCI

Alternative Breast Cancer Imaging Modalities; Project 2 (Hartov)

This is the competing continuation application for a program which is aimed at developing and evaluating four alternative breast imaging modalities.

1 R21 CA133877-01A1 Demidenko (PI)

07/01/2008 - 06/30/2011

NIH

Breast Cancer Detection Using Electrical Impedance Measurements

The goal of this project is to develop a computer-aided system to detect abnormality in breasts, cancer particularly, using electrical impedance tomography (EIT) measurements. The present project aims to develop alternative and inexpensive screening tools to assist diagnosis for situations where mammography is inconclusive.

RC1EB011000-01 Halter (PI)

09/30/09 – 08/31/12

NIH/NIBIB

Electrical Property Based Image-guided Prostate Biopsy

Develop and translate an image-guided prostate biopsy procedure to the clinic based on bioelectrical property mapping.

Role: PI

W81XWH-09-1-0458 Halter (PI)

06/15/09 – 06/14/12

Pending:

NIH (R21 proposal)

Radiation BioDosimetry with Impedance Measurements

This project proposes to investigate the short term (24h-1wk) effect of radiation on tissues and particularly whether these can be quantified ex post facto using impedance measurements. This idea is proposed as a possible field dosimetry tool for screening victims of a nuclear accident.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.

Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Holtzheimer III, Paul Edgar		POSITION TITLE	
eRA COMMONS USER NAME (credential, e.g., agency login)		Associate Professor	
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Pacific Lutheran University, Tacoma, WA	BS	1990-1995	Biology
Pacific Lutheran University, Tacoma, WA	BA	1990-1995	Psychology/Philosophy
Dartmouth Medical School, Hanover, NH	MD	1995-1999	Medicine
Emory University, Atlanta, GA	MS	2005-2008	Clinical Research

A. Personal Statement: I am a board-certified psychiatrist with >15 years' clinical neuroscience research experience and training including a Master's of Science in Clinical Research. I currently direct the Mood Disorders Service at the Geisel School of Medicine at Dartmouth, which includes the Mood Disorders Research Clinic. I have expertise in the use of neuroimaging and brain stimulation to study clinical and healthy samples. I have extensive experience in the use of MRI (diffusion tensor imaging, resting state fMRI, task fMRI) to study patients with depression. Additionally, I have >15 years' experience in the use of brain stimulation therapies to treat depression, including ECT, TMS and DBS (as well as clinical trials of pharmacologic agents to treat depression). Given my background in brain imaging and brain stimulation, as well as expertise in developing clinical translational applications of these methods, I am well-positioned to participate in this proposed program and related research projects.

B. Positions and Honors.

POSITIONS

- 1999-2003 Psychiatry Residency, University of Washington, Seattle, WA
- 2002-2003 Chief Resident, Outpatient Psychiatry, Harborview Medical Center, Seattle, WA
- 2003-2004 Senior Research Fellow (Transcranial Magnetic Stimulation), University of Washington, Seattle, WA
- 2003-2004 Acting Instructor, University of Washington, Seattle, WA
- 2004-2011 Assistant Professor of Psychiatry and Behavioral Sciences, Emory University, Atlanta, GA
- 2011-present Staff Physician, White River Junction VAMC, White River Junction, VT
- 2011-present Associate Professor of Psychiatry and Surgery, Director, Mood Disorders Service, Geisel School of Medicine at Dartmouth, Dartmouth-Hitchcock Medical Center, Lebanon, NH

HONORS

- 1994 Arête Society, Pacific Lutheran University
- 1995 *Summa cum laude*, Pacific Lutheran University
- 1998 Alpha Omega Alpha, Dartmouth Medical School
- 1998 AMA-Foundation Rock Sleyster Scholar, Dartmouth Medical School
- 1998 Rolf Syvertsen Fellow, Dartmouth Medical School
- 1999 Dartmouth Medical School, M.D. with honors
- 1999 Dean's Medal, Dartmouth Medical School
- 2001 Outstanding Junior Resident, University of Washington Department of Psychiatry
- 2001 American Psychiatric Association/Glaxo-SmithKline Fellow
- 2002 President, American Psychiatric Association/Glaxo-SmithKline Fellows
- 2003 Award for Academic Excellence, University of Washington Department of Psychiatry
- 2003 Outstanding Resident, University of Washington Department of Psychiatry
- 2003 National Institute of Health Loan Repayment Program Award
- 2005 American Federation for Aging Research Young Investigator Award
- 2005 National Institute of Health Loan Repayment Program Award

2007 American Psychiatric Institute Research and Education Research Colloquium for Junior Investigators
2007 NARSAD Young Investigator Award
2007 ACNP Young Investigator Memorial Travel Award
2009 Fourth Year Psychiatry Residents' Teaching Award, Emory University
2010 Third Year Psychiatry Residents' Teaching Award, Emory University
2011 Member, American College of Psychiatrists

C. Selected peer-reviewed publications (in chronological order from >75).

1. Holtzheimer PE 3rd, Roberts DW, Darcey TM: Magnetic resonance imaging versus computed tomography for target localization in functional stereotactic neurosurgery. *Neurosurgery* 1999, 45(2):290-7. PMID: 10449073
2. Limonadi FM, Roberts DW, Darcey TM, Holtzheimer PE 3rd, Ip JT: Utilization of impedance measurements in pallidotomy using a monopolar electrode. *Stereotactic and Functional Neurosurgery* 1999, 72(1):3-21. PMID: 10640917
3. Holtzheimer PE 3rd, Russo J, Avery DH: A meta-analysis of repetitive transcranial magnetic stimulation in the treatment of depression. *Psychopharmacology Bulletin* 2001, 35(4):149-169. PMID: 12397863
4. Avery DH, Holtzheimer PE 3rd, Fawaz W, Russo J, Neumaier J, Dunner DL, Haynor DR, Claypoole KH, Wajdik C, Roy-Byrne PP: A controlled study of repetitive transcranial magnetic stimulation in medication-resistant major depression. *Biological Psychiatry* 2006, 59:187-194. PMID: 16139808
5. Avery DH, Holtzheimer PE 3rd, Fawaz W, Russo J, Neumaier J, Dunner DL, Haynor DR, Claypoole KH, Wajdik C, and Roy-Byrne P: Transcranial magnetic stimulation reduces pain in patients with major depression: a sham-controlled study. *Journal of Nervous and Mental Diseases* 2007, 195(5): 378-381. PMID: 17502802
6. Gutman DA, Holtzheimer PE, Behrens TEJ, Johansen-Berg H, Mayberg HS: A tractography analysis of two deep brain stimulation white matter targets for depression. *Biological Psychiatry* 2009, 65(4):276-282. PMID: 19013554
7. James GA, Kelley ME, Craddock RC, Holtzheimer PE, Dunlop B, Nemeroff CB, Mayberg HS, Hu XP: Exploratory Structural equation modeling of resting-state fMRI: applicability of group models to individual subjects. *Neuroimage* 2009, 45:778-787. PMID: 19162206
8. Herbsman T, Avery D, Holt R, Ramsey D, Holtzheimer P, Wajdik C, Hardway F, Haynor D, George M, Nahas Z: More lateral and anterior prefrontal coil location improves rTMS antidepressant response. *Biological Psychiatry* 2009, 66(5):509-15. PMID: 19545855
9. Craddock RC, Holtzheimer PE 3rd, Hu X, Mayberg HS: Disease state prediction from resting state functional connectivity. *Magnetic Resonance in Medicine* 2009, 62(6):1619-28. PMID: 19859933
10. George MS, Lisanby SH, Avery D, McDonald WM, Durkalski V, Pavlicova M, Anderson B, Nahas Z, Bulow P, Zarkowski P, Holtzheimer P, Schwartz T, Sackeim HA: Daily left prefrontal transcranial magnetic stimulation therapy for major depressive disorder: A sham-controlled randomized trial. *Archives of General Psychiatry* 2010, 67:507-516. PMID: 20439832
11. Holtzheimer PE 3rd, McDonald WM, Mufti M, Kelley ME, Quinn S, Corso G, Epstein CM: Accelerated repetitive transcranial magnetic stimulation (aTMS) for treatment-resistant depression. *Depress Anxiety* 2010, 27(10):960-963. PMID: 20734360
12. Ramasubbu R, Masalovich S, Gaxiola I, Peltier S, Holtzheimer PE, Heim C, Goodyear B, Macqueen G, Mayberg HS: Differential neural activity and connectivity for processing one's own face: A preliminary report. *Psychiatry Res* 2011, 194(2):130-40. PMID: 21962775
13. Craddock RC, James GA, Holtzheimer PE, Hu XP, Mayberg HS: A whole brain fMRI atlas generated via spatially constrained spectral clustering. *Hum Brain Mapp* in press (e-pub available). PMID: 21769991
14. Holtzheimer PE 3rd, Kelley ME, Gross RE, Filkowski MM, Garlow SJ, Barrocas A, Wint D, Craighead MC, Kozarsky J, Chismar R, Moreines JL, Mewes K, Riva Posse P, Gutman DA, Mayberg HS: Subcallosal cingulate deep brain stimulation for treatment-resistant unipolar and bipolar depression. *Arch Gen Psychiatry* 2012, e-pub available online. PMID: 22213770
15. Broadway JM, Holtzheimer PE, Hilimire MR, Parks NA, DeVlyder JE, Mayberg HS, Corballis PM: Frontal theta cordance predicts 6-month antidepressant response to subcallosal cingulate deep brain stimulation for treatment-resistant depression: A pilot study. *Neuropsychopharmacology*, in press, e-pub available online. PMID: 22414813
16. Johnson KA, Baig M, Ramsey D, Lisanby SH, Avery D, McDonald WM, Li X, Bernhardt ER, Haynor DR, Holtzheimer PE 3rd, Sackeim HA, George MS, Nahas Z: Prefrontal rTMS for treating depression: Location and intensity results from the OPT-TMS multi-site clinical trial. *Brain Stimul* in press, e-pub available online. PMID: 22465743
17. Riva-Posse P, Holtzheimer PE, Garlow SJ, Mayberg HS: Practical Considerations in the Development and Refinement of Subcallosal Cingulate White Matter Deep Brain Stimulation for Treatment Resistant Depression. *World Neurosurg* in press, available online 2012.
18. McGrath CL, Kelley ME, Holtzheimer PE, Dunlop BW, Craighead WE, Franco AR, Craddock RC, Mayberg HS: Toward a Neuroimaging Treatment Selection Biomarker for Major Depressive Disorder. *JAMA Psychiatry* in press.

D. Research Support (past three years).

Dartmouth Synergy Grant (Co-PIs: Paul Holtzheimer, MD; Yu-Chien Wu, MD, PhD) ONGOING
Dartmouth College

“High Angular Resolution Diffusion Imaging (HARDI) with novel HYPR image reconstruction”
The goal of the proposed pilot project is to begin development of a novel, fast imaging technique for a high angular resolution diffusion imaging method (HARDI) that can be acquired quickly. To do this, HARDI acquisition will be combined with an advanced approach to rapid image reconstruction (HighLY constrained back PROjection reconstruction (HYPR)). The preliminary data from this project will help justify pursuing external funding to expand this work

R01 MH091100-A1 (PI: Paul Holtzheimer, MD) ONGOING
National Institute of Mental Health

“Identifying Biomarkers for Treatment-Resistant Depression Using Resting-State Functional Connectivity”
This project will investigate the neurobiology of treatment-resistant depression (TRD) using functional magnetic resonance imaging functional connectivity analyses. These findings will increase our understanding of the pathophysiology of TRD and will guide further research including the development of novel interventions for this prevalent and costly disorder.

2009-2011 Sub-contract (PI: Paul Holtzheimer, MD) COMPLETED
UCSF/Greenwall Foundation (PI: Laura Dunn, MD)

“Examining Ethical Issues in Deep Brain Stimulation Research”
Using a number of survey and interview methods, this project will examine ethical issues related to informed consent and decision-making capacity in patients considering participation in clinical trials of deep brain stimulation for treatment-resistant depression.

2007-2011 K23 077869- 02 (PI: Paul Holtzheimer, MD) COMPLETED
National Institute of Mental Health

“Investigating Structural and Functional Brain Abnormalities in Late-Life Depression”
A patient-oriented mentored research project that uses magnetic resonance imaging (structural imaging, diffusion tensor imaging and task-activated functional magnetic resonance imaging) to study structural and functional brain abnormalities in 40 patients with late-life depression and 40 healthy controls.
Role: Principal Investigator

2007-2010 Clinical Neuroscience Research Grant (PI: Helen Mayberg, MD) COMPLETED
Dana Foundation

“Deep Brain Stimulation Clinical Research Program for Treatment-Resistant Depression”
Pilot study of deep brain stimulation of the Brodmann Area 25 white matter as a treatment for treatment-resistant major depression. Study also includes mechanism of action studies including PET imaging, neuroendocrine assays, genetic testing and EEG analyses.
Role: Co-Investigator

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME P. Jack Hoopes, DVM, PhD	POSITION TITLE Professor of Surgery and Radiation Oncology Adjunct Professor and Senior Lecturer, Biomedical Engineering		
eRA COMMONS USER NAME (credential, e.g., agency login) P_Jack_Hoopes			
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
Oklahoma University, Norman, OK		1969-71	Liberal Arts
Oklahoma State University, Stillwater, OK	D.V.M.	1972-76	Veterinary Medicine
NIH Graduate School, Bethesda, MD		1977-78	Pathology
Colorado State University, Fort Collins, CO	Ph.D.	1980-84	Pathology/Rad Biology
Colorado State University, Fort Collins,	Fellowship	1984-86	Radiation Pathology
North Carolina State University, Raleigh, NC	Fellowship	1986-1988	Radiation Oncology /
Duke University Medical Center, Durham, NC			Cancer Therapeutics

A. Personal Statement

Training and education: I am a veterinarian with specialty training in veterinary pathology and academic graduate training in radiation biology / radiation oncology and experimental cancer therapeutics. Post-doctoral training in experimental radiation and hyperthermia cancer therapeutics at the Duke University Medical Center / Radiation Oncology. Virtually all post-veterinary and graduate training was performed in an NIH-PPG/R01 funded, translational (animal model /spontaneous animal / human cancer treatment) setting. **Expertise:** Twenty five years of experience in the development and use animal models for many types of translational biology (primarily radiation, hyperthermia and cancer), imaging and therapy, including MRI, CT, ultrasound, PET, fluoroscopy and fluorescence imaging for large and small animal models. Continually funded by NIH and corporate ventures for more than 25 years. **Administration:** Director of the Dartmouth Center for Comparative Medicine and Research (Dartmouth Animal Care and Use Program / Surgical Research Laboratories) and Dartmouth Norris Cotton Cancer Center based Irradiation and Small Animal Irradiation Shared Resource. Co-investigator in the novel Advanced Surgical Center /intraoperative MRI-CT imaging/surgery facility (PI: Paulsen). **Teaching and Research:** Current laboratory research focus is: 1) “antibody and non-antibody directed iron oxide nanoparticle cancer treatment” (NCI-NIH Cancer Center for Nanotechnology Excellence award, project PI and research core co-PI) and 2) ongoing large animal surgical models including a major effort in *kidney transplantation and ex vivo kidney perfusion models (Dartmouth Transplantation Research Program)* primarily using porcine models. I am primarily a translational scientist; PI of five ongoing preclinical studies and PI or co-investigator on five funded NIH grants. The strengths of my laboratory /group lie in the collaborative development of biomedical and biomedical engineering innovations such as the magnetic nanoparticle cancer treatment, radiation induced cancer and normal tissue effect and the kidney transplant research and models. Current laboratory consists four PhD students (cancer biology, biomed engineering, MD/PhD students) and 4 undergrads. Mentored more than 20 grad students and 30 surgery residents (laboratory research years) in the past 25 years. Teach two courses: “Introduction to Biomedical Engineering” (undergraduate course, Thayer School of Engineering) and “Quantitative Pathology for Biomedical Engineers” (graduate course, biomedical engineers). *I have worked with Dr Paulsen for almost two decades on all kinds of biomedical engineering projects in which small and large animal models have been used and look forward to participating in the Center for Surgical Innovation at Dartmouth.*

B. Positions and Honors

Positions and Employment

1976 – 1977 Intern, Meriweather Veterinary Hospital, Miller, SD
 1977 – 1979 Intern, Exotic Animal Med and Pathology, National Zoological Park, Washington, DC
 1979 – 1982 Resident, Pathology, Colorado State Univ, College of Vet Med , Fort Collins, CO
 1981 – 1984 Graduate Student, Pathology/Radiation Biology, Colo State Univ., Fort Collins, CO
 1984 – 1985 Post-Doctoral Fellow, Pathology/Rad Oncology, Colo State Univ., Fort Collins, CO

1985 – 1988 Post Doctoral Fellow and Pathologist (NC Animal Cancer Treatment Program), School of Veterinary Med, NC State Univ., Raleigh, NC & Duke Univ. Med Ctr., Durham, NC

1988 – 1996 Assist Prof Medicine (Radiation Oncology), Dartmouth Medical School (DMS), Norris Cotton Cancer Center (NCCC), Dartmouth-Hitchcock Medical Center (DHMC), Hanover, NH

1989 – 1990 Acting Director Animal Research Facility, Dartmouth Medical School (DMS)

1989 – 1996 Adjunct Assist Prof Biomed Engineering, Thayer School of Engineering, Dartmouth College

1992 – pres Director, Irradiation Shared Resource, NCCC, DMS/DHMC

1992 – 1997 Director, Radiation Oncology/Bioengineering Research Program, NCCC, DMS/DHMC

1996 – pres Director, Surgery, Rad Onc and Bioeng Res Laboratories, NCCC, DMS, DHMC, Thayer School of Engineering

1996 – 2008 Assoc Prof Surgery and Radiation Oncology, DMS/NCCC;
Adjunct Assoc Prof Biomedical Engineering, Thayer Engineering School, DC

2002 – 2010 Chairman, Radiation Safety Committee, Dartmouth College

2005 – pres Vice Chairman, Dartmouth College Institutional Animal Care and Use Committee (IACUC)

2005 – pres Co-Director, NCCC Cancer Nanotechnology Working Group

2008 – pres Professor of Surgery and Radiation Oncology (tenure), DMS/NCCC
Adjunct Prof Biomedical Engineering, Thayer Engineering School, DC

2009 – pres Director, Center for Comparative Medicine and Research / Animal Care and Use Program, Dartmouth College

2010 – pres Director, Small Animal Imaging Shared Resource, Norris Cotton Cancer Center, GSM /DHMC

Honors, Invited Presentations, Review Committees (partial list):

Member: NIH -NCI Program Project Grant Rev Teams (30 teams, 1991-present); Member: US Army Breast and Prostate Cancer Research Program 1998 – 2006, Member: Smithsonian Inst Scholarly Studies Grant Rev Program (1998-2002); Member: 4 NIH-NCI Study Sections (1998-2012); NCI Cancer Center Review: 15 teams (2002-12); Chairman's Award, Department of Surgery, DHMC (2001); Member: WHO Panel on Adverse Temperature Levels in the Human Body, Geneva, Switzerland (2002); Faculty / Speaker: 2004 J&J International Energy Based Therapy Conf, Princeton, NJ (2004); Member: NIH-NCI L30 Review Panel (2004-06); Invited Faculty/Speaker: IEEE/COST 281 Thermal Physiology Wshp at INERIS, Paris, France (2004); Member NIH/NCI Panel: Cancer Nanotech Platforms (2005); NIH Rev Panel: Centers for Medical Counter Measures Against Radiation Exposure (2005); Member NIH Rev Panel: Sm Animal Imaging Program; Member NIH Rev Panel: K99/00 Grants (2006); Member NCIC (Canada) Radiation Biology Rev Panel: (2007-09), Chairman, NIH Nanotechnology SBIR Review Panel (2008-11); Invited speaker 2008 NCI-NIST Sym on Nanotech for Cancer Prevention, Diagnosis and Treatment, JHUMC/Radiation Oncology – Nanotechnology cancer treatment; Invited Speaker (2008): Univ of Conn /Molecular Medicine: Invited Speaker (2009): NCCC 29th Annual Prouty: Nanotechnology and the Future of Cancer Therapy (2009). Invited Speaker (2010): Workshop on Adverse Temperature Levels in the Human Body, Gaithersburg, MD; Invited Speaker (2010): Dartmouth Community Medical School, Hanover, NH; Invited Speaker (2010): Univ MN Nanotechnology Conf. Invited speaker (2011) Gordon Conf on Cancer Nanotechnology, Colby College, 2012 NCI Centers for Cancer Nanotechnology Excellence Annual Meeting. Invited Speaker (2012): 1stASME NanoEngineering for Medicine and Biology (NEMB) Workshop “Challenges for Engineers in Biomed & Clin Sciences, NCI Centers for Cancer Nanotechnology Excellence Annual Meeting, 10th Univ Vermont Breast Cancer Symposium, 40th Anniversary NCCC. 2012: Elected Editorial Board: Nanomedicine: Nanotechnology, Biology and Medicine. Elected Councilor for Medicine: Society for Thermal Medicine. 2013: Track Chair: ASME 2nd Global Congress on Nanoengineering, Boston, MA

C. Selected Publications (peer reviewed only, from 200+)

Most relevant to the current application

1. **Hoopes PJ**, Gillette EL, Benjamin SA. Pathogenesis of radiation nephropathy. Rad Res 104:406-419, 1985.
2. Gillette EL, McChesney SL, **Hoopes PJ**. Isoeffect curves for radiation-induced cardiomyopathy in the dog. Intl J Rad Oncol Biol Phys 11:2091-2097, 1985.
3. **Hoopes PJ**, Gillette EL, Benjamin SA. Radiation nephropathy in the dog. Br J Cancer 53:273-276, 1986.
4. Gillette EL and **Hoopes PJ**. Response of canine oesophagus to dose per fraction. Br J Cancer 53:273-276, 1986.

5. **Hoopes PJ**, Gillette EL, Withrow SJ. Intraoperative irradiation of the canine abdominal aorta and vena cava. *Intl J Rad Oncol Biol Phys* 13 (5):715-722, 1987.
6. **Hoopes PJ**, Bischoff JC, Pearce JC, Giustini AJ, Petryk AA et al In vivo imaging and quantification of iron oxide nanoparticle uptake and biodistribution. 2012 SPIE vol 8317-26
7. Samkoe KS, **Hoopes PJ**, Hasan T, Pogue BW et al. High vascular delivery of EGF, but low receptor binding rate is observed in AsPC-1 tumors as compared to normal pancreas. *Mol Imaging Biol*. 2012 Aug;14(4):472-9. PMID: 21847690
8. Giustini AJ Petryk AA, **Hoopes PJ**, Ionizing radiation increased systemic nanoparticle accumulation. *Nanomedicine*. 2012 Aug;8(6):818-21 PMID: 22633900
9. Toraya-Brown S, Sheen MR, Baird JR, Barry S, Demidenko E, Turk MJ, **Hoopes PJ**, Conejo-Garcia JR, Fiering S. Phagocytes mediate targeting of iron oxide nanoparticles to tumors for cancer therapy. *Integr Biol (Camb)*. 2012 Aug 30 PMID: 22935885
10. Giustini AJ, Perreard I, Rauwerdink AM, **Hoopes PJ**, Weaver JB Noninvasive assessment of magnetic nanoparticle-cancer cell interactions. *Integr Biol (Camb)*. 2012 Oct;4(10):1283-8. PMID: 22945022

Additional recent publications of importance to the field

1. Cubillos-Ruiz JR, **Hoopes PJ**, Fiering S, Conejo-Garciaa JR. Inflammatory and immune responses induced by nanomaterials: challenges and opportunities for future nanotherapies. *Nanotechnology Perceptions* 5 (2009) 195–20
2. Skourou C, **Hoopes PJ**, Gladstone DJ, Paulsen KD, Tissue permittivity: a monitor for progressive tissue fibrosis as observed in bystander tissues following experimental high dose rate irradiation. *Cancer Biology & Therapy*, Dec;8(23):2223-9 (2009)
3. Gibbs S, O'Hara JA, Srinivasan S, **Hoopes PJ**, Hasan T, Pogue BW. Diagnostic detection of diffuse glioma tumors *in vivo* with molecular fluorescent probe-based transmission spectroscopy. *Med. Phys.* Volume 36, Issue 3, pp. 974-983 (2009)
4. Davis SC, Samkoe KS, O'Hara JA, Gibbs-Strauss SL, Payne HL, **Hoopes PJ**, Paulsen KD, Pogue BW. MRI-coupled fluorescence tomography quantifies EGFR activity in brain tumors. *Academic Radiology*, Volume 17, Issue 3, page 271-276 (2010)
5. Eck SM, **Hoopes PJ**, Petrella BL, Brinckerhoff CE Matrix metalloproteinase-1 promotes breast cancer angiogenesis and osteolysis in a novel *in vivo* model *Breast Cancer Research and Treatment* volume 116, issue 1, pp. 79 - 90 (2010)
6. Samkoe KS, **Hoopes PJ**, Hasan T, and Pogue B W et al, Imaging tumor variation in response to photodynamic therapy in pancreas cancer xenograft models, *Inter J of Radiation Onc, Bio, Phy*, Vol 76:1, Pages 251-259 (2010)
7. Gibbs-Strauss SL, Samkoe KS, **Hoopes, PJ**, Hasan, T, Pogue BW et al, Detecting Epidermal Growth Factor Receptor Tumor Activity *In Vivo* During Cetuximab Therapy of Murine Gliomas, *Academic Radiology*, Volume 17, Issue 1, Pages 7-17 (2010)
8. Giustini AJ, Petryk AA, Cassim SM, Tate JA, Baker I, **Hoopes PJ**, Magnetic Nanoparticle Hyperthermia in Cancer Treatment. *Nano LIFE* (2010). Vol 1 (1-2) 17-32.
9. **Hoopes PJ**, Bischoff JC, Pearce JC, Giustini AJ, Petryk AA, Ryan T et al. Nanoparticle based cancer treatment: can delivered dose be and biological dose be reliably modeled and quantified. *SPIE vol 7901-09* (2011)
10. Giustini AJ, Ivkov R, **Hoopes PJ**. Magnetic nanoparticle biodistribution following intratumoral administration. *Nanotechnology* 22(2011)
11. Samkoe K, Gibbs-Strauss KS, Hekmatyar S, **Hoopes PJ**, Kauppinen R, O'Hara J, Pogue B, and Yang H. "Protoporphyrin IX fluorescence contrast in invasive glioblastomas is linearly correlated with Gd enhanced magnetic resonance image contrast but has higher diagnostic accuracy," *J. Biomed. Opt.* 16, 096008 (2011); doi:10.1117/1.3622

D. Research Support

Ongoing Research

Year(s)	Funding Source	PI/Co-PI/Co-I	Grant Title
1992 - 2015	NIH/NCI CCSG (Director: Israel)	Resource Director	Norris Cotton Cancer Center Core Grant (Irradiation and Small Animal Imaging Shared Resource)
2008 - 2013	Euclid Corp	PI	Noninvasive biochemical-based Cornea Reshaping
2008-2013	Intelligent Medical	PI	Preclinical Assessment of a Retinal Implant Device

2009-2013	Implants, Inc. P01CA84203 (PI:Hasan)	Co-I	Molecular Response and Imaging-based Combination Strategies for Optimal PDT (project 4) Core C
2009- 2013	BG –Aspide Medical	PI	In vitro and in vivo assessment of novel non-woven surgical mesh material (Surgimesh)
2010-2013	1R21EB011568-01 (PI: Halter)	Co-I	Electrical Impedance-based Imaging of Brain Compliance in an Animal Model
2010-2015	Center for Cancer Nanotechnology Excellence U54CA151662	Project 3: PI Core B: Co-PI	Multi-project institutional nanotechnology grant focused on the use of antibody and nonantibody targeted magnetic nanoparticles and AMF treatment of breast and ovarian cancer
2010-2015	NIH C06 RFA-RR-09-008 PI: Colachio	Co-I	Advanced surgical training center (ASC) at Dartmouth Hitchcock Medical Center.
2011-2013	KSP Corp	PI	Evaluation of healing, inflammation and strength of a novel closure device.
2012-2014	Trilogy Society (Chen-PI)	Co-I	Tissue Oxygenation and Optimizing Intervention in Wound Healing
2012-2014	Somahlution	PI	Kidney transplant surgery and preservation study

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Janes, Amy C	POSITION TITLE Assistant Professor, Harvard Medical School Neuroscientist, McLean Hospital		
eRA COMMONS USER NAME (credential, e.g., agency login) ajanes			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Rutgers University New Brunswick, NJ	B.A.	1997-2001	Psychology/Biology
Boston University Boston, MA	M.A.	2001-2003	Psychology
Boston University Boston, MA	Ph.D.	2001-2007	Psychology
McLean Hospital, Belmont, MA	Post-doc	2007-2009	Neuroimaging

A. Personal Statement

This proposed developmental R21 aims to identify a novel smoking cessation strategy by linking neurokinin-1 (NK1) receptors with smoking relapse vulnerability symptoms. I have the expertise and motivation necessary to carry out the stated goals as I have conducted addiction-related research for over ten years and nicotine dependence research for the past 6 years. My early research focused on preclinical models of addiction, while my more recent work, including my ongoing K01 projects, focuses on clinical neuroimaging studies of nicotine dependence. I have successfully implemented the functional magnetic resonance imaging (fMRI) smoking cue-reactivity paradigm proposed in this project, as my collaborators and I have shown that heightened brain reactivity to smoking cues is predictive of smoking relapse vulnerability. Since 2007 I have worked with the nicotine-dependent population relevant to this proposed project both within the context of a large collaborative clinical trial as well as during lab based assessments of brain function. I have a successful track record working with a collaborative group of researchers, physicians, and physicists similar to the proposed research team. I have a history of fruitful collaborations with Dr. Blaise Frederick, the MR physicist associated with this project, as we have worked together to develop fMRI protocols and analyze fMRI data. To date our collaborations have resulted in 6 published manuscripts. Proposed co-investigator Dr. Stephanie Licata and I are currently working together to analyze fMRI Emotional Face Recognition Task (EFRT) data, a method proposed in this R21 application. The EFRT data was collected during Dr. Licata's multi-visit drug administration study, which employs a similar design to the proposed work, and indicates that Dr. Licata has project-relevant expertise. This proposed application not only has the potential for high public health impact, as our findings may facilitate the identification of an effective smoking cessation aid, but the proposed work logically follows our previous research. Collectively, the proposed research team has demonstrated a record of productivity and competency using the proposed methods and my experience studying nicotine dependence with fMRI and behavioral measures has prepared me to lead this project.

B. Positions and Honors

Professional experience

1996-2001 (May-August): Lab Assistant, Environmental Science, Rutgers University, New Brunswick, NJ
2007- 2009: Postdoctoral Fellow, Mclean Hospital, Belmont, MA
2009- 2012: Instructor in Psychiatry, Harvard Medical School
2012-current: Assistant Professor, Harvard Medical School

Academic and Professional Honors

2013: Society of Biological Psychiatry Travel Fellowship Award
2011: NIDA Women & Sex/Gender Junior Investigator Travel Award CPDD
2011: Mentored Research Scientist Development Award (K01)
2010: Clinical Research Day Award, Department of Psychiatry, Massachusetts General
2010: Alfred Pope Award for Young Investigators, McLean Hospital

2009: Myself Award, Department of Psychiatry, Harvard Medical School
2009: College on Problems of Drug Dependence Travel Award
2009: International Society for Magnetic Resonance in Medicine Educational Stipend
2008: National Research Service Award (NIDA T32), Postdoctoral Fellowship
2008: NIDA Women & Sex/Gender Junior Investigator Travel Award
2006: Clara Mayo Fellowship, Boston University
2003-2005 & 2006-2007: Research Assistantship, Boston University
2001-2003 & 2005-2006: Teaching Fellowship, Boston University

Professional Memberships

2008: International Society for Magnetic Resonance in Medicine
2008 – current: College on Problems of Drug Dependence

C. Publications

Tomie A, Di Poce J, Aguado A, **Janes A**, Benjamin D, Pohorecky L. (2003) Effects of autoshaping procedures on 3H-8-OH-DPAT- labeled 5-HT_{1a} binding and 125I-LSD-labeled 5-HT_{2a} binding in rat brain. *Brain Res* 975:167-78

Kang N, **Janes A**, Baum M, Cherry J. (2006) Sex difference in fos induced by male urine in medial amygdala-projecting accessory olfactory bulb mitral cells of mice. *Neurosci Lett* 398:59-62.

Kantak KM, Mashhoon Y, Silverman DN, **Janes AC**, Goodrich CM. (2009) Role of the Orbitofrontal Cortex and Dorsal Striatum in Regulating the Dose-Related Effects of Self-Administered Cocaine. *Behav Brain Res* 201:128-36. PMC2905169

Janes AC, Kantak KM, Cherry JA. (2009) The involvement of type 4 phosphodiesterases in cocaine-induced sensitization and subsequent pERK expression in the nucleus accumbens. *Psychopharmacology* 206:177-85. PMID: 19588125.

Janes AC, Frederick BdeB, Richardt S, Burbridge C, Merlo-Pich E, Renshaw PF, Evins AE, Fava M, Kaufman MJ. (2009) Brain fMRI responses to smoking-related images prior to and during extended smoking abstinence. *Exper Clin Psychopharm* 17: 6:365-73. PMC2954596.

Janes AC, Pizzagalli DA, Richardt S, Frederick B deB, Chuzi S, Pachas G, Culhane MA, Holmes AJ, Fava M, Evins AE, Kaufman MJ. (2010) Brain reactivity to smoking cues prior to smoking cessation predicts ability to maintain tobacco abstinence. *Biol Psychiatry* 2010a 67:722-9. PMC2954596.

Wells AM, **Janes AC**, Liu X, Deschepper CF, Kaufman MJ, Kantak KM. (2010) Medial temporal lobe functioning and structure in the spontaneously hypertensive rat: Comparison with Wistar-Kyoto normotensive and Wistar-Kyoto hypertensive strains. *Hippocampus* 2010 20:787-97. PMC2878848

Janes AC, Pizzagalli DA, Richardt S, Frederick Bde B, Holmes AJ, Sousa J, Fava M, Evins AE, Kaufman MJ. (2010) Neural substrates of attentional bias for smoking-related cues: an fMRI study. *Neuropsychopharmacology* 35:2339-45. PMC2955848

Evins AE, Pachas G, Mischoulon D, Urbanoski K, Carlini S, Sousa J, Bentley K, Rigotti NA, Nino-Gomez J, Loebel T, **Janes AC**, Kaufman MJ, Fava, MA. (2011) Double-Blind, Placebo-Controlled Trial of the NMDA Glycine Site Antagonist, GW468816, for Prevention of Relapse to Smoking in Females. *J Clin Psychopharmacol* 31:597-602. PMID: 21869693, PMCID-not yet available

Mashhoon Y, **Janes AC**, Jensen JE, Prescott AP, Pachas G, Renshaw PF, Fava M, Evins AE, Kaufman MJ (2011) Anterior cingulate proton spectroscopy glutamate levels differ as a function of smoking cessation outcome. *Prog in Neuropsychopharmacol Biol Psychiatry* 35:1709-1713. PMC3303218

Janes AC, Smoller JW, David SP, Frederick BB, Haddad S, Basu A, Fava M, Evins AE, Kaufman MJ. (2012) Association between CHRNA5 genetic variation at rs16969968 and brain reactivity to smoking images in nicotine dependent women. *Drug and Alcohol Depend* 120:7-13. PMC3203995

Janes AC, Nickerson L, Frederick BB, Kaufman MJ. (2012) Prefrontal and limbic resting state brain network functional connectivity differs between nicotine-dependent smokers and non-smoking controls. *Drug and Alcohol Depend* 125:252-259. PMC3389311

Gillis TE, **Janes AC**, Kaufman MJ. (2012) Positive reinforcement training in squirrel monkeys using clicker training. *Am J Primatol* PMC3421074

Kaufman MJ, **Janes AC**, Frederick BB, Brimson-Theberge M, Tong Y, McWilliams SB, Bear A, Gillis TE, Schrode KM, Renshaw PF, Negus SS. (In Press) A method for conducting functional MRI studies in alert nonhuman primates: initial results with opioid agonists in male cynomolgus monkeys. *Experimental and Clinical Psychopharmacology*

Ogata N, Gillis TE, Liu X, Cunningham SM, Lowen SB, Adams B, Sutherland-Smith J, Mintzopoulos, **Janes AC**, Dodman NH, Kaufman MJ. (In Press) Brain Structural Abnormalities in Doberman Pinschers with Canine Compulsive Disorder. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*

Janes AC, Jensen JE, Farmer SL, Frederic, BB, Pizzagalli DA, Lukas SE (2013) GABA levels in dorsal anterior cingulate cortex associated with difficulty ignoring smoking-related cues in tobacco-dependent volunteers. *Neuropsychopharmacology* 38: 1113-20. PMC3629395

D. Research Support

Past Projects

T32 DA015036-04 NIH/NIDA	Lukas (PI)	10/08-06/12
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Training in Drug Abuse and Brain Imaging
Objective: This postdoctoral T32 training award combines didactic training in brain imaging and psychopharmacology with practical experience in a variety of highly successful research laboratories to train the next generation of drug abuse researchers to utilize neuroimaging approaches to study substance abuse and dependence.
Role: Trainee

Ongoing Projects

K01DA029645 NIH/NIDA	Janes (PI)	04/11-03/16
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Training in Cognitive Function and Neuroimaging of Smoking-Related Cues
Objective: The goal of this project is to develop a deeper understanding of tobacco smoking relapse risk factors and their interactions using neuroimaging, cognitive, and psychological trait and state measures. Such studies may improve smoker phenotyping and advance research aimed at developing more effective personalized smoking cessation treatments.
Role: PI

R21DA031925 NIH/NIDA	Kaufman (PI)	04/12-03/14
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Concurrent PET D2/D3 receptor imaging and fMRI smoking cue reactivity in smokers
The goal of this project is to determine whether smoking cue functional MRI reactivity Correlates with brain dopamine D3 receptor distributions detected with [11C]-(+)-PHNO.
Role: Co-I

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Ji, Songbai	POSITION TITLE Assistant Professor of Engineering Adjunct Assistant Professor of Surgery
eRA COMMONS USER NAME (credential, e.g., agency login) songbai_ji	

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
Shanghai Jiaotong University, Shanghai, PRC	BS	1996	Computer Science
Shanghai Jiaotong University, Shanghai, PRC	BS	1996	Materials Science
Shanghai Jiaotong University, Shanghai, PRC	MS	1999	Materials Science
Washington University in St. Louis	MS	2001	Mechanical Engineering
Washington University in St. Louis	MS	2003	Computer Science
Washington University in St. Louis	D.Sc.	2003	Mechanical Engineering

A. Personal Statement

The long-term goal of the project is to investigate the biomechanical mechanism of sports-related concussion and neurocognitive impairment using a sophisticated computational model of the human head. The immediate goal of the proposed project is to address the computational challenges in studying a large athletic population on a large scale by establishing a pre-computed model response atlas using a validated finite element model of the human head (i.e., the Dartmouth Atlas Head Model, DAHM). The atlas will be created based on statistical characterization and parameterization of actual on-field head impact exposure of concussed and control teammate athletes. We will evaluate the estimation accuracy and computational efficiency of the pre-computed response atlas, and then utilize it to investigate the significance of cumulative effects of repetitive head impacts for athletes on the risk of concussion and neurocognitive impairment. These efforts will equip us with the computational tools required to rapidly study a large cohort of athletes on a large scale, thus facilitate our long-term goal of identifying key brain regions that are most susceptible to repetitive head impacts and associated with cognitive impairment in contact sports. This proposal will leverage a large database of on-field head kinematics, neuroimaging findings, and neurocognitive clinical outcomes for a cohort of helmeted athletic population generated from multiple institutions. I have a broad background in biomechanics and medical imaging and my past and current research work has been centered on various aspects of brain biomechanics. During my doctoral studies, I measured displacement and strain of rat brains using tagged magnetic resonance images. During my post-doctoral training, I have been working on measuring *in vivo* human brain deformation subjected to gravitation using magnetic resonance images, and developed a computational head model of a 6-month-old infant for investigation of pediatric head injury. I am currently the PI of an NIH-funded research that focuses on measuring material properties of the human brain *in vivo*. I am also PI of a NOCSAE-funded research aiming at better understanding the mechanism of mild traumatic brain injury in college and high-school football/ice-hockey players by comparing prediction performances between multiple validated computational head models and with player-specific neuroimaging findings, and have completed a Dartmouth-funded research on generation of subject-specific head models. In addition, I am a key member heavily involved in all aspects of an NIH-funded research on brain shift compensation in image-guided neurosurgery. A number of manuscripts relating to these efforts in understanding brain biomechanics have been published in both engineering and clinical journals. As part of these programs I have gained experience mentoring post-doc associates and graduate students. Through all of these efforts, I have collaborated closely with other engineers, surgeons, and clinicians at the Thayer School of Engineering and the Geisel School of Medicine at Dartmouth, and the Hitchcock Medical Center. My training, my experience and expertise in biomechanical modeling and image analysis, and my engagement in collaborative research will contribute to the successful completion of the proposed research effort.

B. Positions and Honors

Positions and appointments

1996 – 1999	Research Assistant, Shanghai Jiaotong University, Shanghai, P. R. China
2000 – 2003	Boeing Foundation Research Fellow, Washington University in St. Louis, MO
2003 – 2005	Post-doctoral Researcher, University of Pennsylvania, PA
2005 – 2008	Research Scientist, Dartmouth College, Hanover, NH
2008 –	Research Assistant Professor of Engineering, Dartmouth College, Hanover, NH
2012 –	Adjunct Assistant Professor of Surgery, Geisel School of Medicine, Dartmouth College

Honors and Awards

1992 – 1996	People's Scholarship (each semester)
1993	Exceptional Student Award
1993	Wan Bang Scholarship
1994	Mr. YuanSheng Liu Scholarship
1995	Outstanding Student Award
1995	San-Wa Bank Scholarship
1996	Received B.S. degree with "Exceptional Graduating Student" status
1997	National Merit Scholarship
1998	Bank of Jiaotong Scholarship
1999	Received M.S. degree with "Exceptional Graduating Student" status
2001 – 2003	Boeing Foundation Fellowship

C. Selected peer-reviewed publications

Most relevant to the current application (in chronological order)

1. **S. Ji**, and S. Margulies, "Brainstem Motion within the Skull: Measurement of the Pons Displacement *In Vivo*," *J. of Biomech*, 40(1), 92–99, 2007.
2. **S. Ji**, D.W. Roberts, A. Hartov, and K.D. Paulsen, "Brain-skull contact boundary condition in an inverse computational model," *Medical Image Analysis*, 13(4), 659-672, 2009.
3. **S. Ji**, J.C. Ford, R.M. Greenwald, J.G. Beckwith, K.D. Paulsen, L.A. Flashman, T.W. McAllister, "Automated subject-specific, hexahedral mesh generation via image registration," *Finite Elements in Analysis and Design*, 47:1178–1185, 2011. [DOI: 10.1016/j.finel.2011.05.007].
4. T.W. McAllister, J.C. Ford, **S. Ji**, J.G. Beckwith, L.A. Flashman, R.M. Greenwald. Maximum Principal Strain and Strain Rate Associated With Concussion Diagnosis Correlates With Changes in Corpus Callosum White Matter Indices. *Annals of Biomedical Engineering* 40(1):127-40, 2011. DOI: 10.1007/s10439-011-0402-6
5. **S. Ji**, X. Fan, A. Hartov, D.W. Roberts, and K.D. Paulsen. "Estimation of intraoperative brain deformation", in "Studies in Mechanobiology, Tissue Engineering and Biomaterials", Volume 11, 97–133, Y. Payan (Ed.), Springer-Verlag Berlin Heidelberg, 2012. DOI: 10.1007/8415_2012_129

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

6. P.V. Bayly, **S. Ji**, S.K. Song, R.J. Okamoto, P. Massouros, and G.M. Genin, "Measurement of strain in physical models of brain injury: a method based on HARP analysis of tagged magnetic resonance images (MRI)," *Journal of Biomechanical Engineering*, 126, pp. 523–528, August, 2004.
7. W. Liu, J. Chen, **S. Ji**, J. S. Allen, P.V. Bayly, S.A. Wickline, and X. Yu, "HARP MRI Tagging for Direct Quantification of Lagrangian Strain in Rat Hearts after Myocardial Infarction," *Magnetic Resonance in Medicine*, 52:1282–1290, 2004.
8. **S. Ji**, Q. Zhu, L. Dougherty, S.S. Margulies, "In Vivo Measurements of Human Brain Displacement", 48th Stapp Car Crash Journal, pp. 527–539, 2004.
9. B. Coats, S. Margulies, and **S. Ji**, "Parametric Study of Head Impact in the Infant," *51st Stapp Car Crash Journal*. 51, 1–15 2007.
10. **S. Ji**, Z. Wu, A. Hartov, D.W. Roberts, and K.D. Paulsen, "Mutual-information-based patient registration using intraoperative ultrasound in image-guided neurosurgery," *Medical Physics*. 35(10), 4612–4624, (2008).
11. **S. Ji**, A. Hartov, D.W. Roberts, and K.D. Paulsen, "Data assimilation using a gradient descent method for estimation of intraoperative brain deformation," *Medical Image Analysis*, 13(5), 744–756, 2009.

12. **S. Ji**, D.W. Roberts, A. Hartov, and K.D. Paulsen, "Combining multiple volumetric true 3D ultrasound volumes through re-registration and rasterization," G.-Z. Yang et al. (Eds.): MICCAI 2009, Part I, LNCS 5761, pp. 795–802, 2009.
13. Y. Chen, **S. Ji**, X. Wu, H. An, H. Zhu, D. Shen and W. Lin. "Simulation of Brain Mass Effect with an Arbitrary Lagrangian and Eulerian FEM," MICCAI, 13(Pt 2):274-81, 2010.
14. A. Hartov, K.D. Paulsen, **S. Ji**, K. Fontaine, M. Furon, A. Borsic, and D.W. Roberts, "Adaptive Spatial Calibration of a 3D Ultrasound System," Med. Phys. 37(5), pp. 2121–2130, 2010. [DOI: 10.1118/1.3373520]
15. P.A. Valdes, X. Fan, **S. Ji**, B.T. Harris, K.D. Paulsen, D.W. Roberts, "Estimation of Brain Deformation for Volumetric Image Updating in Protoporphyrin IX Fluorescence-Guided Resection," Stereotactic and Functional Neurosurgery, 88:1–10, 2010. [DOI: 10.1159/000258143]
16. **S. Ji**, D.W. Roberts, A. Hartov, and K.D. Paulsen, "Real-time Interpolation for True 3-Dimensional Ultrasound Image Volumes," Journal of Ultrasound in Medicine, 30:241–250, 2011.
17. **S. Ji**, X. Fan, D.W. Roberts, K.D. Paulsen, "Cortical surface strain estimation using stereovision", G. Fichtinger, A. Martel, and T. Peters (Eds.): MICCAI 2011, Part I, LNCS 6891, pp. 412–419, 2011.
18. **S. Ji**, D.W. Roberts, A. Hartov, and K.D. Paulsen. Intraoperative patient registration using volumetric true 3D ultrasound without fiducials, Medical Physics. 39(12), 7540–7552, (2012).

D. Research Support

Ongoing Research Support

1R21 NS078607 Ji (PI) 9/1/2012 – 8/31/2014
 NIH/NINDS
 Measuring Material Properties of the Human Brain in vivo
 The goal of this project is to measure material properties of the human brain in vivo using noncontact stereovision imaging technique and a novel indenter.

CA159324–01 Keith D. Paulsen (PI) 4/1/2011 – 3/31/2016
 NIH/NCI
 Modeling of Brain Deformation During Surgery
 This project utilizes biomechanical modeling to compensate for brain shift during open cranial surgeries to improve the accuracy in image-guidance and navigation and ultimately to maximize tumor resection.
 Role: Co-Investigator

Completed Research Support

n/a Ji (PI) 05/01/11 – 04/30/13
 National Operating Committee on Standards for Athletic Equipment (NOCSAE)
 Advancing the Understanding of Biomechanical Parameters Associated with Mild Traumatic Brain Injury: An Evaluation of the Relationships Among Head Acceleration, Brain Tissue Mechanical Response, and Diffusion Imaging
 This project compares brain mechanical responses under impact using multiple head models and correlates brain mechanical response with neuroimaging signature for concussed athletes.

n/a Ji (PI) 4/1/2010 – 3/31/2011
 Neukom Institute CompX Faculty Grant
 Subject-specific finite element modeling for mechanisms of sports-related mild traumatic brain injury in Dartmouth athletes.

5 R01 EB002082-13 (Paulsen) 08/25/2005 - 06/30/2010
 NIH/NIBIB
 Modeling of Brain Deformation during Surgery
 This is the competing continuation of a project which is developing modeling methods for compensation of brain deformation during image-guided neurosurgery.

1R01NS055020 (TW McAllister) 7/1/2007 – 6/30/2012

Role of Biomechanical Force Exposure and Genotype on Outcome After TBI. National Institute of Neurological Disorders and Stroke

The major goal for this project is to measure the forces of concussion and repetitive sub-concussive impacts and determine whether there are short- and long-term effects on College Level Athletes.

Role: Investigator

Overlap

There is no scientific overlap between the grants. If pending proposal is awarded then effort will be reduced accordingly without significant effect on the scientific goals of ongoing research programs.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Aaron V. Kaplan, M.D.	POSITION TITLE Professor of Medicine (Cardiology) Director of Research, Cardiology Section Geisel S of Medicine/Dartmouth-Hitchcock Med Ctr		
eRA COMMONS USER NAME (credential, e.g., agency login)			
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
Tufts University, Medford MA	BS ES	01/80	Engineering Science
Wake Forest University, Winston-Salem NC	MD	05/85	Medicine
Northwestern Memorial Hospital, Chicago IL		06/88	Internal Medicine
Stanford University, Stanford CA		06/91	Cardiology
Stanford University, Stanford CA		06/92	Interventional Cardiology

A. Personal Statement

Dr. Aaron V. Kaplan is a practicing interventional cardiologist and a medical device entrepreneur. In addition to his clinical responsibilities in the Cardiac Catheterization Laboratory, Dr. Kaplan supervises cardiology fellows and lectures regularly at the Tuck and Thayer Schools. Prior to joining the Dartmouth Faculty, Dr. Kaplan was Director of Interventional Cardiology at the Palo Alto VA and served on the Faculty at Stanford University. He has more than 50 peer-reviewed publications and is on the Editorial Board of *Cardiac Catheterization and Intervention* and *Cardiovascular Revascularization Medicine*. Dr. Kaplan founded The Dartmouth Device Symposia (3D) in 2003 to provide a forum to examine issues central to the clinical development and commercialization of medical devices. The Symposium brings together a small and balanced group of thought leaders from the clinical, business, governmental/regulatory, financial and legal communities. Publications emanating from 3D have appeared in *JAMA*, *Health Affairs*, *Circulation* and *J Amer College Cardiol*.

Dr. Kaplan is an active medical device entrepreneur who has been on the founding team of a number of medical device companies including Tryton Medical, LocalMed and Perclose (acquired by Abbott) and was an Entrepreneur-In-Residence at Three Arch Partners. Currently, he focuses his device development efforts on Tryton Medical, Inc., a company he founded to develop a side branch specific stent. Dr. Kaplan has authored more than 30 U.S. Patents. He will oversee the commercialization and industrial partnership activities of CSI working with Dr Fossum from Thayer, through his co-leadership of the Comparative Effectiveness and Dissemination Core.

B. Positions and Honors**Positions and Employment**

2008 - Professor of Medicine and of Community & Family Medicine
 2003 – 2008 Associate Professor of Medicine
 2002 – 2003 Visiting Associate Professor of Medicine
 Dartmouth Medical School, Hanover NH
 1998 – 2002 Clinical Associate Professor of Medicine
 1994 – 1998 Clinical Assistant Professor of Medicine
 1991 – 1992 Staff Physician/Clinical Instructor of Medicine
 Stanford University School of Medicine, Stanford, CA

Other Experience and Professional Memberships

2008 - Chief Medical Officer & Director
 2003 – 2008 Founder/President
 Tryton Medical, Inc., Durham, NC

- 2002 Entrepreneur-In-Residence
Three Arch Partners, Portola Valley, CA
- 1995-1999 Chief Scientific Officer & Director
- 1992-1994 Founder/President
LocalMed, Inc., Palo Alto, CA
- 2013 - Cardiovascular Revascularization Medicine
Section Editor
- 2010 - Cardiovascular Revascularization Medicine
- 2002 - Member, Cardiac Catheterization and Intervention
- 2003- Director, Dartmouth Device Development Symposia

C. Selected Peer-reviewed Publications

1. Baim DS, Mehran R, Kereiakes DJ, Gross TP, Simons M, Malenka D, **Kaplan AV**. Post Market Surveillance for Drug-Eluting Coronary Stents: A comprehensive approach. *Circulation* 2006;113:891-897.
2. Popp RL, Lorell BH, Stone GW, Laskey W, Smith JJ, **Kaplan AV**. The Role of Public Registration in the Conduct of Medical Device Trials. *J. Am. Coll. Cardiol*, 2006; 47: 1518 - 1521.
3. Baim DS, Donovan A, Smith JJ, Feigal D, Briefs N, Geofferion R, **Kaplan AV**. Medical Device Development: A Balanced Approach to Managing Conflicts of Interest Encountered by Physicians. *Cathet Cardiovasc Intervent* 2007 69:655-664.
4. **Kaplan AV**, Ramcharitar S, Louvard Y, Müller R, Davis HR, Morice M-C, Serruys PWJC, Grube E. Tryton I (First-In-Man) Study: Acute and 30 Day Outcome. Preliminary Report. *EuroIntervent* 2007 3:54-59.
5. **Kaplan AV**, Lukovits T, Robb JR. PFO Closure for Prevention of Recurrent Stroke in Patients after Cryptogenic Stroke: The imperative of completing randomized controlled trials. *Cathet Cardiovasc Intervent* 2007;69:6-8.
6. Malenka DJ, **Kaplan AV**, Lucas FL, PhD, Sharp SM, Skinner JS. Two Year Outcomes of Coronary Stenting in the Era of Bare Metal versus Drug Eluting Stents: Analysis of the Medicare Claims Made Data Base. *Journal of the American Med Assoc* 2008 299:2868-2876.
7. Ball TC, Foerst JR, Vorpahl M, M.D., Powell RJ, Virmani R, **Kaplan AV**. Embolic Stroke following Carotid Stenting: Micro CT analysis of en bloc surgical specimen demonstrating ulceration. *Circulation* 2010;121:1661-3.
8. Foerst JR, Ball TC, **Kaplan AV**. Post-mortem *in situ* MicroCT Evaluation of Coronary Stent Fracture. *Cathet Cardiovasc Intervent* 2010;76:527-531.
9. Foerst JR, Ball TC, Nakano M, Virmani R. **Kaplan AV**. Late complication Xience V stent fractures with restenosis. *JACC: Cardiovascular Interventions* 2012;5:239-242.
10. **Kaplan, AV**, Williams DO. Medical Device Regulatory Landscape. The Imperative of Finding Balance. *Circ Cardiovasc Interv* 2012;5:2-5.

D. Research Support (Selected)

1. RESOLUTE Integrity US Post Approval Study
Sponsor: Medtronic
P.I. (Local): Aaron V. Kaplan, M.D.
Status: Recruitment ongoing
2. Partners 2 Trial
TAVR vs Surgical AVR in high risk patients aortic stenosis patients
Sponsor: Edwards Life Sciences
P.I. John F. Robb, M.D. & Joe DeSimone, M.D.
Co-P.I. Aaron V. Kaplan, M.D.
3. Tryton IDE Study
Tryton Sidebranch Stent + DES vs POBA + DES
in the treatment of complex bifurcation lesions

Executive Committee Member

Sponsor Tryton Medical Inc.
Status: Recruitment ongoing

4. Cypress

Cypher Post Market Approval Study-Dual Anti-platelet Therapy Study

Sponsor: Cordis/Johnson & Johnson
P.I. (Local): Aaron V. Kaplan, M.D.
Status: Follow-up Ongoing

5. RESOLUTE US

Sponsor: Medtronic
P.I. (Local): Aaron V. Kaplan, M.D.
Status: Recruitment Complete-Follow-up ongoing

6. SPIRIT USA-DAPT

Sponsor: Xience V Post Market Approval Study
Abbott Vascular Corporation
P.I. (Local): Aaron V. Kaplan, M.D.
Status: Recruitment Complete-Follow-up ongoing

7. Closure I

Randomized Controlled trial evaluating the impact of PFO Closure for the prevention of recurrent stroke
Sponsor: NMT Medical, Inc.
P.I. (Local): Tim Lukovits, M.D. (Neurology)
Co P.I. Aaron V. Kaplan, M.D. (Cardiology)
John F. Robb, M.D. (Cardiology)
Status: Recruitment Complete-Follow-up ongoing

Pre Clinical

8. Pericardioscopic left atrial appendage closure system

Development of a chronic porcine models for the evaluation of left atrial appendage closure devices

Sponsor: Ension Medical, Inc.
Co P.I. Aaron V. Kaplan, M.D. (Cardiology)
Status: 2004 Study Complete

9. Clampless Proximal Anastomosis Catheter

Evaluation of a clampless system for aorto-SVG anastomoses. Acute Porcine Models

Sponsor: Magenta Medical, Inc.
Co P.I. Aaron V. Kaplan, M.D. (Cardiology)
Status: 2004-5 Study Complete

10. Biodegradable PFO Closure Device

Development of a chronic ovine model for the evaluation of PFO closure devices

Sponsor: NMT Medical, Inc.
Co P.I. Aaron V. Kaplan, M.D. (Cardiology)
Status: 2005 – Study Complete

11. Pericardioscopic left atrial appendage closure system

Development of a chronic porcine models for the evaluation of left atrial appendage closure devices

Sponsor: Epitek, Inc.
Co P.I. Aaron V. Kaplan, M.D. (Cardiology)
Status: 2005 – Study Complete

12. Bifurcation Coronary Stent

Evaluation of a novel side-branch stent. Acute Porcine Models

Sponsor: Tryton Medical Medical, Inc.
P.I.: Karen Moody, V.M.D. (Cardiology)
Co P.I. Aaron V. Kaplan, M.D. (Cardiology)
Status: 2004 – Study Complete

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Matthew D. Koff M.D. M.S.		POSITION TITLE Assistant Professor of Anesthesiology and Critical Care Medicine	
eRA COMMONS USER NAME (credential, e.g., agency login)			
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)	MM/YY	FIELD OF STUDY
University of Vermont; Burlington, VT	B.Sc.	05/90	Animal Science
University of Vermont; Burlington, VT	M.S.	05/94	Animal Science
University of Vermont; Burlington, VT	M.D.	05/00	Molecular Biology
University of Massachusetts; Worcester, MA		06/03	Emergency Medicine Residency
Dartmouth Hitchcock Medical Center; Lebanon, NH		12/05	Critical Care Medicine Fellowship
Dartmouth Hitchcock Medical Center; Lebanon, NH		12/07	Anesthesia Residency

A. Personal Statement

My research focuses on two main areas, the biology of bacterial cross-transmission, and cross-contamination in the Anesthesia work area, Intensive Care Unit, and hospital wards; the impact on post-operative and health care associated infections, and the development of strategies to eliminate these infections and prevent cross-contamination and health care associated infections. I also have interest in goal-directed intra-operative therapy and utilization of minimally and non-invasive strategies and technologies, to implement and reduce peri-operative morbidity and mortality.

B. Positions and Honors

Positions and Employment

2008-Present	Assistant Professor in Anesthesiology and Critical Care Medicine	Dartmouth-Hitchcock Medical Center, Lebanon, NH
2011-Present	Anesthesiology/Critical Care Fellowship Director	Dartmouth-Hitchcock Medical Center, Lebanon, NH
2011-Present	Associate Medical Director DHART Medical Transport	Dartmouth Hitchcock Medical Center, Lebanon, NH
2011-Present	Critical Care Medicine Anesthesiology Resident Subspecialty Director	Dartmouth Hitchcock Medical Center, Lebanon, NH
2010-Present	Vascular Access Team Medical Director	Dartmouth Hitchcock Medical Center, Lebanon, NH
2008-Present	Critical Care Medicine Medical Student Director	Dartmouth Hitchcock Medical Center, Lebanon, NH
2008-Present	Critical Care Central Line Blood Stream Prevention Director	Dartmouth Hitchcock Medical Center, Lebanon, NH
2008-Present	Department Clinical Division Director of General Surgery	Dartmouth Hitchcock Medical Center, Lebanon, NH
2008-Present	Department Clinical Division Director of Trauma Surgery	Dartmouth Hitchcock Medical Center, Lebanon, NH
2004-2008	Attending Physician Emergency Department	Dartmouth-Hitchcock Medical Center, Lebanon, NH
2003	Chief Resident in Emergency Medicine	University of Massachusetts, Worcester, MA
2000 - 2003	Life Flight Helicopter Flight Physician	University of Massachusetts, Worcester, MA

Other Experience and Professional Memberships

2005-Present	American Society of Anesthesiologists	Member
2003-Present	Society of Critical Care Medicine	Member
2000-Present	Alpha Omega Alpha Society	Member

Honors and Awards

1996	Hitchcock Foundation Competitive Research Grant Principal Investigator, Skin Cancer Research, Dartmouth–Hitchcock Medical Center, Lebanon, NH
1996	Microbiology Class Award, University of Vermont, Burlington, VT
2000	Alpha Omega Alpha Honor Society, University of Vermont, Burlington, VT
2004	Quality Research Grant Program, “Surviving Sepsis,” Dartmouth–Hitchcock Medical Center, Lebanon, NH
2007	Quality Research Grant Program, Infection Control in the Anesthesia Workspace Dartmouth–Hitchcock Medical Center, Lebanon, NH
2008	Teaching Award Department of Internal Medicine, Dartmouth–Hitchcock Medical Center, Lebanon, NH, December 2008

C. Selected Peer-reviewed Publications (Selected from 20 peer-reviewed publications)

Most relevant to the current application

1. Loftus R, **Koff MD**, Burchman CA, Beach ML. Transmission of multidrug resistant bacterial organisms in the anesthesia work area. *Anesthesiology* 2008 Sep;109(3):399-407
2. **Koff MD**, Loftus RW, Burchman CC, et al. Reduction in intraoperative bacterial contamination of peripheral intravenous tubing through the use of a novel device. *Anesthesiology*. May 2009;110(5):978-985.
3. John SK, Rangan Y, Block CA, **Koff MD**., Life-threatening hyperkalemia from nutritional supplements: uncommon or undiagnosed? *Am J Emerg Med*. 2010 Nov 12. [Epub ahead of print]
4. Loftus RW, Muffly MK, Brown JR, Beach ML, **Koff MD**, Corwin HL, Surgenor SD, Kirkland KB, Yeager MP. Hand contamination of anesthesia providers is an important risk factor for intraoperative bacterial transmission. *Anesth Analg*. 2011 Jan;112 (1):98-105. Epub 2010 Aug 4.
5. **Koff, M.D.**, Loftus, R., Corwin, H, Beach, M Reduction in Ventilator Associated Pneumonias in a mixed ICU using a Novel Hand Hygiene System. *J Crit Care* 26:489-95. 2011.
6. Loftus RW, Muffly MK, Brown JR, Beach ML, **Koff MD**, Corwin HL, Surgenor SD, Kirkland KB, Yeager MP. Hand contamination of anesthesia providers is an important risk factor for intraoperative bacterial transmission. *Anesth Analg*. 2011 Jan;112(1):98-105.
7. Loftus RW, Patel HM, Huysman BC, Kispert DP, **Koff MD**, Gallagher JD, Jensen JT, Rowlands J, Reddy S, Dodds TM, Yeager MP, Ruoff KL, Surgenor SD, Brown JR. Prevention of intravenous bacterial injection from health care provider hands: the importance of catheter design and handling. *Anesth Analg*. 2012Nov;115(5):1109-19.
8. Loftus RW, Brindeiro BS, Kispert DP, Patel HM, **Koff MD**, Jensen JT, Dodds TM, Yeager MP, Ruoff

KL, Gallagher JD, Beach ML, Brown JR. Reduction in intraoperative bacterial contamination of peripheral intravenous tubing through the use of a passive catheter care system. *Anesth Analg*. 2012 Dec;115(6):1315-23.

9. Loftus RW, Brown JR, **Koff MD**, Reddy S, Heard SO, Patel HM, Fernandez PG, Beach ML, Corwin HL, Jensen JT, Kispert D, Huysman B, Dodds TM, Ruoff KL, Yeager MP. Multiple reservoirs contribute to intraoperative bacterial transmission. *Anesth Analg*. 2012 Jun;114(6):1236-48.

D. Research Support

Ongoing Research Support

Sage Intra-operative Hand Hygiene Study 2013-Current

Recently Completed Research Support

PSI-2012-2013 Catheter Care System Research

B-Braun 2011-2012 Catheter Design and Handling Research
Anesthesia Patient Safety Foundation Research Grant 2009-2010

Role: Co-PI

BIOGRAPHICAL SKETCH

NAME Krishnaswamy, Venkataramanan	POSITION TITLE Research Assistant Professor, Engineering Sciences		
eRA COMMONS USER NAME vkrishnaswamy			
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
Shanmugha College of Engineering, Bharathidasan Univ., Thiruchirappalli, TN, India	B.E.	1999	Electronics & Instrumentation Engineering
Interdisciplinary Optical Sci. & Eng. Program, Univ. of Alabama in Huntsville, Huntsville, AL	Ph.D.	2007	Optical Science and Engineering
Thayer School of Eng., Dartmouth College	Post-doc	2007-09	Medical Imaging/Biophotonics

A. Personal Statement

Dr. Krishnaswamy has a broad background in Optical Science and Engineering with specific emphasis on optical system design for spectroscopy and imaging applications. As a co-investigator on NIH-funded projects, he has developed several spectroscopy and imaging platforms for cancer diagnosis and image-guided cancer therapies. His demonstrated experience in leading optical technology development at the intersection of engineering and clinical settings would be a valuable addition to this project.

B. Positions and Honors

Employment

01/2000 – 05/2000 Research Tech. & Teaching Asst., Electrical Eng. Dept., Univ. of AL in Huntsville
05/2000 – 03/2003 Grad. Research Asst., Department of Physics, Univ. of AL in Huntsville
03/2003 – 12/2006 Grad. Research Asst., Earth Systems Science Center, Univ. of AL in Huntsville
01/2007 – 05/2007 Grad. Teaching Asst., Department of Physics, Univ. of AL in Huntsville
09/2007 – 12/2007 Consultant, Moxtek Inc., Orem, UT
05/2007 – 11/2009 Research Associate, Thayer School of Engineering at Dartmouth, Hanover, NH
12/2009 – Research Assistant Professor, Thayer School of Eng. at Dartmouth, Hanover, NH

National advisory committees

Member, ZCA1 SRLB - 9(C1) NCI/NIH Special Emphasis Panel/Scientific Review Group, Novel Imaging Agents to Expand the Clinical Toolkit for Cancer Diagnosis, Staging & Treatment, March 2013

Member, ZCA1 RTRB - 8(C1) – NCI/NIH Special Emphasis Panel/Scientific Review Group, Novel Imaging Agents to Expand the Clinical Toolkit for Cancer Diagnosis, Staging & Treatment, Mar 2012

Member, ZCA1 SRLB-X (C1) B – NCI/NIH Special Emphasis Panel/Scientific Review Group, Novel Imaging Agents to Expand the Clinical Toolkit for Cancer Diagnosis, Staging & Treatment, Mar 2011

Professional Society Affiliations

2007 – Member, International Society for Optics and Photonics (SPIE)
2007 – Member, Optical Society of America (OSA)

C. Publications

Peer-reviewed Publications

- A. M. Laughney, **V. Krishnaswamy**, T. B. Rice, D. J. Cuccia, R. J. Barth, B. J. Tromberg, K. D. Paulsen, B. W. Pogue, and W. A. Wells, "System analysis of spatial frequency domain imaging for quantitative mapping of surgically resected breast tissues," *J. Biomed. Opt.*, vol. 18, no. 3, pp. 036012–036012, Mar. 2013.
- V. Krishnaswamy**, A. M. Laughney, W. A. Wells, K. D. Paulsen, and B. W. Pogue, "Scanning in situ Spectroscopy platform for imaging surgical breast tissue specimens," *Opt. Express*, vol. 21, no. 2, pp. 2185–2194, Jan. 2013.
- V. Krishnaswamy**, K. E. Michaelsen, B. W. Pogue, S. P. Poplack, I. Shaw, K. Defrietas, K. Brooks, and K. D. Paulsen, "A digital x-ray tomosynthesis coupled near infrared spectral tomography system for dual-modality breast imaging," *Opt. Express*, vol. 20, no. 17, pp. 19125–19136, Aug. 2012.
- K. Michaelsen, **V. Krishnaswamy**, B. W. Pogue, K. Brooks, K. Defreitas, I. Shaw, S. P. Poplack, and K. D. Paulsen, "Characterization of materials for optimal near-infrared and x-ray imaging of the breast," *Biomed. Opt. Express*, vol. 3, no. 9, pp. 2078–2086, Sep. 2012.
- A. M. Laughney, **V. Krishnaswamy**, E. J. Rizzo, M. C. Schwab, R. J. Barth, B. W. Pogue, K. D. Paulsen, and W. A. Wells, "Scatter spectroscopic imaging distinguishes between breast pathologies in tissues relevant to surgical margin assessment," *Clin. Cancer Res.*, Aug. 2012.
- K. Michaelsen, **V. Krishnaswamy**, B. W. Pogue, S. P. Poplack, and K. D. Paulsen, "Near-infrared spectral tomography integrated with digital breast tomosynthesis: effects of tissue scattering on optical data acquisition design," *Med Phys*, vol. 39, no. 7, pp. 4579–4587, Jul. 2012.
- S. C. Kanick, **V. Krishnaswamy**, U. A. Gamm, H. J. C. M. Sterenborg, D. J. Robinson, A. Amelink, and B. W. Pogue, "Scattering phase function spectrum makes reflectance spectrum measured from Intralipid phantoms and tissue sensitive to the device detection geometry," *Biomed. Opt. Express*, vol. 3, no. 5, pp. 1086–1100, May 2012.
- V. Krishnaswamy**, A. M. Laughney, K. D. Paulsen, and B. W. Pogue, "Dark-field scanning in situ spectroscopy platform for broadband imaging of resected tissue," *Opt. Lett.* 36, 1911-1913 (2011)
- A. Laughney, **V. Krishnaswamy**, et al., "Automated classification of breast pathology using local measures of broadband reflectance," *J. Biomed. Opt.* 15, 066019 (Dec 30, 2010)
- Z. Li, S. Jiang, **V. Krishnaswamy**, S. C. Davis, S. Srinivasan, K. D. Paulsen, and B. W. Pogue, "MR-Guided pulse oximetry imaging of breast in vivo," *J. Innov. Opl. Health Sci.* 04, 199 (2011)
- Z. Li, **V. Krishnaswamy**, et al., "Rapid magnetic resonance-guided near infrared mapping to image pulsatile hemoglobin in the breast," *Opt. Lett.* 35, 3964-3966 (2010)
- B. Pogue, F. Leblond, **V. Krishnaswamy**, and K. Paulsen, "Radiologic and Near-Infrared/Optical Spectroscopic Imaging: Where Is the Synergy?," *Am. J. Roentgenol.* 195, 321-332 (2010).
- Z. Li, **V. Krishnaswamy**, S. C. Davis, S. Srinivasan, K. D. Paulsen and B. W. Pogue, "Video-rate near infrared tomography to image pulsatile absorption properties in thick tissue," in *Opt. Express* 17, 12043-12056, PMID: PMC2797366 (2009)
- P. B. Garcia-Allende, **V. Krishnaswamy**, P. J. Hoopes, K. S. Samkoe, O. M. Conde-Portilla and B. W. Pogue, "Automated Identification of Tumor Microscopic Morphology based upon Macroscopically Measured Scatter Signatures," in *J Biomed. Opt.* Vol. 14, 034034 (2009)
- V. Krishnaswamy**, P. J. Hoopes, K. S. Samkoe, J. A. O'Hara, T. Hasan and B. W. Pogue, "Quantitative Imaging of Scattering Changes Associated With Epithelial Proliferation, Necrosis and Fibrosis in Tumors Using

Microsampling Reflectance Spectroscopy," J Biomed. Opt., 14(1), 014004, (NIHMSID 166743, PMC Journal – in progress) (2009)

J. A. Hopey, K. A. Fuller, **V. Krishnaswamy**, D. Bowdle, and M. J. Newchurch, "Fourier transform infrared spectroscopy of size-segregated aerosol deposits on foil substrates," Appl. Opt. 47, 2266-2274 (2008)

D. Research Support

Ongoing Research Support

“Optical Imaging Fused with Tomosynthesis for Improved Breast Cancer Detection”

R01CA139449 04/09 – 03/14

NIH

This project is an academic-industrial partnership proposal under PAR-07-214 to develop and validate optical imaging fused with breast tomosynthesis for improved breast cancer detection and diagnosis

Role: Co-investigator

“NIRFAST”

R01CA132750 2009 – 2014

NIH

The major goal of this project is to develop and disseminate a key computational resource for integration of Near-Infrared Spectroscopy (NIRS) into Magnetic Resonance Imaging (MRI). NIRFAST is an open source FEM based software package designed for modeling Near Infrared Frequency domain light transport in tissue.

Role: Research Scientist

“Near-Infrared Spectroscopy and Imaging”

PO1CA80139 05/06-04/11

NIH

Within program project “Alternative Breast Cancer Imaging Modalities” Prog. Dir.: Keith D. Paulsen. This project focuses on the technological development of a near-infrared imaging system which can sample signals transmitted through breast tissue and image hemoglobin-related.

Role: Post-doc

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Loftus, Randy Wayne	POSITION TITLE Assistant Professor of Anesthesiology and Critical Care Medicine		
eRA COMMONS USER NAME rwloftus			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
University of Iowa	B.S.	1998	Biology
University of Iowa		1999	Research assistant in epithelial transport
University of Iowa College of Medicine	M.D.	2003	
Dartmouth-Hitchcock Medical Center		2003-2005	Internal Medicine Resident
Dartmouth-Hitchcock Medical Center		2005-2008	Anesthesiology Resident
Dartmouth-Hitchcock Medical Center		2008-2009	Critical Care Fellowship

A. Personal Statement

The proposed project is designed to examine the effectiveness of a novel, evidence-based multimodal program in reducing intraoperative bacterial transmission and the subsequent development of 30-day postoperative healthcare-associated infections (HCAIs) and to characterize the incidence and patterns of intraoperative multi-drug resistant bacterial pathogen transmission. We have previously identified several barriers to intraoperative infection control, including suboptimal hand hygiene compliance of anesthesia providers, inadequate intraoperative environmental decontamination, frequent patient colonization with major bacterial pathogens, and suboptimal intravascular catheter design and handling. We have shown that all of these barriers are associated with intraoperative bacterial transmission events that ultimately lead to increased patient morbidity and mortality. Currently, the intraoperative arena is largely devoid of infection control measures because these barriers have been previously unrecognized. The results of a solid body of preliminary evidence as presented in this proposal, all of which is derived from a novel experimental model for study of intraoperative bacterial cross contamination, strongly suggests that a multimodal program targeting improvements in each of these areas in parallel during the process of intraoperative patient care is indicated to maximally attenuate the complex, multi-faceted problems of intraoperative bacterial transmission, evolving bacterial resistance, and subsequent infection development. As such, we have developed an evidence-based, multimodal approach combining improved intraoperative environmental decontamination, use of passive prevention strategies for intravenous tubing bacterial contamination, improved patient decolonization, and improved hand hygiene compliance and have further developed an experimental model for study of intraoperative bacterial cross contamination. We will evaluate the effectiveness of this multimodal program on the outcomes of intraoperative bacterial transmission and 30-day postoperative HCAI rates, and we will continue to utilize a previously validated experimental model to gain a better understanding of the epidemiology of perioperative bacterial resistance in order that future preventive measures, such as targeted and improved patient decolonization strategies, can be designed, implemented, tested and disseminated to improve hospital-wide patient safety. This work will involve a prospective clinical trial that will utilize a previously validated experimental model to study the impact of these various interventions on intraoperative bacterial transmission (years 1-3) and a series of in vitro investigations (years 4-5). We have built a strong foundation for the proposed project by designing and completing several closely related *in vivo* and *in vitro* investigations, and I have been extensively involved in the design, execution and analysis for each of these investigations. Most recently, I have served as the principal investigator for a multi-centered study investigating the origin of intraoperative bacterial transmission. This study, funded by the Anesthesia Patient Safety Foundation, has been published in our leading journal. In addition, I have recently completed two randomized trials in this arena, both of which have been provisionally accepted for publication pending minor revisions. I established and have maintained a research laboratory over the last 5 years that is fully equipped for the proposed biological investigations. Thus, though I am a young investigator, I have already worked for several years on design, implementation and analysis of clinical trials

and laboratory based investigations, both small and large. As the principal investigator on multiple clinical projects, I have experience with a wide variety of experimental methods and, consequently, a wide variety of analytical techniques. I also have a proven record of effective collaboration with experts in clinical and laboratory based microbiology, infectious disease, epidemiology and biostatistics. Our collaborative efforts have already led to major improvements in patient safety at Dartmouth-Hitchcock Medical Center, and ongoing support of our initiatives is a top institutional priority. Finally, I am currently serving on a Technical Expert Panel (TEP) for a project sponsored by AHRQ designed to conduct a systematic review of preoperative antibiotic prophylaxis and to design a new protocol based on that systematic review, and I am part of a large project sponsored by the Centers for Medicare and Medicaid Services involving a patient safety engagement contract. In summary, these experiences fully qualify me to lead the completion of the important projects proposed in this grant.

B. Positions and Honors.

Positions and Employment

1999	Research assistant at the University of Iowa epithelial transport laboratory.
1999-2003	Medical student
2003-2005	Medical Residency, Internal Medicine, Dartmouth-Hitchcock Medical Center
2005-2008	Medical Residency, Anesthesiology, Dartmouth-Hitchcock Medical Center
2008-2009	Fellowship, Critical Care, Dartmouth-Hitchcock Medical Center
2009-Present	Assistant Professor of Anesthesiology and Critical Care Medicine

Other Experience and Professional Memberships

1999-2003	Member of Christian Medical Association
2006-present	American Society of Anesthesiology
2009-present	Society of Critical Care Medicine
2009-present	International Anesthesia Research Society

Honors

2002	American Medical Association Seed Grant Research Award
2003	American College of Physicians- American Society of Internal Medicine Award
2003	William R. Wilson Award for Exceptional Accomplishment in Internal Medicine, U of Iowa
2006	Dartmouth-Hitchcock Medical Center Quality Improvement Grant Award
2007	Dartmouth-Hitchcock Medical Center Quality Improvement Grant Award
2008	Hitchcock Foundation Award
2008	DHMC Anesthesiology Residency Research Award
2009	APSF/Anesthesia Healthcare Partners (AHP) Research Award
2010	Lead articles in <i>Anesthesiology</i> and <i>Anesthesia and Analgesia</i> , both cover articles.
2011	Most read article for the year 2010 Lippincott Williams & Wilkins
2011	Invited member of the Technical Expert Panel (TEP) for a project sponsored by AHRQ designed to conduct a systematic review of preoperative antibiotic prophylaxis and to design a new protocol based on that systematic review.
2012	Article featured as Continuing Medical Education (CME) in <i>Anesthesia and Analgesia</i> .
2012	Invited to join the Editorial Board of <i>Scientifica</i> .
2012	Multiple invitations to review articles for <i>Anesthesia and Analgesia</i> .
2012	Funded CMMI project-Patient Safety Hospital Engagement Contract with Intermountain Health action network.
2012	Invited speaker for the International Anesthesia Research Society.
2012	Invited speaker to NYU.

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

Most relevant to the current application

1. **Loftus RW**, Koff MD, Burchman CC, Schwartzman JD, Thorum V, Read ME, Wood TA, Beach ML. Transmission of pathogenic bacterial organisms in the anesthesia work area. *Anesthesiology*. 2008 Sep; 109(3):399-407.
2. **Loftus, RW**, and Koff MD. Infection Control Practices by the Anesthesiologist. *Anesthesiology*: May 2009 - Volume 110 - Issue 5 - pp 1191-1192
3. Koff MD, **Loftus RW**, Burchman CC, Schwartzman JD, Read ME, Henry ES, Beach ML. Reduction in intraoperative bacterial contamination of peripheral intravenous tubing through the use of a novel device. *Anesthesiology*. 2009 May; 110(5):978-85.
4. **Loftus RW**, Muffly MK, Brown JR, Koff MD, Corwin HD, Surgenor SD, Kirkland KB, Beach ML, and Yeager MP. Hand Contamination of Anesthesia Providers is an Important Risk Factor for Intraoperative Bacterial Transmission. *Anesth Analg*, 2011. **112**(1): p. 98-105.
5. Matthew D. Koff, MD, Michael L. Beach, MD, PhD, Howard L. Corwin, MD, Jeremiah R. Brown, PhD, MS, Steven D. Surgenor, MD, and **Randy W. Loftus**, MD. Reduction in ventilator associated pneumonia in a mixed intensive care unit after initiation of a novel hand hygiene program. *J Crit Care*, 2011. 26(5): p. 489-95.
6. **Loftus RW**, Brown JR, Koff MD, Reddy S, Heard SO, Patel HM, Fernandez PG, Beach ML, Corwin HL, Jensen JT, Kispert D, Dodds TM, Ruoff KL, and Yeager MP. Multiple Reservoirs Contribute to Intraoperative Bacterial Transmission. *Anesth Analg* 2012 June; 114(6):1236-1248.
7. **Loftus RW**, Patel HM, Huysman BC, Kispert DP, Koff MD, Gallagher JD, Jensen JT, Rowlands J, Reddy S, Dodds TM, Yeager MP, Surgenor SD, and Brown JR. Prevention of Intravenous Bacterial Injection from Healthcare Provider Hands: The Importance of Catheter Design and Handling. *Anesth Analg* (In press).
8. **Loftus RW**, Brindeiro B, Kispert DP, Patel HM, Huysman BC, Koff MD, Jensen JT, DoddsTM, Yeager MP, Ruoff KL, and Brown JR. Reduction in Intraoperative Bacterial Contamination of Peripheral Intravenous Tubing Through the Use of a Passive Catheter Care System. *Anesth Analg* (In press).
9. Koff MD, Desrosiers K, Wood TA, Read ME, Corwin HL, Surgenor SD, and **Loftus RW**. *Environmental Contamination and the Transmission of Bacterial Pathogens in the Intensive Care Unit. J Crit Care* (In Press).

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

10. Sayegh R, Auerbach SD, Li X, **Loftus RW**, Husted RF, Stokes JB, Thomas CP. Glucocorticoid induction of epithelial sodium channel expression in lung and renal epithelia occurs via trans-activation of a hormone response element in the 5'-flanking region of the human epithelial sodium channel alpha subunit gene. *J Biol Chem*. 1999 Apr 30;274(18):12431-7.
11. Auerbach SD, **Loftus RW**, Itani OA, Thomas CP. Human amiloride-sensitive epithelial Na⁺ channel gamma subunit promoter: functional analysis and identification of a polypurine-polypyrimidine tract with the potential for triplex DNA formation. *Biochem J*. 2000 Apr 1;347 Pt 1:105-14. PMID: PMC1220937
12. Mick VE, Itani OA, **Loftus RW**, Husted RF, Schmidt TJ, Thomas CP. The alpha-subunit of the epithelial sodium channel is an aldosterone-induced transcript in mammalian collecting ducts, and this transcriptional response is mediated via distinct cis-elements in the 5'-flanking region of the gene. *Mol Endocrinol*. 2001 Apr;15(4):575-88.
13. Thomas CP, **Loftus RW**, Liu KZ, Itani OA. Genomic organization of the 5' end of human beta-ENaC and preliminary characterization of its promoter. *Am J Physiol Renal Physiol*. 2002 May;282(5):F898-909.

14. Thomas CP, **Loftus RW**, Liu KZ. AVP-induced VIT32 gene expression in collecting duct cells occurs via trans-activation of a CRE in the 5'-flanking region of the VIT32 gene. Am J Physiol Renal Physiol. 2004 Sep;287(3):F460-8.
15. **Loftus RW**, Yeager MP, Clark JA, **Brown JR**, Abdu W, Sengupta D, Beach ML. Intraoperative Ketamine Reduces Perioperative Opiate Consumption and Improves Surgical Outcomes in Opiate-Dependent Patients with Chronic Back Pain Undergoing Back Surgery. Anesthesiology. 2010; 113(3):639-646. PMID: 20693876

C. Research Support

Ongoing Research Support

CMMI Healthcare Engagement Network Contract: 2011-present

My primary role is to serve as a subject matter expert in the area of central line associated bloodstream infections.

Completed Research Support

Industrial support:

- a. Patient safety innovation medical, Inc. 2011-1/2012
This work involved a randomized clinical trial to investigate the efficacy of a new catheter care station in reducing bacterial contamination of intravascular devices and HCAs.
Role: Principal Investigator
- b. B. Braun Medical, Inc. 2011-8/2012
This work involved a randomized, ex vivo trial designed to investigate the relative importance of catheter design and handling in the anesthesia environment.
Role: Principal Investigator

Anesthesia Patient Safety Foundation (APSF) Grant 3/01/09-3/01/11

The goal of this multi-centered, prospective clinical trial is to study the origin of/risk factors for overall intraoperative bacterial transmission and its importance in terms of associated morbidity and mortality
Role: Principal Investigator

DHMC Quality Research Grant Program (QRGP) 2006-2007

The goal of this project was to study potential nosocomial infection prevention via modification of anesthesia intraoperative aseptic practice.
Role: Principal Investigator

DHMC Quality Research Grant Program (QRGP) 2006-2009

The goal of this project was to study intra-operative ketamine infusions in patients with chronic lower back discomfort undergoing multilevel laminectomies.
Role: Principal Investigator

Hitchcock Foundation Grant Program 2008-2009

The goal of this project was to study the origin of intraoperative bacterial transmission.
Role: Principal Investigator

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Lollis, S. Scott	POSITION TITLE Neurosurgeon		
eRA COMMONS USER NAME			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Dartmouth College, Hanover, NH	BA	1998	Government
Columbia University, New York, NY	MD	2003	Medicine
Dartmouth Hitchcock Medical Center, Lebanon, NH		2003 - 2009	Neurosurgery
Cleveland Clinic Foundation, Cleveland, OH		2009-2010	Spine surgery

Dr Lollis is an Assistant Professor of Surgery at Dartmouth's Geisel School of Medicine with an academic clinical practice in Neurosurgery at Dartmouth-Hitchcock with specialty training in spine surgery. During his Dartmouth residency in neurosurgery, he participated with Drs Paulsen and Weaver in brain MRE research, where he developed and perfected the proposed feline hydrocephalus model for MRE studies. As a faculty member, he has continued to contribute to and pursue brain MRE research, working with Drs Weaver and Paulsen to develop and perfect the intrinsically-actuated MRE data acquisition procedure, and to apply it to hydrocephalus patients.

A. Positions and Employment.

2010-present Assistant Professor of Surgery (Neurosurgery), Dartmouth Medical School, Hanover, NH
2009-2010 Fellow in spine surgery, Cleveland Clinic, Cleveland, OH
2003-2009 Resident in neurosurgery, Dartmouth-Hitchcock Medical Center, Lebanon, NH
1998-1991 Research assistant, Division of Cardiothoracic Surgery, Beth Israel Deaconess Medical Center, Boston, MA

MILITARY SERVICE

April 2007 – Present Major, United States Army Reserve
September 2011 – December 2011 Theater Consultant, Neurosurgery, US Forces, Iraq

LICENSURE AND CERTIFICATION:

June 2010 - Present License 14882, New Hampshire
August 2009 - July 2010 License 35.093135, Ohio
June 2003 - June 2009 Training license RT-1202, New Hampshire

MEMBERSHIPS IN PROFESSIONAL AND HONORARY SOCIETIES:

2011 – Present Member, Congress of Neurological Surgeons
2010 – Present Provisional Member, American Assoc. of Neurological Surgeons
2009 – 2010 Fellow Member, American Assoc. of Neurological Surgeons
2004 – 2009 Resident Member, American Assoc. of Neurological Surgeons

AWARDS AND HONORS:

June 2003 Alpha Omega Alpha
June 2003 Major clinical year honors in surgery, neurology, neurosurgery, urology, pediatrics, obstetrics and gynecology, primary care, & psychiatry
June 1998 Cum Laude

RESEARCH INTERESTS:

Magnetic resonance elastography (MRE)

Neurosurgical robotics

Vaccination of brain tumors

Cerebrospinal fluid shunting for refractory perilymphatic fistula

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

1. Lollis SS, Wolak ML, Mamourian AC, Imaging characteristics of the subdural evacuating port system, a new bedside therapy for subacute/chronic subdural hematoma. *AJNR American Journal of Neuroradiology* 27(1), 2006: 74-5.
2. Lollis SS, Hug EB, Gladstone DJ, Chaffee S, Duhaime AC, Acquired Chiari I malformation after fractionated radiation therapy to the anterior skull base in a 20 month old boy. *Journal of Neurosurgery* 104(2 suppl), 2006: 133-7.
3. Hopkin J, Mamourian A, Lollis S, Duhaime T, The next extreme sport? Subdural haematoma in a patient with arachnoid cyst after head shaking competition. *British Journal of Neurosurgery* 20(2), 2006: 111-3.
4. Lollis SS, Weider DJ, Phillips JM, Roberts DW, Ventriculoperitoneal shunt insertion for the treatment of refractory perilymphatic fistula. *Journal of Neurosurgery* 105(1), 2006:1-5.
5. Weaver JB, Perrinez PR, Bergeron JA, Kennedy FE, Wang H, Lollis SS, Doyley MM, Hoopes PJ, Paulsen KD, The effects of interstitial tissue pressure on the measured shear modulus in vivo. *Proc SPIE* Vol 6511, 65111A, 2007.
6. Lollis SS, Roberts DW, Robotic catheter ventriculostomy: feasibility, efficacy, and implications. *Journal of Neurosurgery* 108(2), 2008: 269-74.
7. Perrinez P, Lollis S, Kennedy F, Weaver J, Paulsen K, Magnetic resonance poroelastography of the feline brain. Proceedings 17th Scientific Meeting, International Society for Magnetic Resonance in Medicine, Honolulu, 2009, 4351.
8. Liu F, Lollis SS, Ji S, Paulsen KD, Hartov A, Roberts DW, Model-based estimation of ventricular deformation in the cat brain. *Med Image Comput Comput Assist Interv* 12(2), 2009: 308-15.
9. Desai AD, Lollis SS, Missios S, Radwan T, Zuaro DE, Schwarzman JD, Duhaime AC, How long should cerebrospinal fluid cultures be held to detect infections? *J Neurosurg Pediatrics* 4, 2009: 184-189.
10. Pattison AJ, Lollis SS, Perrinez PR, Weaver JB, Paulsen KD, MRE elastography of hydrocephalus. *Proc SPIE* Vol 7262, 72620A, 2009.
11. Lollis SS, Hoopes PJ, Kane S, Paulsen K, Weaver J, Roberts DW, Low-dose kaolin-induced hydrocephalus and feline ventriculostomy: an updated model. *J Neurosurg Pediatrics* 4, 2009: 383-388.
12. Lollis SS, Roberts DW, Robotic placement of a CNS ventricular reservoir for administration of chemotherapy. *British Journal of Neurosurgery* 23(5), 2009: 516-520.
13. Pattison AJ, Lollis SS, Perrinez PR, Perreard IM, McGarry MD, Weaver JB, Paulsen KD. Time-harmonic magnetic resonance elastography of the normal feline brain. *J Biomech* 43, 2010: 2747-2752.
14. Roberts DW, Valdes PA, Harris BT, Fontaine KM, Hartov A, Fan X, Ji S, Lollis SS, Pogue BW, Leblond F, Tosteson TD, Wilson BC, Paulsen KD. Coregistered fluorescence-enhanced tumor resection of malignant glioma: relationships between delta-aminolevulinic acid-induced protoporphyrin IX fluorescence, magnetic resonance imaging enhancement, and neuropathological parameters. *J Neurosurg* ePub ahead of print, Apr 2010.
15. Lollis SS, Valdes PA, Li Z, Ball PA, Roberts DW, Cause-specific mortality among neurosurgeons. *J Neurosurg* 113(3), 2010: 474-8.

16. Lollis SS, Mamourian AC, Vaccaro TJ, Duhaime AC, Programmable CSF shunt valves: radiographic identification and interpretation. *AJNR* 31(7), 2010: 1343-6.
17. Weaver JB, Pattison AJ, McGarry MD, Perreard IM, Swienckowski JG, Eskey CJ, Lollis SS, Paulsen KD: Brain mechanical property measurement using MRE with intrinsic activation. *Phys Med Biol* 57, 2012: 7275.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.

Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Jon D. Lurie, MD, MS		POSITION TITLE Associate Professor of Medicine, Orthopaedics, and of The Dartmouth Institute for Health Policy & Clinical Practice (TDI)	
eRA COMMONS USER NAME JLURIE			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Princeton University, Princeton, NJ	BS	1985	Geological Engineering
Stanford University School of Medicine, Palo Alto, CA	MD	1992	Medicine
Dartmouth Medical School, Hanover, NH	MS	1995	Evaluative Clinical Sciences

PERSONAL STATEMENT

Dr. Lurie has substantial experience in clinical research and research mentoring, focused on pragmatic clinical trials and comparative effectiveness studies. He is a co-investigator on the NIAMS-sponsored Spine Patient Outcomes Research Trial (SPORT) and the Multi-Centered Prospective Study of Quality of Life in Adult Scoliosis. He is the Director of the Clinical Trials Unit at The Dartmouth Institute for Health Policy & Clinical Practice (TDI), the Co-Director of the NCMRR-funded Center for Translation of Rehabilitation Engineering Advances and Technology (TREAT), Associate Director of the Multidisciplinary Clinical Research Center in Musculoskeletal Diseases (MCRC) at Dartmouth, T2-T3 Portal Director for SYNERGY: The Dartmouth Center for Clinical and Translational Science, and the Program Director of the Dartmouth Orthopaedics Clinician/Researcher Training Program. He serves as primary mentor on a NCCAM-funded K-01 award, a Co-Mentor on an AHRQ-funded K-12 award, and a research mentor in the NH INBRE grant.

POSITIONS AND HONORS

Positions and Employment

1995 - 99 Staff Physician, Veterans Affairs Hospital, White River Junction, VT
1999 - Staff Physician, The Spine Center, Dartmouth Hitchcock Medical Center
1999 - 01 Assistant Professor of Medicine, Dartmouth Medical School
2001 - 05 Assistant Professor of Medicine and of Community and Family Medicine
2005 - 11 Associate Professor of Medicine and of Community and Family Medicine
2008 - Director, Clinical Trials Unit. The Dartmouth Institute for Health Policy & Clinical Practice
2010 - Co-Director: Center for Translation of Rehabilitation Engineering Advances and Technology
2011 - Associate Professor of Medicine, Orthopaedics, and of The Dartmouth Institute (TDI)
2011 - T2-T3 Portal Director. SYNERGY: Dartmouth Center for Clinical and Translational Science
2011 - Co-Director: Multi-Disciplinary Clinical Research Center in Musculoskeletal Disease (MCRC)
2012 - Dartmouth-Hitchcock Program Lead for the High Value Healthcare Collaborative

Other Experience and Professional Memberships

2002 - International Society for Study of the Lumbar Spine
2005 - Invited Panelist NIH conference: "Considering Usual Medical Care in Clinical Trial Design: Scientific and Ethical Issues"
2006 Invited Panelist: Medicare Coverage Advisory Committee on spinal fusion
2006 - Member, Dartmouth Committee for the Protection of Human Subjects
2007 - Invited Member: AMA PCPI/NCQA Spinal Stenosis Measurement Workgroup

2008 - Member, DSMB - Minimally Invasive Knee Replacement Outcomes (MIKRO) Study
2009 - Member, DHMC Clinical Trials Infrastructure Project Steering Committee
2009 - Boston International Low Back Pain Forum X: local organizing committee
2009 - DHMC Clinical Translational Research Core Advisory Panel
2009 - Safety Officer: NIAMS Grant 1-R03-AR056265-01A
2010 - Member, Dartmouth College Conflict of Interest Committee
2011 - ISSLS Regional Representative: Eastern US.
2011 - DSMB Member– University of Washington LESS Study (AHRQ #R01 HS19222-01)
2012 - High Value Healthcare Collaborative Delivery Science Team- Co-Chair
2012 - AHRQ PCOR K12 – Executive Leadership Committee

Honors

1985 Sigma Xi, The Scientific Research Society
1985 Tau Beta Pi, Engineering Honor Society
2006 Outstanding Paper – ISSLS Annual Meeting June 13-17, Bergen Norway
2007 Outstanding Paper – ISSLS Annual Meeting June 10-14, Hong Kong

SELECTED PEER-REVIEWED PUBLICATIONS (Selected from 93 peer-reviewed publications)

1. Whedon, JM, Davis, MA, Song, Y, Lurie JD. Use of Chiropractic Spinal Manipulation in Older Adults is Strongly Correlated with Supply. Spine 2012; Apr 5. [Epub ahead of print]
<http://www.ncbi.nlm.nih.gov/pubmed/22487711>.
2. Davis MA, Onega TL, Weeks WB, Lurie JD. Where the United States Spends its Spine Dollars: Expenditures on different ambulatory services for the management of back and neck conditions. Spine 2012;Mar 16. [Epub ahead of print] <http://www.ncbi.nlm.nih.gov/pubmed/22433497>.
3. Schoenfeld AJ, Lurie JD, Zhao W, Bono CM. The Effect of Race on Outcomes of Surgical or Nonsurgical Treatment of Patients in the Spine Patient Outcomes Research Trial (SPORT). Spine (Phila Pa 1976). 2012 Aug 1;37(17):1505-15. <http://www.ncbi.nlm.nih.gov/pubmed/22842539>
4. Tosteson AN, Tosteson TD, Lurie JD, Abdu W, Herkowitz H, Andersson G, Albert T, Bridwell K, Zhao W, Grove MR, Weinstein MC, Weinstein JN. Comparative effectiveness evidence from the spine patient outcomes research trial: surgical versus nonoperative care for spinal stenosis, degenerative spondylolisthesis, and intervertebral disc herniation. Spine. 2011;36(24):2061-8;
<http://www.ncbi.nlm.nih.gov/pubmed/22048651>.
5. Pearson, AM, Lurie JD, et al. "Who should have surgery for IDH: Comparative Effectiveness evidence from SPORT." Spine 2011; Jun 15. [Epub ahead of print]
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=21681140
6. Lurie, JD, Spratt KF, et al. "The effects of Viewing an Evidence-Based Video Decision Aid on Patients' Treatment Preferences for Spine Surgery." Spine 2011; Aug 15; 36 (18): 1501-4.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=21358485
7. Olson PR, Lurie JD, Frymoyer J, Walsh T, Zhao W, Abdu WA, Weinstein JN. Lumbar Disk Herniation in the Spine Patient Outcomes Research Trial (SPORT): Does Educational Attainment Impact Outcome? Spine 2011; Feb 9. [Epub ahead of print]
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=21311402
8. Krebs EE, Lurie JD, Fanciullo G, Tosteson TD, Blood EA, Carey TS, Weinstein JN. Predictors of long-term opioid use among patients with painful lumbar spine conditions. J Pain. 2010;11(1):44-52. PMID/PMCID: 19628436 / 2818028;
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=19628436
9. Weinstein JN, Lurie JD, Tosteson TD, Zhao W, Blood EA, Tosteson AN, Birkmeyer N, Herkowitz H, Longley M, Lenke L, Emery S, Hu SS. Surgical compared with nonoperative treatment for lumbar degenerative spondylolisthesis. four-year results in the Spine Patient Outcomes Research Trial (SPORT) randomized and observational cohorts. J Bone Joint Surg Am. 2009; 91(6): 1295-1304. PMID/PMCID: 19487505 /

2686131;

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=19487505

10. Fanuele J, Koval KJ, Lurie J, Zhou W, Tosteson A, Ring D. Distal radial fracture treatment: what you get may depend on your age and address. *J Bone Joint Surg Am.* 2009; 91(6): 1313-9. PMID/PMCID: 19487507 / 2686132;
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=19487507
11. Tosteson AN, Lurie JD, Tosteson TD, Skinner JS, Herkowitz H, Albert T, Boden SD, Bridwell K, Longley M, Andersson GB, Blood EA, Grove MR, Weinstein JN. Surgical treatment of spinal stenosis with and without degenerative spondylolisthesis: cost-effectiveness after 2 years. *Ann Intern Med.* 2008; 149(12): 845-53. PMID/PMCID: 19075203 / 2658642;
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=19075203
12. Lurie JD, Berven SH, Gibson-Chambers J, Tosteson T, Tosteson A, Hu SS, Weinstein JN. Patient preferences and expectations for care: determinants in patients with lumbar intervertebral disc herniation. *Spine (Phila Pa 1976).* 2008;33(24):2663-8. PMID/PMCID: 18981962 / 2768262;
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=18981962
13. Weinstein JN, Tosteson TD, Lurie JD, Tosteson AN, Blood E, Hanscom B, Herkowitz H, Cammisa F, Albert T, Boden SD, Hilibrand A, Goldberg H, Berven S, An H. Surgical versus nonsurgical therapy for lumbar spinal stenosis. *N Engl J Med.* 2008;358(8):794-810. PMID/PMCID: 18287602 / 2576513;
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=18287602
14. Weinstein JN, Lurie JD, Tosteson TD, Hanscom B, Tosteson AN, Blood EA, Birkmeyer NJ, Hilibrand AS, Herkowitz H, Cammisa FP, Albert TJ, Emery SE, Lenke LG, Abdu WA, Longley M, Errico TJ, Hu SS. Surgical versus nonsurgical treatment for lumbar degenerative spondylolisthesis. *N Engl J Med.* 2007; 356(22):2257-70. PMID/PMCID: 17538085 / 2553804;
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=17538085
15. Weinstein JN, Lurie JD, Olson PR, Bronner KK, Fisher ES. United States' trends and regional variations in lumbar spine surgery: 1992-2003. *Spine (Phila Pa 1976).* 2006;31(23):2707-14. PMID/PMCID: 17077740 / 2913862;
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=17077740

RESEARCH SUPPORT

Ongoing Research Support

- | | | |
|---|-------------|------------------------------|
| U01 AR045444-11 (PI - Weinstein) | NIH/NIAMS | 6/1/09 - 5/31/14 |
| Low Back: A Multi-Center Clinical Trial | | Role: Physician Investigator |
| The major goal of this project is to continue long-term follow-up on patients enrolled in a multicentered, randomized, controlled trial comparing surgery and non-operative treatment for lumbar intervertebral disc herniation, spinal stenosis and spinal stenosis secondary to degenerative spondylolisthesis. | | |
| R01HS018459-01 | AHRQ | 09/30/2009 – 07/31/2014 |
| Randomized ActiveStep Comparative Effectiveness Trial | | Role: Principal Investigator |
| The goal of this pragmatic clinical trial is to compare the ActiveStep™ training system to traditional physical therapy for reducing the incidence and severity of falls in a geriatric population. | | |
| R24 HD065703-01 (PIs – Greenwald/Lurie) | NCMRR/NICHD | 9/10 – 8/15 |
| Translation of Rehabilitation Engineering Advances and Technology | | Role: Co-PI |

TREAT is a multidisciplinary, multi-institutional, collaborative consortium to provide infrastructure support and expert consultation to researchers and innovators interested in the translation and commercialization of rehabilitation research applications. The major goal is to provide research translation and commercialization expertise and education for rehabilitation researchers and bioengineers with product solutions and to enable and encourage comparative effectiveness trials for rehabilitation technologies considered ready for clinical evaluation and use.

K01AT005092 (Whedon) NCCAM 04/01/09-03/31/14
Utilization and Safety of Chiropractic Care in Older Adults Role: Primary Mentor
The purpose of this award is to provide mentoring support for Dr. Whedon's NCCAM K-award, "Utilization and Safety of Chiropractic Care in Older Adults"

R01 HS018405-01 (PI - Tosteson) AHRQ 01/01/10-07/31/13
Comparative Effectiveness of Treatments for Degenerative Spine Disease Role Co-Investigator
The major goals of this project are to provide policy-relevant evidence on the comparative clinical effectiveness, safety, and economic value of emerging treatments for spine conditions in the elderly.

R01 AR055176-01A2 (PI – Bridwell) NIH/NIAMS 9/1/09 - 8/31/14
A Multi-Centered Prospective Study of Quality of Life in Adult Scoliosis Role: Co-Investigator
The goal of this patient-oriented study is to obtain health-related quality of life (HRQOL) outcomes data on patients who present with adult symptomatic lumbar scoliosis (ASLS) pre- and post-treatment.

P60AR062799 (Tosteson) NIH/NIAMS 09/01/2012-08/31/2017
Multidisciplinary Clinical Research Center Role: Associate Director
The main objective of the MCRC is to improve health for individuals with musculoskeletal disease. By expanding a unique national research program in musculoskeletal diseases, this grant trains new researchers and provides high-quality resources for research projects addressing health care in those who have broken a bone, decision-making about back surgery, and the safety of new medical devices.

5T32AR049710-10 (Lurie) 05/01/2013 – 04/30/2014 NIH/NIAMS
The Dartmouth Orthopaedics Clinician/Researcher Training Program (DOC/RTP)
The Orthopaedic Residency Program, in association with The Dartmouth Institute for Health Policy and Clinical Practice (TDI), has created a unique opportunity for Orthopaedic residents to spend a fellowship year earning a master's degree in the Evaluative Clinical Sciences. Our goals are to educate our residents through a core set of courses, whereby they will increase their basic science knowledge and develop skills in research methods and the critical evaluation of the medical literature.

Completed Research Support

K23 AR48138-01 (PI - Lurie) NIH/NIAMS 9/01/02 - 8/31/08
Clinical Decision Making in Low Back Pain Role: PI
The major goals of this project were to evaluate the clinical and radiographic features of patient in the SPORT trial in order to identify the predictors of outcome with surgery and non-surgical for the purpose of identifying optimal treatment strategies

P60 AR048094-01A1 (PI - A Tosteson) NIH/NIAMS 4/1/03 - 3/31/08
Prognostic Value of Lumbar Spine MRI Role: Co-Investigator
The broad objective of this project was to improve treatment recommendations and health outcomes for patients with chronic low back pain by assessing the role of magnetic resonance imaging (MRI) of the lumbar spine as an indicator of prognosis.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Meaney, Paul Morgan	POSITION TITLE Professor, Thayer School of Engineering		
eRA COMMONS USER NAME (credential, e.g., agency login) PMMEANEY			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Brown University, Providence, RI	A.B.	06/82	Elec. Eng., Comp. Sci.
University of Massachusetts, Amherst, MA	M.S.	01/85	Electrical Engineering
Dartmouth College, Hanover, NH	Ph.D.	06/95	Biomedical Engineering
Dartmouth College, Hanover, NH	Postdoc	06/96	Biomedical Engineering
Royal Marsden Hospital, Sutton, Surrey, England	Postdoc	06/97	Biomedical Engineering

A. Personal Statement

I have been a leader in the microwave tomography area as both an entrepreneur and research professor for the past 15 years. My work at Dartmouth has focused largely on tomographic imaging including (1) thermal imaging for thermal therapy monitoring, (2) breast cancer detection and (3) more recently bone imaging for bone related health monitoring. For all of these applications there is an inherent contrast or variation with temperature of physiological state that can be harnessed for medical diagnosis. Towards this end, we are the first group to translate our technology into the clinic for breast cancer imaging (over 500 exams performed) and now for bone imaging. In addition, MIST has successfully completed a Phase I and II set of grants where we developed the first commercial beta system for microwave breast tomography. Over the years MIST has established an impressive IP portfolio. In continuation of this effort, we have also licensed our technology to a Korean research Institute (ETRI) with whom we had a successful collaboration between 2007 and 2010.

Our early clinical results have demonstrated that we can distinguish between malignant and benign tumors down to 1cm in diameter. This is an impressive early result which we hope to improve as we expand to ever higher operating frequencies. However, for women with denser breasts, the endogenous dielectric property contrast may not be so great as reported in more recent literature. For these cases, being able to expand the utility of our technology through the use of contrast agents would be a significant advance. While other groups have investigated carbon nanotubes and microbubbles as possibilities, both have significant limitations with respect to toxicity and being restricted to the vascular compartment because of size. We think the new charged gold particles and multi-layer particles we are developing will be a significant advance on these other techniques and offer a viable path to clinical acceptance.

B. Positions and Honors

Positions and Employment

1983-1985	Research Assistant, University of Massachusetts, Amherst, MA
1985-86 & 1987-89	Member of Technical Staff, Millitech Corporation, South Deerfield, MA
1986-1987	Member of Technical Staff, Aerojet Corporation, Azusa, CA
1989-1991	Senior Design Engineer, Alpha Industries, Woburn, MA
1991-1995	Research Assistant, Dartmouth College, Hanover, NH
1995-	President, Microwave Imaging System Technologies Inc., Hanover, NH
1997-2003	Research Assistant Professor, Dartmouth College, Hanover, NH
2002-	Associate Investigator, Norris Cotton Cancer Center, Lebanon, NH
2007-2008	Visiting Professor, University of Trento, Trento, Italy
2003-2009	Research Associate Professor, Dartmouth College, Hanover, NH

2009-

Research Professor, Dartmouth College, Hanover, NH

Other Experience and Professional Memberships

- 1992- Senior Member, IEEE MTT, APS and EMBS Societies
1999- Member, American Association of Physicists in Medicine
1995- Member, Society for Thermal Medicine
2007- Associate Editor, IEEE Transaction on Biomedical Engineering

Honors

- 1991 Morgan Parker Memorial Fellowship for potential contribution in biomedical eng.
1995 Radiation Research Society Conference Travel Award
1996 NSF/NATO Postdoctoral Research Fellowship Award
2009 Royal Society Travel Grant – Visit to University of Bristol, Bristol, England

C. Selected Peer-reviewed Publications (Selected from over 50 peer-reviewed publications)

Most relevant to the current application

1. Grzegorzczak T.M., **Meaney P.M.**, Kaufman P.A., diFlorio-Alexander R.M., Paulsen K.D., “Fast 3-D tomographic microwave imaging for breast cancer detection,” IEEE Transactions on Medical Imaging, vol. 31, pp. 1584-1592, 2012.
2. Fang Q., **Meaney P.M.**, Paulsen K.D., “Viable three-dimensional microwave imaging: theory and experiments,” IEEE Transactions on Antennas and Propagation, vol. 58, pp. 449-458, 2010, NIHMSID: 178816 [PubMed – in process].
3. Poplack S.P., Paulsen K.D., Hartov A., **Meaney P.M.**, Pogue B., Tosteson T., Grove M., Soho S, Wells W., “Electromagnetic breast imaging: pilot results in women with abnormal mammography,” Radiology, vol. 243, pp. 350-359, 2007.
4. **Meaney P.M.**, Fanning M.W, Raynolds T., Fox C.J., Fang Q, Kogel C.A., Poplack S.P., Paulsen K.D., “Initial clinical experience with microwave breast imaging in women with normal mammography,” Academic Radiology, vol. 14, pp. 207-218, 2007, PMID:PMC1832118.
5. Rubaek T., **Meaney P.M.**, Meincke P., Paulsen K.D., “Non-linear microwave imaging for breast-cancer screening using Gauss-Newton’s method and the CGLS inversion algorithm,” IEEE Transactions on Antennas and Propagation, vol. 55, pp. 2320-2331, 2007.

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

1. Li D., **Meaney P.M.**, Paulsen K.D., “Conformal microwave imaging for breast cancer detection,” IEEE Transactions on Microwave Theory and Techniques, vol. 51, pp. 1179-1186, 2003.
2. Poplack S.P., Paulsen K.D., Hartov A., **Meaney P.M.**, Pogue B., Tosteson T., Grove M., Soho S., Wells W., “Electromagnetic breast imaging – average tissue property values in women with negative clinical findings,” Radiology, vol. 231, pp. 571-580, 2004.
3. Fang Q., **Meaney P.M.**, Geimer S.D., Streltsov A.V., Paulsen K.D., “Microwave image reconstruction from 3D fields coupled to 2D parameter estimation,” IEEE Transactions on Medical Imaging, vol. 23, pp. 475-484, 2004.
4. Li D., **Meaney P.M.**, Raynolds T., Pendergrass S.A., Fanning M.W., Paulsen K.D., “A parallel-detection microwave spectroscopy system for breast imaging,” Review of Scientific Instruments, vol. 75, pp. 2305-2313, 2004.
5. Fang Q., **Meaney P.M.**, Paulsen K.D., “Microwave image reconstruction of tissue property dispersion characteristics utilizing multiple frequency information,” IEEE Transactions on Microwave Theory and Techniques, vol. 52, pp. 1866-1875, 2004.
6. Fang Q., **Meaney P.M.**, Paulsen K.D., “Singular value analysis of the Jacobian matrix in microwave image reconstructions,” IEEE Transactions on Antennas and Propagation, vol. 54, pp. 2371-2380, 2006.
7. **Meaney P.M.**, Fang Q., Rubaek T., Demidenko E., Paulsen K.D., “Log transformation benefits parameter estimation in microwave tomographic imaging,” Medical Physics, vol. 34, pp. 2014-2023, 2007.
8. Halter R.J., Zhou T., **Meaney P.M.**, Hartov A., Barth R., Rosenkranz K., Wells W., Kogel C., Borsic A., Rizzo E., Paulsen K.D., “The correlation of in vivo and ex vivo tissue dielectric properties to validate electromagnetic breast imaging: initial clinical experience,” Physiological Measurement, vol. 30, pp. S121-S136, 2009, PMID:PMC2792899.
9. **Meaney P.M.**, Goodwin D., Zhou T., Golnabi A.H., Pallone M., Geimer S.D., Burke G., Paulsen K.D.,

"Clinical microwave tomographic imaging of the calcaneus: pilot study," IEEE Transactions on Biomedical Engineering, vol. 59, pp. 3304-3313, 2012.

10. **Meaney PM**, Goodwin D, Zhou T, Golnabi A, Pallone M, Geimer SD, Burke G, Epstein N, Paulsen KD, "Clinical microwave tomographic imaging of the calcaneus: pilot study," IEEE Transactions on Biomedical Engineering, vol. 59, pp. 3304-3313, 2012.
11. **Meaney PM**, Kaufman PA, Muffly LS, Click M, Wells WA, Schwartz GN, di Florio-Alexander RM, Tosteson TD, Li Z, Poplack SP, Geimer SD, Fanning MW, Zhou T, Epstein N, Paulsen KD, "Microwave imaging for neoadjuvant chemotherapy monitoring: initial clinical experience," Breast Cancer Research and Treatment, 2013 (accepted).

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Sohail K. Mirza	POSITION TITLE Professor and Chair of Orthopaedics		
eRA COMMONS USER NAME SOHAILMIRZA			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Colorado College, Colorado Springs, CO	BA	1985	Physics
University of Colorado, Denver, CO	MD	1989	Medicine
University of Washington, Seattle, WA	Residency	1994	Orthopaedic Surgery
Harvard Medical School, Boston, MA	Fellowship	1995	Spine Surgery
University of Washington, Seattle, WA	MPH	2005	Health Services

A. Personal Statement

My interest in clinical research has focused on the safety of spinal surgery. My initial laboratory research was in spinal biomechanics, but I was unable to apply that work to my clinical practice. I realized I needed more training in clinical research methods, and I was able to obtain that through an NIH patient-oriented research career development award (K23AR048979, Safety of Lumbar Fusion) mentored by Dr. Richard Deyo, an MCRC Scientific Advisor. Research under this award led to seminal work on tools for measuring spinal surgery case-mix and complications. The measures have helped adjust for surgical complexity in clinical settings and document patterns of spine surgery in the U.S. The work has been extended to scientific approaches to characterizing the comparative effectiveness of back surgery (Variation in Safety of Lumbar Fusion, PI: S. Mirza; Complications of Spinal Stenosis Surgery, PI: R. Deyo; Comparative Effectiveness of Treatments for Degenerative Spine Disease, PI: A. Tosteson). My other academic interest has focused on issues of professionalism and conflicts of interest in orthopedic surgery. I am currently Professor and Chair of the Department of Orthopaedic Surgery at Dartmouth Medical School and Professor at The Dartmouth Institute for Health Policy and Clinical Practice.

B. Positions and Honors

Chair, Department of Orthopaedics, Dartmouth-Hitchcock Medical Center June 2010-present
Vice-Chair, Department of Orthopaedics, DHMC September 2008-June 2010
Attending Spine Surgeon, Dartmouth-Hitchcock Medical Center, Lebanon, NH September 2008 - present
Attending Orthopaedic Surgeon, University of Washington, Seattle, WA September 1995 - Aug 2008
(Harborview Medical Center, University of Washington Medical Center, Children's Hospital and Medical Center, Veteran's Administration Puget Sound Health Care System)
Director, Spine Trauma Research, Department of Orthopaedics October 1996 - Aug 2008

Assistant Professor, Department of Orthopaedics, University of Washington September 1995 – June 2001
Assistant Professor, Department of Neurologic Surgery, Univ. of Washington July 1997 – June 2001
Associate Professor, Department of Orthopaedics, University of Washington July 2001 – Present
Associate Professor, Department of Neurologic Surgery, University of Washington July 2001 – June 2006
Professor, Department of Orthopaedics, University of Washington July 2006– Aug 2008
Professor, Department of Neurologic Surgery, University of Washington July 2006 – Aug 2008
Visiting Professor, Department of Orthopaedics, Dartmouth Medical School Sep 2008– present
Visiting Professor, The Dartmouth Institute, Dartmouth Medical School Sep 2008– present
Professor, Department of Orthopaedics and The Dartmouth Institute September 2009-present

American Orthopedic Association: ABC Traveling Fellowship 2003
University of Washington Service Excellence Award 2002 and 2008
American Orthopedic Association membership 2002
Cervical Spine Research Society Award 1998
American Orthopaedic Association North American Traveling Fellowship 1997
Daniel E. Hogan Spine Fellowship, 1995 Harvard Medical School
Laurnen Award for Spine Research 1994 University of Washington
Distinction and Honors, Medicine 1989 University of Colorado
Alpha Omega Alpha 1988 University of Colorado
Carbon Gillespie Award, Surgical Anatomy 1986 University of Colorado
Robert C. Lewis Award, Biochemistry 1986 The Colorado College
Phi Beta Kappa 1985 University of Colorado
Magna Cum Laude, Physics 1985 The Colorado College

C. Publications

1. Deyo RA, Nachemson A, Mirza SK. Spinal-fusion surgery - the case for restraint. *N Engl J Med* 2004; 350:722-6.
 2. Mirza SK. Accountability of the accused: facing public perceptions about financial conflicts of interest in spine surgery. *Spine J* 2004; 4(5):491-4.
 3. Mirza SK. Point of view: Commentary on the research reports that led to Food and Drug Administration approval of an artificial disc. *Spine* 2005;30(14):1561-4.
 4. Mirza SK. The Noninferiority Principle: Design Considerations Relevant to Noninferiority Trials of Artificial Disc Replacement. *North American Spine Society SpineLine* 2006;VII(1):17-20.
 5. Martin BI, Deyo RA, Mirza SK, Turner JA, Comstock BA, Hollingworth W, Sullivan SD. Expenditures and health status among adults with back and neck problems. *JAMA*. 2008 Feb 13;299(6):656-64. Erratum in: *JAMA* 2008 Jun 11;299(22):2630.
 6. Mirza SK, Deyo RA, Heagerty PJ, et al. Development of an index to characterize the "invasiveness" of spine surgery: validation by comparison to blood loss and operative time. *Spine* 2008;33:2651-61; discussion 62.
 7. Juratli SM, Mirza SK, Fulton-Kehoe D, Wickizer TM, Franklin GM. Mortality after lumbar fusion surgery. *Spine* 2009;34:740-7.
 8. Deyo RA, Mirza SK, Martin BI, Kreuter W, Goodman DC, Jarvik JG. Trends, major medical complications, and charges associated with surgery for lumbar spinal stenosis in older adults. *JAMA*. 2010;303(13):1259-65;
 9. Gelberman RH, Samson D, Mirza SK, Callaghan JJ, Pellegrini VD, Jr. Orthopaedic surgeons and the medical device industry: the threat to scientific integrity and the public trust. *J Bone Joint Surg Am*. 2010;92(3):765-77;
 10. Deyo RA, Mirza SK. The case for restraint in spinal surgery: does quality management have a role to play? *Eur Spine J*. 2009 Aug;18 Suppl 3:331-7. PMID: 19266220
 11. Deyo RA, Ching A, Matsen L, Martin BI, Kreuter W, Jarvik JG, Angier H, Mirza SK. Use of Bone Morphogenetic Proteins in Spinal Fusion Surgery for Older Adults with Lumbar Stenosis: Trends, Complications, Repeat Surgery, and Charges. *Spine (Phila Pa 1976)*. 2011 Apr 7. PMID: 21494195
 12. Deyo RA, Mirza SK, Martin BI, Kreuter W, Goodman DC, Jarvik JG. Trends, major medical complications, and charges associated with surgery for lumbar spinal stenosis in older adults. *JAMA*. 2010 Apr 7;303(13):1259-65 PMID: 20371784
 13. Martin BI, Turner JA, Mirza SK, Lee MJ, Comstock BA, Deyo RA. Trends in health care expenditures, utilization, and health status among US adults with spine problems, 1997-2006. *Spine (Phila Pa 1976)*. 2009 Sep 1;34(19):2077-84. PMID: 19675510
 14. Gelberman RH, Samson D, Mirza SK, Callaghan JJ, Pellegrini VD Jr. Orthopaedic surgeons and the medical device industry: the threat to scientific integrity and the public trust. *J Bone Joint Surg Am*. 2010 Mar;92(3):765-77. PMID: 20194337
 15. Mirza SK. Folly of FDA-approval studies for bone morphogenetic protein. *The spine journal : official journal of the North American Spine Society* 2011;11(6):495-9.
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16. Martin BI, Mirza SK, Flum DR, et al. Repeat surgery after lumbar decompression for herniated disc: the quality implications of hospital and surgeon variation. *The spine journal : official journal of the North American Spine Society* 2012;12(2):89-97.
 17. Pearson A, Lurie J, Tosteson T, et al. Who should have surgery for an intervertebral disc herniation? Comparative effectiveness evidence from the spine patient outcomes research trial. *Spine* 2012;37(2):140-9.

C. Research Support.

Ongoing Research Support

R01 HS018405 Tosteson, A (PI) 10/01/09-8/31/12
Agency for Health Care Research and Quality
Comparative Effectiveness of Treatments for Degenerative Spine Disease
Major project goals are to provide policy-relevant evidence on the comparative clinical effectiveness, safety, and economic value of emerging devices/biologics to treat common back-pain-related degenerative spine conditions in the elderly. Dr. Mirza is a co-investigator.

Completed Research Support

RC1 AG036268 Mirza (PI) 09/30/09-08/31/11
NIH/NIA
Variation in the Safety of Back Pain-Related Surgery
The goal of this project is to characterize variations in complications associated with surgery for intervertebral disc herniation for the purpose of understanding safety of these procedures.

R01 AR054912 Deyo (PI); Mirza (sub-award PI) 9/16/2008-7/31/11
NIH/NIAMS
Complications of Surgery for Spinal Stenosis: A Clinical Prediction Rule
The project will develop a clinical prediction rule for complications from spinal stenosis surgery. Dr. Mirza is a co-investigator.

K23AR048979 Mirza (PI) 9/30/2002-6/30/2007
NIH/NIAMS
Safety of Lumbar Fusion Surgery for Chronic Back Pain
This patient-centered career development award addressed the relative benefits and risks of lumbar fusion surgery in treating back pain.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Odame, Kofi Mensa		POSITION TITLE Assistant Professor of Engineering	
eRA COMMONS USER NAME (credential, e.g., agency login) KODAME			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Cornell University	B.Sc.	06/2002	Electrical Engineering
Cornell University	M.Sc	05/2004	Electrical Engineering
Georgia Institute of Technology	Ph.D.	07/2008	Electrical Engineering

A. Personal Statement

Kofi Odame will be a junior Core Director in this project. His research focus is on low power electronics and integrated circuits. At the Georgia Institute of Technology, he developed a course on circuit theory for power-efficient systems. Odame’s research has resulted in a number of patent filings, including an invention for an ambulatory EEG device. He has recently received NSF funding to develop a brain computer interface for cochlear implant users. Participation as a mentored junior Core Director will allow Odame to become more involved in biomedical instrumentation research. In particular, Odame would contribute his expertise in low power, miniaturized electronics to solving the instrumentation challenges that surgeons and imaging specialists face in emerging biomedical applications.

B. Positions and Honors

Positions and Employment

2000-2002	Computer Programmer, Cornell theory Center
2002-2004	Graduate Research Assistant, Cornell University
2004-2008	Graduate Research Assistant, Georgia Institute of Technology
2008-present	Assistant Professor of Engineering, Thayer School of Engineering, Dartmouth College

Honors

1998-2002	Cornell International Scholars and Students Award
2002	B.Sc. Magna Cum Laude, Cornell University
2002-2003	Cornell Institute for African Development Fellowship
2008-present	Analog Devices Career Development Chair

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

- 1) Odame, K; Minch, B. “The Translinear Principle: A General Framework for Implementing Chaotic Oscillators,” International Journal of Bifurcation and Chaos (2005), 15(8), 2559-2568.
- 2) Velmurugan, R.; Subramanian, S.; Cevher, V.; Abramson, D.; Odame, K.; Gray, J. D.; Lo, H.-J.; McClellan, J. H.; Anderson, D. V. “On Low-Power Analog Implementation of Particle Filters for Target Tracking,” Proc. of 14th European Signal Processing Conference (2006).

Program Director/Principal Investigator (Last, First, Middle): Odame, Kofi, M.

- 3) Odame, K.; Twigg, C.M.; Basu, A.; Hasler, P.E. "Studying Nonlinear Dynamical Systems on a Reconfigurable Analog Platform," Proc. of IEEE International Symposium on Circuits and Systems (2007), 445-448.
- 4) Odame, K.M.; Hasler, P. "An Adaptive Quality-Factor Bandpass Filter," Proc. of IEEE International Symposium on Circuits and Systems (2007), 3295-3298.
- 5) Basu, A.; Odame, K.; Hasler, P. "Dynamics of a Logarithmic Transimpedance Amplifier," Proc. of IEEE International Symposium on Circuits and Systems (2007), 1673-1676.
- 6) Odame, K.M.; Hasler, P. "An Efficient Oscillator Design Based on OTA Nonlinearity," Proc. of IEEE International Symposium on Circuits and Systems (2007), 921-924.
- 7) Odame, K.M.; Anderson, D.V.; Hasler, P. "A Bandpass Filter With Inherent Gain Adaptation for Hearing Applications," IEEE Transactions on Circuits and Systems I (2008), 55(3), 786-795.
- 8) Odame, K.; Hasler, P. E. "Harmonic distortion analysis via perturbation methods," Proc. of 51st Midwest Symposium on Circuits and Systems (2008), 554-557.
- 9) Odame, K.M.; Hasler, P. "Theory and Design of OTA-C Oscillators with Native Amplitude Limiting," IEEE Transactions on Circuits and Systems I (2009), 56(1), 40-50.
- 10) Odame, K.M.; Minch, B, "Implementing a Lorenz Oscillator with Translinear Elements," Analog Integrated Circuits and Signal Processing (2009), 59(1), 31-41.
- 11) Latham, A.M.; Pilawa-Podgurski, R.; Odame, K.M.; Sullivan, C.R., "Analysis and Optimization of Maximum Power Point Tracking Algorithms in the Presence of Noise," IEEE Transactions on Power Electronics, vol.28, no.7, pp.3479,3494, July 2013.
- 12) D. Du, K. Odame, "An Energy-Efficient Spike Encoding Circuit for Speech Edge Detection," Analog Integrated Circuits and Signal Processing, 2013, DOI: 10.1007/s10470-013-0041-y

D. Research support

NSF 09/09-05/12
Collaborative Research: Stacked Controlled-Cell Power Conversion Architecture for Grid-Connected Photovoltaic Systems
Role: Co-PI

Neukom Institute/Institute for Quantitative Biomedical Sciences 05/11-04/12
Computational Tools for Developing Next Generation Intelligent Neuroprosthetics,
Role: PI

NSF 09/11-08/14
Power-aware sensor interfacing and signal processing using nonlinear analog techniques
Role: PI

NSF 09/11-08/14
PFI: Cognitive Signal Processing
Role: Co-PI

Rambus Inc. 2/12 – 1/15
Investigation of Advanced Image Sensor Devices, Circuits and Architectures
Role: Co-PI

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Peason, Adam MacKay	POSITION TITLE Assistant Professor of Orthopaedic Surgery
eRA COMMONS USER NAME (credential, e.g., agency login)	

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
Dartmouth College	AB	6/99	Chemistry
Yale School of Medicine	MD	5/04	Medicine
Dartmouth College	MS	6/07	Clinical Science
Dartmouth-Hitchcock Medical Center	Residency	6/10	Orthopaedic Surgery
Thomas Jefferson University	Fellowship	7/11	Spine Surgery

A. Personal Statement

I am an adult spine surgeon and treat all conditions affecting the adult spine. My research focus has been on surgical outcomes for degenerative conditions of the lumbar spine and developing predictive models to assist spine patients with treatment decision-making. I am also interested in developing less invasive decompression and fusion techniques that lead to clinically measurable benefits. While many less invasive spine surgery techniques have been developed, none have been shown to lead to measurably better outcomes. Current techniques all involve direct visualization of the neural elements and represent modifications of traditional techniques that allow for surgery through smaller incisions. Not surprisingly, simply performing the same operation through a smaller incision has not led to measurable improvements in outcomes. However, these techniques are associated with a learning curve that leads to a higher rate of complications as surgeons learn the technique. Developing truly less invasive decompression and fusion strategies will likely require the use of advanced imaging modalities in real-time in the operating room that allow for indirect visualization of the neural elements. Hopefully the use of such imaging technology can lead to the development of new techniques that lead to measurably better outcomes.

B. Positions and Honors

Positions and Employment

- 2004-2010 Dartmouth-Hitchcock Medical Center—Resident Physician
- 2010-2011 Rothman Institute at Thomas Jefferson University—Clinical Fellow/Instructor
- 2011- Dartmouth-Hitchcock Medical Center—Assistant Professor of Orthopaedic Surgery
- 2010- Spine Journal Associate Web Editor
- 2011- Spine Journal Associate Editor

Other Experience and Professional Memberships

- 2003- American Academy of Orthopaedic Surgeons

- Honors**
- 2007 Kilfoyle Resident Research Award, New England Orthopaedic Society
 - 2008 Kilfoyle Resident Research Award, New England Orthopaedic Society
 - 2008 North American Spine Society 3 Top 10 Papers
 - 2009 Representative to American Orthopaedic Association Resident Leadership Program
 - 2010 North American Spine Society Top 25 Paper
 - 2010 Invited Guest Editor Seminars in Spine Surgery
 - 2011 Invited Faculty American Academy of Orthopaedic Surgeons Comparative Effectiveness Research Symposium

C. Peer-reviewed Publications/Presentations

1. Pearson A, Blood E, Lurie J, Tosteson T, Abdu WA, Hillibrand A, et al. Degenerative Spondylolisthesis Versus Spinal Stenosis: Does a Slip Matter? Comparison of Baseline Characteristics and Outcomes (SPORT). *Spine (Phila Pa 1976)*. 2010;35(3):298-305. Epub 2010/01/16. doi: 10.1097/BRS.0b013e3181bdafd1. PubMed PMID: 20075768; PubMed Central PMCID: PMCNIHMSID189959.
2. Pearson A, Lurie J, Tosteson T, Zhao W, Abdu W, Mirza S, et al. Who should have surgery for an intervertebral disc herniation? Comparative effectiveness evidence from the spine patient outcomes research trial. *Spine (Phila Pa 1976)*. 2012;37(2):140-9. doi: 10.1097/BRS.0b013e3182276b2b. PubMed PMID: 21681140; PubMed Central PMCID: PMC3472961.
3. Pearson A, Lurie J, Tosteson T, Zhao W, Abdu W, Weinstein JN. Who should have surgery for spinal stenosis? Treatment effect predictors in SPORT. *Spine (Phila Pa 1976)*. 2012;37(21):1791-802. doi: 10.1097/BRS.0b013e3182634b04. PubMed PMID: 23018805.
4. Pearson AM, Blood EA, Frymoyer JW, Herkowitz H, Abdu WA, Woodward R, et al. SPORT Lumbar Intervertebral Disk Herniation and Back Pain: Does Treatment, Location, or Morphology Matter? *Spine*. 2008;33(4):428-35. PubMed PMID: 18277876; PubMed Central PMCID: PMCPMC2785121.
5. Pearson AM, Lurie JD, Blood EA, Frymoyer JW, Braeutigam H, An H, et al. Spine patient outcomes research trial: radiographic predictors of clinical outcomes after operative or nonoperative treatment of degenerative spondylolisthesis. *Spine*. 2008;33(25):2759-66. Epub 2008/12/04. doi: 10.1097/BRS.0b013e31818e2d8b00007632-200812010-00011 [pii]. PubMed PMID: 19050582; PubMed Central PMCID: PMCPMC2775527.
6. Pearson A, Blood E, Lurie J, Abdu W, Sengupta D, Frymoyer JW, et al. Predominant leg pain is associated with better surgical outcomes in degenerative spondylolisthesis and spinal stenosis: results from the Spine Patient Outcomes Research Trial (SPORT). *Spine (Phila Pa 1976)*. 2011;36(3):219-29. Epub 2010/12/03. doi: 10.1097/BRS.0b013e3181d77c21. PubMed PMID: 21124260.
7. Pearson AM, Panjabi MM, Ivancic PC, Ito S, Cunningham BW, Rubin W, et al. Frontal impact causes ligamentous cervical spine injury. *Spine*. 2005;30(16):1852-8. PubMed PMID: 16103855.
8. Pearson AM, Spratt KF, Genuario J, McGough W, Kosman K, Lurie J, et al. Precision of lumbar intervertebral measurements: does a computer-assisted technique improve reliability? *Spine*. 2011;36(7):572-80. Epub 2011/01/11. doi: 10.1097/BRS.0b013e3181e11c13. PubMed PMID: 21217439.
9. Pearson AM, Tosteson AN, Koval KJ, McKee MD, Cantu RV, Bell JE, et al. Is surgery for displaced, midshaft clavicle fractures in adults cost-effective? Results based on a multicenter randomized, controlled trial. *J Orthop Trauma*. 2010;24(7):426-33. Epub 2010/06/26. doi: 10.1097/BOT.0b013e3181c3e50500005131-201007000-00007 [pii]. PubMed PMID: 20577073; PubMed Central PMCID: PMCPMC2892810.
10. Lurie JD, Tosteson AN, Tosteson TD, Carragee E, Carrino J, Kaiser J, et al. Reliability of readings of magnetic resonance imaging features of lumbar spinal stenosis. *Spine*. 2008;33(14):1605-10. Epub 2008/06/17. doi: 10.1097/BRS.0b013e3181791af300007632-200806150-00017 [pii]. PubMed PMID: 18552677; PubMed Central PMCID: PMCPMC2754786.
11. Carrino JA, Lurie JD, Tosteson AN, Tosteson TD, Carragee EJ, Kaiser J, et al. Lumbar spine: reliability of MR imaging findings. *Radiology*. 2009;250(1):161-70. Epub 2008/10/29. doi: 2493071999 [pii]10.1148/radiol.2493071999. PubMed PMID: 18955509; PubMed Central PMCID: PMCPMC2657480.
12. Ivancic PC, Pearson AM, Tominaga Y, Simpson AK, Yue JJ, Panjabi MM. Mechanism of cervical spinal cord injury during bilateral facet dislocation. *Spine*. 2007;32(22):2467-73. PubMed PMID: 18090087.
13. Ivancic PC, Panjabi MM, Tominaga Y, Pearson AM, Elena Gimenez S, Maak TG. Spinal canal narrowing during simulated frontal impact. *Eur Spine J*. 2006;15(6):891-901. PubMed PMID: 16220351.
14. Ivancic PC, Ito S, Tominaga Y, Rubin W, Coe MP, Ndu AB, et al. Whiplash causes increased laxity of cervical capsular ligament. *Clin Biomech (Bristol, Avon)*. 2008;23(2):159-65. PubMed PMID: 17959284.
15. Ivancic PC, Ito S, Panjabi MM, Pearson AM, Tominaga Y, Wang JL, et al. Intervertebral neck injury criterion for simulated frontal impacts. *Traffic Inj Prev*. 2005;6(2):175-84. PubMed PMID: 16019403.

Program Director/Principal Investigator (Last, First, Middle):

D. Research Support
None

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Brian William Pogue	POSITION TITLE		
eRA COMMONS USER NAME (credential, e.g., agency login) bwpogue	Professor of Engineering Sciences		
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
York University, North York, ON, Canada	B.Sc. Honors	1985-1989	Physics
York University, North York, ON, Canada	M.Sc.	1989-1991	Physics
McMaster University, Hamilton, ON, Canada	Ph.D.	1991-1996	Medical Physics
Harvard Medical School/Mass. General Hospital	Res. Fellow	1995-1996	Photobiology/ Photochemistry

A. Personal Statement

At Dartmouth I have been Dean of Graduate Studies during the four years 2008-2012, and retired from this to concentration on research more. My work is currently supported by 4 RO1 grants, a P01 and a U54, where we focus on building imaging and spectroscopy systems for cancer therapy. I have supervised the construction of 6 near-infrared tomography systems, of which 3 were for clinical breast imaging and 3 were for small animal studies. Our research group created the open source software NIRFAST (www.nirfast.org) for image reconstruction with light, and in vivo imaging systems have been developed based upon these algorithms to quantify molecular concentrations using diffuse spectroscopy inside of imaging systems. I have been involved in interdisciplinary cancer imaging projects with biomedical optics focus for my entire career, and have successfully worked out commercial collaborations with DOBI Medical Systems, ART Inc, and Philips Medical Research, which leverage our work, and bring us closer to real translational realization of the end products. We recently started a company focusing on development of a novel system for imaging radiation beams during radiation therapy treatment.

Specifically for this grant, I look forward to working with Dr Davis on his new design for the instrumentation, for a more manageable and translatable system for small animal molecular binding imaging. He has been the lead developer of this type of system at Dartmouth and his proposal brings this work on a new and exciting tangent, towards utilizing hybrid imaging for molecular recognition. I will advise him and work with him to ensure that we can utilize the systems to their maximum potential, imaging response to therapy and tumor epithelial growth independent of tumor vascular effects.

B. Positions and Honors

Positions and Employment

- 12/96 - 09/00 Visiting Research Fellow: Wellman Laboratories of Photomedicine, Mass. General Hospital, Dept. of Dermatology, Harvard Medical School, Boston, MA
- 12/96 - 6/01 Research Assistant Professor, Thayer School of Engineering, Dartmouth College, Hanover, NH
- 07/01 - 06/08 Associate Professor, Thayer School of Engineering, Dartmouth College, Hanover NH.
- 09/05 - 12/08 Director, M.S. and Ph.D. Programs, Thayer School of Engineering, Dartmouth College.
- 09/08 - 08/12 Dean of Graduate Studies, Dartmouth College.
- 06/08 - **Professor**, Thayer School of Engineering, Dartmouth College, Hanover NH.
- 09/07 - **Adjunct Professor**, Department of Surgery, Dartmouth Medical School.
- 10/00 - **Research Scientist**, Wellman Center for Photomedicine, Mass. General Hospital, Boston, MA
- 06/09 - **Adjunct Professor**, Department of Physics and Astronomy, Dartmouth College

Other Experience and Professional Memberships

- 1997-2006** **Writer & Reviewer** of questions on MCAT exam, American Institute for Research.
2003 **Editor** of textbook Fluorescence in Biomedicine, Marcel Dekker Publ., (2003).
2008-2012 **Deputy Editor**, *Optics Letters*, published by the Optical Society of America.
2006 - **Editorial Board** *Medical Physics*, published by the AAPM.
2007- **Editorial Board**, *Journal of Biomedical Optics*, published by SPIE.
2008 - **Editorial Board**, Journal of Photochemistry and Photobiology B: Biology.

Honors

- 2006** **Graduate Student Mentoring Award**, Dartmouth Graduate Studies.
2012-14 **Review Committee Chair** -BMIT A Study Section, NIH CSR
2012 **Light Path Award**, American Society of Photobiology,
2013 **Fellow** of the Optical Society of America

Selected Plenary Talks (from over 160 invited and plenary): IEEE ISBI Beijing April 2014; ECBO OSA Munich May 2013; COMP Halifax July 2013; Frontiers of Imaging Sci. Vanderbilt, 2011; Royal Society London Meeting on NIRS, 2010; SPIE BIOS Hot Topics 2010; ESTRO Future of Radiation Therapy, 2008; Gordon Res. Conf. Lasers. Med. Biol. 2008; Korean Res. Inst. KCIST 2005; NIH Workshop on Optical Imaging, 1999 & 2002; Plenary 1st Annual Soc. for Molecular Imaging 2002.

C. Selected Peer-reviewed Publications (Selected from over 230 peer-reviewed publications)

Most relevant to the current application

1. Gruber JD, Paliwal A, Krishnaswamy V, Ghadyani H, Jermyn M, O'Hara JA, Davis SC, Kerley-Hamilton JS, Shworak NW, Maytin EV, Hasan T, Pogue BW. "System development for high frequency ultrasound-guided fluorescence quantification of skin layers." *J Biomed Opt.* 2010 Mar-Apr;15(2):026028 PMC2866260
2. Samkoe KS, Sexton K, Tichauer KM, Hextrum SK, Pardesi O, Davis SC, O'Hara JA, Hoopes PJ, Hasan T, **Pogue BW**. High vascular delivery of EGF, but low receptor binding rate is observed in AsPC-1 tumors as compared to normal pancreas. *Mol Imaging Biol.* 2012 Aug;14(4):472-9. PMID: 21847690
3. Tichauer KM, Samkoe KS, Sexton KJ, Gunn JR, Hasan T, **Pogue BW**. [Improved tumor contrast achieved by single time point dual-reporter fluorescence imaging.](#) *J Biomed Opt.* 2012 Jun;17(6):066001. PMID: 22734757
4. Torosean S, Flynn B, Axelsson J, Gunn J, Samkoe KS, Hasan T, Doyley MM, **Pogue BW**. [Nanoparticle uptake in tumors is mediated by the interplay of vascular and collagen density with interstitial pressure.](#) *Nanomedicine.* 2012 Jul 25. pii: S1549-9634(12)00403-0. PMID: 22841910
5. Tichauer KM, Samkoe KS, Sexton KJ, Hextrum SK, Yang HH, Klubben WS, Gunn JR, Hasan T, **Pogue BW**. [In Vivo Quantification of Tumor Receptor Binding Potential with Dual-Reporter Molecular Imaging.](#) *Mol Imaging Biol.* 2011 Dec 28. PMID:22203241

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

6. Tichauer KM, Holt RW, Samkoe KS, El-Ghoussein F, Gunn JR, Jermyn M, Dehghani H, Leblond F, **Pogue BW**. [Computed Tomography-guided Time-domain Diffuse Fluorescence Tomography in Small Animals for Localization of Cancer Biomarkers.](#) *J Vis Exp.* 2012 Jul 17;(65). pii: 4050. PMID: 22847515
7. Demers JL, Davis SC, **Pogue BW**, Morris MD. [Multichannel diffuse optical Raman tomography for bone characterization in vivo: a phantom study.](#) *Biomed Opt Express.* 2012 Sep 1;3(9):2299-305. Epub 2012 Aug 30. PMID: 23024921
8. **Pogue BW**, Davis SC, Leblond F, Mastanduno MA, Dehghani H, Paulsen KD. [Implicit and explicit prior information in near-infrared spectral imaging: accuracy, quantification and diagnostic value.](#) *Philos Transact A Math Phys Eng Sci.* 2011 Nov 28;369(1955):4531-57. Review. PMID:22006905
9. Tichauer KM, Samkoe KS, Klubben WS, Hasan T, **Pogue BW**. [Advantages of a dual-tracer model over reference tissue models for binding potential measurement in tumors.](#) *Phys Med Biol.* 2012 Oct 21;57(20):6647-59. PMID: 23022732
10. Tichauer KM, Holt RW, El-Ghoussein F, Zhu Q, Dehghani H, Leblond F, **Pogue BW**. [Imaging workflow and calibration for CT-guided time-domain fluorescence tomography.](#) *Biomed Opt Express.* 2011 Nov 1;2(11):3021-36. Epub 2011 Oct 5. PMID:22076264
11. Davis SC, Samkoe KS, O'Hara JA, Gibbs-Strauss S. L., Payne, H. L., Hoopes, P.J., Paulsen, K. D., Pogue, B. W. "MRI-coupled Fluorescence Tomography Quantifies EGFR Activity in Brain Tumors" *Academic Radiology* 17(3) 271-276 (2010). PMID: 20152724 PMCID: PMC2823000
12. Pogue BW, Samkoe KS, Gibbs-Strauss SL, Davis SC. [Fluorescent molecular imaging and dosimetry tools in photodynamic therapy.](#) *Methods Mol Biol.* 2010;635:207-22. PMID: 20552350
13. **Pogue BW**, Samkoe KS, Hextrum S, O'Hara JA, Jermyn M, Srinivasan S, Hasan T. [Imaging targeted-agent binding in vivo with two probes.](#) *J Biomed Opt.* 2010 May-Jun;15(3):030513. PMID: 20614996

14. **Pogue BW**, Gibbs-Strauss S, Valdés PA, Samkoe K, Roberts DW, Paulsen KD. [Review of Neurosurgical Fluorescence Imaging Methodologies](#). IEEE J Sel Top Quantum Electron. 2010 May;16(3):493-505. PMID: 20671936 PMCID: PMC2910912
15. Gibbs-Strauss, S. L., O'Hara, J. A., Srinivasan, S., Hoopes, P.J., Hasan, T., **Pogue, B. W.**, "Diagnostic Detection of Diffuse Glioma Tumors *In Vivo* with Molecular Fluorescent Probe-Based Transmission Spectroscopy" Medical Physics 36(3) 974- 983 (2009). PMID: 19378758 PMCID: PMC2736749
16. Kepshire D. Mincu N. Hutchins M. Gruber J. Dehghani H. Hypnarowski J. Leblond F. Khayat M. Pogue BW. "A microcomputed tomography guided fluorescence tomography system for small animal molecular imaging." Review of Scientific Instruments. 80(4):043701 (2009). PMID:19405660 PMCID: PMC2678792

D. Research Support

Ongoing Research Support

R01 CA132750 (Pogue)	06/01/09 – 05/31/13	1.20 months
NIH/NCI	\$202,637	
NIRFAST		

The major goal of this project is to develop and disseminate a key computational resource for integration of Near-Infrared Spectroscopy (NIRS) into Magnetic Resonance Imaging (MRI).

R01 EB007966 (Pogue)	08/01/08 - 05/31/13	0.20 months
NIH/NIBIB	\$214,107	

A Boundary Element Method for High Resolution MRI/NIR Imaging and MicroCT/Fluorescence Tomography
This project is aimed at solving the diffusion equation using the BEM (requiring only surface discretization) and apply it for 3D image reconstruction, assuming that the underlying tissue boundaries can be obtained a priori from MRI or CT.

R01 CA69544 (Paulsen)	09/22/08 - 07/31/13	0.60 months
NIH/NCI	\$162,225	

Frequency Domain Optical Imaging of Breast Cancer

This project is developing an MR-compatible NIR imaging system for simultaneous MR and NIR breast examination.

R01 CA139449 (Paulsen)	05/01/09 – 02/28/14	0.60 months
NIH/NCI	\$499,109	

Optical Imaging Fused with Tomosynthesis for Improved Breast Cancer

This project is an academic-industrial partnership proposal under PAR-07-214 to develop and validate optical imaging fused with breast tomosynthesis for improved breast cancer detection and diagnosis.

P01 CA084203 (Hasan)	03/01/09 – 12/31/13	2.00 months
Subcontract through Mass General (NIH)	\$205,305	

Molecular Response and Imaging-based Combination Strategies for Optimal PDT

(subtitle) *In Vivo* Imaging, Dosimetry and Technology Transfer (Core)

(subtitle) Image-Guided and Model-Based Optical Dosimetry Tools (Project)

This program grant focuses on imaging and dosimetry during photodynamic therapy, as combined with antibody or other biological therapies, to maximize efficacy. The project and core funded at Dartmouth assist in research for basal cell carcinoma research and pancreas cancer research, as these support two ongoing clinical trials in these specialty areas.

R01 AR056646 (Morris)	09/01/09 – 08/31/13	0.45 months
Subcontract through University of Michigan (NIH)	\$85,479	

Raman Markers of Allograft Osseointegration

This grant focuses on development of non-invasive diffuse tomography of Raman signals to track bone graft function in a rat model. Dartmouth is a subcontractor to UMich to help with image reconstruction algorithms.

U54 CA151662 (Baker)	09/16/10 – 07/31/15	0.90 months
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NIH/NCI \$1,523,502 (all components)

Dartmouth Center for Cancer Nanotechnology Excellence (DCCNE)

Core: Education/Training and Outreach Activities (PI Pogue) \$47,142

Project II: Spectroscopic quantification of ligand binding in vivo (PI Weaver) \$222,121

The aim of this project is to develop magnetic hyperthermia treatment for cancer so that it can be moved towards clinical trials. The work involves novel nanoparticles development, antibody tagging and the development of novel imaging technology.

R01 CA156177 (Hasan/Pogue) 01/01/11 – 12/31/15 0.45 months

Subcontract through Mass General (NIH) \$94,972

Targeted Photoactivable Nanocells: Image-based Drug Delivery and Dosimetry in GBM; Subaward title: Image guided drug delivery and therapy in GBM using photoactivatable nanocells

This is a joint project between researchers at the Massachusetts General Hospital and with a subcontract to Dartmouth College, to develop a methodology for image-guided drug delivery using targeted nanocells which deliver photodynamic agents as well as antibodies directly to tumor cells.

R01 CA109558 (Pogue) 09/15/11 – 07/31/16 2.0 months

NIH/NCI \$183,594

Fluorescence Imaging to Optimize Cancer Therapy

This is a competing continuation of work to analyze how molecular tracers of glioma tumors can be used to effectively quantify tumor receptor activity, in addition to vascular perfusion from contrast MRI. The hardware and software sub-systems will be developed further to provide 4 layer volumetric data of fluorescence tomography guided by the MR data, and overlaid for visualization of the entire orthotopic tumor.

R01 CA167413 (Pogue/Paulsen) 04/09/13 – 3/31/18 3.00 months

NIH/NCI \$430,380

Molecular Fluorescence-guided Surgery Platform

This proposal funds a partnership pipeline for development and testing of molecular fluorescence-agents to guide neurosurgery, joining together Affibody AB, LI-COR with Dartmouth Engineering and Neurosurgery. A GMP-produced peptide targeted to the EGF-receptor is synthesized, analytical & toxicity testing will be completed, and a phase 0 clinical trial will be conducted in recurrent glioma patients.

Audrey Prouty Breast Cancer Research Grant (Jarvis/Gladstone/Pogue) 04/13-03/14

Norris Cotton Cancer Center Pilot Funds \$50,000

Imaging surface dose in post lumpectomy whole breast irradiation

This pilot grant funds testing and pilot phase clinical trial studies of imaging skin dose during whole breast radiation therapy to test for correlations between excessive skin dose and observed skin complications.

Completed Research Support (in the last 3 years)

R01 CA120368-01A1 Pogue (PI) 02/12/07 - 12/31/11

(NIH/NCI) "Micro CT/NIR Molecular Imaging of Cancer"

The goal of this project was to integrate NIR tomography into a MicroCT system and study optimal ways to image rodent tumors during therapy.

P01 CA080138-08 Paulsen (PI) 05/01/06 – 04/30/11

(NIH/NCI) "Alternative Breast Cancer Imaging Modalities"; (subtitle) "Near Infrared Spectroscopy and Imaging"

This was the competing continuation application for a program which is aimed at developing and evaluating four alternative breast imaging modalities.

Role: PI of Project IV

BIOGRAPHICAL SKETCH

NAME Laura Ray	POSITION TITLE Professor, Thayer School of Engineering		
eRA COMMONS USER NAME (credential, e.g., agency login) meackerman			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Princeton University, Princeton NJ	BSE	06/84	Mechanical and Aerospace Engineering
Stanford University, Stanford CA	MSE	06/85	Mechanical Engineering
Princeton University, Princeton NJ	PhD	02/10	Mechanical and Aerospace Engineering

A. Personal Statement

B. Positions and Honors Positions and Employment

Professor, Thayer School of Engineering, Dartmouth College, July 2009 – present.

Associate Professor, Thayer School of Engineering, Dartmouth College, July 2002 – June 2009.

Co-Founder and Chief Technology Officer, Sound Innovation, Inc., White River Junction, VT, May 2004 - present.

Assistant Professor, Thayer School of Engineering, Dartmouth College, July 1996 – June 2002.

Assistant Professor, Department of Mechanical Engineering, Christian Brothers University, August 1993 - June 1996.

Assistant Professor, Department of Mechanical Engineering, Clemson University, December 1990 - May 1992.

Graduate Research Assistant, Laboratory for Control and Automation, Princeton University, September 1996 - November 1990.

Graduate Assistant in Instruction, Department of Mechanical and Aerospace Engineering, Princeton University, February 1988 - June 1989.

Research Assistant, Center for Energy and Environmental Studies, Princeton University, summer, 1983, 1984, and August 1985 - August 1986.

Awards and Honors

Susan and Gib Myers 1964 Faculty Fellow	2009-10
Speaker and participant, NAS Frontiers of Engineering Symposium	2004
American Society for Non-destructive Testing Fellowship	2001
SAE Ralph R. Teetor Educational Award	1997
Zonta Amelia Earhart Fellowship, Zonta Foundation	1989-90
Luigi Crocco Prize for Excellence in Undergraduate Teaching	1989
Grumman Prize for Academic Excellence, Grumman Corporation	1987
Princeton University Guggenheim Fellowship and University Prize	1986-87

Stanford School of Engineering Fellowship 1984-85
First prize in Graduate Division, Lincoln National Design Competition 1985
Elected to Tau Beta Pi, Sigma Xi, Phi Beta Kappa National Honor Societies 1984
Honorable mention, Donald J. Dike Award for Undergraduate Thesis Research 1984

C. Selected peer reviewed publications.

1. J.H. Lever, A.J. Delaney, L.E Ray, E. Trautmann, L.A. Barna, A.M Burzynski. Autonomous GPR Surveys using Polar Rover *Yeti*, Journal of Field Robotics, DOI: 10.1002/rob.21445
2. T. Mao and L. Ray, Hierarchical State Representation and Action Abstractions in Q-Learning for Agent-Based Herding, International Journal of Information and Electronics Engineering, 2(4), 538-542, 2012.
3. E. Trautmann** and L. Ray Mobility Characterization for Autonomous Mobile Robots using Machine Learning, Autonomous Robots, Autonomous Robot, 30: 369–383, 2011, DOI 10.1007/s10514-011-9224-5.
4. X. Sun*, T. Mao, L. Ray, D. Shi, J. Kralik, Hierarchical State-Abstracted and Socially-Augmented Q-Learning for Reducing Complexity in Agent-based Learning, Journal of Control Theory and Applications, 9(3), 440-450, 2011.
5. L. Ray, Estimation of Terrain Forces and Parameters for Autonomous Robots, IEEE Trans. on Robotics, 25(3), 717-726, 2009. 10.1109/TRO.2009.201897
6. L. Ray and R. Fisher**, The Role of Boundary Control in Enhancing Damage Identification using Eddy Current Sensors, ASME J. Dynamic Systems, Measurement, and Control, March 2009, DOI: 10.1115/1.3072150.
7. L.R. Ray, D. Brande**, J.H. Lever, Estimation of Net Traction for Differential-Steered Wheeled Robots, J. Terramechanics Special Issue on Robotics, 46, 75-87, 2009, [doi:10.1016/j.jterra.2008.03.003](https://doi.org/10.1016/j.jterra.2008.03.003) .
8. J.H. Lever and L.R. Ray, Revised Solar-Power Budget for *Cool Robot* Polar Science Campaigns, Cold Regions Science and Technology, 52(2), 177-190, 2008.
9. L. Ray, A. Streeter**, J. Lever, A. Price, Design and Power Management for a Solar-Powered ‘Cool Robot’ for Polar Instrument Networks, J. Field Robotics, 24(7), 581 – 599, July 2007.
10. A. Ramasubramanian* and L. Ray, Comparison of EKBF-based and Classical Friction Compensation ASME J. Dynamic Systems, Measurement, and Control, 129(2), 236 – 242, March 2007.
11. L. Ray, J. Solbeck, A. Streeter***, and R. Collier, Hybrid Active Noise Reduction for Hearing Protection and Communication, J. Acoustical Society America, 120(4), 2026-2036, Oct 2006.
12. J.A. Solbeck* and L.R. Ray, Damage Identification Using Sensitivity-Enhancing Control and Identified Models, ASME J. Vibration and Acoustics, 128(2), 210-220, April 2006.
13. J.H. Lever, L.R. Ray, A. Streeter**, and A. Price, Solar Power for an Antarctic Rover, Hydrological Processes, 20(4), 629-644, March 2006.
14. L.R. Ray, A. Price***, A. Streeter**, D. Denton***, J. Lever, Cool Robots: Scalable Mobile Robots for Instrument Network Deployment in Polar Climates, The Bridge, National Academy of Engineering, 34(4), 5-12, Winter 2004
15. B.H. Koh* and L.R. Ray, Feedback Controller Design for Sensitivity-based Damage Localization, J. Sound and Vibration, 273 (1-2) 317–335, May 2004.

16. Research Support

Active Awards

Sponsor: NSF
Title: Cognitive Signal Processing
Amount: \$600,000
Role: PI
Effort: Graduate student support for three students in Thayer’s Innovation Program
Sponsor: AFOSR
Title: Distributed Beamforming with Wireless Sensor Networks for Remote Auditory Presence
Dates: June 1, 2008 – May 31, 2012
Amount: \$1,005,450 (DoD \$641,442, private sector \$127,895, cost sharing \$236,114)

Role: PI
Effort: Graduate student support (three students) and one month summer salary per year

Sponsor: ONR-MURI
Title: Modular Social Intelligence for Teaming and Coalition Adaptation of Heterogeneous Autonomous Cooperative Agents (ACAs)
Dates: May 1, 2008 – April 30, 2013
Amount: \$5,634,962 total (\$3.8M Dartmouth, remainder as subcontracts to partners)
Role: PI
Support: Several graduate students, one month summer salary per year

Sponsor: NSF
Title: ARC-0806157: Collaborative Research: Cool Robot to support Greenland Science Campaigns
Dates: 9/1/2010 – 8/31/2013
Amount: \$491,430
Role: PI
Support: Two graduate students

Completed Awards

Sponsor: NASA-JPL
Title: Terrain Characterization for Enhanced Mobility of Autonomous Robots
Dates: 4/27/2010-3/20/2011
Amount: \$54,998
Role: PI
Support: One graduate student

Sponsor: ARO
Title: Cooperative Control of Dynamic Mobile Robots in Diverse Terrain
Dates: June 1, 2006 – May 31, 2010
Amount: \$423,555
Role: PI
Effort: Graduate student and one month summer salary per year

BIOGRAPHICAL SKETCH

NAME David W. Roberts, M.D.	POSITION TITLE Professor of Surgery (Neurosurgery) and of Neurology		
eRA COMMONS USER NAME (credential, e.g., agency login) davidwroberts			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Princeton University, Princeton, NJ	A.B.	06/72	English
Dartmouth Medical School, Hanover, NH	M.D.	06/75	Medicine
Univ. of Utah Medical Center, Salt Lake City, UT		07/75-06/76	General Surg. Internship
Oxford University, Oxford, England	M.A.	06/78	English
Mary Hitchcock Memorial Hosp., Hanover, NH		07/78-06/82	Neurosurgery Residency

A. Personal Statement

Dr Roberts holds the Alma Hass Milham Distinguished Chair in Clinical Medicine and is Chief of Neurosurgery at Dartmouth Hitchcock Medical Center. He has a long-standing clinical and investigative interest in intracranial brain tumor. This has included work in intraoperative image-guidance systems, computational modeling, and neuroimaging. He is currently the principal investigator of this NIH-sponsored investigational study involving fluorescence-guided surgical resection, including the development of new technologies to advance this approach. He will act as the lead neurosurgeon on the proposed ALA-induced PpIX fluorescence clinical studies and liaison for neurosurgeons at the other institutions (UCSF, Hopkins) participating in the surgical data collection. Dr Roberts has worked closely with Dr Paulsen for almost 15 years on image-guided neurosurgery and has developed a very productive research relationship with Dr Wilson, PI of the Toronto subcontract, during the first funding period of the project. He will also interact with Dr Brent Harris who will continue to serve as the neuro-pathologist for the proposed clinical activities and specimen studies.

B. Positions and Honors

Positions and Employment

1980	Honorary House Physician, National Hospital for Nervous Diseases, Queen Square, London
1982-present	Attending Physician, Mary Hitchcock Memorial Hospital, Lebanon NH
1982-1988	Asst. Professor of Clinical Surgery (Neurosurgery), Dartmouth Medical School, Hanover NH
1988-1994	Associate Professor of Surgery (Neurosurgery), Dartmouth Medical School
1994-present	Professor of Surgery (Neurosurgery), Dartmouth Medical School
1997-present	Chief, Section of Neurosurgery, Dartmouth-Hitchcock Medical Center
1997-present	Prog. Director, Neurosurgery Residency Program, Dartmouth-Hitchcock Medical Center
2000-2002	Senior Associate Dean for Clinical Affairs, Dartmouth Medical School
2001-present	Alma Hass Milham Distinguished Chair in Clinical Medicine, Geisel School of Medicine
2011-present	Professor of Neurology, Geisel School of Medicine School

Other Experience and Professional Memberships *(Officer/Committee information maintained on Dr. Roberts' C.V.)*

2008-	Elected Member, Board of Directors, American Board of Neurological Surgery
2008-	Data Monitoring Committee, Medtronic Inc, Medtronic Reclaim Clinical Study
1999-	<u>Stereotactic and Functional Neurosurgery</u> (Associate Editor, 1999-2002, Editor, 2002-),
1992-	Editorial Board (1992-2009), Advisory Board (2009-), <u>Neurosurgery</u>
1999-	Editorial Board (1999-2006, Chairman, 2005-2006), Advisory Board (2006-), <u>Journal of Neurosurgery</u>
2007-	Editorial Board, <u>Neurosurgical Focus</u>
2009-	Editorial Board, <u>World Neurosurgery</u>
1996-	Member, American Academy of Neurological Surgery
1986-	Member, American Association of Neurological Surgeons
2008-	Member, AANS/CNS Joint Section on Tumors

- 1983- American Society for Stereotactic and Functional Neurosurgery (President, 1997-1999)
- 1987- Society of University Neurosurgeons (President, 1996-1998)
- 1997- Society of Neurological Surgeons (Executive Committee, Vice President, 2011-)
- 1983- World Society for Stereotactic and Functional Neurosurgery (Vice President for North America, 2011-2007)

C. Selected peer-reviewed publications (chronological order, no more than 15): (selected from 152 peer-reviewed publications)

1. Valdes PA, Fan X, Ji S, Harris BT, Paulsen KD, Roberts DW: Estimation of Brain Deformation for Volumetric Image Updating in Protoporphyrin IX Fluorescence-Guided Resection. Stereotact Funct Neurosurg 88:1-10, 2010 [PMCID: PMC2813794].
2. Pogue BW, Gibbs-Strauss SL, Valdes PA, Samkoe KS, Roberts DW, Paulsen KD: Review of neurosurgical fluorescence imaging methodologies. IEEE Journal of Selected Topics in Quantum Electronics 16(3):493-505, May/June 2010 [PMCID: PMC2910912].
3. Roberts DW, Valdes PA, Harris BT, Fontaine KM, Hartov A, Fan X, Ji S, Lollis SS, Pogue BW, Leblond F, Tosteson TD, Wilson BC, Paulsen KD: Co-registered fluorescence-enhanced tumor resection of malignant glioma: Relationships between ALA-induced PpIX Fluorescence, MRI enhancement and neuropathological parameters. J Neurosurg 114(3):595-603, 2011 [PMCID: PMC2921008].
4. Valdes PA, Leblond F, Kim A, Harris BT, Wilson BC, Fan X, Tosteson TD, Hartov A, Ji S, Erkmen K, Simmons NE, Paulsen KD, Roberts DW: Quantitative fluorescence in intracranial tumor: implications for ALA-induced PpIX as an intraoperative biomarker. J Neurosurg 115:11-17, 2011.
5. Whitson W, Valdés PA, Harris BT, Paulsen KD, Roberts DW. Confocal microscopy for the histologic fluorescence pattern of a recurrent atypical meningioma. Neurosurgery, 2011 Mar 8. [Epub ahead of print]). [PMID: 2138989]
6. Bekelis K, Valdes PA, Erkmen K, Leblond F, Kim A, Wilson BC, Harris BT, Paulsen KD, Roberts DW. Quantitative and qualitative ALA-induced PpIX fluorescence in skull base meningiomas. Neurosurgical Focus, 2011 May; 30(5): E8 [PMID: 21529179]
7. Valdes PA, Kim A, Bratsch M, Niu C, Moses Z, Tosteson TD, Wilson BC, Paulsen KD, Roberts DW, Harris BT. δ -aminolevulinic acid-induced protoporphyrin IX concentration correlates with histopathological markers of malignancy in human gliomas: the need for quantitative fluorescence guided resection to identify regions of increasing malignancy. Neuro-Oncology, 2011 Aug; 13(8): 846-556, [PMID: 21798847]
8. Leblond F, Ovanesyan Z, Davis SC, Valdés PA, Kim A, Wilson BC, Hartov A, Pogue BW, Paulsen KD, Roberts DW. Analytic expression of fluorescence ratio detection correlates with depth in multi-spectral sub surface imaging. Phys Med Biol, 2011 Oct 5; 56(21): 6823-6837. [PMID: 21971201]
9. Valdes PA, Kim A, Leblond F, Conde OM, Harris BT, Paulsen KD, Wilson BC, Roberts DW. Combined fluorescence and reflectance spectroscopy for in vivo quantification of cancer biomarkers in low- and high-grade glioma surgery. (J Biomedical Optics, 2011 Oct; 16(116007)).
10. Valdés PA, Moses ZM, Kim A, Paulsen KD, Wilson BC, Roberts DW, Harris BT. Relationship between ex vivo gadolinium concentrations and 5-aminolevulinic acid-induced protoporphyrin IX levels in gliomas: a quantitative study on a relationship between protoporphyrin IX levels and blood-brain barrier breakdown. (J Neuropathol Exp Neurol, 2012 Sep;71(9):806-813). PMID: 22878664
11. Konecky SD, Owen CM, Rice T, Valdes PA, Kolste K, Wilson BC, Leblond F, Roberts DW, Paulsen KD, Tromberg BJ. Spatial frequency domain tomography of protoporphyrin IX fluorescence in preclinical glioma models. (J Biomed Opt, 2012 May;17(5):0506008). PMID: 22612131
12. Valdes PA, Leblond F, Kim A, Paulsen KD, Wilson BC, Roberts DW. A spectrally-constrained dual-band normalization technique for protoporphyrin IX quantification in fluorescence guided surgery. (Opt Lett, 2012 Jun 1;37(11):1817-9). PMID: 22660039

13. Roberts DW, Valdés PA, Harris BT, Hartov A, Fan X, Ji S, Pogue BW, Leblond F, Tosteson TD, Wilson BC, Paulsen KD. Adjuncts for Maximizing Resection: 5-ALA. ([Clin Neurosurg](#). 2012;59:75-8).
14. Roberts DW, Valdés PA, Harris BT, Hartov A, Fan X, Songbai J, Pogue BW, Leblond F, Tosteson TD, Wilson BC, Paulsen KD. Glioblastoma Multiforme Treatment with Clinical Trials for Surgical Resection (Aminolevulinic Acid). ([Neurosurg Clin N Am](#), 2012 Jul;23(3):371-7). PMID: 22758650
15. Valdes PA, Leblond F, Jacobs VL, Wilson BC, Paulsen KD, Roberts DW. Quantitative, spectrally-resolved intraoperative fluorescence imaging. ([Sci Rep](#). 2012;2:798. doi: 10.1038/srep00798. Epub 2012 Nov 1).

D. Research Support (ongoing & completed, past three years, begin with projects most relevant to proposed research)

Ongoing Research Support

1R01NS052274-01A2, NIH/NINDS Roberts (PI) 09/01/2007 - 08/31/2013

Coregistered Fluorescence-Enhanced Resection of Malignant Glioma

The long-term goal of this project is to improve patient survival by providing the neurosurgeon with the advanced image-guidance technology necessary for optimal intraoperative decision making during removal of malignant gliomas by exploring coregistered intraoperative fluorescence imaging as an augmentation of preoperative MR guided resection in the late stages of surgery.

Role: PI

1R01CA159324-01, NIH/NCI Paulsen (PI) 04/04/2011 - 03/31/2016

Preoperative Image Updating for Guidance During Brain Tumor Resection

Goal: This academic-industrial partnership will develop and evaluate a system for updating preoperative images in the operating room during brain tumor resection.

Role: Co-Investigator

1 R21 EB011568-01, NIBIB Halter (PI) 06/01/2010 – 05/31/2013

Electrical Impedance-based Imaging of Brain Compliance in an Animal Model.

Goal: NIH Exploratory/Developmental Research Grant Program; the aim of this study is to construct a continuous real-time brain imaging modality based on the significantly different electrical properties of the various cranial tissues and evaluate the clinical potential of this technology through a series of animal studies.

Role: Co-Investigator

1R01NS073083-01A1, NIH/NINDS Holmes (PI) 02/01/2011-01/31/2016

Mechanisms of Cognitive Impairment Following Early-Life Seizures

Goal: Further investigate early-life seizures and the mechanisms leading to cognitive impairments by determining the extent and relevance of brain oscillation dysfunction.

Role: Co-Investigator

NeuroPace, Inc Jobst (PI) 05/07/2008-

RNS System Long Term Treatment Clinical Investigation

Goal: An open-label multi-center prospective clinical investigation to assess the ongoing safety and to evaluate the long-term efficacy of the Responsive Neurostimulator System as in adjunctive therapy in reducing the frequency of seizures in individuals 18 years of age or older with partial onset seizures that are refractory to two or more antiepileptic medications.

Role: Local Co-Investigator

1C06RR030432-01, NIH Colacchio (PI) 03/18/2010 – 03/17/2015

Advanced Surgical Center for Translational Research at Dartmouth

Goal: Further support clinical translational research at Dartmouth via the creation of a dedicated research facility that will offer advanced imaging and image-guidance and data collection tools. Create immediate economic stimulus in the State of New Hampshire and the region.

Role: Co-Investigator

Completed Research Support

5 R01 EB002082-13, NIH/NIBIB

Paulsen (PI)

08/25/2005 - 06/30/2010

Modeling of Brain Deformation during Surgery

Goal: This is the competing continuation of a project which is developing modeling methods for compensation of brain deformation during image-guided neurosurgery.

Role: Co-Investigator

3 R01 EB004632-04, NIH/NIBIB

Roberts (PI)

09/22/2005 - 07/31/2010

Magnetic Resonance Elastography in Hydrocephalus

Goal: Clinical Resident Research supplement with Dr. Lollis to develop, validate and evaluate MRE methods in the treatment of hydrocephalus.

Role: Principal Investigator

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Rosenkranz, Kari M	POSITION TITLE Assistant Professor of Surgery
eRA COMMONS USER NAME (credential, e.g., agency login) KMROSENKRANZ	

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
Princeton University	B.A.	06/92	History
Bryn Mawr College		06/94	Post baccalaureate Pre-medical
Albany Medical College	M.D.	06/99	Medicine
Dartmouth Hitchcock Medical Center		06/05	Residency in General Surgery
MD Anderson Cancer Center		06/06	Fellowship in Breast Surgery

A. Personal Statement

As a sub-specialty trained breast surgery, I have committed my clinical practice to bettering surgical outcomes for women with breast cancer. An ongoing international failing in breast cancer care remains our inability to expeditiously assess pathologic margins despite pre-operative localization with mammogram, ultrasound and/or wire localization. Women experience much anxiety around breast surgery and the prospect of a second or third operation heightens this anxiety during an already stressful time. Re-excisions for close or positive margins also greatly increase the overall financial cost of breast cancer care. For this reason, I am committed to a prospective trial assessing the feasibility of MRI guided tumor excision for women with early, non palpable breast cancer. If successful, this technique will preclude the need for the uncomfortable, pre-operative placement of wires in the breast of un-anesthetized patients. Additionally, if the MRI provides increased biologic accuracy, re-excision rates will decrease.

To date, I have collaborated on other multidisciplinary clinical projects that involved novel technologies including cryoablation of tumors and electrical bioimpedance of tumors. I have experience working in the interdisciplinary clinic and tumor board. In this capacity, I work regularly with the pathologists and other surgeons involved in this study. I have also worked to accrue patients to other clinical trials run through our engineering school including one investigating novel modalities for breast imaging.

B. Positions and Honors

Positions and Employment

1999-2005 Resident in General Surgery, Dartmouth Hitchcock Medical Center, Lebanon, New Hampshire

2005-2006 Fellow, MD Anderson Cancer Center, Houston, Texas

2006- present Assistant Professor of Surgery, Dartmouth-Hitchcock Medical Center, Lebanon, NH and
Dartmouth Medical School, Hanover, NH

2009- present Medical Director, Comprehensive Breast Program, Dartmouth Hitchcock Medical Center,
Lebanon, New Hampshire

2011- present Associate Director, Residency in General Surgery, Dartmouth Hitchcock Medical Center, Lebanon, New Hampshire

Honors

2003	Dartmouth Medical School Excellence in Teaching Award
2004	Dartmouth Medical School Excellence in Teaching Award
2005	Thomas P. Almay House Staff Teaching Award, Dartmouth Medical School
2008	New Hampshire Magazine: Top Doctor Award, Breast Surgery
2009	New Hampshire Magazine: Top Doctor Award, Breast Surgery
2009	Mosenthal Surgical Society Award: Outstanding contributions to Dartmouth Medical School
2010	New Hampshire Magazine: Top Doctor Award, Breast Surgery
2010	Chairman's Award Recipient, DHMC: Excellence in patient care
2010	Surgeon of the Year, School of Surgical Technologists, DHMC
2011	New Hampshire Magazine: Top Doctor Award, Breast Surgery
2012	New Hampshire Magazine: Top Doctor Award, Breast Surgery
2012	Clinical Science Teaching Award, Dartmouth Medical School

C. Selected Peer-reviewed Publications

Original Articles:

1. **Rosenkranz, KM**, Sheridan, RL. "Trauma to Adult Bicyclists: A Growing Problem in the Urban Environment". *Injury*, 2003; 34:825-9 PMID:14580814
2. **Rosenkranz, KM**, Lucci, A. "Surgical treatment of pregnancy associated breast cancer". *Breast Disease* 2005-2006; 23: 87-93. PMID:16823171
3. **Rosenkranz, KM** et.al. "Breast cancer in the very elderly: Treatment patterns and outcomes in a comprehensive cancer center". *American Journal of Surgery*, Oct;192(4):541-4 PMID:16978971
4. Gorechlad J, McCabe E, Higgins J, Likosky D, Lewis P, **Rosenkranz K**, Barth RJ. Screening for Recurrences in Patients Treated with Breast Conserving Surgery: Is there a Role for MRI? *Annals of Surgical Oncology* 2008, 15:1703-9. *Pub Med* 18266039
5. Schell, A, **Rosenkranz, KM**, Lewis, P. "The role of breast MRI in the preoperative evaluation of patients with newly diagnosed breast cancer" *American Journal of Roentology*, 2009 May 192(5):1438-44 PMID:19380574
6. Halter R, Zhou T, Meaney P, Hartov A, Barth RJ, **Rosenkranz K**, Wells W, Kogel C, Borsic A, Rizzo E, Paulsen K. Correlation of in vivo and ex vivo tissue dielectric properties to validate electromagnetic

breast imaging: initial clinical experience. *Physiological Measurement* 2009, 30: S121-36. *Pub Med* 19491436

7. Bauman, L, Barth, R, **Rosenkranz, K**. Breast conservation for multicentric and multifocal breast cancer: Is it feasible? *Ann Surg Onc* 2010, 17 Suppl. 3: 325-329. *Pub Med* 20853054
8. B.L. van Leeuwen, **Rosenkranz, KM**, Lei Feng L., I. Bedrosian, K. Hartmann, K.K. Hunt, H.M. Kuerer, M. Ross, S.E. Singletary, G.V. Babiera. The effect of undertreatment of breast cancer in women 80 years of age and older. *Critical Reviews in Oncology/Hematology*. 2011 Sep 79(3): 315-20
PMID:20655242
9. Yeager MP, **Rosenkranz KM**. Cancer recurrence after surgery: A role for regional anesthesia? *Reg Anesth Pain Med*. 2010 Nov;35(6):483-4 PMID:20975458
10. **Rosenkranz, KM**, "Is Breast Conserving Surgery Appropriate in the Setting of Multifocal and Multicentric Disease? *Current Breast Cancer Reports* Volume 4, epub ahead of press 2012.
11. **Rosenkranz, KM** et al. "Increased rates of long term complications after Mammosite brachytherapy", accepted pending revisions *Journal of the American College of Surgeons*

D. Research Support

None

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Kimberley Samkoe		POSITION TITLE Assistant Research Professor	
eRA COMMONS USER NAME (credential, e.g., agency login) KSAMKOE		Department of Surgery Geisel Medical School at Dartmouth	
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 Regina, SK, Canada	B.Sc. Honors	1997-2001	Biochemistry
University of Calgary, AB, Canada	Ph.D.	2002-2007	Biophysical Chemistry
Thayer School of Engineering, Dartmouth College	Postdoctoral	2007-2010	Biomedical Engineering

Please refer to the application instructions in order to complete sections A, B, C, and D of the Biographical Sketch.

A. Personal Statement

The focus of this proposal is to determine whether patients undergoing treatment for HPV-positive head and neck tumors would benefit from less aggressive, oxygen dependent therapies such as photodynamic therapy and low dose radiation. My education and research background has focused on photodynamic therapy, fluorescence and near-infrared imaging, optics, biochemistry, and animal models of cancer. At Dartmouth College I have worked on several projects including development of *in vivo* molecular imaging for receptor density quantification, fluorescent molecular targeting of pancreas and glioma tumors, xenograft murine models, fluorescence molecular imaging of antibody targeting, photodynamic therapy and dosimetry, image contrast analysis, magnetic resonance (MR) imaging, and MR-guided fluorescence molecular tomography. In doing so, I have directly supervised 14 undergraduate and medical students, and mentored 10 graduate students from numerous disciplines including engineering, biology, neurobiology, physics, and medicine. Inherently, the research that I perform is collaborative in nature. I have been involved in interdisciplinary biomedical and cancer spectroscopy and imaging projects for the entirety of my career. I have worked closely with Dr. Chen (Department of Surgery) on other funded projects. I have also worked closely with both Dr. Pogue (Thayer School of Engineering) and Dr. Hoopes (Department of Surgery) during the past five years while at Dartmouth College and have greatly benefited from their mentorship.

B. Positions and Honors**Positions and Employment**

1999-2001 Chemistry, Biochemistry and Mathematics Assistant, University of Regina, Regina, SK, Canada

2000 Biology Laboratory Instructor, University of Regina, Regina, SK, Canada

2001 Research Assistant, University of Regina, Regina, SK, Canada

2001 Research Assistant, University of Calgary, Calgary, AB, Canada

2002-2007 Laboratory Instructor, University of Calgary, Calgary, AB, Canada

2007 Invited Lecturer, University of Calgary, Calgary, AB, Canada

2009-2012 Invited Lecturer, Thayer School of Engineering, Dartmouth College, Hanover, NH

2011-present Assistant Research Professor, Department of Surgery, Geisel School of Medicine, Hanover, NH

2012-present Adjunct Assistant Professor, Thayer School of Engineering, Dartmouth College, Hanover, NH

Other Experience

2007-present Selected Journal Reviewer – International Journal of Radiation Oncology – Physics, Biology; Journal of Applied Physics; Journal of Photochemistry and Photobiology B: Biology; Optics Letters; Photochemical and Photobiological Sciences; Photochemistry and Photobiology; Photodiagnosis and Photodynamic Therapy

2009- Session Chair, International Photodynamic Association World Congress 2009

2010- Panel Writer, *Spotlight on Optics*, Optical Society of America

2010- Executive Member, Medical Innovation Network at Dartmouth (MIND)

2011-2012- Co-Chair of Membership, American Society of Photobiology

2012- Council Member, American Society of Photobiology

Honors

2002-2005 NSERC-eMPOWR Recipient

2002-2007 Alberta Ingenuity Fund Incentive Award

2004 Alberta Odd Fellow Rebekah Visual Research Student Awards

2006 Michael Lazer Community Service Award

2008 Edward A. Smuckler Memorial Workshop

C. Selected Peer-reviewed Publications

1. Scott C Davis, **Kimberley S Samkoe**, Kenneth M Tichauer , Kristian J Sexton , Jason R Gunn , Sophie J Deharvengt , Tayyaba Hasan , Brian W. Pogue, “Dynamic dual-tracer MRI-guided fluorescence tomography to quantify receptor density *in vivo*,” *PNAS*, **accepted**, April 18th, 2013.
2. Secton, K., Tichauer, K., Samkoe, K. S., Gunn, J., Hoopes, P. J. and Pogue, B. W., “Fluorescent affibody peptide penetration in glioma margin is superior to full antibody,” *PLoS One*, 2013, 8(4), e60390.
3. Torosean, S., Flynn, B., Axelsson, J., Gunn, J., **Samkoe, K. S.**, Hasan, T., Doyley, M. M., and Pogue, B. W.. “Nanoparticle uptake in tumors is mediated by the interplay of vascular and collagen density with interstitial pressure,” *Nanomedicine*, 2013, 9(2), 151-8.
4. Tichauer, K. M., Holt, R. W., El-Ghoussein, F., Davis, S. C., **Samkoe, K. S.**, Gunn, J. R., Leblond, F. and Pogue, B. W., “Dual-tracer background subtraction approach for fluorescent molecular tomography,” *Journal of Biomedical Optics*, 2013, 18(1):16003.
5. Tichauer, K. M., **Samkoe, K. S.**, Klubben, W. S., Hasan, T. and Pogue, B. W., “Advantages of a dual-tracer model over reference tissue models for binding potential measurement in tumors,” *Physics in Medicine and Biology*, 2012, 57(20):, 6646-59.
6. Tichauer, K. M., Holt, R. W., **Samkoe, K. S.**, El-Ghoussein, F., Gunn, J. R., Jermyn, M., Dehghani, H., Leblond, F. and Pogue, B. W. “Compute tomography-guided time-domain diffuse fluorescence tomography in small animals for localization of cancer biomarkers,” *Journal of Visual Experiments*, 2012, 65:e4050.
7. Tichauer, K. M., **Samkoe, K. S.**, Sexton, K. J., Gunn, J. R., Hasan, T. and Pogue, B. W., “Improved tumor contrast achieved by single time-point dual-reporter fluorescence imaging,” *Journal of Biomedical Optics*, 2012, 17(6), 066001.
8. Tichauer, K. M., **Samkoe, K. S.**, Sexton, K. J., Hextrum, S. K., Yang, H. H., Klubben, W. S., Gunn, F. R., Hasan, T., and Pogue, B. W., “*In vivo* quantification of tumor receptor binding potential with dual-reported molecular imaging,” *Molecular Imaging and Biology*, 2012, 14(5), 584-92.
9. **Samkoe, K. S.**, Sexton, K., Tichauer, K. M., Hextrum, S. K., Pardesi, O., Davis, S. C., O’Hara, J. A., Hoopes, P. J., Hasan, T. and Pogue, B. W., “High vascular delivery of EGF, but low receptor binding rate is observed in AsPC-1 tumors as compared to normal pancreas,” *Molecular Imaging and Biology*, 2012, 14(4), 472-9.
10. **Samkoe, K. S.**, Gibbs-Strauss, S. L., Yang, H. H., Hekmatyar, S. K., Hoopes, P. J., O’Hara, J. A., Kauppinen, R. A. and Pogue, B. W., “Protoporphyrin IX fluorescence contrast in invasive glioblastomas is linearly correlated with Gd enhanced MR image contrast but has higher positive predictive value,” submitted to *Journal of Biomedical Optics*, (**accepted for publication**, July, 2011).

11. Davis, S. C., **Samkoe, K. S.**, O'Hara, J. A., Gibbs-Strauss, S. L., Paulsen, K. D., and Pogue, B. W., "Comparing implementations of MR-guided fluorescence molecular tomography for diagnostic classification of brain tumors," *Journal of Biomedical Optics*, **15(5)**, 051602, (2010).
12. Valdes, P. A., **Samkoe, K. S.**, O'Hara, J. A., Roberts, D. W., Paulsen, K. D., and Pogue, B. W., "Deferoxamine iron chelation increases d-aminolevulinic acid induced protoporphyrin IX in xenograft glioma model," *Photochemistry Photobiology*, **86(2)**, 471-475, (2010).
13. Pogue, B. W., **Samkoe, K. S.**, Hextrum, S., O'Hara, J. A., Jermyn, M., Srinivasan, S., and Hasan, T., "Imaging targeted-agent binding in vivo with two probes," *Journal of Biomedical Optics*, **15(3)**, 030513, (2010).
14. Pogue, B. W., Gibbs-Strauss, S., Valdes, P. A., **Samkoe, K.**, Roberts, D. W., and Paulsen, K. D., "Review of neurosurgical fluorescence imaging methodologies," *IEEE J. Sel. Top. Quantum Electron.*, **16(3)**, 493-505, (2010)
15. Pogue, B. W., **Samkoe, K. S.**, Gibbs-Strauss, S. L. and Davis, S. C., "Fluorescent molecular imaging and dosimetry tools in photodynamic therapy," *Methods Mol. Biol.*, **635**, 207-222, (2010).
16. Davis, S. C., **Samkoe, K. S.**, O'Hara, J. A., Gibbs-Strauss, S. L., Payne, H. L., Hoopes, P. J., Paulsen, K.D., and Pogue, B. W., "MRI-coupled fluorescence tomography quantifies EGFR activity in brain tumors," *Academic Radiology*, **17(3)**, 271-6, (2010).
17. Celli, J. P., Spring, B. Q., Rizvi, I. Evans, C. L., **Samkoe, K. S.**, Verma, S. Pogue, B. W., and Hasan, T., "Imaging and photodynamic therapy: mechanisms, monitoring and optimization," *Chem. Rev.*, **110(5)**, 2795-2838, (2010).
18. Khurana, M., Moriyama, E. H., Mariampillai, A., **Samkoe, K. S.**, Cramb, D. T., and Wilson, B. C., "Drug and light dose responses to focal photodynamic therapy of single blood vessels *in vivo*," *Journal of Biomedical Optics*, **14(6)**, 064006, (2010).
19. **Samkoe, K. S.**, Chen, A. A., Rizvi, I., O'Hara, J. A., Hoopes, P. J., Hasan, T., and Pogue, B. W., "Imaging tumor variation in response to photodynamic therapy in pancreas cancer xenograft models," *International Journal of Radiation Oncology, Biology, Physics*, **76(1)**, 251-9, (2010).
20. Gibbs-Strauss, S. L., **Samkoe, K. S.**, O'Hara, J. A., Davis, S. C., Hoopes, P. J., Hasan, T., Pogue, B. W., "Detecting Epidermal Growth Factor Receptor Tumor Activity In Vivo During Cetuximab Therapy of Murine Gliomas," *Academic Radiology*, **17(1)**, 7-17, (2010).
21. Garcia-Allende, B., Krishnaswamy, V., Hoopes, P. J., **Samkoe, K. S.**, Conde, O. M., and Pogue, B. W., "Automated identification of tumor microscopic morphology based on macroscopically measured scatter signatures," *J. Biomed. Opt.*, **14(3)**, 034034 (2009).
22. Krishnaswamy, V., Hoopes, P. J., **Samkoe, K. S.**, O'Hara, J. A., Hasan, T., and Pogue, B. W., "Quantitative imaging of scattering changes associated with epithelial proliferation, necrosis, and fibrosis in tumors using microsampling reflectance spectroscopy," *Journal of Biomedical Optics*, **14(1)**, 014004 (2009).
23. **Samkoe, K. S.**, Clancy, A. A., Karotki, A., Wilson, B. C., and Cramb, D. T., "Complete Blood Vessel Occlusion in the Chick Chorioallantoic Membrane using TPE-PDT: Implications for Treatment of Wet Age-Related Macular Degeneration," *Journal of Biomedical Optics*, **12(3)**, 034025: 1-14, (2007).
24. **Samkoe, K. S.**, Fecica, M. S., Goyan, R. L., Buccholz, J. L., Campbell, C., Kelly, N. M., and Cramb, D. T., "Photobleaching Kinetics of Optically Trapped Multi-Lamellar Vesicles Containing Verteporfin Using Two-Photon Excitation," *Photochemistry and Photobiology*, **82(1)**, 152-57, (2006).
25. **Samkoe, K. S.**, and Cramb, D. T., "Application of an *Ex Ovo* Chicken Chorioallantoic Membrane Model for Two-Photon Excitation Photodynamic Therapy of Age-Related Macular Degeneration," *Journal of Biomedical Optics*, **8(3)**, 210-217, (2003).

D. Research Support

Currently Funded Research Grants

R01 CA156177 (T. Hasan, B. Pogue and K. Samkoe) 01/01/11-12/31/15

NIH

“Image-Guided Drug Delivery and Image-Guided Light Delivery”

The goal of this work is to develop a targeted nanocell that incorporates a photodynamic therapy agent, a biological agent and a MR imaging agent for maximal therapeutic outcome of glioblastoma multiforme. The delivery of these agents will be monitored using magnetic resonance guided optical imaging and predictive pharmacokinetic binding models.

Synergy Pilot Project (K. Samkoe and E. Chen) 01/01/11-12/31/12

DHMC Synergy

“Theranostics for head and neck cancer using hypoxia-targeted, fluorescent antibody-labeled nanoparticles (HyFAN)”

The innovation of this project is creating a single, intravenously deliverable theranostic agent that works for simultaneously targeting, imaging and treating hypoxic regions in head and neck tumors.

P01 CA084203-01A1 (P. Dir. Hasan) 03/01/09 – 02/28/14

NIH/NCI

"An Online-Measurement and Model-Based Approach to PDT"

Project 4 & Core C within Program from Massachusetts General Hospital (PI Pogue)

The goal of this work is to develop optimal ways to deliver photodynamic therapy to pancreas cancer and skin cancer, in combination with biological therapy which can provide an optimal window for receptive targeting.

Previously Funded Research Grants

Alberta Ingenuity Fund Incentive Award (K. S. Samkoe) 2002-2007

Alberta Ingenuity Fund

“Two-Photon Photodynamic Therapy for Age-Related Macular Degeneration”

The development of a vascular model and the execution of proof-of-principle experiments for two-photon excitation photodynamic therapy for the treatment of age-related macular degeneration.

NSERC-eMPOWER (K. Samkoe) 2002-2005

NSERC and Canadian Institution for Photonic Innovations

“Development of Two-Photon Photodynamic Therapy”

The goal of this work was to demonstrate that two-photon photodynamic therapy could be used to treating single blood vessels in age-related macular degeneration, a retinal disease of the elderly, using clinically approved photosensitizing agents.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Singer, Robert J	POSITION TITLE Assistant Professor of Neurological Surgery		
eRA COMMONS USER NAME			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
University of Iowa, Iowa City, Iowa	BA	1982-1986	General Science
University of Nebraska, Omaha, Nebraska	MD	1988-1992	Medicine
Vanderbilt University Medical Center, Nashville,	Internship	1992-1993	General Surgery
Vanderbilt University Medical Center, Nashville,	Residency	1993-1998	Neurosurgery
Stanford University Medical Center, Nashville, TN	Fellowship	1995-1996	Interventional Neuroradiology
Massachusetts General/Harvard Medical, MA	Fellowship	1998-1999	Neurovascular Surgery

A. Positions and Honors.

Positions and Employment

1999-2001	Neurological Surgeons, P.C., Nashville, TN
2002-2002	Associate Professor, Director, Neurovascular Therapeutics, University of Nebraska, NE
2003-2007	Neurological Surgeons, P.C., Nashville, TN
2007-2008	Tennessee Brain and Spine, PLC, Nashville, TN
2008-2009	Skyline Neuroscience Associates, Nashville, TN
2009	Assistant Professor, Vanderbilt University Medical Center, Nashville, TN

Honors

1989-1990	American Medical Association, UNMC Student Research Forum Planning Committee American Cancer Society; UNMC Student Cancer Society Chairman
1989-1991	University of Nebraska Medical School, Class of 1992 Vice President
1996	Magna Cum Laude scientific exhibit at the American Society of Neuroradiology, Seattle

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

1. **Singer RJ**, Norbash AM, Interventional neuroradiology: techniques, applications, and clinical issues, *Int Anesthesiol Clin* Vol 34, Issue 4, Pgs 161-78, Jan 1996
2. Abe T, **Singer RJ**, Marks MP, Kojima K, Watanabe M, Uchida M, Hayabuchi N, Arterial vascular abnormality accompanying cerebral cortical dysplasia, *American Journal of Neuroradiology*, Vol 18, Issue 1, Pgs 144-6, Jan 1997
3. **Singer RJ**, Dake MD, Norbash AM, Abe T, Marcellus ML, Marks MP. Covered Stent Placement for Neurovascular Disease; a report of two cases. *American Journal of Neuroradiology* 18: 507-509, March 1997.
4. **Singer, RJ**, Abe T, Taylor WH, Marks MP, Norbash AM. Intracavernous Anterior Cerebral Artery Origin with Associated Arteriovenous Malformation: a Developmental Analysis. *Neurosurgery* 40;4, April 1997.
5. Abe T, Kojima K, **Singer RJ**, Marks MP, Watanabe M, Kojima K, Uchida M, Hayabuchi N. Arterial vascular abnormality accompanying cerebral cortical dysplasia. *American Journal of Neuroradiology* 18:144-146, Jan 1997.

6. Abe T, **Singer RJ**, Marks MP, Norbash AM, Crowley R, Steinberg GK. Coexistence of Occult Vascular Malformations and Developmental Venous Anomalies in the Central Nervous System: MR Evaluation. *American Journal of Neuroradiology*, 19;1:51-57, January 1998.
7. Abe T, Kojima K, **Singer RJ**, Marks MP, Watanabe M, Nishimura H, Hayabuchi N. Endovascular Management of an aneurysm arising from anomalous C2 origin posterior Inferior cerebellar artery. *Radiation Medicine* 16(2):141-143, 1998.
8. Norbash AM, Perl J, **Singer RJ**. A Method to Videographically Assess Favorable and Unfavorable Aneurysm Embolic Characteristics Applied to Three Polymeric Compounds: Ethylene Vinyl Alcohol, Cellulose Acetate, and Liquid Urethane. *American Journal of Neuroradiology* 22:146-148, 1998.
9. **Singer RJ**, Clough J, Johnson M, Copeland MJ. Pigmented Schwannoma of the Ventral Spinal Cord. *Southern Medical Journal* 92:7:545-47, 1999.
10. **Singer RJ**, Ogilvy CS. Endovascular embolization of 150 basilar tip aneurysms with Gugliemi detachable coils: results of the FDA multicenter clinical trial, comment. *Neurosurgical Focus*, Oct. 1998.
11. Norbash AM, **Singer RJ**. Videographic assessment of the embolic characteristics of three polymeric compounds: ethylene vinyl alcohol, cellulose acetate, and liquid urethane. *AJNR Am J Neuroradiol*, Vol 22, Issue 2, Pgs 334-40, Feb 2001
12. Ogilvy CS, Hoh BL, **Singer RJ**, Putman CM. Clinical and radiographic outcome in the management of posterior circulation aneurysms by use of direct surgical or endovascular techniques. *Neurosurgery*, Vol 51, Issue 1, Pgs 14-21, discussion 21-2. Aug 2002
13. **Singer RJ**. Management of Dissections of the Carotid and Vertebral Arteries. *Operative Neurosurgical Techniques*, fifth edition 82, Sept. 2004.
14. Reig A., **Singer R.**, Balloon Test Occlusion prior to Carotid Sacrifice: The Vanderbilt Experience and Review of the Literature. *Journal of Neurointerventional Surgery* 2010, in press
15. Kiehna EN., **Singer RJ**. Operative Management of a Large Scalp Hemangioma: Case Report and Review of the Literature. *Journal of Neurosurgery (Pediatrics)* 2010, in press
16. Jermakowicz WJ, Tomycz L, Ghiassi Mayshan, **Singer RJ**. Use of endovascular embolization to treat a ruptured arteriovenous malformation in a pregnant woman: a case presentation. *Journal of Medical Case Reports* April 2012.
17. Luke Tomycz, Alexander S. Maris, Mahan Ghiassi, **Robert J. Singer**. Open surgical disconnection for congenital, multi-hole, pial arteriovenous fistulae in non-eloquent cortex. *Neurology India*. July-August 2012/ Vol 60/ Issue 4
18. Martin, J. A., Maris, A. S., Ehtesham, M., **Singer, R. J.** Rat Model of Blood-brain Barrier Disruption to Allow Targeted Neurovascular Therapeutics. *J. Vis. Exp.* (), e50019, DOI: 10.3791/50019 (2012).
19. **Singer RJ**, Jordan LC. Brain arteriovenous malformations in adults and children. *Tenn Fam Physician* 2012; Summer edition:2.
20. Martin, J. A., Maris, A. S., Ehtesham, M., **Singer, R. J.** Rat Model of Blood-brain Barrier Disruption to Allow Targeted Neurovascular Therapeutics. *J. Vis. Exp.* (69), e50019, doi:10.3791/50019 (2012).
21. Alteration of Isocitrate Dehydrogenase Following Acute Ischemic Injury as a Means to Improve Cellular Energetic Status in Neuroadaptation. ; Reference#: BSP-CDTCNSND-2012-58
22. Lee Y, Khan I, Ladner T, MacLean K, Ehtesham M, **Singer RJ**. The Utilization of Diagnostic Procedures in the Emergency Department for Acute Stroke in the United States.
23. Tomycz L, Bansal N, Lockney T, Strothers M, Connors J, Shay S, **Singer RJ**. Primary balloon angioplasty for symptomatic, high-grade intracranial stenosis. *Surg Neurol Int* 2013;4:18.
24. Grelli KN, Palubinsky AM, Kale AC, Lizama-Manibusan BN, Stankowski JN, Milne GL, **Singer RJ**, McLaughlin B. Alteration of Isocitrate Dehydrogenase Following Acute Ischemic Injury as a Means to Improve Cellular Energetic Status in Neuroadaptation. 2013 Feb 27.

C. Research Support

Ongoing Research Support

2012 The Role Of Cxcr4 In Cerebral Vasospasm And Its Potential As A Therapeutic Target In Rat Model Of Subarachnoid Hemorrhage Principal Investigator - Protocol Number: M/12/008

2012 Biological Basis and Downstream Effects of Cavernous Malformations Principal Investigator
– IRB# 120138

2012 Subarachnoid Hemorrhage Database
Principal Investigator – IRB# 120098

2011 (ongoing) An Integrated CT-based Image-Guided Neurosurgical System
NIH Grant

2011 Secondary Stroke Prevention In The Setting Of Intracranial Stenosis: Balloon Angioplasty
Versus Stenting

2011 NeuroFlo HUD - Codman, Primary Investigator
Onyx Liquid Embolic System (Onyx HD-500) HUD/HDE – EV3, Primary Investigator

2011 Neuroform 2 HDE – Stryker, Primary Investigator

2011 Codman Enterprise - Codman, Primary Investigator

2011 Wingspan - Stryker, Primary Investigator

2011 Effects of Blood Brain Barrier Disruption on Oxidative Stress in Rat Brain. Status: Co-
Investigator

2011 Effect of Isocitrate Dehydrogenase (IDH) Disruption on Rat CNS Glial Cell Viability. Status: Co-
Investigator

2011 The Consequences of Disruption of IDH on the Viability of Neurons in the Rat CNS. Status: Co-
Investigator

2010 Wingspan™ Stent System and Gateway PTA Balloon Catheter. Status: Principal Investigator

2010 Neuroform EZ™ Stent System. Status: Principal Investigator

2010 Translational Imaging and Therapy Studies of Anti-vascular
Agents in Glioblastoma. Vanderbilt University Medical Center
Co-Investigator

2008 Xoran Image Acquisition Trial (XIAS), Part One
Skyline Medical Center, 2008
Principal Investigator

2005 Xoran Technologies, Medical Advisor, Concept and Clinical,
XCAT portable CT scanner, Co-Investigator- Beach Trial part II

2005 Principle Investigator-Boston Scientific: The
Wingspan Stent system with Gateway PTA
balloon catheter

2004 National Cancer Institute
Sub-Investigator
Interactive Intraoperative Imaging with Cone Beam CT

Completed Research Support

- 2005 Principle Investigator-Abbott Vascular Exact: Emboshield and Xact Post Approval Carotid Stent Trial using the Emboshield Barewire Rapid Exchange Embolic and Xact Rapid Exchange Carotid Stent System
- 2003 Co-Investigator-Boston Scientific EPI: A Carotid Stenting Trial for High Risk Surgical Patients
- Co-Investigator-A Double-Blind, Randomized, Phase I/II Study to Evaluate the Safety of xxxx and the Effect of xxxx on the Healing of Lumbar Spinal Fusions
- Co-Investigator-The Gliasite Radiation Therapy System as a Boost to External Beam Radiation Therapy in Patients with Newly Diagnosed Malignant Gliomas
- Co-Investigator-Multicenter, Double-Blind, Randomized, Placebo-Control, Parallel-Group Study to Evaluate the Safety and Efficacy of xxxx in Patients with Neuropathic Pain Due to Radiculopathy
- Co-Investigator-PROLONG A Prospective Look at Outcomes Nationally With Gliadel Wafer
- Co-Investigator-A Randomized, Double-blind, Placebo Controlled Study of xxxx To Improve Memory in Patients Suffering from Anterior Communicating Artery Syndrome
- 2001 Principal Investigator: Robert J. Singer, M.D.
Title: Temperature Control during Aneurysm Surgery (TCAS)
Sponsor: Innercool Corporation
Comparative Investigation Using an Intravascular Device For Cooling and Warming during Aneurysm Surgery
- 1996 Principal Investigator: Alex Norbash, M.D.
Status: Co-Investigator
Source: Private funding (Therox Corp.)
Comparison of Cerebral Ischemia between Superoxygenated Solution Infused and Non-Infused Hemispheres in a Rat Model. April, 1996
- Principal Investigator: Alex Norbash, M.D.
Status: Co-Investigator
Source: Private funding
Utility of Intra Aneurysmal Copolymer Instillation for Aneurysm Therapy in a Rabbit Jugular Pouch Model. April, 1996.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Stauth, Jason T.	POSITION TITLE Assistant Professor of Engineering		
eRA COMMONS USER NAME (credential, e.g., agency login)			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Colby College, Waterville, Maine	B.A.	05/99	Physics
Dartmouth College	B.E.	06/00	Engineering
University of California at Berkeley	M.S.	06/06	Electrical Engineering
University of California at Berkeley	Ph.D.	12/08	and Computer Science

A. Personal Statement

B. Positions and Honors

Positions and Employment

2000-2003	Integrated Circuit Design Engineer, Allegro Microsystems, Concord, NH
2003-2008	Graduate Student Researcher, University of California, Berkeley, CA
2008-2009	Co-Founder and Chief Technology Officer, QVSense, Inc., Berkeley, CA (Acquired by Solar Semiconductor)
2009-2011	Director of Engineering, Solar Semiconductor, Inc., Sunnyvale, CA
2011-	Assistant Professor, Dartmouth College, Hanover, NH

Other Experience and Professional Memberships

2005-2006	Consultant: Fairchild Semiconductor
2007-2008	Consultant: Panasonic Corporation
2009	Consulting: Passif Semiconductor
1999-	Member Institute of Electrical and Electronics Engineers (IEEE)
2000-	Member: Solid State Circuits Society
2003-	Member: Power Electronics Society

Honors

1995-1999	Presidential Scholar, Colby College, Waterville, ME
1999	Phi Beta Kappa, Sigma Pi Sigma, Summa Cum Laude Distinction
2007	Calview – Banatao Award for Teaching in a Distance Learning Environment
2008	U.C. Berkeley Venture Lab Award (GreenLight Energy)
2009	U.C. Berkeley Venture Lab Award (QVSense, Inc.)

C. Selected Peer-reviewed Publications and Patents

- [1] J.T. Stauth, M. D. Seeman, and K. Kesarwani, "Resonant Switched-Capacitor Converters for Sub-module Distributed Photovoltaic Power Management," IEEE Transactions on Power Electronics, vol. 28, no. 3, pp. 1189–1198, Mar. 2013.
- [2] J. T. Stauth, M. D. Seeman, and K. Kesarwani, "A Resonant Switched-Capacitor IC and Embedded System for Sub-Module Photovoltaic Power Management," IEEE Journal of Solid-State Circuits, vol. 47, no. 12, pp. 3043–3054, 2012.
- [3] J.T. Stauth, M.D. Seeman, K. Kesarwani, "A High-Voltage CMOS IC and Embedded System for Distributed Photovoltaic Energy Optimization with over 99% Effective Conversion Efficiency and 0.1% Insertion Loss," IEEE International Solid State Circuits Conference (ISSCC), February, 2012.
- [4] J.T. Stauth and S.R. Sanders, "A 2.4GHz, 20dBm Class-D PA with Single-Bit Digital Polar Modulation in 90nm CMOS," IEEE Custom Integrated Circuits Conference (CICC), 2008.
- [5] J.T. Stauth and S.R. Sanders, "Pulse Density Modulation for RF Applications: The Radio-Frequency Power Amplifier (RF PA) as a Power Converter," IEEE Power Electronics Specialists Conference (PESC), June 2008.
- [6] J.T. Stauth and S.R. Sanders, "Optimum Biasing for Parallel Hybrid Switching-Linear Regulators" IEEE Transactions on Power Electronics, vol. 22, pp. 1978-1985, Sept. 2007
- [7] J.T. Stauth and S.R. Sanders, "Optimum Bias Calculation for Parallel Hybrid Switching-Linear Regulators," Applied Power Electronics Conference (APEC), pp. 569-574, Feb. 2007.
- [8] J.T. Stauth and S.R. Sanders, "Power Supply Rejection for Radio Frequency Amplifiers: Theory and Measurements," IEEE Transactions on Microwave Theory and Techniques, vol. 55, pp. 2043-2052, Oct. 2007.
- [9] J.T. Stauth and S.R. Sanders, "Power supply rejection for common-source linear RF amplifiers: theory and measurements," IEEE Radio Frequency Integrated Circuits (RFIC) Symposium, pp. 317-320, June 2006.
- [10] J. Stauth, M. Seeman, S. Surana. "Methods and Apparatuses for Photovoltaic Power Management." U.S. Patent 8,390,147, March 5, 2013
- [11] J. Stauth, M. Seeman, S. Surana. "Methods and Apparatuses for Photovoltaic Power Management." U.S. Patent 8,384,245, February 26, 2013
- [12] J. Stauth, R. Dickinson, G. Forrest, R. Vig. "Integrated Sensor." U.S. Patent 7,746,056. June 29, 2010.
- [13] J. Stauth, R. Dickinson, G. Forrest, R. Vig. "Multi-Substrate Integrated Sensor." U.S. Patent 7,518,354. April 14, 2009.
- [14] J. Stauth, R. Dickinson, J. Sauber, R. Engel, S. Pinelle. "Integrated Current Sensor." U.S. Patent 7,265,531. Sept. 4, 2007.
- [15] K. Scheller, G. Monreal, J. Stauth. "Proximity Detector." U.S. Patent 7,199,579. Apr. 3, 2007.
- [16] J. Stauth, K. Scheller, G. Forrest, R. Vig, J. Towne. "Proximity Detector." U.S. Patent 6,693,419. February 17, 2004.

BIOGRAPHICAL SKETCH

NAME Ivan M. Tomek, MD, FRCSC	POSITION TITLE Assistant Professor, Orthopaedics
eRA COMMONS USER NAME (credential, e.g., agency login) IVANTOMEK	

EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
Acadia University Wolfville, Nova Scotia, Canada	BS with Honors	1990	
Dalhousie University Halifax, Nova Scotia, Canada	BS	1994	Medicine
Dalhousie University Halifax, Nova Scotia, Canada	MD	1994	Medicine
McGill University Montreal, Quebec, Canada		1999	Residency in Orthopaedic Surgery
Hospital for Special Surgery New York, NY		2003	Fellowship in Adult Reconstruction

A. Personal Statement

My ongoing data collection efforts in total knee arthroplasty serve as the prototype for this project. As PI of an on-going clinical trial in total joint arthroplasty, I am familiar with the barriers to implementation and can serve to avert some of them for the other sites. My expertise in joint reconstruction and interest in comparative effectiveness research afford me the opportunity to lead the Dartmouth site as the DHMC PI.

B. Positions and Honors

Positions

1998-1999 Chief Resident, McGill University Health Center, Montreal, Quebec, Canada
 1999-2002 Surgeon and Partner, Medical Associates of Clinton LLC, Clinton, Iowa, USA
 2003-present Assistant Professor and Attending Staff, Dartmouth-Hitchcock Medical Center, Dartmouth Medical School, Lebanon, New Hampshire, USA

Honors

1998-1999 President, Nu Sigma Chapter of Phi Chi Medical Fraternity, Dalhousie University, Halifax, Nova Scotia, Canada
 1987 Deacon G. Thomas Scholarship
 1988 Chipman Achievement Award
 1993 Sarah and Morris Gold Award

C. Selected Publications

1. Sites BD, Gallagher JD, Tomek I, Cheung Y, Beach ML. The use of magnetic resonance imaging to evaluate the accuracy of a handheld ultrasound machine in localizing the sciatic nerve in the popliteal fossa. *Reg Anesth Pain Med.* 2004 Sep-Oct;29(5):413-6
2. Mont MA, Tomek IM, Hungerford DS. Core decompression for avascular necrosis of the distal femur. *Clinical Orthopaedics and Related Research* 334: 124-130, 1997
3. Sponseller PD, Tomek IM, Pyeritz RE. Developmental dysplasia of the hip in Marfan syndrome. *Journal of Pediatric Orthopaedics* 6: 255-259, 1997.

D. Research Support

Ongoing Research Support

Zimmer 05826.0701457RC07

Tomek (PI)

01/01/07 – 06/30/11

Quadriceps Sparing Total Knee Replacement and the Effect on Early Clinical and Economic Outcomes

The goal of this study is to compare the effects of two substance abuse interventions on health outcomes in an urban population of older opiate addicts.

Role: PI

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Van Citters, Douglas Wayne		POSITION TITLE Assistant Professor of Engineering	
eRA COMMONS USER NAME (credential, e.g., agency login) DVancitters			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Dartmouth College	BA	06/99	Geology & Engineering
Thayer School of Engineering at Dartmouth	BE	06/03	Engineering Sciences
Thayer School of Engineering at Dartmouth	MS	06/03	Engineering Sciences
Thayer School of Engineering at Dartmouth	PhD	12/06	Engineering Sciences

A. Personal Statement

The goal of the proposed STTR project is to develop an advanced bearing construct to improve patient outcomes in total hip arthroplasty. Professionally, I am well suited to be the Principal Investigator at the partnering academic institution due to my experience in 1) Identification and laboratory simulation of clinically relevant failure modes in total joint arthroplasty, 2) Interest and research in biomechanics leading to device failure, and 3) Experience in total hip tribosystem modeling, simulation, and laboratory testing.

Dartmouth's vast collection of failed hip devices spans nearly four decades of implant design, and my colleagues and I have published numerous analysis techniques and global design parameters for artificial hips. Relevant to the proposed work, I am involved in ongoing studies of joint failure due to wear and fracture of acetabular components, as well as preliminary research in using ultrasound and imaging to detect implant loosening and wear. My bench-top research aims to recreate clinical results under reproducible laboratory conditions. Thus, the proposed work will benefit from my mechanical engineering acumen and ability to develop clinically relevant laboratory simulations, as well as my ability to design and manufacture surgical tools and devices.

More broadly, my experience spans all joints in the body. For instance, I am working with outside scientists to explore energy harvesting and infection detection in total knee arthroplasty; I am developing a novel total shoulder arthroplasty construct; and I have worked with members of the Dartmouth imaging team to examine ultrasound as a modality for measuring bone density. Further, I have just returned from a three-month Visiting Scientist appointment at the Mayo Clinic's Orthopedic Biomechanics Laboratory under the sponsorship of Dr. Daniel Berry and Dr. Kai-Nan An. Our collaboration continues today, with active projects in failure analysis of historical total hip arthroplasty devices (1970-1980) and impact mechanics for materials used in total hip arthroplasty (Collaborator Dr. Kenton Kaufman). I believe the current proposal is clinically relevant, the science is sound, and the team is well suited for this work.

B. Positions and Honors

Positions and Employment

1999-2001	Staff Hydrogeologist and Engineer, Atlantic Geoscience Corporation (ENSR), Gilford, NH
2006-2007	Research Associate, Dartmouth Biomedical Engineering Center, Hanover, NH
2007-2010	Consultant, DePuy Inc, a Johnson & Johnson Company, Warsaw, IN
2007-2010	Research Assistant Professor and Lecturer, Thayer School of Engineering at Dartmouth College
2011-	Assistant Professor, Thayer School of Engineering at Dartmouth College, Hanover, NH
2012-	Visiting Scientist and Research Collaborator, Mayo Clinic, Rochester, MN

Other Experience and Professional Memberships

2002-	Member, The Orthopaedic Research Society
2003-	Member, ASME International
2003-	Sigma Xi
2003-	Member, The Society of Tribologists and Lubrication Engineers
2007-	Member, ASTM (Active on committee F4)
2007-	Chair and Treasurer – Upper Valley Subsection of ASME International

Honors

2001	The Henry J. McCarthy Fellowship, Dartmouth College
2003	The Charles F. and Ruth D. Goodrich Prize, Dartmouth College
2003	The Myron Tribus Fellowship, Dartmouth College
2006	The Dean's Service Award, Thayer School of Engineering
2008	Best Peer Reviewed Paper of 2007: <i>ASME Journal of Tribology</i>

C. Selected peer-reviewed publications

1. **Van Citters DW**, Kennedy FE, Currier JH, Collier JP, Nichols TD. 2004 A Multi-Station Rolling/Sliding Tribotester for Knee Bearing Materials. *ASME Journal of Tribology* 126:380-385
2. Currier BH, Currier JH, Mayor MB, Lyford KA, **Van Citters DW**, Collier JP. 2007 In Vivo Oxidation of Gamma-Barrier UHMWPE Bearings. 2007 *Journal of Arthroplasty*. 22(5):721-731
3. Tower SS, Currier JH, Currier BH, Lyford KA, **Van Citters DW**, Mayor MB. 2007 Rim Cracking of the Cross-linked Longevity™ Polyethylene Acetabular Liners in Total Hip Arthroplasty. *Journal of Bone and Joint Surgery*. 89: 2212-2217, 2007
4. Currier BH, Currier JH, Mayor MB, Lyford KA, **Van Citters DW**, Collier JP. 2007 Clinical Performance of Highly Cross-linked Crossfire Liners—A retrieval study. *Journal of Bone and Joint Surgery*. 89: 2023-2029,
5. Kennedy FE, **Van Citters DW**, Wongseedakaew K, Mongkolwongrojn M. 2007 Lubrication and Wear of Artificial Knee Joint Materials in a Rolling/Sliding Tribotester. *Journal of Tribology*. 129: 326-335
6. **Van Citters DW**, Kennedy FE, Collier JP. 2007 Rolling Sliding Wear of UHMWPE for Knee Bearing Applications. *Wear*. 263:1087-1094
7. Patten, E. W., Atwood, S. A., **Van Citters, D. W.**, Jewett, B. A., Pruitt, L. A. & Ries, M. D. 2010. Delamination of a highly cross-linked polyethylene liner associated with titanium deposits on the cobalt-chromium modular femoral head following dislocation. *J Bone Joint Surg Br*, 92, 1306-11.
8. Currier, B. H., **Van Citters, D. W.**, Currier, J. H. & Collier, J. P. 2010. In Vivo Oxidation in Remelted Highly Cross-Linked Retrievals. *Journal of Bone and Joint Surgery-American Volume*, 92A, 2409-2418.
9. Currier, J. H., Anderson, D. E. & **Van Citters, D. W.** 2010. A proposed mechanism for squeaking of ceramic-on-ceramic hips. *Wear*, 269, 782-789.
10. Huot, J. C., **Van Citters, D. W.**, Currier, J. H. & Collier, J. P. 2011. The effect of radiation dose on the tensile and impact toughness of highly cross-linked and remelted ultrahigh-molecular weight polyethylenes. *Journal of Biomedical Materials Research Part B-Applied Biomaterials*, 97B, 327-333.
11. Barrett MO, **Van Citters DW**, Hamilton WG. 2011 Mechanical Failure of Marathon Cross-Linked Polyethylene Acetabular Liner After Total Hip Arthroplasty. *American Journal of Orthopaedics*. 40(10):523-526
12. Atwood, S. A., **Van Citters, D. W.**, Patten, E. W., Furmanski, J., Ries, M. D. & Pruitt, L. A. 2011. Tradeoffs amongst fatigue, wear, and oxidation resistance of cross-linked ultra-high molecular weight polyethylene *Journal of the Mechanical Behavior of Biomedical Materials*, 4(7), 1033-1045
13. Tomek, I. M., Currier, J. H., Mayor, M. B. & **Van Citters, D. W.** 2012. Metal Transfer on a Ceramic Head with a Single Rim Contact. *Journal of Arthroplasty*, 7(2) 324e.1-324e.4
14. Currier JH, McHugh DJ, Tower DR, Kennedy FE, **Van Citters DW**. Gouge Features on Metal-on-Metal hip bearings can result from high stresses during rim contact. *Tribology International*. In Press
15. Currier, B. H., **Van Citters, D.W.**, Currier, J. H., Carlson E.M., Tibbo M.E., & Collier, J.P. In Vivo Oxidation in Retrieved Highly Cross-linked Tibial Inserts. *Journal of Biomedical Materials Research – Part B* In Press

Research Support.

Ongoing Research Support

538691: DBEC Collier (PI) 9/1/2009 – 9/31/2013
DePuy, A Johnson & Johnson Company
Dartmouth Biomedical Engineering Center – Orthopaedic Retrieval Laboratory
The goal of this project is the design and failure analysis of total joint arthroplasty devices with a particular focus on artificial knees and hips.
Role: Co-Investigator

R24 HD065703-01 Greenwald and Lurie (PI) 9/1/2010-5/1/2015
Translation of Rehabilitation Engineering Advances and Technology (TREAT)
TREAT is a multidisciplinary, multi-institutional, collaborative consortium to provide infrastructure support and expert consultation to researchers and innovators interested in the translation and commercialization of rehabilitation research applications.
Role: Investigator

Orthosensor Thayer Van Citters (PI) 6/1/2012-5/31/2013
Improvement of and Infection Detection System and Energy Harvesting Systems
The goal of the current project is to design both an analog and digital sensor system to optically detect infection in a total joint construct. Supplying power to the construct, optimizing signal to noise ratio, and integrating an implantable circuit will be accomplished, and sensitivity will be validated through laboratory simulation.
Role: PI

Topsfield Medical Thayer Van Citters (PI) 6/15/2012-5/31/2013
Glenoid Loosening and Subsequent Fixation Simulation
The goal of the current project is to develop a clinically relevant simulation for artificial glenoid loosening in total shoulder constructs. Loose glenoids will be stabilized using a novel cement delivery system. Mechanisms of failure and re-fixation will be identified.
Role: PI

Completed Research Support

COSAT Thayer Van Citters (PI) 4/1/2008 – 12/31/2011
Johnson & Johnson Corporate Office for Science and Technology
Extrusion of UHMWPE for Orthopaedic Bearings
The goal of this project is to explore novel methods of consolidating Ultra High Molecular Weight Polyethylene for use in artificial knee and hip surgery. Modeling of polyethylene extrusion techniques will be validated through laboratory testing and joint simulation.
Role: PI

60NANB5D1250 Collier and Van Citters (PI) 10/1/2005 – 9/30/2009
NIST
Dartmouth Biomedical Engineering Center - Laboratory for Orthopedic Retrieval Analysis and Research
This focus of this project is the re-development of a center for failure analysis and materials research related to total joint arthroplasty.
Role: Co-PI

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME John B. Weaver	POSITION TITLE Professor of Radiology		
eRA COMMONS USER NAME (credential, e.g., agency login) JBWEAVER			
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 Arizona	B.S.	05/1977	Engineering Physics
University of Virginia	Ph.D.	05/1983	Biophysics
University of Virginia	Postdoctoral	02/1984	Medical Physics

A. Personal Statement

I am a Medical Physicist specializing in MRI who is a Professor of Radiology at the Dartmouth Medical School and Chief Diagnostic Physicist at the Dartmouth-Hitchcock Medical Center. I am also an adjunct Professor at the Thayer School of Engineering and the Physics Department at Dartmouth College. I have been a practicing medical physicist who has been involved with MRI in both clinical and research efforts since 1985 when I was an MRI Applications Scientist with Siemens. My MRI research has included fast MRI, wavelet encoded MRI and magnetic resonance elastography. I have also been active in image processing: I published the first wavelet transform filter in any discipline. I remain active in MR elastography of brain tissue. But most of my efforts are now devoted to developing methods of bio-sensing and imaging magnetic nanoparticles using a method I introduced, MSB. MSB is able to measure several key features of the microenvironment of magnetic nanoparticles including molecular binding, temperature and rigidity. The current proposal results from the finding that the bound state can be characterized using the magnetic properties of the nanoparticles in an alternating magnetic field. Further, the measurements can be made using very low concentrations of iron *in vivo*. Thus an *in vivo* system to follow the concentration of biomarkers and drugs *in vivo* should be possible.

B. Positions and Honors

Positions and Employment

1982 - 1983 Postdoctoral Research Assistant, University of Virginia
1983 - 1985 MRI Applications Scientist, Siemens Medical Systems
1985 - 1991 Assistant Professor, Radiology, Dartmouth Medical School & Thayer School of Engineering
1991 - 2005 Associate Professor, Radiology, Dartmouth Medical School, Dartmouth-Hitchcock Medical Ctr
Adjunct Associate Professor, Thayer School of Engineering, Dartmouth College
2005 - present Professor, Department of Radiology, Dartmouth Medical School,
Chief of Clinical Physics, Department of Radiology, Dartmouth-Hitchcock Medical Ctr
Adjunct Professor, Department of Physics, Dartmouth, College, NH
Adjunct Professor, Thayer School of Engineering, Dartmouth College, Hanover, NH

Other Experience and Professional Memberships

1986-present Chief of Diagnostic Physics, Mary Hitchcock Memorial Hospital
1986-present Member American Association of Physicists in Medicine
1986-present Member International Society of Magnetic Resonance in Medicine
1986-present Member Mary Hitchcock Memorial Hospital Radiation Safety Committee
1996-present Radiobiology and Bioengineering Research Program, Norris Cotton Cancer Center
1997-2001 Assistant Radiation Safety Officer, Mary Hitchcock Memorial Hospital
1998-present American Board of Radiology Certification, Diagnostic Physics
2009-present Conference Chair, SPIE Med. Imaging, Molecular, Structural & Functional Imaging Conference
2008-present Program Committee, SPIE Med. Imaging, Molecular, Structural, & Functional Imaging Conf.
NIH reviewer: "Clinical and Translational Imaging Applications" 02/15/2012; "Academic-Industrial Partnerships for Development and Validation of In Vivo Imaging Systems And Methods for Cancer Investigations" NCI PAR 07-214 ZRG1 2009-2010; Challenge Grants ZRG1 SBIB-V (58) R-RFA OD-

09-003 Panel # 23, 2009; NIBIB "Enabling Technologies for Tissue Engineering and Regenerative Medicine" 2008; ZRG1 "Development of Methods for In Vivo Imaging and Bioengineering Research" 2006; "Microscopic Imaging Study Section" 2004; "ZRG1-SRB(53) Image Guide Intervention Study Section" 2003; "Lung Imaging Database Resource for Imaging Research" 2000; "Small Animal Imaging Resource Programs" 1999; ad hoc Program Project Grants 1999&7;
DoD: CDMRP - LC 110593 Early Diagnosis of Lung Cancer SRA, 2011-2012.
NSF; Canadian Institutes of Health Research; Kentucky Small Grant Program 2003.
Special Associate Editor for Medical Physics, 2005, 2007, 2008; Faculty of ISMRM Workshop on Minimum MR Data Acquisition Methods, 2001; Program Committee for SPIE Wavelets IX (AM308), 2001; Workshop Chair: Elastography Directions & Applications for Ultrasound and MR Palpation, 2009. Chaired Sessions: ISMRM 1994 "Image Processing"; ISMRM 1999 "Image Processing"; ISMRM 2001 "Magnetic Resonance Elastography"; ISMRM Workshop on Minimum MR Data Acquisition Methods 2001 "Non-Fourier Encoding Methods"; Fourth International Conference on the Ultrasonic Measurement and Imaging of Tissue Elasticity "Inverse Methods for Shear Stiffness Imaging"; SPIE Medical Imaging 2006 "MRI and MRE Methods"; SPIE Medical Imaging 2009 "MRI and MRE Methods"; SPIE Medical Imaging 2009 "Elastography Workshop".

Honors 1976, Tau Beta Pi; 1983, Sigma Xi; 1982, Bronze Metal Poster the Radiological Society of North America; 1983, Honorable Mention Citation from the Radiological Society of North America.

C. Selected Peer-reviewed Publications (selected from 75 peer-reviewed publications)

1. JB Weaver, Yansun Xu, DM Healy, Jr., LD Cromwell: "Filtering Noise From Images With Wavelet Transforms" Magnetic Resonance in Medicine, 21:288-295 (1991).
2. JB Weaver, Yansun Xu, DM Healy, JR Driscoll: "Wavelet Encoded MR Imaging" Magnetic Resonance in Medicine, 24(2):275-287 (1992).
3. Jian Lu, DM Healy, Jr., JB Weaver: "Contrast Enhancement of Medical Images Using Multiscale Edge Representation." Optical Engineering, 33(7), 2151-61 (1994).
4. JB Weaver, DM Healy, Jr.: "Signal to Noise Ratios and Effective Repetition Times for Wavelet Encoding and Encoding with Wavelet Packet Bases," Journal of Magnetic Resonance Series A 113, 1-10 (1995).
5. DM Healy, JB Weaver: "Adapted Waveform Encoding for Magnetic Resonance Imaging" IEEE Engineering in Medicine and Biology 14(5) 621-638 (1995).
6. JB Weaver, EEW Van Houten, MI Miga, FE Kennedy, KD Paulsen: "MR Elastography Using 3D Gradient Echo Measurements of Steady State Motion," Medical Physics, 28(8):1620-1628 (2001).
7. Q Zeng, I Baker, JA Loudis, Y Liao, PJ Hoopes, JB Weaver. "Fe/Fe oxide nanocomposite particles with large specific absorption rate for hyperthermia." Applied Physics Letters 90, 233112 (2007).
8. JB Weaver, AM Rauwerdink, C Sullivan, I Baker. "Frequency distribution of the nanoparticle magnetization in the presence of a static as well as a harmonic magnetic field," Medical Physics 35,1988-94 (2008).
9. JB Weaver, AM Rauwerdink, EW Hansen, "Magnetic Nanoparticle Temperature Estimation", Medical Physics 36(5):1822-1829 (2009).
10. A.M. Rauwerdink, J.B. Weaver, "Measurement of Molecular Binding Using The Brownian Motion of Magnetic Nanoparticle Probes" Applied Physics Letters 96, 033702 (2010).
11. J.B. Weaver, "Hot Nanoparticles Light Up Cancer" Nature Nanotechnology 5:630-631 (2010).
12. J.B. Weaver, "The Use of Magnetic Nanoparticles in Thermal Therapy Monitoring and Screening: Localization and Imaging", Journal of Applied Physics 111, 07B317 pp1-3 (2012).
13. J.B. Weaver, E. Kuehlert, "Measurements of Magnetic Nanoparticle Relaxation Times" Medical Physics 39(5):2765-2770 May (2012).
14. A.J. Giustini, I.M. Perreard, A.M. Rauwerdink, P.J. Hoopes, J.B. Weaver, "Noninvasive assessment of magnetic nanoparticle-cancer cell interactions" Integrative Biology 4:1283-8 (2012).
15. D.B. Reeves, J.B. Weaver, "Simulations of magnetic nanoparticle Brownian motion" Journal of Applied Physics JR12-8177R1 (2012).

D. Research Support

Ongoing Research Support

“Frequency Domain Optical Imaging of Breast Cancer Detection” PI: K. D. Paulsen, Period 09/22/08 - 07/31/13.
NIH/NCI

This project develops an MR-compatible NIR imaging system for simultaneous MR and NIR breast imaging.
Role: Co-Investigator (6% Salary)

1U54CA151662-01 PI: Ian Baker Period: 09/16/2010 – 08/31/2015

“Dartmouth Center for Cancer Nanotechnology Excellence”

NCI - Centers of Cancer Nanotechnology Excellence

Project 2: “Spectroscopic Quantification of Ligand Binding in Vivo”

The aim of this project is to develop magnetic hyperthermia treatment for cancer. Project 2 will develop magnetic and optical methods of measuring the bound fraction in vivo.

Role: Principal Investigator Project 2 (10% Salary).

“Specific Drug Release from Mesoporous Silica Supported Lipid Bilayer Nanoparticles via Alternating Magnetic Fields” PI: J.B. Weaver. Period: 5/1/11 - 11/30/12

NCI – Centers of Cancer Nanotechnology Excellence

The aim of this joint effort with the University of New Mexico is to develop nanoscale structures that can be ruptured to release drugs selectively. Only bound structures will rupture while free structures remain intact.

Role: Principal Investigator

PI J.B. Weaver Period: 2/01/12 - 1/31/13

“Sensing the local concentration of biomarkers in vivo using implantable microscopic constructs”

Source: Hopeman Fund Grant: Norris Cotton Cancer Center

The aim of this joint effort is to develop a method of monitoring specific target molecules in vivo at selected sites for cancer diagnosis and treatment monitoring.

Recently Completed Research Support

“Early Detection of Ovarian Cancer”, PI: J.B. Weaver. Period: 2009 - 2011

Norris Cotton Cancer Center

This pilot project develops a novel method of screening for ovarian cancer using phagocytosis of magnetic nanoparticles in the peritoneal cavity and the migration of those phagocytes to the malignancy.

Role: Principal Investigator.

P01 CA080139-06A2, PI: KD Paulsen Period: 2005 – 2010

NIH/NCI “Alternative Breast Cancer Imaging Modalities”: Project I; Cores A, C

Role: Project I Principal Investigator; Magnetic Resonance Elastography.

RO1 EB004632, PI: KD Paulsen Period: 2005 – 2009

National Institutes of Health – NIBIB

“Advanced Magnetic Resonance Elastography”

Role: Co-Investigator

R21 CA102938, PI: KD Paulsen Period: 2005 – 2009

National Institutes of Health - NCI

“MR Microwave Absorption and Tomography Imaging”

Role: Co-Investigator

R01 DK063013, PI: JB Weaver Period: 2004 – 2008

National Institutes of Health – NIDDK “Mapping the Mechanical Properties of the Diabetic Foot”

Role: Principal Investigator

Philips Medical Systems, PI: JB Weaver Period: 2005-2009

“Evaluation of Pulse Sequences for MR Elastography at 3T”

Role: Principal Investigator

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME James N. Weinstein	Director, The Dartmouth Institute for Health Policy and Clinical Practice; President, Dartmouth-Hitchcock Clinic; Professor, Department of Orthopaedics, Dartmouth Medical School		
eRA COMMONS USER NAME (credential, e.g., agency login) JNWEINSTEIN			
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
Bradley University, Peoria, IL	BS	5/1972	Biochemistry
Chicago College of Osteopathic Medicine	DO	5/1977	Medicine
Rush-Presbyterian-St. Luke's Medical Center, Chicago, IL	Internship	7/1978-6/1979	Orthopaedic Surgery
Rush-Presbyterian-St. Luke's Medical Center, Chicago, IL	Residency	7/1979-6/1983	Orthopaedic Surgery
Dartmouth College, Hanover, NH	MS	6/1995	The Dartmouth Institute for Health Policy & Clinical Practice

A. Personal Statement.

As Principal Investigator of the original grant application "Low Back Pain: A Multicenter Randomized Trial" that became the Spine Patient Outcomes Research Trial, or SPORT, I wish to affirm my overwhelming support for and commitment to the revision grant proposal *Evaluating the Impact of a Summary Tool & Teach-Back Technique on Comprehension of Research Informed Consent*. SPORT was a leader in its informed consent process, using innovative techniques such as shared decision making videos to help patients make decisions in the absence of evidence for the relative effectiveness of their choices. The proposed project would build from SPORT's innovation and also from a Dartmouth study about research informed consent, VICE (Valid Informed Consent Education), now named VOICE (Valid Optimized Informed Consent Education). I have continued to publish works of public policy about consent and shared decision making, and I am very proud of the work that continues to grow from our original grant.

B. Positions and Honors.

1987-1996	Director, Spine Diagnostic and Treatment Center, University of Iowa, Iowa City, IA
1991-1996	Professor, Orthopaedic Surgery, University of Iowa, Iowa City, IA
1991-1996	Professor, Biomedical Engineering, University of Iowa, Iowa City, IA
1993-1996	Endowed Chair, Professor of Spine Research, Department of Orthopaedic Surgery, University of Iowa College of Medicine, Iowa City, IA
1993-current	Editor-in-Chief, <i>Spine</i>
1996-current	Professor, Orthopaedics and Community & Family Medicine, Dartmouth Medical School, Hanover, NH
1996-current	Dartmouth Atlas Musculoskeletal Diseases Working Group
1999-2005	Strategic Planning Committee NIH (NIAMS)
1999-2005	Chair, AAOS Task Force on Quality Improvement Initiatives
2000-2005	Co-Director, Dartmouth Clinical Trials Center, Dartmouth Medical School
2001-2007	Board of Directors, AAOS
2001-2011	Board of Directors, ABOS
2002-2003	U.S. Senate Finance Committee work re: demonstration project on new model of healthcare reimbursement, CMS – SDM (Shared Decision Making)
2002-2010	Chairman, Department of Orthopaedics, Dartmouth Medical School/DHMC
2004-2007	Chairman, Council on Academic Affairs (AAOS)
2005-2007	National Committee for Quality Assurance (NCQA) Spine Care Advisory Committee
2006-current	National Quality Forum(NQF): Episodes of Care Working Group (AMI and Back Pain)
2005-2010	NIH National Advisory Council for NIAMS – appointed by Secretary Leavitt, HHS

2007-current	Director, The Dartmouth Institute for Health Policy and Clinical Practice – Successor to Jack Wennberg, MD, MPH
2007-2009 2/14/2008	Blue Cross Blue Shield Association’s National Medical Advisory Panel Health Overview Hearing; House Appropriations Committee Labor-HHS Subcommittee
2008-current 2009	Member, IOM Standing Committee of Medical Experts to Assist Social Security on Disability Issues Member, IOM Committee on Comparative Effectiveness Research Priorities
2009-2010	Third Century Professor, Dartmouth College
2009-current	Chair, Dartmouth-Hitchcock Board of Governors
2010-current	President, Dartmouth-Hitchcock Clinic
2010-current	Peggy Y. Thomson Professor, Evaluative Clinical Sciences, Dartmouth Medical School
2010-current	Member, IOM Value Incentives Learning Collaborative
2010-current	Steering Committee Member, National Quality Forum Resource Use

Awards & Honors: 1986-89-Career Development Award (OREF);1989-90-Outstanding Spinal Research Paper, NASS; 1990-Volvo Award Winner; 1997-Kappa Delta Award Orthopaedic Research Society/ AAOS; 1998-Bristol-Meyers-Squibb/Zimmer Outstanding Orthopedic Research Award; 1998-Nimmo Award, Distinguished International Visiting Professor, Royal Adelaide Hospital, Australia; 2000 Pauwels Professor for European and German Orthopaedic Societies; 2001 Medtronic Sofamor Danek Best Basic Science Paper, ISSLS; 2000-2005 Chair, Clinical Trials Course Washington DC; 2003 Chair AHRQ/AAOS Musculoskeletal Disparities Conference, Washington, DC; 2003 The Freddie Award International Health & Medical Media Awards, Arthritis/Inflammatory Disease Category "Treatment Choices for Knee-Osteoarthritis;" Leon Wiltse Award for Leadership in the Field of Spine Surgery, NASS, 2004; Leon Wiltse Lifetime Achievement Award, ISSLS, 2006; 2006 ISSLS Best Paper Award, "Surgical vs. Non-Operative Treatment for Lumbar Disc Herniation: RCT and observational cohort outcomes from SPORT;" ISSLS 2007-Best Paper Award, "Surgical versus non-operative treatment for lumbar spinal stenosis: Two-year results of SPORT;" IOM - Institute of Medicine roundtable / workshop(s) invited participant; (1) highly effective clinical services, knowing what works 2007-08 and (2) evidence-based medicine, shared decision making 2007; Keynote address National Quality Forum, March, 2009.

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

1. Weinstein JN. Editorial: "The Tortoise and the Hare: Is there a place in spine surgery for randomized trials?" Spine 24(23):2548-9, 1999.
 2. Fanuele, Jason C., M.S.; Nancy J. O. Birkmeyer, Ph.D.; William A. Abdu, M.D.; Weinstein JN, "The Impact of Spinal Problems On the Health Status of Patients: Have We Underestimated the Effect?" Spine 25(12):1509-14, 2000.
 3. Birkmeyer NJO, Weinstein JN, Tosteson ANA, Tosteson TD, Skinner JS, Lurie, JD, Deyo RA, Wennberg JE. "Design of the Spine Patient Outcomes Research Trial (SPORT)." Spine 27(12): 2002.
 4. Lurie J, Birkmeyer NJ, Weinstein JN. "Rates of Advanced Spinal Imaging and Spine Surgery." Spine 28(6):616-620, 2002.
 5. Skinner, J, Weinstein JN, Sporer SM ,Wennberg, JN. "Racial Disparity and Geographic Variation in the use of Total Joint Arthroplasty Among Medicare Patients." NEJM Oct 3, 2003 p 1348.
 6. Weinstein JN, Clay K, Morgan TS. "Informed patient choice: patient-centered valuing of surgical risks and benefits." Health Aff (Millwood) 2007;26:726-30.
 7. Weinstein JN, Tosteson TD, Lurie JD, Tosteson AN, Hanscom B, Skinner JS, Abdu WA, Hilibrand AS, Boden SD, Deyo RA. "Surgical vs nonoperative treatment for lumbar disk herniation: the Spine Patient Outcomes Research Trial (SPORT): a randomized trial." JAMA 2006;296:2441-50.
 8. Weinstein JN, Tosteson TD, Lurie JD, Tosteson AN, Blood E, Hanscom B, Herkowitz H, Cammisa F, Albert T, Boden SD, Hilibrand A, Goldberg H, Berven S, An H. "Surgical versus nonsurgical therapy for lumbar spinal stenosis." N Engl J Med 2008;358(8):794-810.
 9. IOM - Committee on Reviewing Evidence to Identify Highly Effective Clinical Services Board on Health Care Services, Knowing What Works in Health Care –A Roadmap for the Nation. Editors: J Eden, B Wheatley, B McNeil, H Sox. The Institute of Medicine of the National Academies. The National Academies Press, Washington, DC, 2008. J. Weinstein –participant.
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10. Pearson A, Lurie JD, Blood EA, Frymoyer JW, Braeutigam H, An H, Girardi FP, Weinstein JN. "Radiographic Predictors of Clinical Outcomes Following Operative or Non-operative Treatment of Degenerative Spondylolisthesis." *Spine*. 2008; 33(25).
 11. Tosteson ANA, Lurie JD, Tosteson TD, Skinner JS, Herkowitz H, Albert T, Boden SD, Bridwell K, Longley M, Andersson GB, Blood EA, Grove MR, Weinstein JN. "Cost-Effectiveness of Spine Surgery for Spinal Stenosis and Degenerative Spondylolisthesis at Two Years in the Spine Patient Outcomes Research Trial." *Ann Intern Med*. 2008; 149.
 12. Lurie JD, Tosteson AN, Tosteson TD, Carragee E, Carrino J, Kaiser J, Sequeiros RT, Lecomte AR, Grove MR, Blood EA, Pearson LH, Weinstein JN, Herzog R. "Reliability of readings of magnetic resonance imaging features of lumbar spinal stenosis." *Spine* 2008;33(14):1605-10.
 13. Lurie JD, Tosteson AN, Tosteson TD, Carragee E, Carrino J, Kaiser J, Sequeiros RT, Lecomte AR, Grove MR, Blood EA, Pearson LH, Herzog R, Weinstein JN. "Reliability of magnetic resonance imaging readings for lumbar disc herniation in the Spine Patient Outcomes Research Trial (SPORT)." *Spine* 2008;33(9):991-8.
 14. Weinstein JN, Lurie JD, Tosteson TD, Zhao W, Blood EA, Tosteson ANA, Birkmeyer NJ, Herkowitz H, Longley M, Lenke LG, Emery SE, Hu SS. "Surgical Compared with Non-Operative Treatment for Lumbar Degenerative Spondylolisthesis: Four-Year Results in the Spine Patient Outcomes Research Trial (SPORT) Randomized and Observational Cohorts." *J Bone Joint Surg Am*, 91:1295-1304, June, 2009.
 15. Weinstein JN. "Editorial: Balancing Science and Informed Choice in Decisions about Vertebroplasty." *NEJM*.2009;361(6):619-621.
 16. Pearson A, Blood E, Lurie J, Tosteson T, Hilibrand A, Bridwell K, Weinstein J. "Degenerative Spondylolisthesis versus Spinal Stenosis: Does a Slip Matter? Comparison of Baseline Characteristics and Outcomes (SPORT)." *Spine*.2010;35(3):298-305.
 17. Atlas SJ, Tosteson TD, Blood EA, Skinner JS, Pransky GS, Weinstein JN. "The Impact of Workers' Compensation on Outcomes of Surgical and Non-operative Therapy for Patients with a Lumbar Disk Herniation: SPORT." *Spine*. 2010;35(1):89-97.
 18. Pearson A, Lurie J, Tosteson T, Zhao W, Abdu W, Mirza S, Weinstein J. Who should have surgery for an intervertebral Disc herniation? Comparative Effectiveness Evidence from SPORT. *Spine*. 2011; <http://www.ncbi.nlm.nih.gov/pubmed/21681140>.
 19. McGuire KJ, Harrast J, Herkowitz H, Weinstein JN. Geographic Variation in the Surgical Treatment of Degenerative Cervical Disc Disease: American Board of Orthopedic Surgery (ABOS) Quality Improvement Initiative; Part II Candidates. *Spine*. 2011; [tp://www.ncbi.nlm.nih.gov/pubmed/21301394](http://www.ncbi.nlm.nih.gov/pubmed/21301394).

C. Research Support.

CURRENT

3 U01 AR045444 (Weinstein, J) 4/1/99-5/31/14

NIH/NIAMS: Low Back Pain: A Multicenter Randomized Trial

The major goal of this project is to extend the original follow-up of SPORT for an additional five years and provide short and long term scientific evidence as to the relative efficacy/effectiveness of surgical versus non-surgical treatment for the three most commonly diagnosed lumbar spine conditions: intervertebral disc herniation (IDH), spinal stenosis (SpS), and degenerative spondylolisthesis (DS).

1 T32 AR049710 (Weinstein, J) 7/1/03-6/30/14

NIH/NIAMS: Orthopaedic Resident Clinician/Researcher Program

The major goal of this grant is to support the training of orthopaedic clinician/researchers in good, solid research principles and practices and to assume leadership positions to initiate health care improvement.

RC1 AG036268 (Mirza) 9/30/09-9/29/11

NIH/NIAMS: Variation in the Safety of Back Pain-Related Surgery

The project goal is to characterize variations in complications associated with surgery for intervertebral disc herniation for the purpose of understanding procedure safety and factors affecting safety.

Role: Co-Investigator

1R01 HS018405-01 (Tosteson) 9/30/09-7/31/12

AHRQ: Comparative Effectiveness of Treatments for Degenerative Spine Disease

The major goal of this project is to provide policy-relevant evidence on the comparative clinical effectiveness, safety, and economic value of emerging devices/biologics to treat common back pain-related degenerative spine conditions in the elderly.

Role: Co-Investigator

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Wendy A. Wells	POSITION TITLE Professor and Chair of Pathology		
eRA COMMONS USER NAME WWELLS			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
St. Thomas's Hospital Med School, London, UK Member, Royal College of Pathologists, UK	M.B., B.S M.R.C.Path	Jun, 1982 Aug, 1990	Medicine Pathology
Royal Postgraduate Med. School, Hammersmith Hospital, London, UK	M.Sc	Jun, 1993	Image Analysis in Histology

A. Personal Statement:

I am Professor and Chair of Pathology at the Geisel School of Medicine at Dartmouth, and a Board certified pathologist in Anatomic Pathology and Cytopathology with specialist expertise in breast pathology. My research interests include diagnostic reproducibility in breast disease, therapeutic targets in breast cancer, and the validation of novel breast imaging modalities with morphologic, proteomic and genetic correlates. As PI or co-Investigator on numerous NCI/NIH-funded projects to date, I use my knowledge of morphologic clinical diagnoses, special diagnostic techniques, optimal tissue preservation and triaging to effectively collaborate with translational scientists across the Dartmouth campus. For over 10 years, I have worked with a team of surgical oncologists, medical oncologists, pathologists, radiologists and biomedical engineers in the field of breast cancer detection and treatment. This team was brought together by Project grant P01 CA80139-06A2 (PI: Keith D. Paulsen) to provide biological interpretations for the imaging signatures identified in alternative electromagnetic imaging modalities. Currently, we are validating unique spectroscopy technology in the intra-operative assessment of resection margins following breast-conserving surgery for cancer. Exciting results from prior R21 funding (NCRR 1R21RR024411-01A1, P.I.: Wendy A. Wells), evaluating two new localized spectroscopic imaging methods, have shown high sensitivity, specificity and negative predictive value in the discrimination of benign versus malignant pathologies at the surface of excised breast tissues in breast conserving surgical procedures. We will expand this work in the current R01 proposal by testing a combined imaging system in a prospective, randomized clinical trial.

This teamwork across multiple specialties is made possible utilizing the current resources of the Advanced Imaging Center, Advanced Surgical Center and Biomedical Engineering Laboratories now available for translational imaging research at Dartmouth. As co-Director of the Pathology Translational Research Program at Dartmouth (a CLIA-certified laboratory with dedicated research technologists, founded to validate and implement novel translational technology), I have the laboratory infrastructure to facilitate the translational aspects of this proposal. A Center for Surgical Innovation infrastructure will further consolidate our ability to perform high technology and innovative translational research at Dartmouth.

B. Positions and Honors:

Positions and Employment

1982 - 1983	Junior House Officer, General Surgery, Frimley Park Hospital, Surrey, England
1983	Junior House Officer, General Medicine, St. Peter's Hospital, Surrey, England
1983	Pathology Elective, Dartmouth-Hitchcock Medical Center (DHMC), Lebanon, NH
1983 - 1984	Senior House Officer, St. George Hospital, London, England
1984 - 1987	Registrar in Histopathology, St. George's Hospital, London, England
1987 - 1990	Residency in Pathology, DHMC, Lebanon, NH, (Chief Resident, 1989-1990)
1989 - 1992	Instructor in Clinical Pathology, Geisel School of Medicine at Dartmouth (Geisel), NH
1990 - 1992	Fellowship in Pathology, DHMC, Lebanon NH, (Cytology and Analytical Cell Pathology)
1992 -1993	Master of Science in Image Analysis in Histology, Royal Postgraduate Medical School, Hammersmith, Hospital, London, England

1992 - 1994	Locum Consultant in Histopathology (England): West Essex Health Authority; Ipswich NHS Trust Hospital; North Hertfordshire Trust, The Lister Hospital.
1994 - 2000	Assistant Professor, Department of Pathology, Geisel School of Medicine at Dartmouth
2000 - 2008	Associate Professor, Department of Pathology, Geisel School of Medicine at Dartmouth
2008	Professor, Department of Pathology, Geisel School of Medicine at Dartmouth, NH
2001	Member, Cancer Control Research Program, Norris Cotton Cancer Center, Lebanon, NH
2006 – present	Co-director, Pathology Translational Research Program, DHMC, Lebanon, NH
2008 – 2009	Interim Chair, Department of Pathology, Geisel School of Medicine at Dartmouth, NH
2011 – present	Chair, Department of Pathology, Geisel School of Medicine at Dartmouth, NH

Honors and Awards

1990 - 1991	Tiffany Blake Fellowship Award, Hitchcock Foundation, Geisel School of Medicine, NH
1993	Master of Science, awarded with <i>Distinction</i> , Royal Postgraduate Medical School, Hammersmith, London, England
1998	Fellow, Royal College of Pathologists, London, UK (FRCPath.)

National Advisory Committees

2004 – 2009	Member, Pathology Working Group, Network for Translational Research in Optical Imaging (NTROI), Cancer Imaging Program, NCI.
2005	Member, Ad Hoc Study Section Review group, Center for Scientific Review, Biomedical Imaging Technology, NIH
2008-present	Member, Quick Trials Study Section Review group, Center for Scientific Review, R21 applications (Imaging and Image-Guided interventions), NIH
2011	External advisory panel, MIT Laser Biomedical Research Center, Boston, MA.

B. Selected peer-reviewed publications (Selected from more than 70 peer-reviewed publications):

1. **Wells WA**, Carney PA, Eliassen MS, Tosteson AN, Greenberg ER (1998). Statewide study of diagnostic agreement in breast pathology. *J Natl Cancer Inst* 90 (2): 142-145. PMID: 9450574
2. **Wells WA**, Carney PA, Eliassen MS, Grove MR, Tosteson AN (2000). Pathologists' agreement with experts and reproducibility of breast ductal carcinoma *in-situ* classification schemes. *Am J Surg Pathol* 24 (5): 651-659. PMID: 10800983
3. Pogue BW, Poplack SP, McBride TO, **Wells WA**, Osterman, KS, Osterberg UL, Paulsen KD. Quantitative Hemoglobin Tomography with Diffuse Near-Infrared Spectroscopy: Pilot Results in the Breast (2001). *Radiology* 218:261-266. PMID: 11152812
4. **Wells WA**, Daghlian CP, Tosteson TD, Grove MR, Poplack SP, Soho SK, Paulsen KD. Analysis of the microvasculature and tissue type ratios in benign and malignant breast tissue (2004). *Analytical and Quantitative Cytology and Histology* 26:166-174. PMID: 15218693
5. Poplack SP, Paulsen KD, Hartov A, Meaney PM, Pogue BW, Tosteson TD, Grove MR, Soho SK, **Wells WA**. Electromagnetic Breast Imaging. Average tissue property values in women with negative clinical findings (2004). *Radiology* 231:571-580. PMID: 15128998
6. Bartek M, Wang X, **Wells WA**, Paulsen KD, Pogue BW. Estimation of Subcellular Particle Size Histograms with Electron Microscopy for prediction of optical scattering in breast tissue (2006). *Journal of Biomedical Optics* 11(6): 064007. PMID: 17212530
7. **Wells WA**, Barker PE, MacAulay C, Novelli M, Levison R, Crawford JM (2007). Validation of Novel Optical Imaging Technologies: the Pathologists's View. *J Biomed Opt.* Sep-Oct;12(5):051801. PMID: 17994879
8. Poplack SP, Tosteson TD, **Wells WA**, Pogue BW, Meaney PM, Hartov A, Kogel CA, Soho SK, Gibson JJ, Paulsen KD. Electromagnetic Breast Imaging: Results of a pilot study in women with abnormal mammograms (2007). *Radiology* 243(2):350-359. PMID: 17400760
9. **Wells WA**, Wang X, Daghlian CP, Paulsen KD, Pogue BW. Phase Contrast Microscopy analysis of breast tissue: Differences in benign versus malignant epithelium and stroma (2009). *Analytical and Quantitative Cytology and Histology* 31:197–207. PMID: 19736867
10. Jiang S, Pogue BW, Carpenter CM, Poplack SP, **Wells WA**, Kogel CA, Forero J, Muffly LS, Schwartz GN, Paulsen KD, Kaufman PK. Evaluating tumor response to neoadjuvant chemotherapy with Diffuse Optical Spectroscopic Imaging: Case study of tumor Region of Interest changes (2009). *Radiology* 252:551-560. PMID: 19508985

11. Srinivasan S, Carpenter CM, Ghadyani HR, Taka SJ, Kaufman PA, DiFlorio-Alexander RM, **Wells WA**, Pogue BW, Paulsen KD. Image guided Near Infrared Spectroscopy of Breast Tissue In-vivo using Boundary Element Method (2010). Journal of Biomedical Optics 15(6), 061703. PMID: 21198151
12. Laughney AM, Krishnaswamy V, Garcia-Allende B, Conde OM, **Wells WA**, Paulsen KD, Pogue BW. Automated classification of breast pathology using local measures of broadband reflectance (2010). Journal of Biomedical Optics Nov-Dec 15(6):066019. PMID: 21198193
13. Pakalniskis MG, **Wells WA**, Schwab MC, Froehlich HM, Jiang S, Li Z, Tosteson TD, Poplack SP, Kaufman PA, Pogue BW, Paulsen KD. Tumor angiogenesis change estimation by diffuse optical spectroscopic tomography; can a correlation predict neo-adjuvant chemotherapy response in women with invasive breast cancer? (2011). Radiology 259: 365-374. PMID: 2140663
14. Laughney AM, Krishnaswamy V, Rizzo EJ, Schwab MC, Barth RJ, Pogue BW, Paulsen KD, **Wells WA**. Scatter spectroscopic imaging distinguishes between breast pathologies in tissues relevant to surgical margin assessment. Clin Cancer Res. 2012 Nov 15;18(22):6315-25. PMID: 22908098
15. Krishnaswamy V, Laughney AM, **Wells WA**, Paulsen KD, Pogue BW. Scanning in situ Spectroscopy Platform for Imaging Surgical Breast Tissue Specimens. Optics Express 21(2): 2185-2194, 2013. PMID: 23389199
16. Laughney AM, Krishnaswamy V, Rice TB, Cuccia DJ, Barth RJ, Tromberg BJ, Paulsen KD, Pogue BW, **Wells WA**. System analysis of spatial frequency domain imaging for quantitative mapping of surgically resected breast tissues. Journal of Biomedical Optics, 18(3), 036012, 2013. PMID: 23525360

C. Research Support.

Ongoing Research

NCRR (1P20GM104416-01) (P.I. Margaret Karagas PhD) 12/01/12 - 11/30/17
COBRE Center for Molecular Epidemiology

As P.I. on the Bio-repository Core, I will oversee the establishment of a CLIA-certified, College of American Pathologists (CAP)-accredited biorepository for standardized biospecimen annotation, collection, processing, storage and retrieval for the four proposed research projects. This infrastructure, in turn, will provide the template for a comprehensive coordinated institutional biorepository that will enhance cross-disciplinary translational research collaborations and the progression to personalized medical care.

NIH/ U54CA163307 (PI: Anna Tosteson) 09/27/11 - 05/31/16
Advancing systems approaches to personal & population breast cancer screening

The major goal of the proposed PROSPR Research Center and related clinical practice networks that form the New England Collaborative Breast Surveillance Network, is to advance systems of care that lead to optimal personal and population breast cancer screening regimens. I will serve as an advisor to the Center, providing expertise in breast pathology to the multidisciplinary team of experts planning the research.

Role: Co-Investigator

Completed Research

NCI 1 R21 CA141017-01A2 (PI: Lorenzo Sempere) 01/01/11 - 12/31/12
microRNAs as novel biomarkers for management of breast cancer

The goal of this study is to further develop an in situ hybridization (ISH) protocol for identification of a subset of miRNAs linked to breast cancer (BrCa) and to assess the clinical utility of these miRNAs as surrogate markers of treatment response.

Role: Co-Investigator

NCRR 1R21RR024411-01A1 (PI.: Wendy A. Wells) 07/20/09 - 06/30/11
A spatially-modulated scatter imaging system to detect tumor-associated stroma

The goal of this study is to develop and validate a spatially-modulated, scatter-based imaging system to intra-operatively assess surgical excision margin status for involvement of breast cancer

Role: PI

NCI 2R01CA126618-05A2 (PI.: William B. Kinlaw) 07/01/07 – 05/31/12
The role of protein Spot 14 in normal and neoplastic mammary tissue

The goal of this study is to continue to interpret the pathology of the human and mouse mammary gland as well as oversee the performance and quality control of immunohistochemistry and mammary whole mounts.

Role: Co-Investigator

NIH/NCI: P01 CA80139-06A2 (PI: Keith D. Paulsen)

05/01/06 – 04/30/11

Alternative Breast Cancer Imaging Modalities

The major goal of this competitive renewal project is to continue the development and evaluation of new breast imaging modalities using computer-assisted, quantitative methods to validate the underlying pathophysiologic proteomic and genomic correlates in the breast tissue being imaged.

Role: Co-Investigator

NIH: IU54CA105480-01 (PI: Wendy A. Wells)

09/29/03 - 08/31/08

Subaward 2003-1344

Breast Cancer Multidimensional Diffuse Optical Imaging (MDDOT).

Network for Translational Research in Optical Imaging (NTROI)

The goal of this study is to develop the methodology to validate diffuse optical imaging signatures of benign and malignant breast lesions with biophysical, proteomic and genomic correlates in order to improve our understanding of the biological origins of the image signal. I will measure the tissue correlates using quantitative image analysis to help establish correlate reproducibility across the different teams in the NTROI.

Role: PI

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Wu, Yu-Chien	POSITION TITLE Research Assistant Professor		
eRA COMMONS USER NAME (credential, e.g., agency login) YUCHIEN			
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
National Taiwan University, Taipei, Taiwan	B.S.	06/1994	Physics
Kaohsiung Medical University, Kaohsiung, Taiwan	M.D.	06/2000	Medicine
Chang-Gung Memorial Hospital, Linkou, Taiwan	Residency	06/2001	Radiology
University of Wisconsin-Madison, Madison, WI	M.S.	05/2004	Medical Physics
University of Wisconsin-Madison, Madison, WI	Ph.D.	04/2006	Medical Physics
University of Wisconsin-Madison, Madison, WI	Postdoctoral	05/2007	Magnetic Resonance Diffusion Imaging

A. Personal Statement

My role in the proposed project is to assist with magnetic resonance (MR) diffusion imaging, e.g. acquisition and data processing, to investigate the structural connectivity of white matter of individual with treatment-resistant depression. I have expertise in MR imaging techniques and general imaging processing skills. In particular, I am proficient in magnetic resonance diffusion imaging including Diffusion Tensor Imaging (DTI), q-Space Imaging and High Angular Resolution Diffusion Imaging (HARDI). I have worked on diffusion imaging for eight years with my previous mentors, Drs. Andrew Alexander and Aaron Field, at the University of Wisconsin-Madison and continue to work in this field independently at the Dartmouth Brain Imaging Center (DBIC), Dartmouth College, Hanover, NH since 2009. I have experience with different magnetic resonance imaging scanners including Philips 3T Achieva Intera, GE 3T SIGNA, GE 3T 750 and Varian 4.7T animal scanner. I have implemented the advanced diffusion imaging MR pulse sequence on the Philips 3.0T Achieva Intera scanners at both DBIC and the Advanced Imaging Center (AIC) at Dartmouth-Hitchcock Medical Center. The new diffusion pulse sequence allows Philips scanners to perform diffusion imaging with arbitrary diffusion-weighting (DW) b-values and DW gradient directions. I currently have a post-doc and a full-time research assistant and I have previously mentored several graduate students and undergraduate research assistants of Drs. Alexander and Whalen at the University of Wisconsin-Madison and at Dartmouth College, respectively. I believe that I am well qualified to assist the neuroimaging part of the proposed research.

B. Positions and Honors

Positions and Employment

2007 - 2009 Assistant Scientist, Univ. of Wisconsin - Madison, Depts of Radiology & Waisman Lab.
2009 -present Research Assistant Professor, MRI Physicist,
 Dartmouth College, Dartmouth Brian Imaging Center, Hanover, NH

Other Experience and Professional Memberships

2003 - present Member: International Society for Magnetic Resonance in Medicine (ISMRM)
2006 - present Reviewer of the Journal, Magnetic Resonance in Medicine

2006 - 2009	Member: National Multiple Sclerosis Society (NMSS)
2008 - present	Member: Organization for Human Brain Mapping (OHBM)
2009 - present	Reviewer of the Annual meeting of Organization for Human Brain Mapping (OHBM)
2009 - present	Reviewer of the Journal, NeuroImage
2009 - present	Reviewer of the Biomedical Central – Medical Imaging
2010 - present	Reviewer of the Journal, NMR in Biomedicine
2011 - present	Reviewer of the Journal Neuropsychologia
2011 - present	Reviewer of the Journal of Magnetic Resonance Imaging.
2012 - present	Reviewer of the Journal American Journal of Neuroradiology
2012	Co-organizer for the 2 nd Neural Computation Workshop
2013 - present	Reviewer of the Journal Magnetic Resonance Imaging
2013	Nominee for the Governing Committee of the White Matter Study Group of the International Society for Magnetic Resonance in Medicine (ISMRM)

Honors

1990 - 1993	Dr. Samuel Ting Fellowship in Physics.
1994	Graduate School Fellowship, National Taiwan University, Dept. of Physics, Taipei, Taiwan.
2003/2005/2007	Educational Stipend: International Society for Magnetic Resonance in Medicine (ISMRM).
2006	Vilas Travel Award, Graduate Student Collaborative of Univ. of Wisconsin – Madison, WI.

C. Peer-reviewed Publications

- 1 Field AS, Alexander AL, **Wu Y-C**, Witwer B, Badie B. Diffusion Tensor Eigenvector Directional Color Imaging Patterns in the Evaluation of Cerebral White Matter Tracts Altered by Tumor. *J Magn Reson Imaging*. **20**(4): 555-562 (2004).
- 2 **Wu Y-C**, Field AS, Badie B, Alexander AL. Quantitative Analysis of Diffusion Tensor Orientation: Theoretical Framework. *Magn Reson Med*. **52**(5): 1146-1155 (2004).
- 3 Field AS, **Wu Y-C**, Alexander AL. Principal Diffusion Direction in Peritumoral Fiber Tracts: Color Map Patterns and Directional Statistics. *Ann NY Acad Sci*. **1064**: 193-201 (2005).
- 4 Alexander AL, **Wu Y-C**, Venkat PC. Hybrid Diffusion Imaging (HYDI). In proc. *IEEE-EMBS*, New York City, USA, 2245-2248 (2006).
- 5 Alexander AL, Lee JE, **Wu Y-C**, Field AS. Comparison of DTI Measurements at 1.5T and 3.0T with and without Parallel Imaging. *Neuroimaging Clin N Am*. **16**(2): 299-309 (2006).
- 6 **Wu Y-C**, Alexander AL. Hybrid diffusion imaging. *Neuroimage* **36**(3):617-629 (2007). PMID: PMC2428345
- 7 **Wu Y-C**, Alexander AL. A method for calibrating diffusion gradients in diffusion tensor imaging. *J Comp Aided Tomography (JCAT)* **31**(6): 984-93 (2007). PMID: PMC2701239
- 8 Liu H-L, Chen H-M, **Wu Y-C**, Lim S-N, Huang C-M, Hsu Y-Y, Wu T. False Positive Analysis of Functional MRI during Simulated Deep Brain Stimulation. *J Magn Reson Imaging* **27**: 1439-1442 (2008).
- 9 **Wu Y-C**, Field AS, Alexander AL. Computation of diffusion function measures in q-space using magnetic resonance hybrid diffusion imaging. *IEEE Transactions on Medical Imaging (TMI)*. **27**(6): 858-865 (2008). PMID: PMC2674390
- 10 O'Halloran RL, Holmes JH, **Wu Y-C**, Alexander AL, Fain SB. Heilum-3 MR q-Space Imaging with Radial Acquisition and Iterative Highly Constrained Back-Projection. *Magn Reson Med* **63**:41-50 (2010)
- 11 Chung M, **Wu Y-C**, Alexander AL. 3D Eigenfunction Expansion of Sparsely Sampled 2D Cortical Data. In proc. *IEEE-ISBI* Boston, USA, 113-116 (2009).
- 12 **Wu Y-C**, Field AS, Whalen PJ, Alexander AL. Age and Gender Related Changes in the Normal Human Brain using Hybrid Diffusion Imaging (HYDI). *NeuroImage*. **54**:1840-1853 (2011).
- 13 **Wu Y-C**, Field AS, Duncan ID, Samsonov AA, Kondo Y, Tudorascu D, Alexander AL. High b-value and diffusion tensor imaging in a canine model of dysmyelination and brain maturation. *NeuroImage*. **58**: 829-837 (2011).
- 14 Hosseinbor AP, Chung MK, **Wu Y-C**, Alexander AL. Bessel Fourier Orientation Reconstruction: An

- Analytical EAP Reconstruction Using Multiple Shell Acquisitions in Diffusion MRI. In MICCAI (2) 217-225 (2011).
- 15 Connolly AC, Guntupalli SJ, Gors J, Hanke M, Halchenko YO, **Wu Y-C**, Abdi H, Haxby JV. Representation of Biological Classes in the Human Brain. J. of Neuroscience **32**:2608-2618 (2012).
 - 16 Hosseinbor AP, Chung MK, **Wu Y-C**, Fleming JO, Field AS, Alexander AL. Extracting Quantitative Measures from EAP: A Small Clinical Study using BFOR. In MICCAI (3) 280-287 (2012).
 - 17 Samsonov A, Alexander AL, Mossahebi P, **Wu Y-C**, Duncan ID, Field AS. Quantitative MR imaging of two-pool magnetization transfer model parameters in myelin mutant shaking pup. Neuroimage Sep;**62**(3):1390-8 (2012).
 - 18 Hosseinbor AP, Chung MK, **Wu Y-C**, Alexander AL. Bessel Fourier Orientation Reconstruction (BFOR): An Analytical Diffusion Propagator Reconstruction for Hybrid Diffusion Imaging and Computation of q-Space Indices. NeuroImage **64**:650-670 (2012).

D. Research Support

Ongoing Research Support

R21 NS075791-01 Wu, McAllister (PI) 09/01/11-08/31/13
HYBRID Diffusion Imaging to Detect Acute White Matter Injury After Mild TBI
The goal of this project is to improve our diagnosis and understanding of the underlying neural mechanisms of mild traumatic brain injury (MTBI) using a new diffusion imaging technique, hybrid diffusion imaging.
Role: PI

Dartmouth Synergy Wu, Holtzheimer (PI) 08/01/12-07/31/14
High Angular Resolution Diffusion Imaging (HARDI) with novel HYPR image reconstruction
The goal of the proposed project is to develop a novel, fast imaging technique for a high angular resolution diffusion imaging method (HARDI) that can be acquired quickly. To do this, HARDI acquisition will be combined with an advanced approach to rapid image reconstruction (Highly constrained back Projection reconstruction (HYPR)).
Role: PI

R01 MH091100-A1 Holtzheimer (PI) 08/01/11-07/31/16
Identifying Biomarkers for Treatment-Resistant Depression Using Resting-State Functional Connectivity
This project will investigate the neurobiology of treatment-resistant depression (TRD) using functional magnetic resonance imaging functional connectivity analyses. These findings will increase our understanding of the pathophysiology of TRD and will guide further research including the development of novel interventions for this prevalent and costly disorder.
Role: Co-Investigator

R01 MH080716 Whalen (PI) 12/01/11-11/30/16
Prefrontal-amygdala interactions in social learning
This R01 application proposes functional neuroimaging studies with human subjects to elucidate the role of the prefrontal cortex and amygdala in the processing of facial identities and expressions that predict different social outcomes.
Role: Co-Investigator

Pending Research Support

R21 EB016839 Wu, Holtzheimer (PI) 12/01/13-11/30/15
RSA-EPI: A Novel Sequence for Fast, High Resolution MR Diffusion Weighted Imaging
The goal of the proposed project is to develop a novel, fast magnetic resonance imaging technique for white matter diffusion imaging. The new sequence is designed to be faster than the single-shot EPI (SS-EPI) sequence commonly used in diffusion imaging. If successfully created, such a pulse sequence would allow very high angular resolution diffusion data to be acquired in a short period of time, which would greatly

increase the clinical potential of advanced DWI techniques.

Role: PI

DoD: W81XWH-11-PHTBI-ANRA

Buckey (PD)

12/01/13-11/30/17

Neuroanatomical and Auditory Correlates of Traumatic-Brain-Injury-Related Hearing Dysfunction

The objective of this proposal is to establish the causes of auditory problems in individuals with traumatic brain injury (TBI). We will perform both auditory tests and neuroimaging that can identify the nature of the hearing/auditory complaints and their neuroanatomic correlates. The auditory tests will focus on measures of (central) auditory processing (CAP) using a novel game-like program and otoacoustic emission (OAE) suppression. Functional MRI (fMRI) (auditory functional localizer and tonotopic or cochleotopic mapping) will be used to define key cortical regions involved in central auditory processing and assess cerebral activation to auditory stimuli. High Angular Resolution Diffusion Imaging (HARDI) will be used to characterize abnormalities in structural connectivity of white matter pathways relevant to auditory processing.

Role: Co-I

Completed Research Support

NOCSAE

Greenwald, McAllister, Ji (PI)

06/01/11-05/31/13

Advancing the Understanding of Biomechanical Parameters Associated with Mild Traumatic Brain Injury: An Evaluation of the Relationships Among Head Acceleration, Brain Tissue Mechanical Response, and Diffusion Imaging

The overarching goal of the project is to inform actionable advances in standard test methods, protective equipment design, and clinical understanding of mild traumatic brain injury.

Role: Co-Investigator

R01 MH080716-04S1

Whalen (PI)

09/27/10-05/31/11

Prefrontal-amygdala interactions in social learning

The goal of this study is to combine the advanced magnetic resonance imaging (MRI) technique, diffusion imaging, and the ongoing projects of functional magnetic resonance imaging (fMRI) to investigate the structural and functional pathways of cerebral amygdala.

Role: Co-Investigator