BIOGRAPHICAL SKETCH

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NAME: Thalman, Scott

eRA COMMONS USER NAME (credential, e.g., agency login): scott.thalman

POSITION TITLE: Graduate Research Assistant

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)	Completion Date MM/YYYY	FIELD OF STUDY
Brigham Young University, Provo, UT	BS	08/2011	Applied Physics

A. Personal Statement

I am really excited by the opportunity to work with the Sanders-Brown Center on Aging. The paramount importance of advanced imaging techniques in studying the brain is highlighted by the number of labs, investigators, and students who include MRI in their work. The complex physics and incredible diversity in the field of MRI is what makes me so passionate about imaging, and it's what makes me and this project a perfect fit for this T32 Training Program. My training in magnetic resonance began during my undergraduate research experience with Dr. John Colton at Brigham Young University. While in that lab I helped publish a novel technique for measuring electron spin lifetimes in semi-conductor quantum dots and gained a great deal of experience with laboratory instrumentation. In graduate school I have been very well mentored by Dr. Moriel Vandsburger, Dr. David Powell, and my current advisor Dr. Ai-Ling Lin. With these professors I have received a great deal of training in image acquisition and analysis, as well as the scientific process. In medical school, I was an exemplary student which will help me understand the physiology and pathology of the important phenomena we are trying to image. I also have the great opportunity to work with Dr. Peter Nelson on my advisory committee. He is a renowned expert on neurovascular pathology and he has been immensely helpful in focusing my research efforts as well as being a wonderful example of a physician-scientist. All of this training will be vital to the execution my proposed project and give me confidence that I will be able to accomplish it. I am excited to already be working on a project that intersects engineering and medicine because it is my goal to be an exceptional physician-scientist who brings engineering to the clinic. Adding the resources and diverse research interests of the SBCoA to my already remarkable training environment will accelerate that goal by broadening my expertise and providing even more tools for my success.

B. Positions and Honors

Positions and Employment

2009 - 2011 Undergraduate Research Assistant, Brigham Young University, Department of Physics and Astronomy, Provo, UT

2010 - 2010 Research Experience for Undergraduates, Brigham Young University, Department of Physics and Astronomy, Provo, UT

2010 - 2011 Undergraduate Research Assitant, University of Utah Hospital, Department of Surgery, Salt Lake City, UT

2014 - Graduate Research Assistant, University of Kentucky, Department of Biomedical Engineering, Lexington, KY

Other Experience and Professional Memberships

2014 - Trainee Member, International Society for Magnetic Resonance in Medicine

Honors

2005 Brigham Young University President's Scholarship, Brigham Young University

2005 Robert C. Byrd Scholarship, Colorado Dept. of Education

2006	Mountain West Conference Scholar-Athlete Award, Mountain West Conference
2009 - 2010	Mountain West Conference Scholar-Athlete Award, Mountain West Conference
2015 - 2017	F. Joseph Halcomb III, M.D. Fellowship for Engineering in Medicine, University of Kentucky Department of Biomedical Engineering
2015	2015 ISMRM Annual Meeting Travel Stipend Award, International Society for Magnetic Resonance in Medicine
2015	2nd place, Graduate Student Outstanding Poster Awart, Gill Heart Institute Annual Research Day
2016	2016 ISMRM Workshop Travel Stipend Award, Internation Society for Magnetic Resonance in Medicine
2017	2017 ISMRM Annual Meeting Travel Stipend Award, International Society for Magnetic Resonance in Medicine

C. Contribution to Science

1. My undergraduate research was done in the field of solid state physics under Dr. John Colton at Brigham Young University. Our lab studied electron spin resonance, which is closely related to nuclear magnetic resonance. Specifically we studied the optical spin properties of electrons in indium-gallium-arsenide quantum dots which are useful in electronics applications, quantum computing, and have even been used as immunofluorescence tags. I particularly became interested in the photoluminescence lifetimes of these structures and took on the task of refurbishing a temperamental, home-built pulsed laser inherited from a collaborator in order to measure those lifetimes using time-correlated single photon counting (TCSPC). These were experiments our lab had never before performed, so I was instrumental in developing the operational protocol for both the laser and the TCSPC experiments. This work was the subject of my senior thesis and resulted in three publications listed below.

    a. Bair N, Hancock JM, Simonson CJ, Thalman SW, Colton JohnS, Asplund MC, Harrison RG. Assemblies composed of oligothiophene-ruthenium complexes bound to CdSe nanoparticles. Journal of luminescence. 2014 October 31; 158:501-9.
    b. Colton JohnS, Clark Ken, Meyer D, Park T, Thalman SW. Universal scheme for measuring the electron T1 in semiconductors and application to a lightly-doped -GaAs sample. Solid state communications. 2012 March; 152(5):410-413.
    c. Thalman SW. Photoluminescence Lifetimes of Quantum Dots. BYU Dept. Physics and Astronomy Senior Thesis. 2011 March;

2. While working with Dr. Vandsburger I helped implement and optimize and advanced cardiac chemical exchange saturation transfer technique for use in mice. This technique will allow in vivo molecular imaging of structural and metabolic biomarkers crucial in understanding cardiac remodeling, regeneration and adaptation. I was also involved in the translation of this technique to human imaging hoping to detect fibrosis in the hearts of patients with chronic kidney disease, a population at high risk for sudden cardiac death but who are currently precluded from contrast-based methods of detecting fibrosis.

    a. Pumphrey A, Yang Z, Ye S, Powell DK, Thalman S, Watt DS, Abdel-Latif A, Unrine J, Thompson K, Fornwalt B, Ferrauto G, Vandsburger M. Advanced cardiac chemical exchange saturation transfer (cardioCEST) MRI for in vivo cell tracking and metabolic imaging. NMR Biomed. 2016 Jan;29(1):74-83. PubMed PMID: 26684053; PubMed Central PMCID: PMC4907269.
    b. Thalman SW, Pumphrey A, Yang Z, Vandsburger M. The Effect of Hypertrophy in CardioCEST Magnetization Transfer Contrast.. ISMRM Annual Meeting; 2016 May; Singapore, Singapore. c 00 .
    c. Thalman SW, Yang Z, Mattingly A, Vandsburger M. Cardiac CEST Imaging of Diffuse Fibrosis. ISMRM Annual Meeting; 2015 June; Toronto, Ontario, Canada. c 00 .

3. My current research is focused on the aims presented in this proposal. The project is largely my own creation resulting from an observed problem in the way cerebral blood flow was calculated from arterial spin labeling (ASL) images. The potential impact for ASL in a clinical setting is immense, and this project represents a significant advancement in its clinical validity. I developed the protocol for abbreviated blood

brain partition coefficient (BBPC) mapping and showed a proof of concept that has been presented at two international meetings, and now I am working on validating that technique, translating it to use in humans, and applying it to important research questions.

a. Thalman SW, Powell DK, Shen A, Harts A, Lin A. Using Calibrated Proton Density Imaging to Measure Blood-Brain Partition Coefficient in Aging and Alzheimer's Disease Mice. ISMRM Annual Meeting; 2017 April; Honolulu, Hawaii, United States. c 00 .

b. Thalman SW, Powell DK, Lin A. Calibrated Proton Density Imaging Measures Reduced Blood-Brain Partition Coefficient in Aging Mice. ISMRM Workshop on Quantitative MR Flow; 2016 October; San Francisco, CA, United States. c 00 .

D. Additional Information: Research Support and/or Scholastic Performance

Predoctoral applicants: Using the chart provided, list by institution and year all undergraduate and graduate courses with grades. In addition, in the space following the chart, explain any marking system if other than 1-100, A, B, C, D, F, or 0-4.0 if applicable. Show levels required for a passing grade.

YEAR	SCIENCE COURSE TITLE	GRADE	YEAR	OTHER COURSE TITLE	GRADE
	Brigham Young University			Brigham Young University	
2005	Science of Biology	A	2005	Calculus 2	A
2005	Principles of Physics	A	2006	Biodiversity	A
2006	Calculus of Several Variables	A	2006	Principles of Physics 2	A
2006	Intro to Experimental Physics	A	2008	Elementary Linear Algebra	A
2008	Human Anatomy (with lab)	A	2008	Electronics Lab	A
2009	General College Chemistry 1	A	2009	Principles of Physics 3	A
2009	Computational Physics Lab 1	A	2009	Modern Physics	A
2009	Design, Fabrication, Sci Apparatus	A	2010	General College Chemistry 2	B
2010	General College Chemistry Lab	A	2010	Ordinary Differential Equations	A
2010	Molecular Biology	B	2010	Molecular and Cell Biology Lab	A
2010	Organic Chemistry 1	A	2010	Mechanics	A
2010	Computational Physics Lab 2	A	2010	Fundamentals of Mathematics	A
2010	Cell Biology	B	2010	Advanced Physiology	A
2010	Advanced Physiology Lab	A	2010	Intro to Classical Field Theory	A
2011	Organic Chemistry 2	A	2011	Organic Chemistry Lab	A
2011	Experiments in Contemp. Physics	A	2011	Writing in Physics	A
2011	Computational Physics Lab 3	A	2011	Solid State Physics	A
2011	Electrostatics and Magnetism	A			
	University of Kentucky, College of Medicine			University of Kentucky, College of Medicine	
2012	Anatomy	92.1	2012	Cellular Struct.& Function/Genetics	91.5
2012	Cellular Struct.& Function/Biochem	89.8	2012	Intro to Clinical Medicine 1	95.0
2013	Neurosciences	86.7	2013	Behavioral Basis of Medicine	95.2
2013	Foundations of Disease/Therapeutics	95.7	2013	Intro to Clinical Medicine 2	92.3
2013	Musculoskeletal and Integumentary	92.6	2013	Hematologic and Lymphatic Sys	86.5
2013	Endocrine and Reproductive Systems	90.3	2013	Renal and Urinary Systems	91.9
2014	Cardiovascular System	95.6	2014	Respiratory System	90.2
2014	Gastrointestinal System & Nutrition	84.1	2014	Multisystem & Integrative Concepts	95.1

YEAR	SCIENCE COURSE TITLE	GRADE	YEAR	OTHER COURSE TITLE	GRADE
	University of Kentucky, College of Engineering			University of Kentucky, College of Engineering	
2014	Cell Mechanobiology	A	2015	Basic Statistical Analysis	A
2014	Topics in Magnetic Resonance Imaging	A	2015	Numerical Analysis	A
2014	Biomedical Signal Processing	A	2015	Biofluid Mechanics	A
	Standardized Testing				
	MCAT	38			
	USMLE Step 1	238			