



UNIVERSITY OF KENTUCKY®

MD/PhD Program

DIRECTOR'S WELCOME

Reflecting on the past to shape the future: The 1950s and 1960s witnessed the emergence of the National Institutes of Health (NIH) as the premier sponsor of biomedical research and was a time of tremendous expansion in federal funding for research intensive universities. The investment in scientific discovery laid the groundwork for expansion in the faculty of medical schools. Clinically trained individuals who would compete successfully for federal biomedical research grants were targeted for recruitment. Medical schools began programs to develop physician-scientists who performed combined medical and graduate training and earned joint MD and PhD degrees. The NIH quickly recognized the importance of combined training programs and invested support in the form of training grants for Medical Scientist Training Programs. To mark the 50th anniversary of Medical Scientist Training Programs, the National Institute of General Medical Sciences hosted a Symposium in Bethesda in July in which NIH director Dr. Francis Collins and others described the rich array of the science conducted by MD/PhD trainees. The report of the Physician-Scientist Workforce Working Group, convened by Collins, was also released this summer. The report, which served as a platform for discussion at our annual retreat, emphasizes that the productivity return from the physician-scientist workforce is a direct reflection of the national investment from NIH. Challenges, including an aging workforce, lack of diversity, financial pressures, and length of training, were outlined along with recommendations to support clinically-trained investigators. NIH has begun to implement the suggestions and is exploring the development of a new program to facilitate the transition of physician-scientists from training to independence.

Locally: UK MD/PhD students continue to contribute to the nation's scientific agenda through their basic and clinical research. Our students excel not just in their scientific achievements, but also in academic records, leadership roles, and community service. Applications for the UK program come from across the US and Canada, and our current students reflect that diversity with undergraduate degrees from the finest schools across the country. The MD/PhD students had another record year for publications – 16 in total, with an average of over 3 publications per student by graduation. Students are gaining visibility by presenting high-caliber science at national and international meetings and with the receipt of local and national awards, with nearly all of our students receiving extramural funding for their work during graduate school. While challenges may lie ahead for healthcare and academic medicine, UK MD/PhD students will be well prepared to meet them and to continue the critical role that physician-scientists have played in the biomedical work force.

Susan Smyth, MD, PhD

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Erin Wolf Horrell, G3
Edita Klimyte, G3

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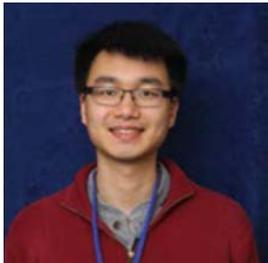
Retreat Committee

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Andrew Welleford, M2



My Old Kentucky Home: Meet Our New Students

JEFF CHEN – M1, UNIVERSITY OF CALIFORNIA, LOS ANGELES



I was raised in Los Angeles and attended UCLA as a biochemistry major before joining the MD/PhD program at the University of Kentucky. I enjoy the smell of wintergreen oil, lecture podcasts, and long walks around the hospital. I was primarily interested in diabetes mellitus from the Barnstable Brown Diabetes and Obesity Research Center; the University of Kentucky overall has a large and diverse pool of faculty that would allow me to find both a

mentor with similar research interests and other faculty who can provide valuable insight from outside my field. I was further encouraged by the openness of the faculty, staff, and students during the entire application and interview process. This atmosphere of welcomeness was an indicator of the unprecedented access to a diverse set of world class faculty that being part of the MD/PhD department allowed. Combined with the newly revamped integrated medical curriculum which emphasized earlier exposure to clinical skills and correlation as well as emphasis on evidence based medicine, the MD/PhD program at the University of Kentucky really becomes something greater than the sum of its parts.

MEGHAN GREEN – M1, DENISON UNIVERSITY



I am from Rochester, NY and graduated from Denison University with a major in Biology and a minor in Spanish. I studied abroad in Spain the summer after my Sophomore year. This past year I worked at the University of Florida doing clinical research in pediatric rare genetic diseases including Pompe Disease, Myotubular Myopathy, and Duchenne Muscular Dystrophy. I also taught MCAT prep class for Kaplan while I was in Florida. I enjoy swimming, playing tennis, hanging out with friends and family, and cooking/eating and I swam competitively throughout college. I chose to come the UK because I felt so welcomed by the people that I met here. I was really impressed by how friendly and easy to talk to everyone was on my interview and felt like I really fit in here.

DAVID HENSON – M1, HANOVER COLLEGE



I am from Frankfort, Kentucky, and I went to Hanover College where I studied Biology and Chemistry. I knew as I began High School that I truly wanted to pursue a MD/PhD that would allow me to see patients as well as pursue research. After I completed the process of applying to medical school I had my first interview at the University of Kentucky where I was immediately struck by how much it felt like home. The faculty were all incredibly welcoming during the process. They did not try to scare any students away, they just made their best effort to get to know the person they were interviewing. The current MD/PhD students were also involved in the process and they increased the comfort I felt with the program. They were all incredibly open to just talking about our lives

and our interest, and seemed genuinely interested in making sure that the interviewing students were having a good experience. As I left I felt so comfortable with the idea of joining the UK MD/PhD program because I knew the environment of the program was just perfect for me, and that was the most important thing.

ANDREW WOLLEFORD – M2, UNIVERSITY OF KENTUCKY



I was born the second of five brothers here in Lexington, KY. I attended Tates Creek High School and went to UK for undergraduate where I received a BS in Chemistry and a BS in Biology with a minor in Neuroscience. Food is one of my biggest hobbies: I'm interested in food science, nutrition, cooking, baking, and eating good food. I've commuted to school by bike since undergrad and I'm active in the Lexington cycling community. I also enjoy rock climbing, both at the Johnson Center and outdoors at Red River Gorge. My research interests include several disciplines of neuroscience, especially those relating to neurodegenerative diseases.



“THE ATMOSPHERE OF WELCOMNESS WAS AN INDICATOR OF THE UNPRECEDENTED ACCESS TO A DIVERSE SET OF WORLD CLASS FACULTY.”

JEFF CHEN

“RESEARCH IS WHAT I’M DOING WHEN I DON’T KNOW WHAT I’M DOING”

WERHNER VON BRAUN

Chris Brown, G1 - I am beginning work in Dr. Brian Gold’s lab, focused on neuroimaging in Alzheimer’s and aging. By using multiple imaging techniques we hope to understand how changes in the brain’s structure and function correspond with aging and development of Alzheimer’s disease. Looking at the earliest stages of disease, the goal is to determine the early alterations to the brain and how they may be used to predict or track future disease development and progress. In addition, by comparing the relationship of multiple imaging and non-imaging techniques, we hope to further our insight into the pathologic mechanisms within the brain involved in early Alzheimer’s and how they differ from normal aging.

Department: Anatomy and Neurobiology
Mentor: [Brian Gold, Ph.D.](#)

“IF WE KNEW WHAT WE WERE DOING, IT WOULD NOT BE CALLED RESEARCH.”

ALBERT EINSTEIN

Jacqueline Kulbe, G1 - Mild traumatic brain injury is difficult to diagnosis. Subtle white matter changes cannot be identified using conventional imaging techniques and self-reported symptoms such as loss of consciousness, altered consciousness, and amnesia can be subjective. A more objective measure

for diagnosing mTBI is needed. Biomarkers are successful in other fields of medicine, i.e. troponin used to diagnose myocardial infarction. My goal is to identify novel biomarkers of mTBI by using rodent models of injury and the phage display technique to screen cerebral spinal fluid and serum.

Department: Anatomy and Neurobiology
Mentor: [Jim Geddes, Ph.D.](#)

Joshua Mitchell, G1 - My research project involves writing computer software to help automate the analysis of ultra-high resolution mass spectrometry information in the context of metabolomics research. There are two major components to this project but both involve the creation of novel 'chemically-aware' algorithms that can utilize known properties of biochemical networks to aid in the high-throughput analysis of MS-derived metabolomics data. The first component is the development of software that can help identify detectable yet unknown metabolites using a combination of chemoselective adduct formation, the isotope-resolved molecular formulae determined by ultra-high resolution mass spectrometry and the experimental conditions used to extract them. This information can then be used to categorize unknown metabolites into the various classes of metabolites in software. Once identified and categorized, the second component of my project is to develop an algorithm to place these unknown metabolites within the metabolic network accurately.

Department: Biochemistry
Mentor: [Hunter Mosley, Ph.D.](#)

“THERE ARE NO RULES HERE. WE ARE TRYING TO ACCOMPLISH SOMETHING.”

THOMAS EDISON

Scott Thalman, G1 - My research uses a phenomenon in MRI known as magnetization transfer to image fibrosis in the heart. Certain conditions like ischemic heart disease, diabetes, chronic kidney disease and others cause fibrotic remodeling of heart muscle. This remodeling is characterized by excessive deposition of extracellular matrix (ECM) and the macromolecules associated with it. Currently, the standards for quantifying fibrotic remodeling are biopsy and MRI using a gadolinium contrast agent, both of which present significant risk to the patient. Magnetization transfer, on the other hand, uses the different physical properties of water and ECM macromolecules to create contrast between healthy and fibrotic myocardium without requiring any exogenous contrast agent. This is particularly useful in the chronic kidney disease population who are at significant risk for developing fibrotic remodeling but are contraindicated for gadolinium contrast.

Department: Biomedical Engineering
Mentor: [Moriel Vandsburger, Ph.D.](#)

RESEARCH HIGHLIGHTS: OUR NEWEST PHD GRADUATES REFLECT ON THEIR DISSERTATIONS

DUSTIN STEPHENS, PhD – My research explores infectious disease and risk behavior among illicit drug users in rural Appalachian Kentucky, a low-income region with poor access to healthcare services. Kentucky has had the highest incidence of hepatitis C virus (HCV) nationwide since 2009 and the third-highest annual rate of drug overdose deaths. These trends have been largely driven by non-medical use of prescription drugs in rural communities, particularly snorting and injection drug use (IDU) of benzodiazepines and opioid analgesics such as oxycodone and hydrocodone. In order to inform intervention efforts to address this public health crisis, I analyzed longitudinal data from 500 drug users in Eastern Kentucky recruited as part of an ongoing cohort study, *Social Networks among Appalachian People* (PI: [Jennifer R. Havens, MPH PhD](#)). The aim was to identify sociodemographic and behavioral predictors of IDU risk behavior including syringe and equipment sharing, which facilitate rapid transmission of blood-borne infections such as HIV, HCV, and the bacterial pathogens responsible for infective endocarditis. I also examined healthcare follow-up and treatment uptake among drug-using individuals recently diagnosed with HCV, with the goal of expanding active management of HCV among vulnerable populations in the era of increasingly efficacious antiviral treatment options. Reducing hepatitis C prevalence in medically underserved areas such as rural Appalachia will likely require a multi-faceted approach combining both primary and secondary disease prevention modalities.

BEN FOWLER, PhD - I study non-coding RNA biology in the context of a disease called age-related macular degeneration. Some of my research interests include the host cell response to retrotransposons and the plasticity and intra-individual divergence of the somatic genome.

CONGRATS TO OUR GRADUATES!

Andres Chang, MD/PhD – Medicine, University of Emory
Graduated with Distinction

Abdel Salous, MD/PhD – General Surgery – Georgetown
Graduated with High Distinction, AOA

Mellani Lefta, MD/PhD – Pediatrics – Eastern Virginia Medical School
Graduated with Distinction



Andres Chang announced he matched at the University of Emory at Match Day 2014.

AWARDS

Induction into Alpha Omega Alpha National Honors Society – Jason Meyer, M4

NIMH Fellowship to attend ERP Boot Camp at University of California – Davis in July 2014 – Luke Broster, G4

Clinical and Translational Science T32 Training Fellowship – Edita Klimyte, G3

Markey Cancer Center T32 Training Fellowship – Erin Wolf Horrell, G3

Gill Heart Saha Cardiovascular Award – Greg Wehner, G2

Highest Academic Achievement: Behavioral Basis of Medicine – Jacqueline Kulbe, G1

Distinguished Portfolio Award: Introduction to Clinical Medicine I – Jacqueline Kulbe, G1

2014 Charles S. Neer Award in Basic Science from the American Shoulder and Elbow Surgeons – Evan Lynch, M2

2014-2015 Professional Student Mentored Research Fellowship – Evan Lynch, M2

CONFERENCES

Annual Meeting of the Organization for Human Brain Mapping – Hamburg, Germany 2014 – Luke Broster, G4

European Association for Vision and Eye Research – Nice, France 2013 – Ben Fowler, PhD

Oral Presentation at Association of University Professors of Ophthalmology and Research to Prevent Blindness Conference – Miami, Florida 2014 – Ben Fowler, PhD

American Physician Scientist Association Meeting – Chicago, Illinois 2014 – Edita Klimyte, G3

National Institute of Allergy and Infectious Disease and the Infectious Diseases Society of America – Bethesda, Maryland 2014 – Edita Klimyte, G3

National MD/PhD Conference – Keystone, Colorado 2014 – Erin Wolf Horrell, G3



National MD/PhD Conference hosted by the University of Colorado
Keystone Resort in Keystone, Colorado

CONFERENCE HIGHLIGHT: EDITA KLIYMYTE

In April of this year, I had the opportunity to attend the annual American Physician Scientist Association meeting in Chicago. It was held in conjunction with the annual meetings of the American Society for Clinical Investigators and the Association of American Physicians. This meeting had a remarkable line of speakers, including world renowned physician scientists, Nobel laureates and an NIH institute director. I also participated in career development sessions, networking events to meet representatives from residency programs across the country, and presented a poster of my original research. University of Kentucky's MD/PhD program was awarded an Institutional Travel Grant to contribute to the cost of attending the meeting.

I also was accepted to attend a research careers meeting hosted by the National Institute of Allergy and Infectious Disease and the Infectious Diseases Society of America held in Bethesda, MD in May of this year. This was a great opportunity to meet the leaders of infectious disease research, hear about their science as well as their career paths, and present my own research at a poster session. We also toured the campus of the NIH and met with Dr. Anthony Fauci, the director of the NIAID.

THE PERSONALS

Chris Brown, G1, and Lisa Thompson are engaged!

Scott, G1, Lesley, and Jackson Thalman welcome little brother Eli Joseph!

Jeremy, M1, and Courtney Johnson were married in November 2013!

Yuan Wen, G2, and his wife Fei Xiong are expecting a baby girl!

Don't forget our Alumni!

Chris Simmons, medicine/pediatrics resident at the University of Kentucky, and his wife Katie Twist are expecting a baby in February!

Zach Fulkerson, internal medicine resident at Indiana University and his wife Lauren are expecting a baby in February!

Caitlin Latimer, pathology resident at the University of Washington, and her husband David are expecting a baby girl in February!



Scott and Lesley Thalman with their two boys, Jackson and Eli.

FROM RECENT GRADUTES TO FACULTY, OUR ALUMNI ARE SUCCEEDING AT EVERY LEVEL

SCOTT SILVA (PhD – 2011, MD – 2013) Dr. Silva is a second year resident in the department of Radiation-Oncology at Vanderbilt University Medical Center. While at the University of Kentucky, he received the Endocrine Society Award.

CAITLIN LATIMER (PhD – 2011, MD – 2013) Dr. Latimer is a second year resident in the Department of Anatomic Pathology at the University of Washington in Seattle, Washington. At the University of Kentucky, she received the Outstanding Medical Student in Physical Medicine and Rehabilitation Awards and the Pathology Physician Award. Her dissertation work focusing on the role of vitamin D and cognitive decline in the elderly was recently highlighted in the Los Angeles Times.

ROMULO ALBUQUERQUE (PhD – 2009, MD – 2011) Dr. Albuquerque is chief resident at the University of Kentucky in the Department of Ophthalmology. He is submitting an application for a K award and will be completing his fellowship at the University of Kentucky.

MICHELLE (STEPHENS) HUMEIDAN (PhD – 2009, MD – 2011) Dr. Humeidan is chief resident at The Ohio State University in the Department of Anesthesia. She recently received IRB approval for her first investigator-initiated clinical trial partnering with Lumosity to investigate whether pre-operative brain activity is protective against post-operative delirium. She will complete a Neuroanesthesia fellowship next year.

MARK WURTH (PhD – 2006, MD – 2008) – Dr. Wurth completed his residency in Internal Medicine and Pediatrics from the University of Kentucky. He served as chief resident for the Department of Pediatrics in 2012. He started his combined allergy, immunology, and pediatric pulmonary fellowship at Vanderbilt University in 2013.

SHANE RAU (PhD – 2003, MD – 2005) Dr. Rau is currently an Assistant Professor at the University of North Carolina, Chapel Hill in the Department of Psychiatry. He is the Director of Medical Education at the UNC Center for Excellence in Community Mental Health, the Associate Medical Director of the UNC STEP community Clinic and the clinical director of the North Carolina Psychiatric Research Center. He completed his residency in the Department of Psychiatry at the University of Virginia Health System.

GREGORY COOPER (PhD – 1992, MD – 1994) Dr. Cooper completed his residency in the Department of Neurology and fellowship in Behavioral Neurology and Cognitive Neuroscience at the University of Iowa Hospitals and Clinics. He is currently practicing at the Baptist Neurology Center in Lexington, KY.

GREGORY BARNES (PhD – 1990, MD – 1992) Dr. Barnes completed his residency in the Department of Pediatrics at Washington University in St. Louis and in Child Neurology and Pediatric Epilepsy from the Children's Hospital of Boston/Harvard Longwood Neurology Residency Program. He completed his epilepsy fellowship at Duke University. He is currently the Director of the University of Louisville Autism Center and is an Associate Professor in Pediatrics at the University of Louisville.

RECENT CURRENT STUDENT PUBLICATIONS (2013-2014)

Oak NR, Gumucio J, Davis ME, **Lynch EB**, Roche SM, Bedi A, Mendias CL. Inhibition of 5-LOX, COX-1, and COX-2 increases tendon healing and reduces muscle fibrosis and lipid accumulation after rotator cuff repair. *Am J Sports Med*. 2014 *In Press*.

Moylan J, Smith JD, **Wolf Horrell EM**, McLean JB, Deevska GM, Bonnell MR, Nikolova-Karakashian MN, Reid MB. Neutral sphingomyelinase-3 mediates TNF-stimulated oxidant activity in skeletal muscle. *REDOX Biology*. 2014 *In Press*.

Wolf Horrell EM, Wilson K, D'Orazio JA. Melanoma – Epidemiology, Risk Factors, and the Role of Adaptive Pigmentation. *Intech*. 2014 *In Press*.

Mendias CL, Roche SM, Harning JA, Davis ME, **Lynch EB**, Sibilsky Enselman ER, Jacobson JA, Claflin DR, Calve S, Bedi A. Reduced muscle fiber force production and disrupted myofibril architecture in patients with chronic rotator cuff tears. *J Shoulder Elbow Surg*. 2014 Sep [Epub ahead of print] <http://www.ncbi.nlm.nih.gov/pubmed/25193488>

Luo Y, Wu T, **Broster LS**, Feng C, Zhang D, Gu R, Luo YJ. The temporal course of the influence of anxiety on fairness considerations. *Psychophysiology*. 2014 Sept 51(9):834-42 <http://www.ncbi.nlm.nih.gov/pubmed/24840323>

Barcomb K, Buard I, Coultrap SJ, **Kulbe JR**, O'Leary H, Benke TA, and Bayer K. Autonomous CaMKII requires further stimulation by Ca²⁺/calmodulin for enhancing synaptic strength. *FASEB J*. 2014 Aug 28(8):3810-9 <http://www.ncbi.nlm.nih.gov/pubmed/24843070>

Mitchell JM, Fan TW, Lane AN and Moseley HN. Development and In silico Evaluation of Large-Scale Metabolite Identification Methods using Functional Group Detection for Metabolomics. *Front Genet*. 2014 Jul 5:237 <http://www.ncbi.nlm.nih.gov/pubmed/25120557>

Jarrett SG, **Wolf Horrell EM**, Christian PA, Vanover JC, Boulanger MC, Zou Y, D'Orazio JA. PKA-mediated phosphorylation of ATR promotes recruitment of XPA to UV-induced DNA damage. *Mol Cell*. 2014 Jun 54(6):999-1011. <http://www.ncbi.nlm.nih.gov/pubmed/24950377>

“IN A WORD, I CONSIDER HOSPITALS ONLY AS THE ENTRANCE TO SCIENTIFIC MEDICINE; THEY ARE THE FIRST OF OBSERVATION WHICH A PHYSICIAN ENTERS; BUT THE TRUE SANCTUARY OF MEDICAL SCIENCE IS A LABORATORY; ONLY THERE CAN HE SEEK EXPLANATIONS OF LIFE IN THE NORMAL AND PATHOLOGICAL STATES BY MEANS OF EXPERIMENTAL ANALYSIS”

CLAUDE BERNARD, 1864

Yang S, Luo W, Zhu X, **Broster LS**, Chen T, Li J, Luo Y. Emotional content modulates response inhibition and perceptual processing. *Psychophysiology*. 2014 Jun [Epub ahead of print] <http://www.ncbi.nlm.nih.gov/pubmed/24942597>

Zhang D, Gu R, **Broster LS**, Jiang Y, Luo W, Zhang J, Luo YJ. Linking brain electrical signals elicited by current outcomes with future risk decision-making. *Front Behav Neurosci*. 2014 Mar 8;84 <http://www.ncbi.nlm.nih.gov/pubmed/24672447>

McBride JC, Zhao X, Munro NB, Smith CD, Jicha GA, Hively L, **Broster LS**, Schmitt FA, Kryscio RJ, Jiang Y. Spectral and complexity analysis of scalp EEG characteristics for mild cognitive impairment and early Alzheimer's disease. *Comput Methods Programs Biomed*. 2014 Apr 114(2):153-63 <http://www.ncbi.nlm.nih.gov/pubmed/24598317>

Kulbe, JR, Mulcahy Levy JM, Coultrap SJ, Thorburn A, and Bayern KU. Excitotoxic glutamate insults block autophagic flux in hippocampal neurons. *Brain Res*. 2014 Jan 1542:12-9 <http://www.ncbi.nlm.nih.gov/pubmed/24505621>

Kerur N, Hirano Y, Tarallo V, **Fowler BJ**, Bastos-Carvalho A, Yasuma T, Kim Y, Hinton DR, Kirschning CJ, Gelfand BD, Ambati J. TLR-independent and P2X7-dependent signaling mediate Alu RNA-induced NLRP3 inflammasome activation in geographic atrophy. *Invest Ophthalmol Vis Sci*. 2013 Nov 54(12):7395-401 <http://www.ncbi.nlm.nih.gov/pubmed/24114535>

Xu P, Gu R, **Broster LS**, Wu R, Van Dam NT, Jiang Y, Fan J, Luo YJ. Neural basis of emotional decision making in trait anxiety. *J Neurosci*. 2013 Nov 33(47): 18641-53 <http://www.ncbi.nlm.nih.gov/pubmed/24259585>

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Feng C, Luo Y, Gu R, **Broster LS**, Shen X, Tian T, Luo YJ, Krueger F. The flexible fairness: equally, earned entitlement, and self-interest. *PLoS One*. 2013 Sep 8(9): e73106 <http://www.ncbi.nlm.nih.gov/pubmed/24039867>

