

# The Vulcan Letter

Voice of the UAB MSTP

March 3, 2015

## What Are the Outcomes of MD/PhD Education?

### *MSTP Students Research the Benefits and Pitfalls of Their Own Training*

*by Alice Weaver*

Being a physician scientist pays off. Grants, leadership opportunities, scale of impact - all are areas that favor our chosen career path. However, these advantages typically don't kick in until the degree(s) are already completed. We actually know very little about the effects of combining medicine and research in the context of the trainee. And aside from our tuition and monthly paycheck, the little we know suggests that MD/PhD students may



actually be at a disadvantage during medical school as compared to our MD classmates. With the support of the MSTP and UASOM, two groups of UAB MSTP students have been given the opportunity to study how research affects clinical training so that we can shed light on and, hopefully, correct this problem. *continued on page 3*

*Alice Weaver (GS-2) is attempting to understand how exposure to research influences medical education and career choice.*

## En-"gene"-eering Better Medical Care:

### *A Student Perspective on HudsonAlpha*

*by Paige Souder*

Recently, several students have forgone student life in Birmingham in order to work at the HudsonAlpha Genome Sequencing Center in Huntsville, Alabama. To better understand their decision, we interviewed several of these students about life in this industrial setting.

in Huntsville, AL. It currently houses 10 academic faculty members (many with joint appointments to UAB's Genetics Department), over 25 biotech companies, and one of the largest CLIA-certified (Clinical Laboratory Improvement Amendments) genome sequencing centers in the world.

#### **What is HudsonAlpha?**

HudsonAlpha is a non-profit research institute founded in 2008

#### **Why do graduate work at HudsonAlpha?**

HudsonAlpha's relatively small *continued on page 7*



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# Our First Code

by Jeff Singer

*Preface: This reflection was written in 2012 for the UASOM: Voices in Words Literary Journal during my MS2 year of medical school. Three years later, I can say that it accurately reflects my thoughts and feelings at the time it was written. However, the reader should note that like medicine, my views are ever-evolving and undergoing refinement. It is my hope that this story will resonate with others, but many may not find it personally apposite. In either case, it is a perspective to consider.*

The heart is a powerful organ. Pumping about 100,000 times a day, it sends five liters of blood coursing over 60,000 miles of vasculature every minute. That is, until it fails. I thought that the countless hospital dramas on television with ubiquitous heart attack and defibrillation scenes might better prepare me for the first time I witnessed a gurney being wheeled into the ER. Several students and I were participating in a voluntary shadowing activity. The attending physician turned to us with a grin and said, “Stay back, but come watch this.” My peers teemed with excitement at the prospect of watching a real-life cardiac arrest. We were so lucky to have such an incredible learning opportunity; I felt neither luck nor excitement as I observed the chaos. I saw only a scared and confused man, whose clothes had been cut from his body, hooked up to a dozen wires and tubes. “Look at the bundle branch block,” a student whispered to me with an eager smile referring to the patient’s EKG pattern. “Look at his face. It’s wrenching in pain,” I wanted to reply, but couldn’t muster it. I nodded my head in agreement.

I had just completed the cardiac learning module, so a million figures and PowerPoint slides should have



been whirling through my head. I understood many of the drug names, differential diagnoses, and clinical reasoning jumps that would ultimately uncover the patient’s ailment. However, I felt uneasy the entire time that we stood there, just outside the room. The man on the stretcher was not a “clinical vignette”, or a conglomeration of physical exam findings, EKG readings, and laboratory tests. He was a human on the brink of confronting his mortality surrounded by a handful of experienced professionals – and, of course, a small yet enthusiastic crowd of first-year medical students.

“Can we keep the EKG?” one of the medical students asked. “Awwww, our first code!” another chimed in as we walked away from the room. I felt increasingly uncomfortable. Our code? It seemed indefensible to take ownership over what we just witnessed. Keep the EKG? An electrocardiogram is, in its truest sense, a representation of the inner workings of a person’s heart. Disregarding the obvious HIPAA concerns, it seemed tasteless to keep a patient’s medical record as some sort of personal trophy or keepsake. Again, I bit my tongue. Luckily, further unease was short-lived, as our session ended and I left for home.

That afternoon continues to resonate with me. Thankfully, my reflections are now more developed than simply visceral disgust with my peers. During the session, they disregarded the human for a set of symptoms, and later prized the entire afternoon as an educational milestone. While this seemed reprehensible, it is precisely the way in which medical education is taught. Sure, we hear axioms of “treat the whole patient”, but, more often than not, our achievements are measured in how well we recognize patterns. The patterns may be intricate and difficult, but word association and pattern recognition comprise the bulk of our multiple-choice exam questions. So, why wouldn’t students get excited when presented with real-life scenarios in which their pattern recognition skills can be applied? This is how we’re encouraged to approach problems in the first two years of medical school. Or rather, this is how we’re incentivized to think based on the payoff of good grades. In clinical settings involving complaints beyond the scope of our ever-growing knowledge base, it is no wonder why some are excited to see a familiar pattern...even if that pattern indicates possible death.

## Our First Code, continued

Furthermore, as uncomfortable as it may be to admit, patients are milestones in our education. Prizing electrocardiograms still seems perverse to me, but the sentiment of “you’re lucky to see this”, is not wholly false. As prospective medical students, many of us (myself included) gushed in interviews over the “patient population” that we would learn from during medical school. Some of us (me again) even based application decisions on this notion. However, while I still wholeheartedly agree with this idea, it is much more difficult to apply the same line of thinking to individual patients I meet. I’m grateful to train at a medical school where chronic diseases growing in prevalence, such as diabetes and hypertension, are overrepresented in the general patient population. Yet, no part of me is ever glad to see a patient with these afflictions – even if it presents a valuable learning opportunity.

My peers’ reactions in the ER showed excitement in their education, which is a good thing in itself. However, I would argue that maintaining a sense of the patient’s perspective leads to more compassionate medicine. Enthusiasm for progressing as a medical thinker might easily be confused for a lack of concern. There is extensive literature on the perceived decline of empathy as students progress through their medical training<sup>1-3</sup>. One study suggested that the transition into third-year clinical rotations is where one sees the largest drop in the measured morality of students<sup>4</sup>. The authors believe a lack of role models, time pressure, high volume of information to learn, and other factors are at play. Additionally, my experiences indicate that the transition between textbook and patient-based learning may factor into this. Up until this point in our lives, we’ve had the luxury of seeing the sick only as fellow humans in need of help. Our unfamiliarity with pathophysiology and diagnostic criteria left us only to focus on the person in front of us. In the classroom, we are presented with epidemiology and pathogenesis, devoid of interpersonal interaction. Brief vignettes and clinical scenarios may attempt to bridge that gap, but they

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## MD/PhD Training, Cont’d

The first study looks at ways in which the clinical abilities of MSTP students are affected by PhD training. Over the last decade, MD/PhD students across the country have become increasingly worried that taking 3-4 years off between MS2 and MS3 years makes it difficult to do well on clinical clerkships. Less-than-ideal clerkship grades and exam scores are a definite disadvantage on residency applications and can be a significant source of anxiety for students. In response to these concerns, many programs now offer and/or require a clinical continuity course to help maintain clinical skills during PhD training. The UAB version, MSTP 795 Continuing Clinical Education, features a variety of clinical training opportunities including patient encounters, shadowing, simulation labs, and case discussions. Although the NIH strongly encourages these types of courses, it’s not clear how they should be structured or how effective they are. A single study out of Vanderbilt University demonstrates that students who take a clinical continuity course have higher MS3 grades and exam scores than students who do not. This report suggests that “something is better than nothing,” but fails to identify the activities of greatest benefit.

To answer this question, we are investigating the impact of MSTP 795 on clinical performance and student confidence. First, academic outcomes including clerkship grades, shelf exam scores, and Step 2 exam scores will be compared between UAB MSTP students

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# The Importance of Mistakes

## *Vulcan Staff Member Writes on Lessons Learned from Research in Kenya*

*by Anna Joy Rogers*

I sometimes get the question, “Doesn’t a master’s degree provide you with enough skills to do research? Why do a PhD?” I don’t know how other doctoral students answer this question, but for me, the answer is simple. I get four years of protected time to make research mistakes and learn from them. As a MSTP student collecting my dissertation data in Kenya, I get to add on a layer of cross-cultural challenges to the regular difficulties that other PhD students encounter.

### **Lesson #1: Discuss authorship issues early and frankly**

Two years ago, I worked for a summer on a collaborative research project across four institutions. In addition to familiarizing myself with the literature, gathering data, and learning a statistical program to analyze the data, I joined in on many of the team calls. When it came time to write the manuscript, I dutifully wrote up my section of paper. A month later, as the team was circulating the manuscript draft, they began discussing turning my section into a full-blown paper, and thus taking it out of the current manuscript. They complimented my work highly, and asked if I was okay with that. Naively thinking that it made no difference to my authorship on the paper, I accepted their accolades and agreed to work on my section separately. Little did I know that my name would drop from the authorship list to the acknowledgement section of the article, which was published in a widely respected journal. Fast forward to Kenya. As I doctoral student, I primarily work on my project with my two Co-PIs. I personally conducted all the data collection, analysis, and write up for an abstract. When I submitted the abstract to a conference, I only listed three authors: myself and my two mentors. It made sense to me. But little did I know that it would get me in a good deal of trouble. While the work was indeed my own, I failed to recognize that the research infrastructure – and thus the individuals who established that infrastructure – made my research possible and thus deserved recognition. In

*Anna Joy Rogers (GS-2) is researching how to better prevent mother-to-child transmission of HIV in Kenya.*

international settings, collaboration with local researchers not only enables the work, but it also empowers the host country to have ownership over and take action on the results of the research. Thus, regardless of the research setting, it is crucial to talk frankly with collaborators about who should get credit for the work that is being done.

### **Lesson #2: Always involve the Institutional Review Board**

I’m not sure how the IRB feels about this analogy, but I sometimes think of myself as a teenager and them as my research parents. Basically, they are interested in my safety (and the safety of those around me). If my activities are legitimate, they happily give me the go-ahead. If not, they may set a curfew. If I step out of bounds, I could get grounded for a few weeks. I once made the mistake of pretending like if I ignored the



# The Importance of Mistakes, continued



IRB, it would just cease to exist. I conducted my low-risk research in a small population and was willing to not publish it as the price to pay for not writing an extensive protocol.

In retrospect, my actions were like sneaking out of the house at midnight to go get ice-cream and assuming my parents would overlook that harmless activity. There are three reasons why that was the wrong decision: 1) It would have been incredibly easy to call up the IRB and ask whether I might be eligible for exempt status. 2) I short-changed myself on the opportunity to write a human subjects protocol and think through the reasons for my research decisions. 3) I later really wished that I could have published the data. While retroactive IRB approval is possible in some situations, they (like your parents) would much rather you hadn't sneaked out in the first place.

### **Lesson #3: Don't try to save the world in your first week**

One of my main reasons for wanting to work in a lower-resource international setting is my strong belief in the concept of capacity building. Empowering local researchers with higher-level skills through training

that is not widely available in their home country allows them to take their own steps towards progress. My first week in Kenya, I was invited to assist a grant-writing instructor in a two-day workshop. As fate would have it, that same week, a young local investigator approached me about helping him write a grant. Perfect! (Or so I thought.) Before finding out this individual's prior training, skill level, and interpersonal skills, I happily agreed to help.

I launched into assisting him with a literature review, refining his specific aims, and contacting potential collaborators. Little did I know, this individual had a weak research background and due to poor interpersonal skills, ended up damaging my relationship with a few collaborators. While I have since come across very talented Kenyan investigators whom I have been honored to partner with, I was unwise to try and implement my world-saving ideas in my first week on the ground with that individual.

In summary, I'm thankful that I have these PhD years to make mistakes and learn from them. Hopefully, after reading this article, you'll make one fewer mistake than I did.

## MD/PHD Training, continued

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pre-MSTP 795 and UAB MSTP students enrolled in MSTP 795 to determine if and to what extent the course improves clerkship performance. Second, a longitudinal survey will be given to students at three different time points in their graduate school years to identify how students perceive and predict their clinical performance level. This project, the work of the MSTP Griffin Society, started data collection in Summer 2014. When completed, we will know which clinical abilities suffer most during the MD/PhD leave of absence and which educational strategies soften the blow.

The second study evaluates how research during medical school impacts clinical career outcomes. Medical students interested in research have many different options including informal experiences, like summer research, as well as structured programs with a separate research curriculum, such as the MSTP. The UASOM and many other schools have recently introduced a research requirement as part of medical training, although there is significant variety between schools as to how these experiences are set up, from 8 weeks of Scholarly Activity at UAB to a full year of research training at Duke. We still don't really understand if and how required research experiences affect the type of career students choose, much less the impact of length of time or formal classwork. We have developed a survey for UASOM alumni, with particular emphasis on those who graduated in the 5 years before and after the introduction of the Scholarly Activity clerkship requirement. The first half of the survey contains descriptive questions about research experiences during medical school, including type of research, productivity, mentorship, and impact on career goals. The second half of the survey has questions relating to post-medical school training, including residency match, fellowship/faculty positions, current involvement with research, and satisfaction with career choices. Survey responses will be used to answer questions about how different types of research are associated with career outcomes: does Scholarly Activity make UASOM students more or less likely to continue research as residents and attendings? How much is the right amount of research time during medical school? Is it more beneficial to do research as a MS1 or MS4?

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## Student Spotlight

### Brian Warmus - MS3

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Frontotemporal Dementia (FTD) is a progressive neurological and cognitive disorder that accounts for roughly twenty percent of young onset dementia cases. Current treatment for this disease is limited to symptom management, and patients typically only survive between two and ten years following diagnosis. However, recent work by Brian Warmus in the laboratory of Dr. Erik Roberson has identified a potential therapy that targets an underlying abnormality of this debilitating disease. Outlined in a recent publication in *The Journal of Neuroscience*, Warmus et al. characterized a novel mouse model that displays behavioral abnormalities reminiscent of FTD and possesses neuronal impairment in its ventral striatum and insular cortex; regions of the brain known to malfunction in FTD. Specifically, the mouse neurons in these brain regions demonstrated diminished expression of anchoring proteins at their synapses, as well as a reduction in the expression of excitatory receptors such as the NMDA receptor. Intrigued by this finding, Warmus et al. then went on to show that treatment of this mouse model with cycloserine, a NMDA receptor co-agonist, was able to rescue this impairment in NMDA receptor function and repair the behavioral and physiological deficits observed in this model. Excitingly, deficits in these mice could be repaired as far out as one year from initial observation of FTD symptoms, and cycloserine has already been FDA approved for the treatment of tuberculosis, potentially facilitating its translation into clinical use. Brian hopes to build on this recently published work by examining what effect cycloserine treatment has on observed neuronal pathology in this model of FTD. Outside of the lab, Brian enjoys spending time with his family and playing soccer and ultimate Frisbee.

# HudsonAlpha, continued

size and impressive scientific resources provide a unique opportunity for graduate trainees to work on the frontlines of next-generation sequencing data generation and analysis. The institute currently has many translational research projects and other large scale genomic projects, such as the public research consortium, ENCODE (Encyclopedia of DNA Elements). The projects utilize a wide array of techniques such as whole-genome sequencing, methylation analysis, RNASeq, miRNA-seq, ChIP-seq, and metabolomics, so if you are at all interested in learning how to work with “big data,” HudsonAlpha is the place to be.

## What are you currently working on?

*Ryne Ramaker (Graduate Student, Year 1)*

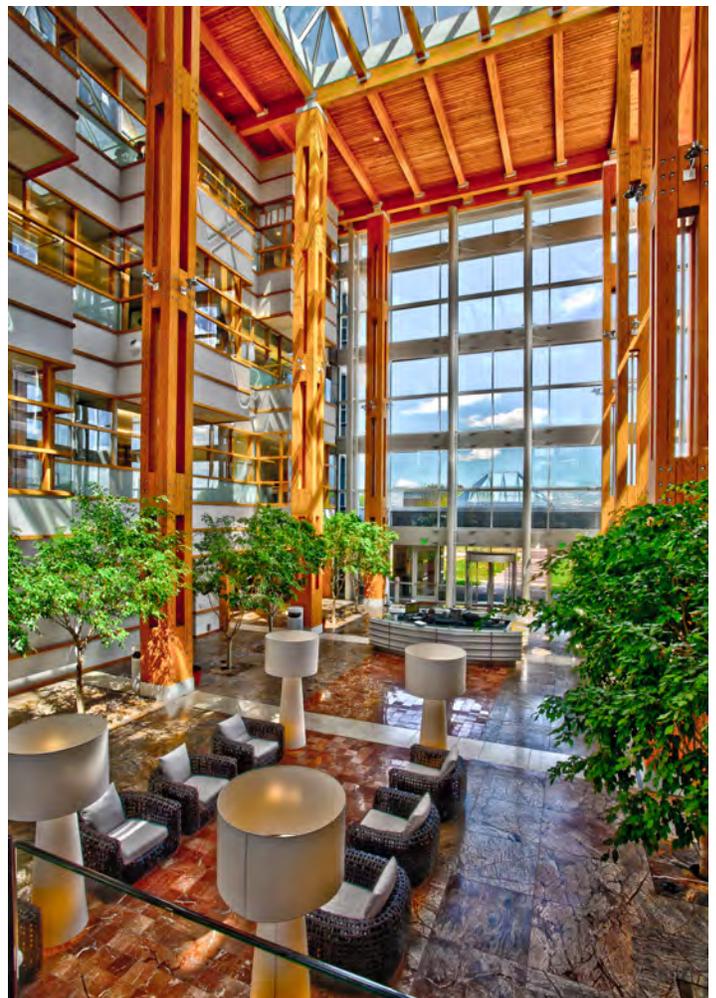
I’m working on a smattering of projects that broadly fall under theme of developing analysis methods, particularly those equipped for integrating metabolomics with functional genomics to help understand novel disease pathways and identify candidate therapeutic approaches. The specifics of the projects I’m working on range from developing new analysis programs (shameless plug: <https://github.com/rramaker/IPA>), analyzing primary brain tissue of neuropsychiatric patients as a part of the Pritzker Neuropsychiatric Disorders Research Consortium, and identifying prognostic markers for pancreatic cancer patients with the UAB pancreatic cancer SPORE group.

*Drew Hardigan (Graduate Student, Year 1)*

I’m currently working on utilizing next-generation sequencing to investigate circulating miRNAs and other non-coding RNAs in human plasma as biomarkers of disease. We are currently applying this method, in collaboration with physicians at UAB, to identify biomarkers of colorectal cancer and alterations in the adenoma-adenocarcinoma sequence with the goal of detecting pathogenic/neoplastic changes earlier than current methods. In addition to working at the lab bench, I’m learning how to utilize bioinformatics and computational approaches to investigate basic biological questions that are related to our work, such as the detection and functional relevance of novel miRNA isoforms (isomirs).

## How difficult was the transition from UAB to HudsonAlpha?

Although Huntsville is only an hour away, moving here from Birmingham for our graduate work has definitely presented unexpected challenges, both academically and socially. Many of these challenges have been solved as they have arisen, and the MSTP administration has been very helpful in navigating this experience by, for example, coordinating graduate coursework with appropriate local or online options. There aren’t many graduate students on campus yet, which has challenged us with a steep learning curve. We’ve been forced to work much more independently than we did in some other labs we rotated with previously. Nevertheless, we have really enjoyed the opportunity to work in such a unique environment and we are very satisfied with our decision to come to HudsonAlpha.



## Our First Code, continued

are poor substitutes for sitting down and hearing a patient's story. As our knowledge of medicine grows and we are able to systematically dissect away (sometimes literally) the illness from the individual, it is natural to feel personal satisfaction in recognizing the inciting malady and proper course of treatment. However, in the pursuit to uncover the illness, we cannot forget about the patient. I feel mildly apologetic to bring up the trite adage of "treat the patient, not the disease", because it has always struck me as a vague and obvious proclamation. It is pretty clear that physicians should talk to their patients and address their concerns even beyond filling out the prescription pad. However, tempering our personal excitement, ambitions, and desires is also appropriate because they distract us from what is important and could project a lack of empathy.

Although I continue to dwell on that afternoon of "our first code," I've said nothing to the attending or the other students involved. Medicine is an intensely hierarchical profession with what Frederic Hafferty describes as a "hidden curriculum" in regards to ethical and professional conduct<sup>5</sup>. Since Hafferty's landmark paper was published, medical schools do a great deal more to emphasize the formal instruction of ethics. However, I still fear that any mention of my feelings from that afternoon might be taken as accusatory and insubordinate. Even if addressing the issue with the utmost tact and respect, I worry over the foreseeable backlash that might ensue from questioning a peer's enthusiasm or a supervisor's attitude. I do not pretend to have the solution or a deep understanding of all the forces at work that shape how the hospital functions. All I do know is that as an (perhaps overly) idealistic first-year medical student, I felt and continue to feel that compassion is one of the most important attributes in our profession. After all, the heart is a powerful organ.

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## ANNOUNCEMENTS

Congratulations to Mark and Sandy Pepin on the new addition to their family! Amélie Dawson Pepin was born on February 21st, 2015 at 1:12 PM, and weighed 7 pounds and 5 ounces.

Additional congratulations to Mark Pepin for his 6th place finish in the Mercedes Marathon!

Congrats to Tyler McCaw for his 15th place finish in the Mercedes Marathon!

Congratulations to Brandon Pope for his recent engagement to Rachel Jackson!

Congratulations to former MSTP Student Juan Calix who is now the proud father of triplets. Julio Selig, Emile Mercer, and Juan Mateo were born on November 3rd, 2014.



# Publications

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## MD/PhD Training, continued

What type of research involvement maximizes career satisfaction? Is the answer to all these questions dependent on the medical specialty? This project, sponsored by the UAB chapter of the American Physician Scientists Association (APSA), is expected to produce results by the end of the year, from which we hope to create a model to help current UASOM students design a research training plan specific to their career goals.

Although many training pathways exist for physician scientists, we are considered “endangered” by the NIH, as MDs and MD/PhDs alike are often not able to sustain an active career in both research and patient care. Lack of support during training, especially at key transition points, is thought to be a major contributor to this problem. We believe the studies described above will clarify the experiences which are most likely to produce successful physician scientists and suggest potential curricular changes to maximize the education of both MD and MD/PhD students.

### The Vulcan Letter

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