

Research: An Infinite Quest of Knowledge and Creativity

Miranda Hanson

Good morning students, faculty, and friends. Firstly, I would like to thank Dr. Raudenbush and the rest of the Research Symposium Committee for inviting me to speak here today. It is truly an honor. I had an opportunity to look over the research projects that will be presented throughout the day, and I was quite impressed. I'm looking forward to learning more about the research currently taking place on campus.

As the title of my talk suggests, I regard research as a journey that incorporates the mind with the heart. Our minds allow for the pursuit of knowledge, while the heart provides the desire to be creative- the want to achieve greatness. The distinguished American psychologist, physiologist, and philosopher William James said, "The great use of life is to spend it for something that outlasts it." I hold research as the epitome of this philosophy. The remarkable quality about research is the everlasting impact it may have on generations to follow. It is this colossal impact that made research so appealing to me when I began my college career here at WJU. During my first three years here, I was interested in both medical research and marine biology, so I kept an open-mind regarding graduate programs and career paths. In the spring of my junior year, I was encouraged by Dr. Shurina to apply for summer internships in research fields that interested me. I was accepted to one that focused on marine biology and another that centered on cancer research. Though working on the coast was a more attractive option to me, I had a great interest in molecular biology so I thought studying cancer would be more beneficial to me long-term. I decided to accept the offered internship at the Mary Babb Randolph Cancer Center at West Virginia University. I did not have that much experience in a research facility at this point in my education, so I was quite intimidated upon entering the lab. Luckily, I had a notable mentor and several well accomplished graduate students who offered their expertise readily. By the third week, I had learned most of the techniques I would need to adequately gather data for the project I was assigned and I was, for the most part, feeling comfortable in my surroundings. I remember thinking as I walked in to

work every day that summer, “I really think I can do this for the rest of my life”. (Now, when I’m walking into the same building as a graduate student, I’m thinking “When will it end?”, but I’ll get to that later.) The design of the Cancer Center is such that the hallway to the research labs overlooks the waiting room for the cancer patients. The direct connection between benchwork and bedside was quite apparent and provided me with the “heart” aspect of research I was lacking up until this point. At the conclusion of my internship, I left with a great deal of research experience, improved presentation skills, and a clear mindset of the career path I would choose following graduation. When I returned to WJU for my senior year, I continued working on the research I began at WVU. The guidance and expertise that I received from my mentor, Dr. Shurina, coupled with the experimental tools that I gained from my summer internship enabled me to obtain significant results that I had the opportunity to present at several venues throughout the year. I cannot stress enough the importance of undergraduate research experience for those of you who want to pursue a career in this field. Research is not solely about performing experiments in a lab, but rather it includes being able to communicate one’s novel findings with others. Presenting one’s research in a convincing manner is where knowledge and creativity intersect. I have come to realize, it is also a skill that many researchers lack. That is why participating in events such as today will give you an advantage in your future endeavors, whether it is graduate school or a another career path. During my senior year, I was also given the opportunity by Dr. Shurina to attend the American Association for Cancer Research Conference in Anaheim, CA. Being exposed to the most current molecular biology research reaffirmed my desire to pursue a career in that particular field. This opportunity also facilitated the preparation of my first presentation at a conference as a graduate student.

Since being a scientist was my goal, graduate school was my destiny. After graduating from WJU, I was accepted into the Biomedical Sciences Program at West Virginia University’s School of Medicine. After I had completed three rotations in research labs of my choice, I decided to do my doctoral work in an immunotoxicology lab in the department of Microbiology, Immunology, and Cell Biology. At the end of my first year of grad school, I had completed most of my

coursework and my working environment could not be any better, so everything was going rather well for me. I have realized though, that there is always that chance for an unsuspected misfortune that will counteract one's contentment. For me, the balance to my good fortune thus far was that I was diagnosed with a rare form of cancer. This nightmare became a reality that I was forced to accept. The irony that the disease I had been studying was now the one that may prevent me from accomplishing all of my goals was overwhelming to me. The tables had turned- I was now the patient in the waiting room looking up at people working in the research labs. When a doctor diagnoses you with a disease, followed by the statement: "Not a lot of research has been done on this", it makes you realize how indispensable research is to the human race. It is so easy to get caught up in one's own work and lose sight of the impact it has on other people.

I assume that when anyone is diagnosed with a fatal illness he/she has to make a decision regarding the way in which the rest of his/her life will be led. For me, I refused to let the disease get the best of me so, in between surgeries and treatment, I continued working in the lab and attended classes. Though I would be a liar if I stood up here today and said that I never thought about giving up, I can definitely tell you that I found the strength somewhere within myself to overcome the odds and continue with my life's plan. Presently, I have been cancer-free for little over a year. Since my diagnosis, my commitment to research has amplified, and making an impact in the scientific world has become my number one priority.

Currently I'm in my third year of doctoral studies. My research consists of studying the effects of prenatal cadmium exposure on T cell development and whether these effects will persist throughout adulthood. Though effects of cadmium on the immune system have been studied, no one has determined the effects of the metal when exposure occurs during pregnancy. Cadmium is a heavy metal found in batteries and cigarette smoke, and is a byproduct of the zinc industry. For nonsmokers, food constitutes the principal environmental source of cadmium. In many respects cadmium has become an essential component of modern technology, with numerous applications in the electronics, communications, power generation, and aerospace industries. The main

metabolic feature of the metal which contributes to its toxicity is an exceptionally long biological half-life resulting in an almost complete irreversible accumulation of it in the body throughout life. Cadmium and cadmium compounds have been classified as known human carcinogens by the International Agency for Research on Cancer and the National Toxicology Program based on epidemiologic studies showing a causal association with lung cancer, and possibly prostate cancer. In addition, epidemiologic studies have been published suggesting that cadmium is also associated with cancers of the breast, kidney, pancreas, and urinary bladder. My preliminary results suggest that prenatal exposure to cadmium has a detrimental effect on T cell development, thus altering the immune response.

A few weeks after I began my work, it was revealed that residents of a small town in Harrison County, WV sued a chemical company for improperly disposing zinc tailings at a former smelting plant site. This resulted in zinc tailing piles of up to 100 feet high covering about 50 acres, with high concentrations of lead, cadmium, and arsenic. Some homes are located within 50 yards of the zinc piles. The company knowingly exposed the residents of the community to cadmium levels 2000 times the acceptable limit due to their improper disposal of the tailings. The most discouraging statistic is that Harrison County has the highest incidence of cancer in the nation. This case reaffirms the importance of research, but more importantly the impact that it has on a local level.

After three years of enduring graduate school, I can stand before you and say that research is not for everyone. In the past two weeks alone, I've been bitten by mice multiple times, had a mice bladder explode in my face, and caught on fire, so glamorous it is not. As the title of my talk describes, it is an endless pursuit that requires all of one's mind and heart. I am proud to be an alumna of a university that promotes such diligence in its students as evident by the quality of research being conducted. I want to wish good luck to all of the participants today. Thank you for your attention.