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The first project I was involved in was the role of smurf2 in intervertebral disk degeneration. Smad Ubiquitin regulation factor (Smurf) 2, an E3 ubiquitin ligase, was found to induce intervertebral disc degeneration in vivo. Disc degeneration is a major cause of lower back pain in humans. In order to characterize the molecular mechanism of smurf2 in disc degeneration we used an in vitro cattle disc cell model. The downstream factors of smurf2 such as GSK-3β-B-catenin pathway and other cross-talking pathways including TGF-B and BMP signaling pathways are currently under investigation. By using techniques such as DNA cloning, quantitative PCR, and western blotting we are able to measure mRNA and protein expression levels. I had the opportunity to perform each of these analytical techniques numerous times throughout the course of the summer.

The smurf2 study has the potential to treat lower back pain by understanding a molecular pathway that leads to chondrocyte maturation and extracellular matrix degeneration. Currently, smurf2 is known to cause osteoarthritis symptoms in the transgenic mice model. [1] The study is important to the healthcare industry, because arthritis is the leading cause of disability in the United States with osteoarthritis as the most common type. [2] A pharmaceutical approach could be potentially useful in targeting the downstream pathways of smurf2 such as GSK-3β and TGF-
Moreover, there are few therapies available to treat osteoarthritis, most of which are invasive, so a pharmaceutical approach would be a major breakthrough in treating arthritis.

The second study I was involved in was the predictors of limitations in Parkinson’s disease. Parkinson’s disease affects nearly seven million people and is the second most common type of neurodegenerative disorder. The disease is a movement disorder, which affects both the motor and non-motor functions of the individual. The disease works by targeting dopamine-generating cells in the brain and can cause tremors, decreased speed of motor movements, rigidity, loss in smell, decline in cognitive abilities, changes in mood, and problems with sleep. Recent research has begun to show that the non-motor symptoms of Parkinsonism are a better indicator of future limitations in patients. This study hopes to discover the non-motor symptoms that best indicate future functional disability, in order to better tailor management strategies for patients. The desired goal of the study is to increase the functional independence and quality of life for patients suffering from Parkinson’s as well as their caregivers.

The study gives a comprehensive evaluation of motor, and non-motor symptoms of Parkinson’s. I had the opportunity to administer mood and self-report assessments to the patients participating in the research study. This involved carefully reading the assessments to the patients, in order for them to completely understand and comprehend all the questions. Additionally, I had to ensure that I was not biasing their answers, and was consistent for all patients. Once the tests were administered I evaluated them according to protocol and entered the findings into a database.

Baylor Scott and White’s mission statement is, “Baylor Scott & White Health exists to serve all people by providing personalized health and wellness through exemplary care, education and research as a Christian ministry of healing.” Through my contributions to the
Parkinson’s research study, I served the people of central Texas by helping to elucidate Parkinson’s disease and its non-motor symptoms. This study has the potential to drastically improve the quality of life and more importantly increase the independence of patients suffering from Parkinson’s. The study will provide doctors with a better set of non-motor predictors to tailor a proper treatment plan for patients. The correct treatment plan is critical to patients as a well-tailed plan can alleviate the symptoms of Parkinson’s disease. I also attended PD support groups where I had the chance to meet with individuals suffering from Parkinson’s along with their caregivers. This gave me an invaluable opportunity to gain insight into the daily lives of patients, and the difficulties they encounter on a day-to-day basis. I was humbled by the experience and furthered Baylor Scott and White’s mission of providing personalized healthcare.

From the study and observation, it was clear that most caregivers in the study did not feel burdened by their partner with Parkinson's. In fact, it appeared as though there was no correlation between severity of progression and caregiver burden. This, to me, was an astounding observation, because the patient in most cases is mostly, if not completely, dependent upon their caregiver for support. Furthermore, numerous patients with Parkinson's remained in high spirits despite displaying numerous motor and non-motor symptoms.

The role I played in the study on smurf2 gave me firsthand look on lessons I’ve learned in the classroom at Baylor University. I have learned about electrophoresis, PCR, and western blotting, which gave me a solid foundation for understanding the experiment and its methodology. It was fascinating to compare what I have learned in the classroom about analytical techniques to the procedures actually followed in lab. I found the actual procedures and protocols followed by researchers to be very precise and more in-depth than what was taught in class. For example, many of the steps in western blotting require a precise pH, in order to
activate the necessary enzymes. Moreover, foundational skills, which I learned in Baylor laboratories such as pipetting, measuring, and calculating concentrations, were required to be successful.

The SWURP internship was instrumental in solidifying my desire to pursue a career in medicine. It was an invaluable opportunity to see many different aspects of the healthcare field including basic bench-top research, clinical research, and surgical procedures. By directly interacting with patients in the Parkinson’s research study, I’ve seen the importance of research and its potential impact on more than just a number, but a life. It has been a humbling experience to talk with patients who suffer from a debilitating disease, as well as a great source of motivation for me.

My expectations going into the internship were two fold, first to shadow a physician and second to learn about clinical research. Throughout the summer both exceptions were met with greater than anticipated results. My time at Baylor Scott and White has changed my initial perspective on the healthcare industry by allowing me to better understand the ethics and responsibilities of doctors. I was unaware of the great amount of ethical responsibility doctors have when ordering tests and seeing patient in the clinic. Similarly, on the research side of medicine, my perspective was transformed by better understanding the Internal Review Board process. The Internal Review Board is very stringent on how research is to be conduct, as well as the methodologies when conducting the study. I was also unaware of the enormous list of requirements to begin a study, and the type of consent required to add patients onto a study. An astonishing amount of work is required to start, conduct, and maintain a research study in the hospital.
An essential lesson I’ve learned by shadowing my mentors and actively talking with patients is the importance of the doctor-patient relationship. This relationship is critical to enhancing the care received by the patient. Trust is the cornerstone of the relationship, because patients must be able to entrust their doctor with sensitive information. Without this relationship, the healthcare received by the patient quickly deteriorates, because proper diagnosis cannot be identified which in turn leads to unsuitable management strategies. My first hand experiences of observing doctors interact with their patients has shown me the difference that being personable and professional can have on the patients. Patients responded extraordinarily well when doctors treated them as more than numbers, and were likely to build a stronger relationship with the doctor. I will bring these experiences with me, in order to improve the quality of care I can give to my patients in the future.

As I experienced and learned the process of clinical research, I began to understand the profound impact medical research has on the community. Without clinical research the medical field would come to a standstill. New cures, drugs, and treatments can only come to fruition through research. I’ve learned the importance of involving the community in medical research, and the need to change the negative persona surrounding medical research. By teaching the community about the benefits of research and inspiring young physicians to participate in research, I believe we can greatly advance the healthcare industry.
References

