

2021 PSBR High School Essay Contest
Finalist

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Only about 5,000 Americans per year are diagnosed with amyotrophic lateral sclerosis . Most diagnoses of ALS are in people between the ages of 55 through 75 and only 10% of people are diagnosed outside of this age range. Unfortunately, my grandfather was one of those 5,000 people to be faced with this rare diagnosis, and he was outside of the diagnosis range, only diagnosed at age 85. These statistics placed my grandfather into a small category of people that had the disease, but an even smaller category of older people who were learning of their diagnosis while also entering into the final stages of their lives. Without the advancement of medical science, specifically through studying animals, my grandfather's end stages of life would have been exponentially worse.

ALS is responsible for ceasing the function of nerve cells. In other words, nerve cells die and trigger certain muscles to become weak. A few of them include fasciculations, muscle cramps, muscle weakness, difficulty chewing or swallowing, and slurred speech. My grandfather's symptoms began with weakness in his left hand. Once his weakness began to become more noticeable, he visited a neurologist.

The advancement of biomedicine and the ongoing commitment of medical scientists to discover the unknown amazed me. One of the first questions that the doctor asked my grandfather was whether he had served time overseas. My grandfather proudly told the doctor that he served in the Korean War, stationed in Guam. Immediately, the doctor asked him if he had ever eaten a flying fox. My grandfather had no idea what a flying fox was and continued to tell the doctor that they ate whatever food was provided to them. Unknown to him and during the war, the people of Guam mixed flying foxes into the food they ate, bats that contained a large amount of BMAA. BMAA is a non-protein amino acid proven to kill neurons. Given there is no "test" to determine if a patient has ALS, but instead is an elimination game, this finding ultimately led the doctor to believe that these animals were a likely cause of my grandfather's ALS.

Without the studies done on flying foxes, my grandfather and family would have never had the closure and information necessary to make informed decisions. However, medical science did not stop there. The doctor decided to prescribe a medication, Riluzole. There is no medication that can work to fully cure ALS; however, Riluzole works to slow down the progression of it. Although this drug has been tested on animals, animal experiments were not fully able to replicate the human features of ALS.

Luckily, scientists found that dogs can develop a disease known as degenerative myelopathy, extremely similar to ALS in humans. The scientists conducted a study on these dogs to see the effects of Riluzole, specifically if it would help to cure the disease. They were

unsure if continuous intrathecal delivery (IT) infused directly into the spine would work better than if taken orally, without increasing the side effects.

Over a six week time period, hound dogs received Riluzole both orally and infused into the spinal cord. After those six weeks, researchers concluded that there was an increase in concentration. This proved that both methods were more effective together, rather than oral administration alone. Although this experiment could have had harmful effects on the dogs, the researchers concluded that the Riluzole was well-tolerated by them, except in higher dosages.

Ultimately, when combining both the IT administration of Riluzole with the oral administration, the concentration of the drug increased in the spinal cord worked much more effectively to slow down the progression of this disease. It has been indicated that by utilizing carefully selected doses of IT, it could be administered to patients with ALS.

Overall, biomedical research and the use of animals in that research has been extremely impactful on me and my family. Since ALS is such a rare disease and my grandfather was in an even more minute category, my family was concerned that he would not be given the appropriate care. Fortunately, thanks to bats, dogs, and scientists' unwavering commitment to biomedical research, my grandfather was able to live the remainder of his life as comfortably as possible. We all believe that Riluzole helped my grandfather continue to live his last 8 months of his life to the best of his ability. For this, I am forever grateful and for having the opportunity to spend more precious time with my grandfather.

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