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2005 Winning Essay - Phoenix

Congratulations to the Phoenix winner of the 2005 Essay Contest!

Mighty Mouse Saves the Day: Animal Research Saves Lives by Elizabeth, Payne Academy

"Here I come to save the day!" In the old TV show, Adventures of Mighty Mouse, he becomes a superhero, saving lives and conquering evil enemies. Animals saving humans is a common concept, but do we ever take into consideration the fact that animals may save our lives in more ways than one? One day in February, my grandmother was in the middle of folding laundry when my uncle found her clutching the side of the washing machine, the other hand pressed against her forehead as the room spun in a maelstrom of color. My grandmother waved it away, claiming that she was just tired. A few weeks later, she was again doing laundry in the early morning when my uncle heard a dull thud from the laundry room. He ran to the room and discovered her lying prostrate on the ground, a half-folded shirt still in her right hand. She was shaking and trying to get up. We later found out that she had suffered a transient ischemic stroke when she first felt weak and dizzy, and when she collapsed a few weeks later, she had undergone a cerebral thrombosis.

My grandmother had to be helped into the hospital, as she was unable to support herself, especially because her left side was completely senseless. In the emergency room, the doctors took a CT scan and a electroencephalogram (EEG), which showed my grandmother's brain's electrical activity. The doctors also performed a Doppler ultrasound test, which uses high frequency sound waves to detect a blockage of arteries. My grandmother was soon diagnosed with cerebral thrombosis, a type of ischemic stroke, which are caused by blood clots that block blood flow to part of the brain. Cerebral thrombosis occurs when a blood clot, also known as a thrombus, forms and blocks blood flow in an artery that usually brings crucial blood to a part of the brain. Cerebral thrombotic strokes often occur at night or in the morning, when blood pressure is low. In my grandmother's case, she had suffered a cerebral thrombosis, and a few weeks before when she first felt dizzy, she had experienced a transient ischemic stroke (TIA), which produces stroke-like symptoms but causes no lasting damage. Fortunately, the doctors were able to treat her with Tissue Plasminogen Activator, ot tPA, a drug treatment for acute ischemic strokes. Since ischemic strokes constitute 70 to 80 percent of all strokes, the discovery of tPA, which eliminates blood clots, was a major breakthrough for stroke research. Thanks to tPA, my grandmother is on her way to recovery.

As the third leading cause of death in the United States and other developed countries around the world, strokes play a role in every person's life. Animal research is imperative for the progress that has been made in discovering effective treatments, drugs, and/or mechanisms for alleviating stroke symptoms on a long-term basis. Approximately 25 percent of

stroke victims die from stroke or its complications, and only another 25 percent recover more or all of normal health and function. Today, tPA, which was FDA-approved in 1996 as the only treatment for acute stroke, is increasingly used as a therapeutic agent. tPA can reverse effects of strokes, including disabilities, and was first studied in rats with experimental stroke. The number of rats and other rodents used in medical research has increased in correlation to their monumental contribution to numerous scientific discoveries in many medical fields, including diabetes, polio, obesity, cystic fibrosis, and more.

Ongoing stroke research daily employs animal research, as shown in another promising endeavor that involves animals' abilities to hibernate. Hibernating animals undergo a sharp decrease of blood flow to the brain, a drop that plunges so rapidly that it would kill a non-hibernating animal. By understanding how animals hibernation sustain this decrease in blood flow without any brain damage, scientists hope to unlock the secret of preventing the brain damage caused by decreased blood flow to brain cells in stroke patients.

The Declaration of Helsinki mandates that "medical research on humans must be supported by animal research." 150,000 people in the United States alone die every year from strokes, and without animal research, many more stroke patients would not be alive today. Although my grandmother is still struggling to regain feeling in her left arm and leg, she is going through therapy and is already showing much improvement. The medication she received, including tPA, was all made possible by animal research. Who could have known that Mighty Mouse would save humans?

Follow up essay - Elizabeth, Internship at Barrow Neurological Institute

This summer I had the opportunity of experiencing the laboratory environment firsthand. While pooling samples from patients and helping to count leukocytes in colony-forming units, as well as learning how to perform an ELISA assay, I was able to grasp a better understanding of neuruimmunology. The ELISA, or enzyme-linked immunosorbent assay, is used as a direct binding assay for antibody or antigen. This ELISA process detects the presence and measures the amount of an antigen recognized by an antibody from a sample of body fluid. In this specific ELISA procedure, the Interleukin-5 (IL-5) cytokine is being detected. IL-5 is a growth factor that is secreted in human and mouse species. IL-5 is secreted by Th2 (helper T) cells and attracts cytotoxic white blood cells called eosinophils.

At the end of an ELISA, the reaction of a substrate with the enzyme produces color, indicating a positive reaction. The microplate reader detects the wavelength of the sample's colors in each well of the plate, therefore measuring the concentration of IL-5. The ELISA is often used in viral diagnostics, and is therefore an important component of conducting research in neuroimmunology. Along with conducting studies for companies, the neuroimmunology laboratory I worked at is also involved in research using both human and mice subjects. I would like to thank all of the laboratory staff for being so generous with their time with me this summer and patiently explaining concepts to help me comprehend their work.