

2015 PSBR High School Essay Contest
Finalist

Emma M.
Norwin High School
North Huntingdon, PA

Multiple sclerosis (MS) is a severe disease that occurs in the central nervous system, primarily affecting the brain and the spinal cord. 2.5 million people worldwide have MS, including 400,000 Americans, one of those being my grandmother. MS hinders the course that information travels in the brain and through the body to the brain, thereby creating many problems that weaken the body. Symptoms can range from numbness and muscle stiffness to thinking difficulties. MS also acts as a gateway for other autoimmune disorders, such as psoriatic arthritis, from which my grandmother currently suffers.

There is no cure for MS, but discoveries in biomedical research have given hope and relief to MS patients. Some of these discoveries were the result of animal experimentation and testing. While opponents of animal testing see such a practice as unethical and ineffective, I believe the evidence of the success of animal testing, and the help it has brought to people like my grandmother, make it a critical part of modern medicine.

For example, animal testing may have uncovered a possible reason why some patients get more serious aspects of MS sooner than others. A 2013 study found that low amounts of the gene *Tob1* in CD4+T-cells, a type of immune cell, in certain patients resulted in signs of MS activity earlier than patients who had regular amounts of *Tob1*. In a first experiment, a group of mice were genetically modified to have less *Tob1* than a group of mice having normal *Tob1* levels. In a second experiment, T-cells without *Tob1* were inserted into mice that lacked immune systems, but contained regular *Tob1* in all their other cells. In each experiment, mice without *Tob1* in their T-cells exhibited harsher stages of the disease at a much earlier time than the mice with regular levels of *Tob1*.

Another test in which animals were involved showed one of the new possible treatments for MS. Researchers found an experimental treatment for MS that reversed the disorder in mice, and thus might also work on humans. This new treatment is called GIFT15 and it reduced MS in mice by restraining the immune response. More specifically, GIFT15 was found to transform B-cells (white blood cells used in immune response) into stronger, B-regulatory cells. Samples of B-cells were taken from mice that showed symptoms of MS, and then the B-cells were transformed using GIFT15, then given back to the mice. As a result they no longer showed a sign of MS.

Additional studies carried out using animal testing also gave scientists an improved idea of how to advance cures for MS. It is known that MS is a disease where the immune system attacks the protein membrane covering the part of the neuron cell that sends electrical signals. The protein membrane consists of oligodendrocytes, a type of non-neuronal cell. A new study recently conducted showed a more exact way to count how many oligodendrocytes are in brain and spinal cord tissue samples from animal models. A method called flow cytometry, which is a laser-based technology used in cell counting, sorting, and detection, is being used to help calculate these oligodendrocytes in mouse models.

Though biomedical research presents enormous opportunity for finding a method to treat MS, some people are not in favor of using animals for testing. To use animals as models, scientists create various symptoms to look like those in human disorders, such as MS. In one animal test, rodents were injected with protein extracts from the brains of other animals to cause symptoms that resemble MS, specifically nervous system inflammation and demyelination. Opponents of animal testing dislike the idea that animals have no choice in testing and are subject to several diseases and the associated symptoms. While one can appreciate the concern for the well-being of all life, scientific study, as evidenced by even the few examples above, has shown that animal testing appears to be the best method to replicate the conditions of human disease for study.

MS will continue to impact many lives as long as there is no way to treat it. Without biomedical research that utilizes animal testing, my grandmother and others will have to struggle with this disease. Animal testing can make such a huge difference in science as we know it. Not only could MS be cured, but a multitude of other diseases could be too. It is an unfortunate sacrifice of life, but I believe it to be a necessary one.

Works Cited

- "Multiple sclerosis successfully reversed in animals." *Phys.org*. 2009. McGill University. 25 January 2015.
- Plumridge. Sarah. "New Method Tests Effectiveness of MS Treatments." *northwestern.edu*. 2014. Feinberg School of Medicine. 25 January 2015.
- "In multiple sclerosis animal study, absence of gene leads to earlier, more severe disease." *sciencedaily.com*. 2013. University of California, San Francisco (UCSF). 25 January 2015.
- "The validity of animal experiments in medical research." *drhadwentrust.org*. 2009. Dr Hadwen Trust for the Humane Research, Hitchin, Hertfordshire, England. 25 January 2015.
- "What is MS?" *www.nationalmssociety.org*. 2015. National Multiple Sclerosis Society. 8 February 2015.
- "MS Health Center" *www.webmd.com*. 2005. WebMD, LLC. 8 February 2015.