

**2023 PSBR High School Essay Contest**  
**3<sup>rd</sup> Place**

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Biomedical Research and My Life

Biomedical developments and advancements impact every aspect of medicine in order to improve people's lives through animal testing. Although it is a controversial topic, animal experimentation is a necessary component of the biomedical field to find new cures for diseases. It is the preferred method to safely develop new drugs and vaccines. Humans and animals share similar DNA and health problems, making them the optimal choice for testing. New treatment for a disease can be monitored throughout an animal's entire life, as their lifespan is shorter than humans. Animal testing has identified harmful side effects of new drugs and prevented humans from experiencing them. Animal testing in the biomedical field has led to the development of hundreds of medications and vaccines over the past decade (Stanford Medicine).

Cerebral amyloid angiopathy (CAA) is a condition where amyloid proteins are deposited along the walls of the blood vessels in the brain. These proteins weaken the blood vessel walls, making the brain prone to bleeds (MedlinePlus). This can occur spontaneously or be due to a genetic predisposition. Scientists have found evidence that the development of CAA has a relationship with apolipoprotein E (APOE). In familial syndromes, the disease is caused by a mutation in the amyloid precursor protein gene. A definitive diagnosis of CAA can only be confirmed with a complete examination of the brain after death. CAA occurs most frequently in people over the age of sixty (Kuhn and Sharman). The disease progresses slowly over time, as the amyloid proteins build up in the brain. There are two basic groups of symptoms for CAA. The first group of symptoms are life-threatening and required immediate medical attention. They include headaches, double or decreased vision, confusion, slurred speech, seizures, and paralysis. The secondary group of symptoms appears more gradually and does not require immediate medical attention. They include loss of mental function, episodes of confusion, unusual sensations, and gradual memory loss. These symptoms mirror those found in patients with dementia, whereas the first group of symptoms mirrors the symptoms of an acute stroke (Medline Plus).

Taxifolin, also known as dihydroquercetin, is a bioactive flavonoid that decreases the build-up of amyloid protein in the brain. It is a therapeutic agent that can be found in foods. Taxifolin can be found in grapes, citrus, olive oil, green tea, wine, and herbs (Saito et al.).

The animal model used for testing Taxifolin for the treatment of patients with CAA was a mouse. Scientists used mice that expressed the APP gene. They administered Taxifolin to the mice, and the result was a reduced amount of amyloid protein deposited in the walls of the

blood vessels in the brain. Taxifolin was found to restore cerebrovascular reactivity, improve spatial reference memory, and suppress inflammation in the brain in mice with CAA. The positive effects of taxifolin improved the symptoms of CAA in mouse models (Saito et al.).

Due to the positive results that Taxifolin had in animal trials, it has progressed to the clinical trial stage in humans. This is a slow process as scientists have to determine the correct dosage for humans based on the data obtained from the mice trials. Scientists need to adjust the dose of Taxifolin to make it effective in humans but prevent harmful side effects. Factors such as metabolism also could affect the success of Taxifolin humans. In the animal trials, a mouse with a higher metabolism had a more optimal outcome when Taxifolin was administered. Metabolism is one of the factors that is being taken into consideration during the clinical trials in humans for the use of Taxifolin in the treatment of CAA (Saito et al.).

CAA relates to my life because my Grandma has this condition. One may forget when researching diseases, it is not just definitions of the condition, but how the disease negatively impacts the lives of those who have the condition and their families. Seeing my Grandma's CAA slowly progress has been a difficult experience to go through. I remember when I was younger, she had difficulty remembering my name. I felt as if she was purposely forgetting who I was. Now, I realize that her memory loss was the progression of the CAA, making it more upsetting. She has slowly forgotten everyone in my family including her grandchildren and deceased husband. I hope through animal testing a cure or treatment for CAA can be found, allowing a person with CAA to lead a normal life and prevent their family from suffering.

#### Works Cited

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