

2017 PSBR High School Essay Contest
Finalist

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A Zoo of Breakthroughs

Type II diabetes is a devastating diagnosis. However, this disease can be controlled through the use of insulin injections. My father has been stable with diabetes for ten years due to this therapy. The only way these injections were made possible for my dad was because of animal testing. I will be forever grateful to the animal research that improved my dad's quality of life.

Josef von Mering and Oskar Minkowski began the study of diabetes. They removed a pancreas from a dog, discovering that this organ, when removed, causes diabetes. This sparked continuing research on the specific hormone that affects blood glucose levels. Twelve years later, in 1901, pathologist Eugene Opie discovered insulin was the root of the disease. Then in 1921, surgeon Frederick Banting and his student Charles Best also induced diabetes in dogs by removing the pancreas. Banting and Best successfully restored the health of a diabetic dog utilizing injections created from the secretions of a pancreas. The extract they developed, however, did not work well for humans. Biochemist James Collip purified their extract by ensuring it was primarily insulin. This injection was not yet safe to use in humans though since too much insulin in the bloodstream could be life-threatening. This is where another animal—rabbits—came into play. Collip needed to test his purified extract to figure out exactly how much insulin was required to lower blood glucose levels. He injected his extract into rabbits in a series of experiments. After a concentration was discovered, this injection was again tested on diabetic dogs. In 1922, patients suffering from diabetes were finally able to benefit from this breakthrough therapy, and today, my dad reaps the same benefits. All thanks to dogs and rabbits.

Another medical mystery that is progressing with animal research is Alzheimer's disease. My grandfather suffers from Alzheimer's, and while his case is too advanced to be helped at this point, it is comforting knowing others may benefit from the current research. Scientists have used mice, among other animals, to gain an understanding of this disease. Genetically-modified mice have revealed a link between heredity and Alzheimer's. Specifically, research on these mice "has shown how one particular version of the human APP gene leads to build up of damaging deposits in the brain" ("Alzheimer's Disease"). Furthermore, pinpointing the cause of Alzheimer's will help scientists develop treatments. Studies have shown that buildup in the brain seems to be a cause of Alzheimer's. The two molecules that are the culprits for this buildup are amyloid-beta proteins and tau protein tangles. Astrocytes are a type of cell released in response to plaque buildup, and scientists have discovered from mice that these cells may be released because they attempt to degrade this plaque. If this is the case, treatments to draw more astrocytes to the site of the plaque may be useful. Potential medications to treat Alzheimer's have also been discovered through animal research. Experiments revealed that non-steroidal anti-

inflammatory drugs (NSAIDs) may benefit Alzheimer's patients since they "have successfully lowered amyloid levels in mice, using doses achievable in humans" ("Alzheimer's Disease"). Mice have been undeniably beneficial in the search for a treatment for Alzheimer's.

Overall, animal testing is no doubt irreplaceable. Insulin for diabetes and possible treatments for Alzheimer's are only two of the ample breakthroughs brought about by animal research. On a personal level, my dad would not be here today were it not for those mice and rabbits used by scientists to discover insulin. Additionally, although my grandfather is suffering from Alzheimer's, there is hope that fewer and fewer families will need to endure this heartbreaking diagnosis. This hope is in the form of tiny, forgetful mice that are responding to promising new therapies. Animal research has and will continue to have a positive influence on my life and the medical community.

Works Cited

"Alzheimer's Disease." *AnimalResearch.Info*. Animal Research Info, n.d. Web. 18 March 2017.

"Frederick Banting, Charles Best, James Collip, and John Macleod." *Chemical Heritage Foundation*. Chemical Heritage Foundation, 3 August 2015. Web. 18 March 2017.

Parry, Vivienne. "What have Guinea Pigs Ever Done for us?" *The Guardian*. Guardian News and Media Limited, 31 August 2005. Web. 18 March 2017.