

2019 PSBR High School Essay Contest
Grand Essayist

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In 2005, my sister was diagnosed with Type 1 diabetes, an incurable autoimmune disease which renders your pancreas incapable of producing insulin, the hormone that controls blood sugar levels. Because the body can't produce insulin on its own, a diabetic relies on insulin injections to control blood sugar. While I don't remember the details of my sister's diagnosis, much of my childhood was filled with watching her test her blood sugar, get insulin shots, and go to the doctor. My sister is now nineteen, and while there is still no cure for diabetes, in the 14 years since my sister's initial diagnosis, I have witnessed all the incredible and innovative ways biomedical technology and research has allowed my sister and other Type 1 diabetics to be strong, independent, and healthy.

Before the discovery of insulin, knowledge of diabetes and treatment was extremely limited. Those diagnosed only survived for a few months, and starvation and dietary modifications were used in desperate but unsuccessful attempts to manage the disease. In 1921, however, Frederick Banting and Charles Best spearheaded future diabetic research and treatment by being the first to derive insulin. The doctors experimented on dogs with pancreatectomy, the removal of the pancreas and duct ligation, a procedure that involves tying the small intestine's pancreatic duct. After months of research, they were eventually able to lower the blood glucose levels of severely diabetic dogs and keep them alive using an injection prepared with the "brown mucky" extract from duct ligated dog pancreas. This extract contained the fluid from healthy dogs' islets of Langerhans which are cells within the pancreas that produce insulin. As long as the diabetically-induced dogs were injected with the extract, they remained healthy. After finding success in animals, Best and Banting recruited the help of biochemist Bertram Collip. Collip found that using alcohol with a 90 percent concentration helped purify the extract and precipitate out the insulin, and finally, the extract was ready for clinical testing on humans.

In 1922, fourteen-year-old Leonard Thompson, on the verge of a diabetically-induced coma, received the first medical administration of insulin. Thompson lived for another 13 years, and this proved that the new, purified medicine could now help humans with Type 1 diabetes. Soon, animal insulin, derived from the pancreas of pigs and cows using similar methods to that of Banting and Best, was used to help millions, globally, combat diabetes.

By the 1980s and with the help of animal research and biotechnology, scientists were able to manufacture a synthetic insulin, by growing insulin proteins within E-coli bacteria, that mimicked the structure of natural human insulin. This "human insulin" was also less likely than animal insulin to cause allergic reactions. and throughout the late 20th century, manufacturers like Eli Lilly made this new, synthetic insulin widely available.

Today, many diabetics use insulin analogs, a refined form of “human insulin” with altered amino acids that allows the body to absorb the insulin faster and more uniformly. Insulin’s continuous success emphasized the importance of personalized insulin therapy, one where patients and doctors were able to eliminate the dichotomy between each other and work together to tailor the patient’s diabetes management and treatment to assure the most independence and health. Inventions such as the insulin pump, a small, wearable device that delivers insulin through a tiny catheter inserted under the skin which millions like my sister use, enables diabetics to control their blood sugar at a more detailed level and eliminates the need for constant insulin injections. Other wearable devices like the continuous glucose monitor, an instrument which regularly tracks blood sugar levels, helps patients proactively manage high and low blood glucoses without the need to constantly test blood sugar levels with a glucose meter and blood. Diabetes is no longer seen as a deadly disease but rather something completely manageable.

With news of artificial pancreases, innovative glucose devices, and even a possible cure for diabetes, it’s easy to only look towards the future with eager eyes and forget the role animals have played in the history of diabetes research and biomedical technology. Our accomplishment in the field, today, rest on the shoulders of the decades of animal research that has now saved millions of lives. Not even a century ago, a diabetic would have only months left to live, but today, people like my older sister, with the help of insulin and devices such as the continuous glucose monitor and insulin pump, are able to live normal and fulfilling lives.

Works Cited

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