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Finalist

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Dogs and Diabetes- How Animals Help Treat the Disease

In many ways, my friend Olivia is like any other teenager: she loves music and animals and running and making art, and she hates math. Unlike most teenagers, however, she must carefully plan her meals and constantly monitor her blood sugar to make sure she doesn't end up in the hospital. At just two months old, Olivia was diagnosed with type 1 juvenile diabetes, making her one of the youngest cases ever diagnosed. For as long as she can remember, she has relied on external sources of insulin to help her lead a normal, healthy life. Olivia can thank the animals she loves so much for this life-saving technology, as animal testing has led to the development of many treatments for diabetes. Animal research and testing has developed many treatments for diabetes that allows people with the disease, including my friend Olivia, to lead active, healthy lives.

Diabetes is a disease that occurs when the body does not produce enough of or properly utilize the protein insulin to regulate the amount of glucose in the bloodstream. In type 1 diabetes, also known as juvenile diabetes for its typical time of onset, the body's immune system destroys the cells that produce insulin, resulting in a lack of insulin and a requirement for manual monitoring and insulin administration (JDRF). Without treating or managing type 1 diabetes, an individual with the disease is susceptible to blindness, liver failure, nerve damage, pregnancy complications, and death. However, in 1921, Frederick Banting and Charles Best discovered both the cause and the treatment for diabetes by removing the pancreases of dogs, then injecting them with insulin, and ultimately finding that the dogs' blood glucose levels decreased to a normal level after the injection (American Diabetes Association). This crucial animal experiment showed that the pancreas, and insulin production-related problems caused diabetes, and that insulin injections were a viable option for treatment. People with diabetes started to turn to insulin injections as a way to counteract the disease, and the treatment remains the most common way of managing diabetes even today (JDRF).

This frequent insulin injection method has been tied to animal research and products since it came about in 1921, especially since research on dogs identified both the cause and the treatment for diabetes. Before scientists started to genetically engineer bacteria with plasmids to produce insulin, people relied on bovine and porcine insulin for the treatments, which only differs from human insulin by a few amino acids. Pharmaceutical companies produced insulin by taking the hormone from either cows or pigs, purifying it, and selling it. Due to its structural similarity to human insulin, this animal insulin functioned quite well with few adverse effects on the patients, allowing them to maintain a normal glucose level in the blood and avoid adverse complications like blindness and organ failure (Brar). Not only were animals directly involved in producing the treatment for diabetes, they also played a role in developing a new way to

administer insulin. An alternative to injections is the insulin pump, which continuously administers insulin to the patient through a small pack. This technology was designed off of a similar pump that was used for infusing the parathyroid hormone in dogs (Understanding Animal Research). Though insulin today is usually produced by genetically modifying bacteria, some pharmaceutical companies are turning back to animals as a source of insulin: “pharm animals” are animals that have been genetically engineered to produce the hormone in their milk. These animals, usually goats and cows, are genetically engineered to have the gene that produces human insulin, and as a result produce human insulin in their milk (Ganzel). Their milk is then refined and filtered, with usable insulin as the result.

Animals are also involved in clinical trials and possible cures for diabetes. Dogs were involved in a recent study that tested the effectiveness of inhaled insulin (Understanding Animal Research). Some animals are even involved in testing an artificial pancreas, which would limit the need for constant injections or monitoring.

Animal testing and research has played an important part in previous developments in treating diabetes, and will likely play a key role in developing a cure. It has allowed people with the disease, like my friend Olivia, to live happy, healthy, active lives, and will likely continue to help others in the future. The process of testing and studying animals has led to a number of developments that makes living with type 1 diabetes easier for those who are afflicted with the disease.

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