New research for canine, human Type 1 diabetes holds promise

Preclinical results reversed Type 1 in 24 hours and maintained insulin independence for 90 days

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[1]
A new therapy is in a clinical stage of testing to reverse Type 1 diabetes in dogs, such as for seven-year-old Lexi, pictured here with her owner, Jan Goetz. “With giving my dog shots twice a day, I have to constantly be thinking about where I am and when I need to be home,” said Goetz. “Not having to give these shots would mean freedom.”

Reversing Type 1 diabetes in dogs and humans without the use of daily insulin injections or pumps may become a reality, thanks to a collaboration between Purdue University and the Indiana University School of Medicine. In a preclinical study, researchers developed a mixture of collagen and pancreatic cells and engineered a delivery method that successfully reversed Type 1 diabetes within 24 hours and maintained insulin independence for 90 days.

A clinical study in dogs with naturally occurring Type 1 diabetes in collaboration with Purdue’s College of Veterinary Medicine is next.

“We plan to account for differences from mouse to human by helping dogs first,” said Clarissa Hernandez Stephens, first author on the work and a graduate researcher at Purdue’s Weldon School of Biomedical Engineering[2]. “This way, the dogs can inform us on how well the treatment might work in humans.”

Because diabetes in dogs and humans occurs the same, both potentially could benefit from the same cure: A new set of pancreatic cells to replace islets (clusters of cells) that aren’t releasing insulin to monitor blood glucose levels.

Islet transplantation isn’t new, and it poses challenges: It requires multiple donors, it’s invasive, and large numbers of transplanted islets get destroyed by the human immune system.

Researchers injected a mixture of mouse islets and collagen solution just under the skin instead of all the way to the liver, according to the study. After injection under the skin, the solution solidifies, and the body recognizes the collagen and supplies it with blood flow to exchange insulin and glucose.

The researchers tested the solution's effects between mouse twins and nontwins. Results showed if the mouse donor were a twin to the recipient, the diabetic mouse could go at least 90 days without needing another shot. In nontwins, the mouse had normal blood sugar levels for at least 40 days. Nearly all transplanted islets survived both scenarios, removing the need for multiple donors, according to study findings.

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Researchers plan to explore transplanting pig islets or stem cells programmed to produce insulin in hopes of further increasing donor availability.

Preclinical study findings appear in early view for a forthcoming issue of the American Journal of Physiology – Endocrinology and Metabolism[3].

Endnotes:

1. [Image]: https://www.veterinarypracticenews.com/wp-content/uploads/2018/08/Purdue-canine-diabetes-ONLINE.jpg
2. Weldon School of Biomedical Engineering: https://engineering.purdue.edu/BME
3. American Journal of Physiology – Endocrinology and Metabolism: https://www.physiology.org/doi/10.1152/ajpendo.00073.2018

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