

Inspired By His Son, Boston University Professor Invents Bionic Pancreas To Manage Type 1 Diabetes

Boston University



The mental math of monitoring one's blood sugar can be exhausting, as anyone who lives with type 1 diabetes knows. How do I compensate for the cookie in the breakroom? What if I take an extra-long hike today? Do I have supplies ready if my blood sugar crashes? Someone with type 1 diabetes must consider questions like these during every part of their day.

Type 1 diabetes is an autoimmune condition where the pancreas produces little to no insulin, the hormone that the body relies on to allow sugar into cells to use as energy. Insulin lowers blood sugar levels; without it, sugar builds up in the bloodstream as glucose. If untreated, diabetes can lead to death. When undertreated, it can result in serious long-term health problems, including nerve damage, blindness, and kidney and heart disease; overtreating with too much insulin leads to hypoglycemia. According to the Centers for Disease Control and Prevention, an estimated 1.6 million adults have type 1 diabetes in the US.

To date, those with type 1 diabetes have relied on continuous glucose monitors and insulin pumps to help regulate and manage the disease. Yet what if there were a wearable device that, as needed, automatically delivered insulin to a user?

That's what Ed Damiano, a professor of biomedical engineering at Boston University, has created. In May 2023, the FDA cleared the iLet bionic pancreas that Damiano developed over two decades. The iLet bionic pancreas is an insulin delivery system that works with glucose monitor to reduce the need to make decisions about diabetes management.

From his first idea, to FDA approval, Damiano worked in partnership with the university's tech transfer office, which received its first of many disclosures in 2004.

"These things always take longer than you think they will, especially when there is so much focus on the welfare of the people that will benefit from the new product," said Michael J. Pratt, managing director of BU's Technology Development office.

Damiano had been researching microvasculature systems (the tiny blood vessels within organs) when his son David was diagnosed with type 1 diabetes shortly before his first birthday in 2000. Damiano and his wife Toby Milgrome, a pediatrician, lived in dread of what is called "dead-in-bed syndrome", the sudden death of young people with the disease. They tested David constantly.

"That overriding concern, worry and fear inspired this idea of building a bionic pancreas that would basically take care of his diabetes for him better than we could," Damiano said.

Over the next decade, Damiano raised \$30 million in research grants and philanthropy to test and improve his product. In 2015, he incorporated Beta Bionics as a benefit corporation, a certification that enables a company to prioritize a stated purpose over shareholder interests in its decision making.

"Ed's mission has always been to put the care of the people first," Pratt said. In mid-November 2015, Damiano told Pratt he had lined up a pair of big-name investors – if he could close the deal by year's end. Working nonstop, they hammered out 11 different support agreements required to finalize the two licensing agreements, and Beta Bionics was able to close its first tranche of funding on December 31, 2015.

"The university's tech transfer office has been my partner the whole way," Damiano said. "Now the iLet, an automated insulin delivery system, is available as the first automated insulin-delivery system that determines 100% of all insulin doses."

To date Beta Bionics has raised nearly \$300 million in equity financing, including the \$100 million series D financing that just closed in August 2023.

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