

Bionic pancreas automatically controls diabetics' blood sugar

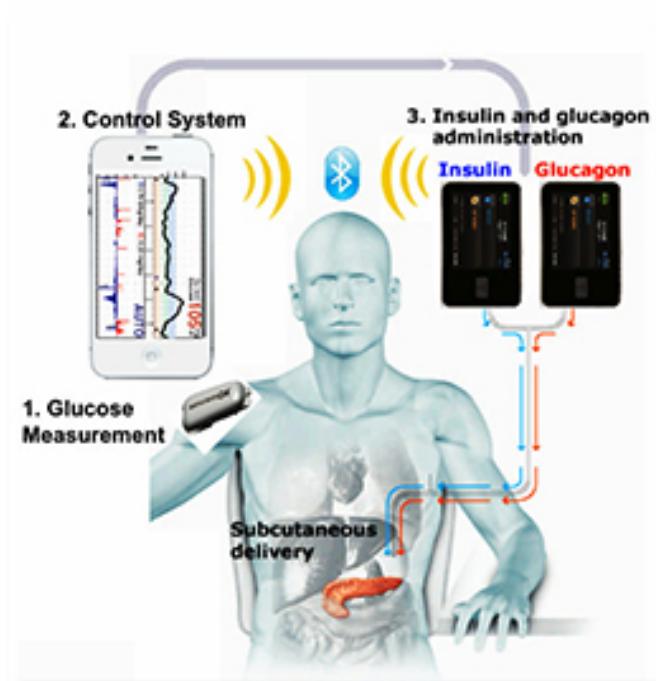
Sensor, pump, action! Mobile phone algorithms hooked up to insulin pumps are allowing people with type 1 diabetes to live without needles and the need to monitor blood sugar levels manually.



"The sense of potential freedom is amazing," says Juliet Hughes, mother of 8-year-old Felix, who was one of the children who took part in a trial to see if a bionic pancreas could free people with diabetes from the daily routine of monitoring their glucose levels and injecting insulin.

Type 1 diabetes is caused by destruction of cells in the pancreas that use the hormone insulin to control how much sugar circulates in the blood. When the pancreas is no longer in control, a person risks seizures and death from too high or too low levels of glucose. For a decade, researchers have been working on an algorithm to make life easier for people with type 1 diabetes.

The algorithm is installed in a tablet computer or an android phone and can check a person's blood glucose levels automatically and wirelessly, with the help of a sensor implanted into the layer of fat above their abdomen. When sugar levels rise, for example after a meal, the algorithm tells a portable insulin pump also plumbed into the abdomen to administer exactly the right amount of insulin.



Sleep at last

While many type 1 diabetics have glucose sensors and insulin pumps attached to their abdomens, they still have to check their glucose levels themselves and adjust their insulin intake manually. The new device automates this process, checking blood sugar every 12 minutes.

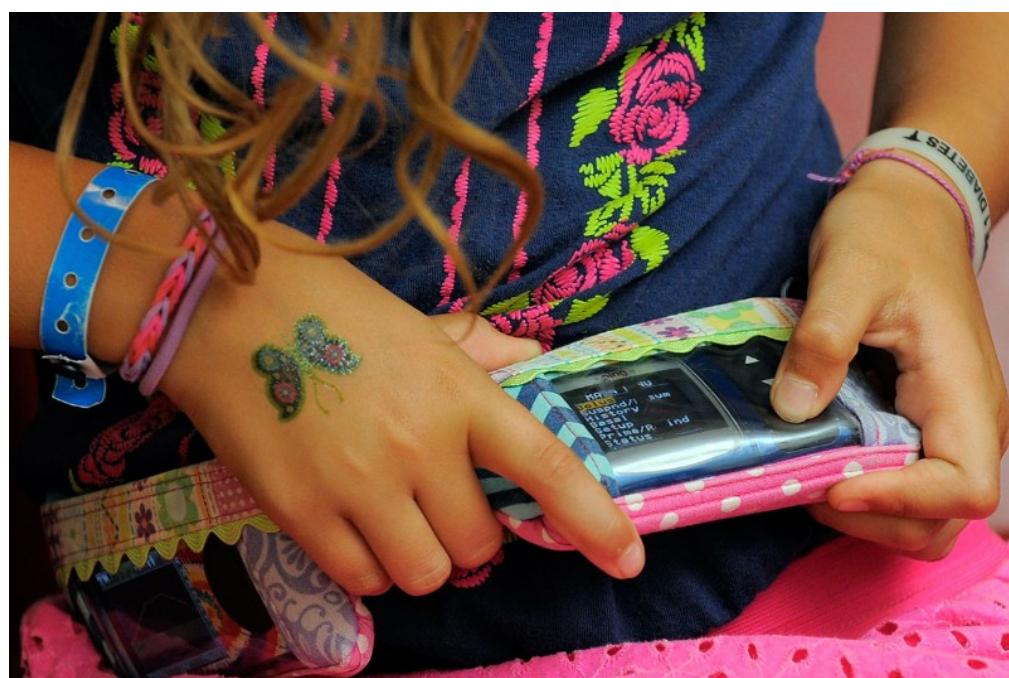
“It tells the pump how much insulin to deliver and it does it day and night,” says Roman Hovorka of the University of Cambridge.

This means that diabetics can sleep more soundly, without needing to wake up to check blood sugar levels throughout the night. “It took time to trust the system, but once we did, and saw the amazing results, it meant a lot more sleep for everyone,” says Hughes.

Safety zone

To test if their bionic pancreas really would improve the lives of diabetics, Hovorka’s team ran a three-month trial of the device, involving 33 adults and 25 children. Each person tried the new system, as well as the best currently available combination of sensor and pump, but unconnected by the algorithm. They used the new device at home, without medical supervision – the longest and most realistic test of any artificial pancreas system so far.

The children used the system only at night, when lack of glucose reaching the brain may cause seizures and death. Compared to the current system that lacks any intelligent algorithm, the children using the bionic device spent 25 per cent more of their time in the “ultrasafe” blood sugar target zone, up from 34 to 60 per cent. The time they spent with abnormally low sugar levels per night was halved, to just 5 minutes.



The system worked well for the adults too, pushing them into the target zone 68 per cent of the time, up from 57 per cent with the simpler system. Hovorka says his team is working with a medical device company to commercialise the algorithm.