

# **JDRF briefing: Development of the artificial pancreas for people with type 1 diabetes**

**December 2018**

This briefing has been prepared by JDRF in advance of the adjournment debate 'Development of the artificial pancreas for people with type 1 diabetes'.

JDRF is the world's leading type 1 diabetes research charity. It funds research to cure, treat and prevent type 1 diabetes.

## **Background**

People with type 1 diabetes rely on taking insulin every day just to stay alive, until the cure for the condition is found. It normally strikes children but can strike at any age. Type 1 diabetes affects about 400,000 people in the UK, 29,000 of them children. Type 1 diabetes cannot be prevented, and is not linked to lifestyle. There is no way to avoid it.

With this type of diabetes, a person's pancreas stops producing insulin. It occurs when the body's immune system attacks and destroys the insulin-producing cells in the pancreas.

Type 1 diabetes has a life-long impact on those diagnosed and their families. A child diagnosed with type 1 diabetes at the age of five faces up to 19,000 injections and 50,000 finger prick blood tests by the time they are 18. Effective management control of blood glucose levels is a key factor in avoiding future complications and reducing costs for the NHS. Access to diabetes technology is crucial to help better manage the condition.

## **Current state of play in type 1 diabetes treatment**

Diabetes technology can be life changing. Flash glucose monitoring for example reduces the need for finger-prick testing and shows trends in blood glucose levels, which can improve management of the condition.

Continuous glucose monitoring (often referred to as CGM) can help maintain target blood glucose levels, and limit the risk of hypoglycaemia if it is used on a daily basis (ie at least 80 percent of the time). It can provide peace of mind for parents as they feature an alarm which can be set to go off when a child's levels get too low or high.

Unfortunately, people with diabetes face a postcode lottery across the UK when it comes to access to technology that can help improve and manage their condition.

On the 14<sup>th</sup> of November 2018, World Diabetes Day, NHS England announced that the Freestyle Libre, a flash glucose monitoring device, would be made available to all who met the clinical criteria, regardless of where in England they lived, from April 2019. Previously it was up to Clinical Commissioning Groups to decide whether to make the Libre available on the NHS and under what criteria.

NICE has issued statements detailing when CGM may be suitable for someone with type 1 diabetes, however there is no statutory obligation on CCGs to provide funding for the technology, though some CCGs do have policies for prescribing it in certain circumstances.

Insulin pumps are an increasingly common treatment for type 1 diabetes. An insulin pump delivers insulin every few minutes in tiny amounts, 24 hours a day. Insulin pumps eliminate the need for multiple injections and give the user the ability to make smaller, more accurate adjustments to insulin delivery.

NICE has produced Technology Appraisal Guidance on the use of insulin pumps for people with type 1 diabetes (TA151), however uptake and use of insulin pumps is still quite slow and the rate at which people with type 1 diabetes are starting pump treatment has stabilised recently, with the proportion of people in the UK on pumps at 15.6% in England and 6.7% in Wales. The most recent National Diabetes Audit, published in July 2018 showed that whilst overall uptake of insulin pumps had increased, the proportion of people with type 1 diabetes attending specialist services that are treated with pumps varies from >40% to <5%.<sup>1</sup>

### **Hope for the future – the ‘artificial pancreas’**

JDRF is leading on the design of an artificial pancreas, which will change the lives of those affected by type 1 diabetes. The artificial pancreas is in advanced human trials and the work in the UK is being led by Professor Roman Hovorka at the University of Cambridge, with funding from JDRF.

An artificial pancreas is three pieces of technology working together a piece of technology that could do some of the job of a healthy pancreas, providing exactly the right amount of background insulin to the body as it's needed. This then removes some of the time and effort that goes into managing type 1 diabetes.

The artificial pancreas consists of a continuous glucose monitor, a computer programme and an insulin pump that work together to automatically control background insulin levels.

The system currently being developed by Professor Hovorka's team would be able to take over much of the management of insulin delivery throughout the day and night, and keep blood glucose levels in target range for longer periods of time.

A recent JDRF-funded trial found that the artificial pancreas is better at helping people to manage their glucose levels than the best currently available technology. People who used the artificial pancreas spent 65% of time with glucose levels in range, compared with 54% of time for people using a continuous glucose monitor and an insulin pump. In addition, people on the system experienced greater reductions in HbA1c over the three months of the trial, and no difference in hypos.<sup>2</sup>

### **What changes need to occur to progress towards an artificial pancreas?**

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<sup>1</sup> National Diabetes Insulin Pump Audit Report 2016-2017

<https://files.digital.nhs.uk/80/1E37C4/National%20Diabetes%20Insulin%20Pump%20Audit%20Report%2C%20Main%20Report%2C%202016-2017.pdf>

<sup>2</sup> <https://jdrf.org.uk/news/artificial-pancreas-better-than-existing-treatment-for-people-with-type-1-diabetes-a-jdrf-funded-study-finds/> and [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)31947-0/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)31947-0/fulltext)

A new device that takes us closer to the artificial pancreas has been developed by Medtronic, the MiniMed 670G. A number of people with type 1 diabetes have started using the system in the UK in a pilot phase, before it is rolled out wider across the country.

As only 15.6% of those with type 1 in England are currently using insulin pumps, it's potentially a concern that healthcare professionals would be unlikely to recommend an artificial pancreas if someone is not using a pump/CGM already.

If the NHS access issues to today's type 1 diabetes technology can be addressed, a path can then be cleared for the artificial pancreas.

### **Psychological impact of type 1 diabetes, other resources and support**

A recent survey by Dexcom revealed that more than three quarters of people with diabetes suffer from stress, anxiety attacks or bouts of deep depression.<sup>3</sup>

There's already plenty of evidence that living with long-term chronic conditions can impact upon mental health, but when it comes to type 1 diabetes, it is such a relentless, 24/7 condition where people living with it have to inject insulin every day to stay alive. Having to continuously monitor blood glucose levels, while crucial, is a potentially exhausting aspect of the condition. There can also be a feeling of shame and guilt for not being 'good' at managing type 1 diabetes.

While healthcare teams help and teach people how to manage their blood glucose levels, type 1 diabetes is largely a self-managed condition - it is down to the individual to put in the effort and get on with it. It takes a lot of effort, planning and organisation to do blood glucose checks, carb-counting and basal adjustments. This is a lot to take on. And if you are an adult often you are the only one responsible.

Burnout can be a big factor for someone with type 1 diabetes, whereby they feel that every decision they make related to their type 1 diabetes is the wrong one. Type 1 diabetes is unpredictable - something that may work one day, doesn't work the next. And while doing exercise can be a very good idea – especially when it comes to mental health - for people with type 1 diabetes they need to factor in how their insulin needs will change during and afterwards, so there is never a break.

Type 1 diabetes is a hidden condition in many ways - it is hard to tell if someone has type 1 diabetes unless they are immediately managing the condition in front of you. There is also the psychological strain associated with the societal misunderstandings of the condition. There are many myths and misunderstandings around the so-called 'causes', that see children in school and parents at school gates patronised or even bullied regarding their status of having this condition, due to the ongoing stigma with any type of diabetes that it has been brought on by unhealthy diet and lifestyle, when in fact type 1 diabetes is an autoimmune condition that cannot be prevented.

The NHS needs to ensure that the resources and community support that people with type 1 diabetes require are well-advertised, well-recognised, well-understood and well-invested in.

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<sup>3</sup> <http://www.pharmafile.com/news/519352/3-4-uk-diabetes-patients-suffer-mental-health-issues-says-report>

Mental health support could be provided as part of routine diabetes health clinics in order to address the psychological impact of managing the condition.

In summary, having access to both the right technology and the right support can be life changing. It can help people better control their condition and can save the NHS money through reduced complications. People with type 1 diabetes deserve to get the type 1 diabetes technology and support they want and need on the NHS.

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