



## PRESS RELEASE

### Start of the MuSiC4Diabetes Project: Improving Type 1 Diabetes Treatment through Unobtrusive Continuous Diabetes Management Technology

*The project aims to achieve a major breakthrough in insulin-treated diabetes management through a collaboration of six international partners joining forces to develop an unobtrusive and long-lasting device for diabetes treatment.*

**Berlin, 5 of October 2023 – Diabetes mellitus is a rapidly growing life-threatening disease. Current diabetes management systems such as glucose monitoring systems and integrated insulin-delivery devices offer valuable treatment solutions. However, they require regular maintenance by the patient, and can fail to forecast glucose deficits in specific situations. MuSiC4Diabetes intends to bridge this gap by developing an implantable multi-metabolite sensor connected to a pump that delivers insulin continuously to the patient. In addition, the device will aim for a ten-year- battery life, offering a long-lasting and unobtrusive solution to the patient. To achieve this ambitious step forward in diabetes management technology, the project will receive more than EUR 3.8 million from the prestigious European Innovation Council's (EIC) Pathfinder programme over the next four years and benefit from the collaboration of six European partnering institutions. An important pillar of the European Union's Horizon Europe Framework Programme for Research and Innovation, the EIC Pathfinder programme targets visionary and disruptive innovations that can bring about decisive societal transformations while addressing global challenges.**

#### Prioritizing safety: challenges in current Diabetes treatments

Diabetes affects the body's ability to control its blood sugar levels. This condition affects the individual with a variety of symptoms, ranging from blurred vision and weight loss to disorders of the cardiovascular system, kidney, eye and nerves. The disease has dramatically increased over the last three decades, with a doubling of the number of affected people between 1980 and 2017, and this number is expected to rise to 629 million cases by 2045. The treatment burden is the heaviest in people with diabetes who need insulin therapy.

Current insulin therapies fail to provide safe solutions that remain convenient over time. The efficacy of the treatment is highly dependent on the individual's ability to correctly track their glycaemic levels and to self-deliver insulin accordingly. This creates a burden and high levels of distress for the person with diabetes, as inadequate insulin administration can lead to hyper- or hypoglycaemia.

Today's options to track glucose levels can lack precision, especially during physical exercise. An algorithm capable of forecasting the change in glucose levels would greatly help predict these changes over time, before the individual reaches hyper- or hypoglycaemic states. State-of-the-art

devices of monitoring and insulin delivery including carry-on sensors and pumps, have not yet significantly improved the quality of life for those with diabetes due to their cumbersome nature and requirement for frequent maintenance.

MuSiC4Diabetes offers a paradigm shift and lasting solution for diabetes management with insulin

MuSiC4Diabetes sets out to change the current paradigm in diabetes management while maintaining safety and convenience for the users. The research project is based around two core principles: to improve the quality of life for people living with diabetes and to overcome the obstacles they encounter. This will be reached by developing a smart device that integrates multi-metabolite (MM) sensors and high-precision insulin-delivering pumps delivering a compact, safe and long-lasting solution.

Current techniques to manage diabetes involve monitoring glucose levels in the subcutaneous (SC) tissue. However, this approach provides incomplete insights on glucose levels due to i) the high glucose fluctuation in specific situations such as physical exercise and ii) the limited forecasting for hypo- and hyperglycaemia in the absence of predictive algorithms. This is where MuSiC4Diabetes comes into play: based on a novel algorithm to be developed, a three-metabolite measurement device will for the first time enable the simultaneous scan of the three key physiological signals glucose, lactate and 3  $\beta$  OH-butyrate. The MM control algorithm uses these signals to predict system delays and trigger precise control action via a sophisticated insulin pump.

This new state-of-the-art insulin-pump will be developed to dispense an adequate insulin dose in a precise and safe manner via intraperitoneal (IP) delivery. The device will also integrate safety features such as a free-flow stop structure preventing insulin leakage and a self-sensing capability to detect internal disturbances powered by artificial intelligence.

With the efficiency of the MEMs pumping technology, the grant team is aiming for a battery life of 10 years. User burden will be further reduced by providing a stabilized insulin allowing a refill interval of at least 3 months. Testing will be conducted to evaluate the feasibility of extending the refill interval for up to a year. Finally, an assessment tool designed for Type 1 Diabetes (T1D) individuals will capture a comprehensive view of "human factors", i.e., perceived barriers and benefits of MM sensing and possible areas of improvement in diabetes treatment.

"Lifestyle improvement and safety are increasingly urgent matters to address in diabetes management with insulin. We are thrilled to challenge the status quo of current treatment technology by investigating new disease monitoring models and providing safe delivery hardware based on a MEMS pump. Our ambition is to bring relief to individuals living with diabetes by providing them with a long-term solution replicating the healthy glucose dynamics," says project coordinator Martin Richter from the German Fraunhofer Institute for Electronic Microsystems and Solid State Technologies EMFT.

The kick-off meeting of the MuSiC4Diabetes project will take place on November 14<sup>th</sup> at the premises of the Fraunhofer EMFT in Munich.

## **Project Key Facts**

Title: Unobtrusive Continuous Multi-Metabolite Monitoring for a Physiological Care of Insulin-treated Diabetes (MusiC4Diabetes)

Start: 1 October 2023

Duration: 48 months

Budget: 3.885.642 €

Coordinator: Fraunhofer Institute for Electronic Microsystems and Solid State Technologies EMFT

Website: [www.music4diabetes.eu](http://www.music4diabetes.eu)

Social Media: LinkedIn, X (formerly Twitter)

## **Project Partners**

### **Belgium**

- Indigo Diabetes

### **France**

- Centre Hospitalier Universitaire de Montpellier

### **Germany**

- Fraunhofer Gesellschaft Zur Forderung Der Angewandten Forschung e. V.
- FIDAM GmbH
- EURICE – European Research and Project Office GmbH

### **Italy**

- Universita Degli Studi Di Pavia
- Universita Degli Studi Di Padova

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