Debiotech and ARTORG Initiate an Exclusive Collaboration on the Next Generation Artificial Pancreas

Lausanne and Bern, Switzerland, November 24, 2015. **Debiotech SA,** the **ARTORG Center for Biomedical Engineering Research** of the **University of Bern** – and the **Division of Endocrinology, Diabetes and Clinical Nutrition of the Bern University Hospital "Inselspital"** are proud to announce the start of an exclusive collaboration to develop a novel generation artificial pancreas. Combining a fully new control algorithm for the personalised delivery of insulin for diabetic patients with the unequalled accuracy of an MEMS based pump, the three partners' ambition is to create a substantial change in the treatment of diabetes and in the market for the artificial pancreas.

The artificial pancreas is often presented as the holy grail of diabetes treatment. "Today, a diabetic patient must follow a very constraining therapy with many blood glucose measurements, dose calculations and insulin injections. The ideal would be to have a single system that can conduct all of these operations without requiring any intervention", says Peter Diem, MD, Professor and Head of the Division of Endocrinology, Diabetes and Clinical Nutrition of the "Inselspital". On the one hand, such systems require a continuous glucometer that every minute will measure and calculate the level of glucose present in the blood and, on the other hand, an infusion pump that will continuously deliver insulin. The amount of infused insulin is determined by an algorithm that estimates the patient needs based on the measured glucose levels, the time of day or the expected activities and that will adapt the pump infusion rate accordingly. "Approaches taken so far do not resolve fundamental difficulties: the patients' variability, uncertainties related to system disturbances, e.g. food intake and physical activity, and errors related to the used devices. The proposed algorithm is easy to use, introduces the concept of real-time personalisation based on reinforcement learning, a machine learning method, is able to tackle inter- and intra-patient variability, and can compensate for the effects of uncertain events", says Stavroula Mougiakakou, PhD, Head of the Diabetes Technology Research Group at the ARTORG Center.

The system will include the JewelPUMP developed by Debiotech and the algorithm will run on the wireless PDA device used today for the programming of the pump. “Our objective has always been to bring innovation that can better serve patient needs and improve quality of life”, says Frédéric Neftel, President and CEO of Debiotech. “The JewelPUMP, with its unique accuracy and safety features, offers an ideal platform to develop new approaches for an artificial pancreas. ARTORG has been working for many years on new algorithms, outside the conventional approach, which could open new perspectives for a more intelligent artificial pancreas. We are delighted to enter into this partnership with both clinical experts and engineers in the heart of Switzerland”.

The JewelPUMP is a patch pump, directly placed on the skin, which can be detached and reattached at will. It is waterproof and includes several sensors to continuously monitor therapy. It has been used by patients in a clinical trial for several days at home and its reception has been very enthusiastic. The accuracy of the different elements in an artificial pancreas is critical. The insulin levels have to be maintained in a very narrow window. Too little insulin will lead to hyperglycaemia, while too much insulin generates hypoglycaemia. Both situations may induce coma and even patient death. “The scrutiny on pump accuracy has increased in recent years. *In vitro* and *in vivo,* the JewelPUMP has shown its ability to inject the programmed dose very accurately. Combining the algorithm developed by ARTORG with Debiotech’s JewelPUMP has the potential to revolutionise the way we approach the Artificial Pancreas”, says Laurent-Dominique Piveteau, COO of Debiotech.

After development and integration, the algorithm will be tested in different clinical trials. “We are looking forward to seeing this new approach being used by patients and appreciate how much this may facilitate their treatment. It is even more important to improve their quality of life”, said Christoph Stettler, MD, Professor and newly elected Director of the Division of Endocrinology, Diabetes and Clinical Nutrition at the “Inselspital”.

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About Debiotech

Debiotech has specialised for over twenty five years in the research and development of innovative medical devices, with a focus on implantable and external drug delivery systems for the treatment of severe diseases such as diabetes, renal failure, cardiovascular diseases and cancer. The company's products are based on micromechanics and nanotechnologies, as well as novel technologies. Debiotech has over 40 exclusive license agreements with leading companies in medical devices and pharmaceuticals and holds over 500 patents worldwide.

Further information on Debiotech and the JewelPUMP™ can be found at www.debiotech.com.