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Human Islet Microtissue Perifusion in Organ-on-a-Chip Platform Provides Diabetes Researchers a Powerful Tool for Studying Insulin Release Dynamics

New study confirms hanging drop microfluidics platform for miniaturized islet perifusion assays enables high-resolution assessment of islet insulin secretion from single human islets over time.

Schlieren and Basel, Switzerland – May 19, 2020 InSphero AG, the pioneer of 3D cell-based assay technology, and the Bio Engineering Laboratory at ETH Zürich today announced that a recent study published in *Advanced Biosystems* confirms that organ-on-a-chip solutions can be harnessed to advance diabetes drug discovery. Results of this research collaboration between InSphero and microfluidic system engineers at ETH Zürich's department of Biosystems Science and Engineering demonstrated that using 3D InSight™ Human Islet Microtissues in a novel microfluidic hanging-drop-based perifusion assay system enables the study of physiologically relevant dynamic insulin secretion with low sample-to-sample variation and at high temporal resolution.

"Glucose-stimulated insulin release from pancreatic beta-cells is a highly dynamic biphasic and pulsatile process, which is disrupted in diabetes patients," said InSphero Head of Islet Solutions, Burcak Yesildag, PhD. The restoration of either the blunted first phase or lost oscillations of the second phase of insulin secretion have been proposed as potential therapeutic targets for type 2 diabetes. Additionally, dynamic insulin secretion can be modulated with various insulin secretagogues.

Although pancreatic islet perifusion assays have been used for more than 30 years, implementing a reliable, highly reproducible, yet simple method to assess human islet function has remained challenging. "As confirmed in this study, the InSphero 3D InSight™ Diabetes Discovery Platform is ideal for perifusion studies because our islet microtissue models are not only homogenous in size, cellular composition, and function, but also reflect the physiological response of the human pancreas to stimulation under varying conditions," added Yesildag.

"The combination of our miniaturized, open microfluidic chip design with InSphero's uniform and highly functional human islet microtissues, enables reproducible assessment of dynamic insulin secretion in single human islets. It is an efficient system that facilitates rapid glucose switching, minimal sample dilution, low analyte dispersion, and short sampling intervals," said ETH Zürich Postdoctoral Researcher Patrick Misun, PhD, who led the engineering portion of the project.

"InSphero has a rich history of successful collaborations with the ETH Zürich Bio Engineering Laboratory led by Professor Andreas Hierlemann," said InSphero CEO and Co-founder Jan Lichtenberg, PhD. "This study is another excellent example of the collaborative bioengineering innovation that we do best as we strive to develop 3D *in vitro* solutions that will help further our understanding of complex diseases, such as diabetes."

Read the Advanced Biosystems paper: "*In Vitro* Platform for Studying Human Insulin Release Dynamics of Single Pancreatic Islet Microtissues at High Resolution"
https://onlinelibrary.wiley.com/doi/abs/10.1002/adbi.201900291

About InSphero

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InSphero is the pioneer of industrial-grade, 3D-cell-based assay solutions and scaffold-free 3D organ-on-a-chip technology. Through partnerships, InSphero supports pharmaceutical and biotechnology researchers in successful decision-making by accurately rebuilding the human physiology *in vitro*. Its robust and precisely engineered suite of 3D InSight™ human tissue platforms are used by major pharmaceutical companies worldwide to increase efficiency in drug discovery and safety testing. The company specializes in liver toxicology, metabolic diseases (e.g., T1 & T2 diabetes and NAFLD & NASH liver disease), and oncology (with a focus on immuno-oncology and PDX models). The scalable Akura™ technology underlying the company's 3D InSight™ Discovery and Safety Platforms includes 96 and 384-well plate formats and the Akura™ Flow organ-on-a-chip system to drive efficient innovation throughout all phases of drug development.

Learn more at www.insphero.com and follow InSphero on Twitter and LinkedIn.
Read about the 3D InSight™ Diabetes Discovery Platform: https://insphero.com/products/islet/

About the ETH Zürich Bio Engineering Laboratory

The research of the Bio Engineering Laboratory (BEL) at ETH Zürich is rooted in Engineering and Physics. BEL is performing interdisciplinary engineering research and education relevant to biology and medicine. It has longstanding experience in the development of Complementary Metal Oxide Semiconductor (CMOS)-technology-based integrated chemical and biomicrosystems, as well as bioelectronics and microelectrode arrays. Moreover, BEL is engaged in the development of microfluidics for investigating the characteristics of single cells and microtissues. BEL is one of several innovative research groups within the ETH Zürich Department of Biosystems Science and Engineering (D-BSSE), where engineers, biologists and computational scientists work together on the understanding, rational design, and reprogramming of complex biological systems from the nanoscale up to whole organisms.

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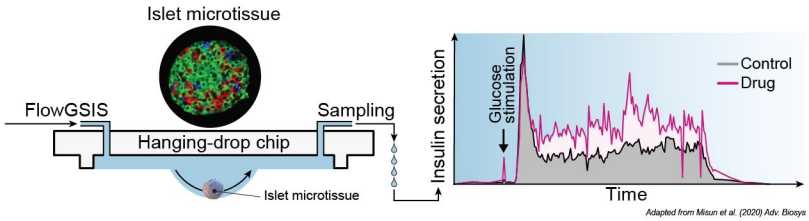
Images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Drug
Time
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