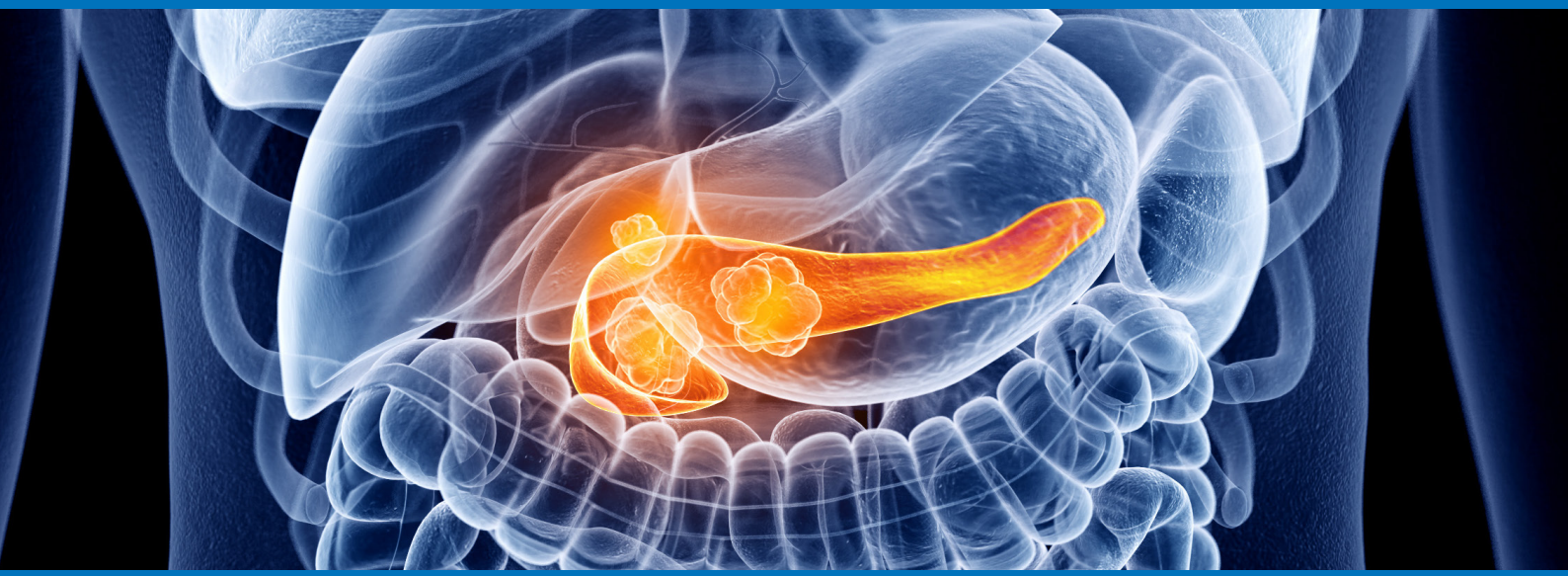
Beta Cell Screening

Acute and chronic recordings of glucose-induced electrical activity in pancreatic beta cells



Innovative technique for diabetes research—
in vitro electrophysiology on isolated islets of Langerhans

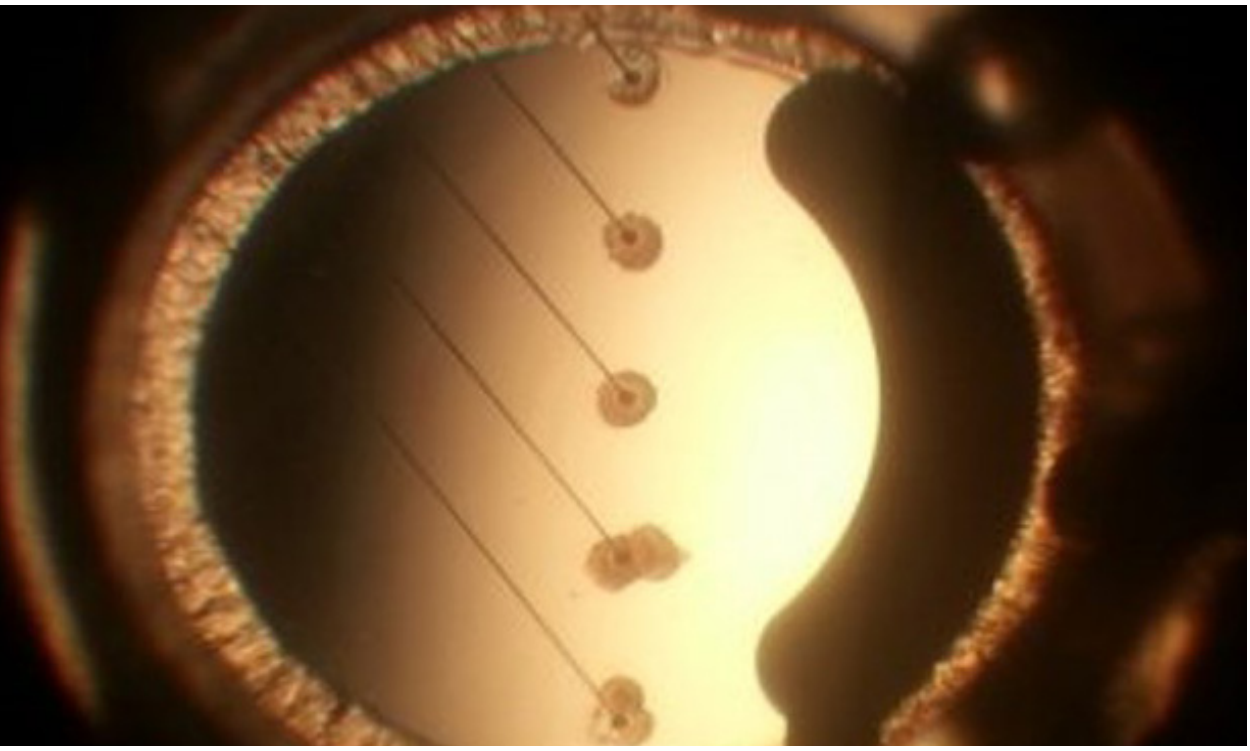
Obtain comprehensive data quickly—
MEA-based screening of intact islets of Langerhans

Flexible configurations—
Choice of long-term, incubator-ready chronic, and non-invasive acute recordings

HB

multichannel systems

MEA-based simultaneous screening of islets of Langerhans



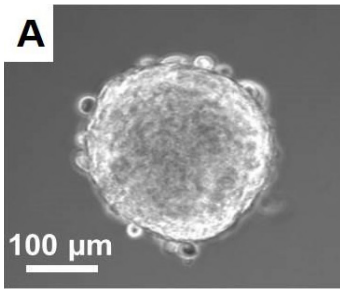
- Non-invasive method enables long-term in vitro diabetes research
- Simplified experimental handling with higher throughput than conventional methods, ideal for both academic and industrial laboratories
- Easy and fast versus conventional, invasive methods such as patch-clamp and recording with intracellular electrodes
- Intact islets now allow electrophysiological screening in drug development

Glucose-dependent electrical oscillatory activity in beta cells within islets of Langerhans is important for understanding their physiology and pathophysiology; however, electrophysiological recordings are both time consuming and technically challenging, posing obstacles to efficient academic research and industrial drug development. We offer MEA-based simultaneous recording systems for multiple acute recordings on primary or stem cell derived islets of Langerhans and chronic recordings in an incubator system.

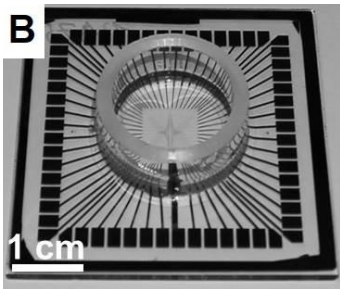
The MEA technology creates new possibilities for the development of new drugs in the treatment of diabetes mellitus, as well as to elucidate beta cell pathophysiology (e.g. during the progression of diabetes).

Islet recordings using MEA technology.

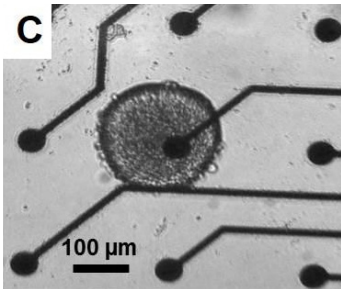
Microscopic view of a single murine islet of Langerhans.

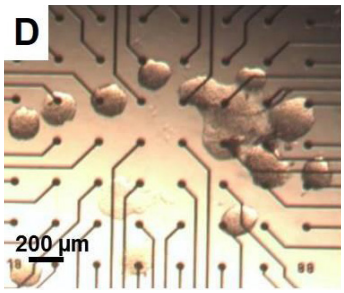


Standard microelectrode array (MEA, Multi Channel Systems).

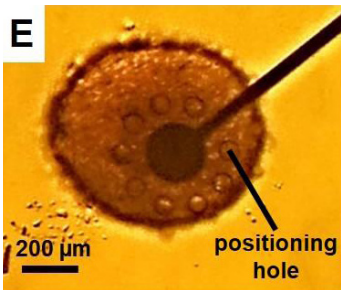


Islet of Langerhans placed on top of a MEA electrode during an acute measurement.

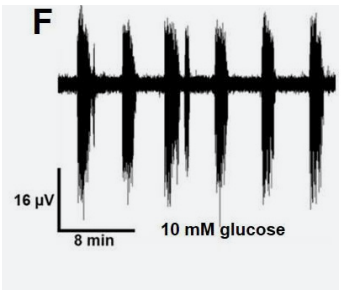




Microscopic view of islets cultivated on the electrode field of a MEA for long-term recordings.



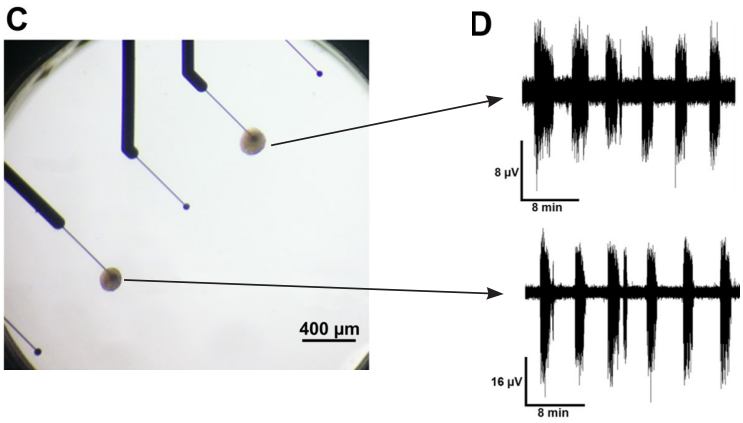
View of a Beta-Screen electrode covered with an intact murine islet positioned via negative pressure through the positioning holes.



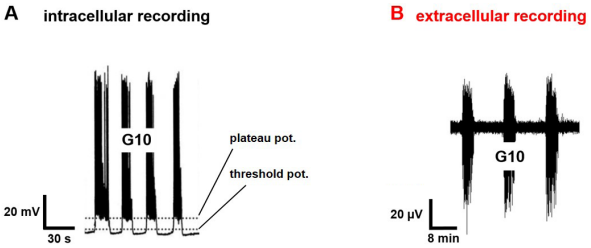
Typical field potential recording of a murine islet with characteristic oscillatory activity in 10 mM glucose.

Application

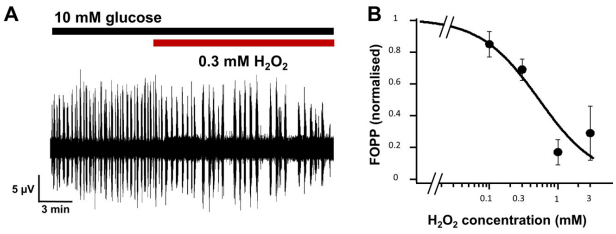
Electrophysiological recordings of multiple acute islets of Langerhans for diabetes research on beta cells



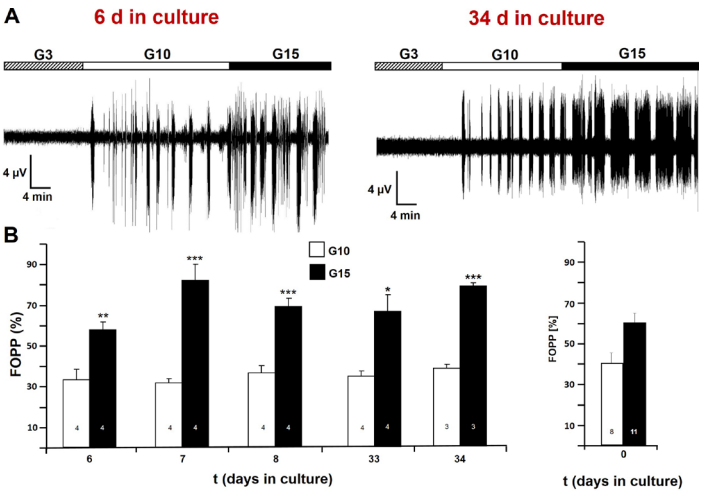
Higher throughput than conventional electrophysiological methods



Extracellular recordings with MEA technology are qualitatively comparable to intracellular measurements (Figure A taken from Drews et al., 2015)

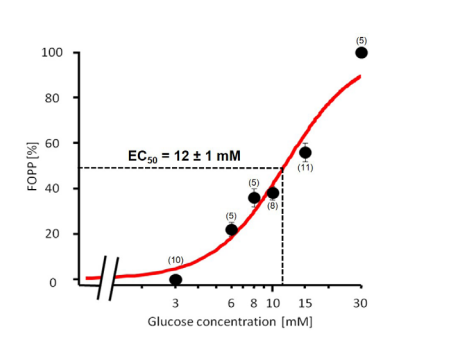


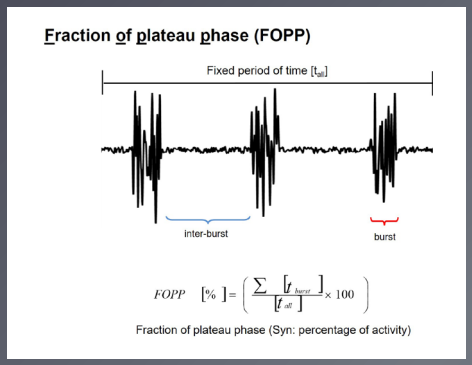
Investigate beta cell pathophysiological reactions e.g. induced by oxidative stress



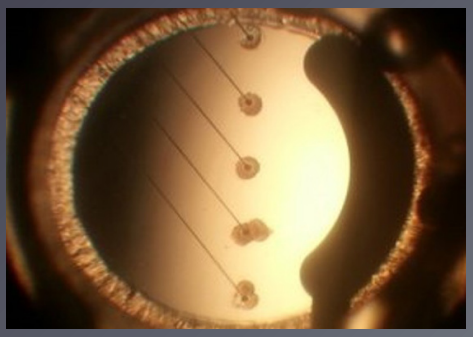
Long term electrophysiological experiments made possible by non-invasive in vitro MEA technology

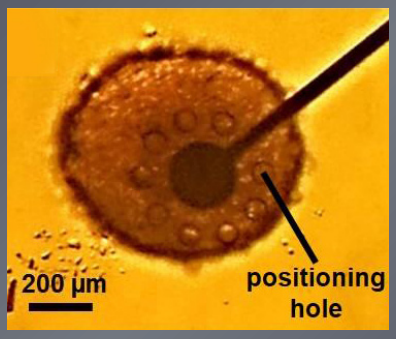
Uncover Glucose Induced Electrical Activity in Intact Islets of Langerhans

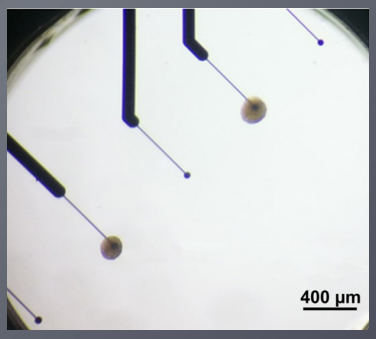


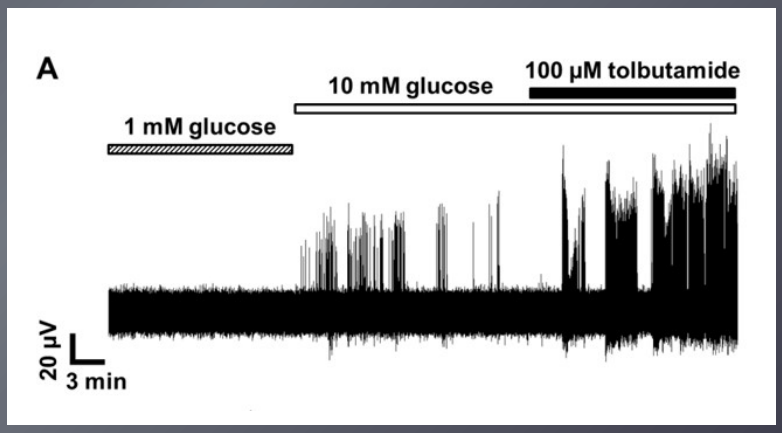


The fraction of plateau phase (FOPP) is the percentage of burst activity in a time interval. FOPP is a marker for insulin release.







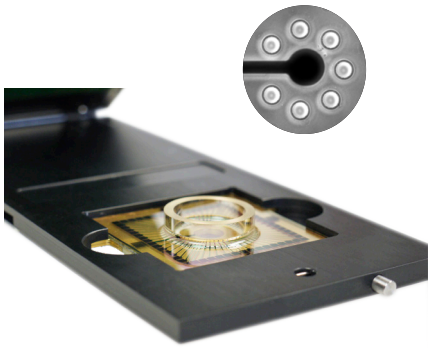


Analysis of electrophysiological recordings from isolated human islets using MEA technology

Acute recordings

MEA2100-Beta-Screen-System

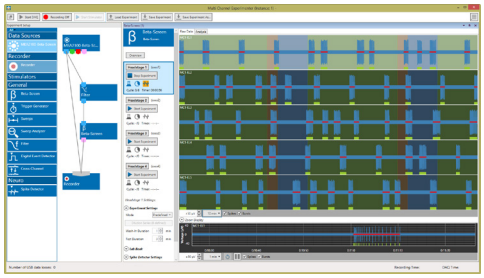
- Easy to use for electrophysiological recordings of up to 40 islets simultaneously
- Non-invasive and fast, medium throughput screening device
- Beta cell specific analysis software included
- Islets secured using suction
- Drug screening also possible with human beta cells



Chronic recordings with incubator-ready system

MEA2100-Mini-System

- Small footprint, low heat emission
- Possibility for simultaneous operation of many headstages
- Ideal solution for continuous, undisturbed recordings and stimulation of samples in the incubator or on a microscope stage with environmental control



Beta-Screen Software

The Beta-Screen software is specifically designed for long-term and acute beta cell recordings. It is a specialized tool set for spike/burst (oscillation) analysis and dose response experiments on pancreatic beta cells in islets of Langerhans.

Interface Board Multiboot

The Multiboot Interface Board facilitates operation of all MCS in vitro and in vivo headstages within the entire 2100 amplifier solution suite. This suite includes: MEA2100-Mini-HS, Multiwell-MEA-HS, CMOS-MEA-HS, MEA2100-Beta-Screen-HS, W2100-HS and ME2100-HS. The modular 2100 amplifier solution suite design makes it easy to modify your lab equipment generally with modest hardware upgrade investments.

Interface Board Multiboot

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a division of **Harvard Bioscience, Inc.**

multichannelsystems.com • sales@multichannelsystems.com

Americas (+1) 833 668 8632 • **Europe, Middle East, Africa** (+49) 7121 909 2525 • **Asia Pacific** (+86) 21 6226 0239