

GLUCOSE Biosensors

The Glucose biosensors have been developed to allow implantation in the brain, facilitating long-term *in vivo* and real time measurements of glucose. Glucose is the major energy source in the brain and monitoring changes in its concentration using our Glucose biosensor advances studies of brain energy metabolism.

Properties

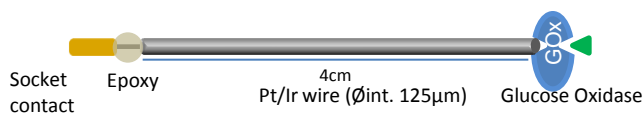
The sensors are based on the immobilization of glucose oxidase (GOx) on Platinum/Iridium (Pt/Ir) wire. A combination of this enzyme specificity and electrochemical detection allows for rapid and direct measurements of glucose. Measurements are made amperometrically using constant potential amperometry by applying a constant voltage to the biosensor (+700 mV).

Applications

Glucose biosensors can be implanted in any target brain region by stereotaxic implantation and used to assess changes in glucose current with sub-second resolution.

Dimensions

The dimensions of glucose biosensors are 175 μ m external diameter and are typically supplied as 3cm or 4cm in length. If you require a different length for your specific purposes, please contact us.

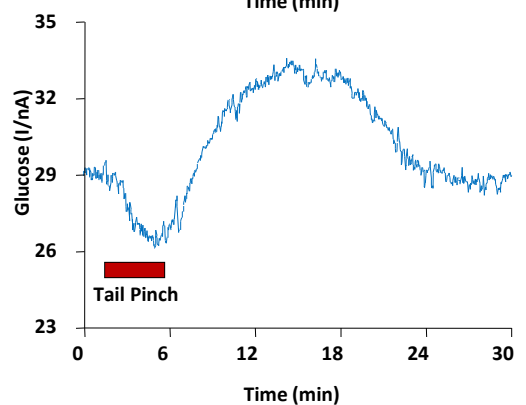
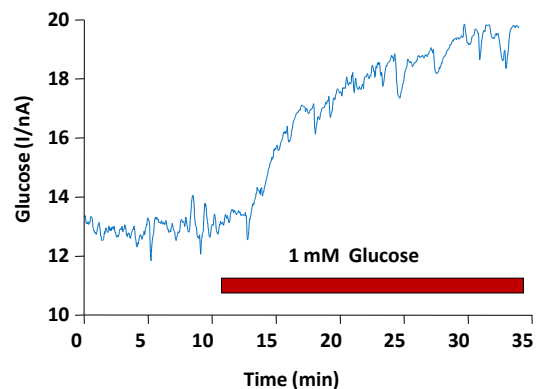


Response time:

The response to glucose concentrations (1mM-100mM) is immediate (response time < 1 sec) and linear.



In vivo Glucose biosensor response



Lowry et al., (1998) J Neurosci Methods. 79(1):65-74

Sensitivity

Each biosensor is calibrated individually for a linear response within the physiological concentration of glucose (~0.5mM in ECF) and supplied with the exact calibration constant. The detection limit for glucose is 3.5 μ M. The ability to reject interferences such as Ascorbic Acid are also tested prior to shipping.



In Vivo Stability

The glucose biosensors show stability over extended periods of repeated recording. The sensors have been tested to be stable for up to four weeks when implanted in the brain. Degradation of the sensor by fouling or enzyme degradation will show as a gradual decrease in baseline current over time.

The sensors are single use, that is, after removal from the animal they should not be used again. The sensor is independent of the variations in ascorbic acid and oxygen concentrations found in the brain. The sensor will not perform under anoxic conditions, but can be used during mild hypoxia.

Glucose Biosensor

Internal Diameter	125µm
Applied Potential	+700mV
Shelf life	2 months
Storage	4°C

Life time/Shelf Life

The shelf life is two months from the date of delivery, when stored at 4°C.

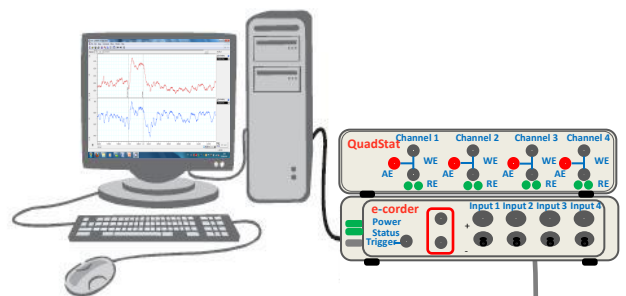
Recording Options for Glucose Biosensors

Glucose biosensors can be implanted in any brain region by stereotaxic implantation. They are then connected to a potentiostat outside the animal (Tethered) which delivers the required constant potential.

The tethered solution allows:

- ❖ Continuous recording of changes in Glucose concentration in the implanted brain region
- ❖ Monitoring in awake and freely moving animals
- ❖ Real time monitoring with sub-second resolution
- ❖ Long term stability of signal (up to 4 weeks)

Tethered



- ❖ Pharmacological testing
- ❖ Operant Box Monitoring
- ❖ General activity sleep/wake



Relevant Publications

Dixon BM, et al., (2002) J Neurosci Methods. 119(2):135-42.
Lowry JP, et al., (1998) J Neurosci Methods. 79(1):65-74.
Lowry JP, et al., (1998) J Neurochem. 70(1):391-6.