铭泰佳信
MT Technology

Brain Neurochemical Analysis System

Product Catalog

Revision Date: June 16, 2025

CATALOGUE

Brain Neurochemical Analysis System ····· 01

Electrodes ····· 02

MT100Plus Brain Neurochemical Analysis System ····· 03

MT200 Dual Channel Brain Neurochemical Analysis System ····· 04

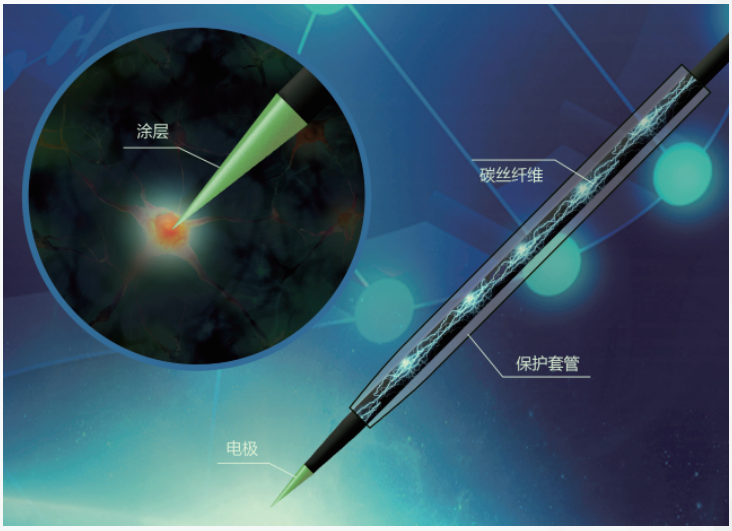
Freely Moving Animal System ····· 05

Online Detection ····· 06

Technical Parameter ····· 07

Brain Neurochemical Analysis System

With the deepening of neuroscience research and the enrichment of research tools, researchers require increasingly higher spatial and temporal resolution for detection substances in the brain. At the same time, interdisciplinary research has become indispensable means to gain a deeper understanding of the brain. The study of brain chemical concentration changes and its combination with in vivo multi-channel electrophysiology, membrane clamp, two-photon, optogenetic, fiber photometry, and behavioural studies have become the focus of researchers' attention. However, both traditional methods and the combination of microdialysis and liquid chromatography-mass spectrometry (LC-MS/MS) can only achieve the highest temporal resolution of minutes, which is not able to synchronously record neuroelectric signals with milliseconds changes, let alone synchronously monitor with optical stimulation, electrical stimulation, intravenous drug administration, and other methods.



The birth of the real-time analysis technology of in vivo brain chemicals solves the above problems.By modifying the carbon fibre electrodes with nanomaterials, the diameter of the electrodes has been reduced from the hundred-micron level of microdialysis probes to the micron level, which significantly reduces neurotrauma and more realistically responds to the changes in the concentration of brain chemicals in animals under normal physiological conditions. Through the optimised electrochemical detection method, the technology not only achieves specific millisecond detection of neurotransmitters, but also allows real-time monitoring of changes in the concentration of several energy metabolising , ions and gas molecules. Currently available brain chemicals include dopamine, hydrogen ions, potassium ions, calcium ions, oxygen, ascorbic acid, glucose, and lactic acid.

The birth of the real-time analysis technology of in vivo brain chemicals solves the above problems.By modifying the carbon fibre electrodes with nanomaterials, the diameter of the electrodes has been reduced from the hundred-micron level of microdialysis probes to the micron level, which significantly reduces neurotrauma and more realistically responds to the changes in the concentration of brain chemicals in animals under normal physiological conditions. Through the optimised electrochemical detection method, the technology not only achieves specific millisecond detection of neurotransmitters, but also allows real-time monitoring of changes in the concentration of several energy metabolising , ions and gas molecules. Currently available brain chemicals include dopamine, hydrogen ions, potassium ions, calcium ions, oxygen, ascorbic acid, glucose, and lactic acid.

Electrodes

The electrodes accompanying the in vivo real-time brain chemical analysis system have been developed for common brain chemicals.The part of the electrode implanted in the brain is mainly made of carbon fibre material.This material has a series of advantages such as high biocompatibility, high electrical conductivity and high toughness. The surface of the carbon fibre electrode can be specifically modified according to the different substances to be detected in the experiment, so as to achieve the high selectivity of the electrode to the substances in the animal's brain.

Meanwhile, the advanced preparation process and a large number of in vivo experiments ensure that the electrodes are highly reliable.

Test Substance

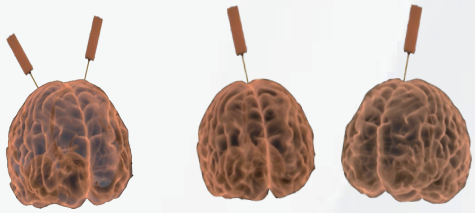
Substance	Detection range	Time resolution	Change value/Base value
Dopamine	0.05-10 μM	0.1s	Change value
Glucose	0.5-10 mM	1s	Change value/Base value
Lactic acid	0.5-10 mM	1s	Change value/Base value
Oxidation	10-200 μM	1s	Change value/Base value
Hydrogen ion PH	pH6.0-8.0	0.1s	Change value
Calcium ion	0.5-10 mM	0.1s	Change value
Potassium ion	0.5-10 mM	0.1s	Change value
Vitamin C	10-500 μM	0.1s	Change value/Base value
Glutamic acid (Glu) (under development)	0.05-10 μM	0.1s	Change value
Serotonin (Upgrading)	0.05-10 μM	0.1s	Change value

MT100Plus
Brain Neurochemical Analysis System

MT100Plus is a new and upgraded version of MT100 system.Compared with the previous model, the MT100Plus analyser's main unit, hardware and software, supporting electrodes, cables and other parts are completely redesigned for experimental scenarios, and the automatic marking function is added. There are significant improvements in detection sensitivity, noise resistance, real-time data monitoring capability, data review processing capability and compatibility with other experiments.

MT100Plus, as the basic version of the real-time analyser of brain chemicals in vivo, adopts a single-channel design, which enables real-time detection of chemicals at specific sites in a single brain region of a single animal. Combined with a microdialysis in vivo sampling system, it also enables the detection of chemicals in the brain of animals in single-channel microdialysis-online mode.By using the MT RACS awake animal activity device, it is possible to detect chemicals in the brain while the animal is awake and free to move.

MT200
Dual Channel Brain Neurochemical Analysis System



The MT200 Real-Time Analyser of In Vivo Brain Chemicals is a dual-channel version.While maintaining the existing features of MT100PLUS, it further enhances the arithmetic power and data parallel processing capability.It achieves dual-channel synchronous recording, which significantly improves the flexibility of the application.

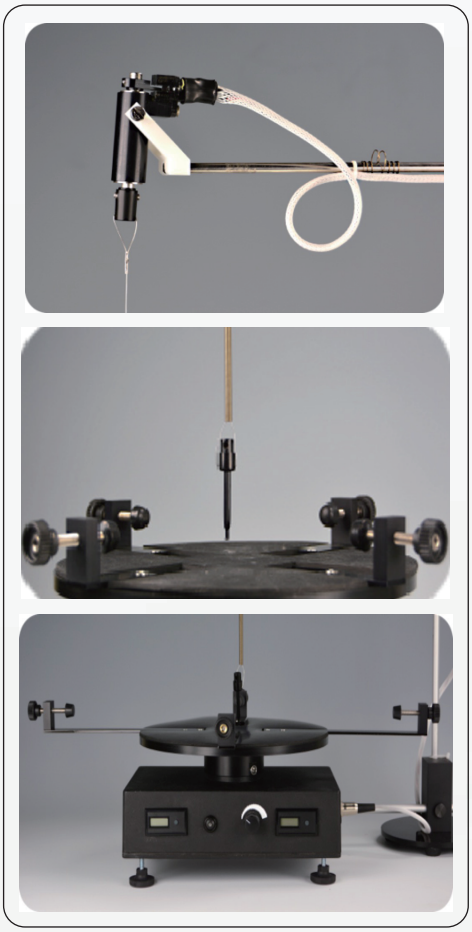
The MT200 allows simultaneous testing of a single brain region in two animals or two different brain regions in one animal. With the Microdialysis In Vivo Sampling System, dual-channel microdialysis-online detection is also possible.With the MT RACS awake animal activity device, it is possible to detect different chemicals in the brain in real time while the animal is awake and free to move.

Freely Moving Animal System

The MT RACS Sober Activity Device is a multi-channel small animal rotary activity system that does not require a swivel ring.

The system uses optical sensor-touch compensation technology to sense animal movement, followed by reverse rotation compensation of the device the animal is in via an automatic rotating base, preventing various lines (cables, fibre optics, fluid pathways, etc.) in the animal's brain from becoming tangled and knotted during the experiment.

MT RACS can replace the traditional rotary ring activity system and can be of significant help for small animals to perform electrochemical, electrophysiological, optogenetic, fibre-optic recording, microdialysis experiments or a combination of multiple experiments synchronously while awake and freely moving.It provides a platform for multi-channel and multi-type signal acquisition while the animal is awake and active.

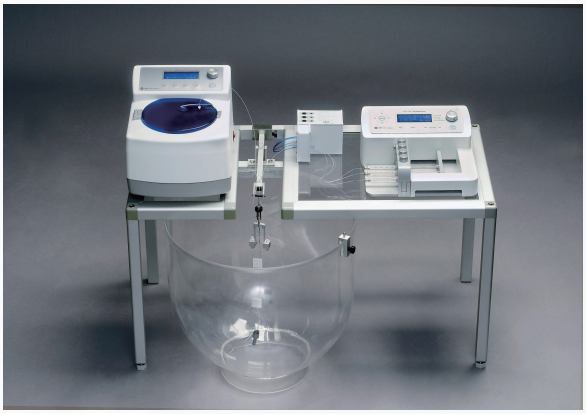


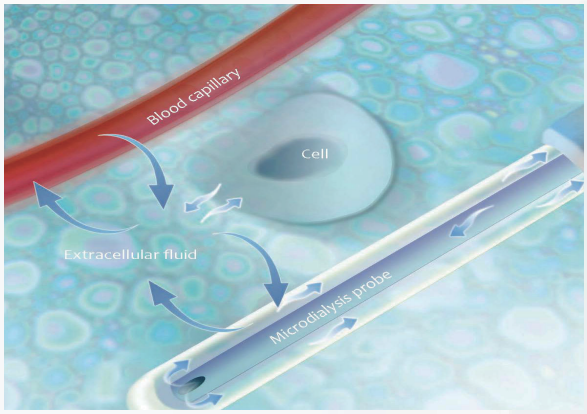
The balancing arm uses optical sensors to touch and compensate for base rotation to prevent animal lines from tangling and kinking during experiments.The sensitivity of the optical sensor is greater than that of other touch methods, and the length and height of the balance arm can be adjusted to meet the needs of different species of experiments, such as rats and mice, with one machine.

The rotation of the base to prevent kinking of the lines allows for the connection of various lines such as cables, fibre optics, and liquid pathways in experiments.The rotating speed of the base is adjustable, the noise of the base rotation is small, and the clamping arm can be adjusted to achieve the placement of different sizes and specifications of cages or boxes, which greatly expands the scope of application of the equipment and avoids the influence of the experimental data on the animals due to the change of the living environment.

The built-in counting sensor, which counts clockwise and anticlockwise and displays it in real time through the screen, is a very meaningful indicator for examining the effect of drugs on the rotational behaviour of animals.

Online Detection





Microdialysis in vivo sampling technology is one of the important tools for neurobiological and pharmacokinetic studies, which can be used to sample endogenous and exogenous compounds free in the extracellular fluids of target parts of the body of the organism in vivo, in real time and online, under the condition of basically not interfering with the normal physiological activities of the organism, and it is especially suited for the study of deep tissues and vital organs.

Samples collected by microdialysis in vivo sampling techniques contain all small molecules at the target site that can pass through the probe's semi-permeable membrane. The traditional way of analysing the samples is to subject them to high-performance liquid chromatography (HPLC) separation, and then feed them into a mass spectrometer, UV detector, fluorescence detector, or electrochemical detector to analyse the substances.However, the sample volume required for these analyses is usually 10 μL or more, which makes it necessary to perform microdialysis experiments for at least 5 min to 10 min to obtain a sample for detection, with low temporal resolution.

The coupling of the Real-Time Analysis System for In Vivo Brain Chemicals and microdialysis can greatly improve this situation by allowing samples collected by microdialysis probes to be transported directly to the flow cell, where changes in the concentration of the target substance in the sample can be detected in real time with minute-level temporal resolution. Online detection of glucose, lactic acid and ascorbic acid has already been realised, and more substances will be supported for online detection in the future.

Technical Parameter

1.Functional requirement

1.1 Changes in the concentration of chemicals in the animal's brain can be measured in situ by electrodes or online by microdialysis.

1.2 Display: It can show the test method and instrument operation status.

1.3 With real-time background deduction and real-time marking of the current number of laps, the software interface can simultaneously display the real-time background deduction and non-background deduction of two interfaces.

1.4 The software interface displays a potential-current diagram, which allows real-time observation of the trend of current values at different potentials.

2.Substance Requirements

2.1 Instantaneous changes in chemical concentrations in the brain or tissues of living animals can be monitored in real time with millisecond time resolution.

2.2 Detectable chemicals include dopamine, hydrogen ions, potassium ions, calcium ions, oxygen, ascorbic acid, glucose, and lactic acid.

2.3 Biosensor parameters: Carbon fibre biosensors and bio-enzyme sensors, which can be implanted in animals for rapid measurement of chemicals.

2.4 Spatial resolution: carbon fibre diameter 7μm, length 0.2mm (DA electrode for example).

2.5 Can be combined with microdialysis, electrophysiology, optogenetics and other experiments.

3.Test Method Requirements

3.1 Fast Scan Cyclic Voltammetry (FSCV)

3.2 Current Signature-time analysis

3.3 Potential Signature-time analysis

4.Technical parameters

4.1 Scanning potential range：±10V

4.2 Voltage Resolution：0.5mV

4.3 Voltage accuracy:±0.5%(0.6~10V),±1mV(0.6V or less)

4.4 Measuring current resolution：0.0015%current range (1E-2～1E-10A)

4.5 sampling rate：10μs

4.6 Scan rate range:10-3~10-3V/s

4.7 Maximum scan rate：103V/s

4.8 Filter Settings: Smooth Filter and No Filter

4.9 External Trigger:Digital,TTL compatible(0V,5V)

4.10 Sensing of animal movement trends via optical sensors above the tether.

4.11 Optical sensors control the reverse rotation of the base to compensate for animal movement, so that each pipe line is less likely to be knotted.

4.12 Adjustable base speed according to the intensity of the animal's activity.

铭泰佳信
MT Technology

Brain Neurochemical Analysis System

ANATECH (Beijing)Co., Ltd.
1502, Block C, Yiheyangguang Building, No. 12 Dongtucheng Road, Chaoyang District, Beijing, China
400-685-1800
mtjx2009@163.com
www.anatechchina.com