

Neuronal Network HTS Device

~ To Measure Synaptic Spontaneous Release Microcurrents at Multiple Points ~

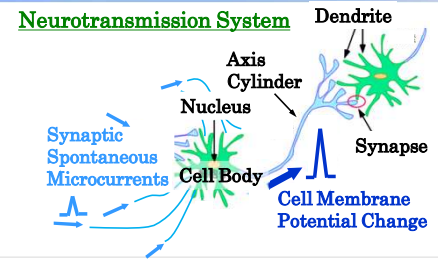
Department of Intellectual Property Management

KEY INVENTION

The technology to make "Synaptic Spontaneous Release Microcurrents" measurable at the multiple points and the high-throughput screening (HTS) device based on the technology have been developed.

→ The detailed and precise studies of Neuronal Network got feasible.

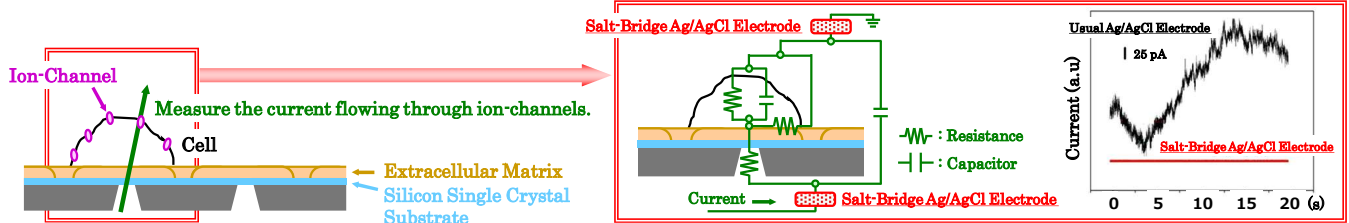
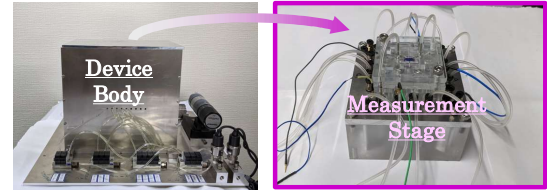
The current technology such as Multi Electrode Assay; MEA or Ca²⁺ Imaging is not enough to detect the pathogenesis of neurological intractable diseases in terms of its accuracy since these measure "Cell Membrane Potential Change" generated by the integration of Synaptic Spontaneous Release Microcurrents are measured.



SUMMARY of INVENTION

4 Channel Culture-type Planer Patch Clamp Device (displayed)

- Planer Patch Clamp enables the multi-measurement.
⇒ High-speed measurement is made easy.
- Salt-Bridge Ag/AgCl Electrodes enable the low noise.
⇒ The current at ion-channels is made measurable.
- A neuronal network is formed with good spatial uniformity.

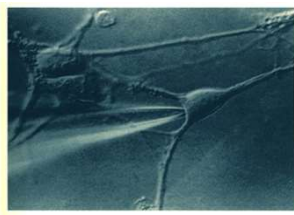
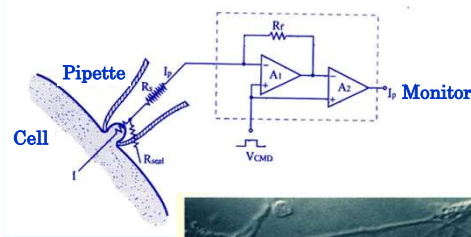


A neuron is immobilized on silicon a single crystal substrate covered with extracellular matrix to measure the current flowing through ion channels.

COMPARISON with CURRENT TECHNOLOGY

[Current Technology] - Pipette Patch Clamp

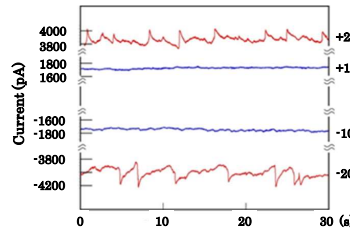
- Best method to measure ion channel current
- Difficulty to measure at the multiple points
- Important technology, but difficult to acquire



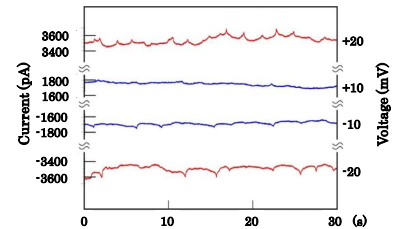
[Advantages of Invention]

a. Synaptic Spontaneous Release Microcurrents at Glutamine Receptors

Buffer Solution (BS) + Glutamic Acid (Glu)

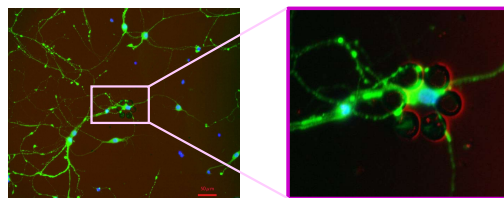


BS + Glu + AP5 + CNQX



AP5 : Glu Receptor (NMDA Type) Antagonist
CNQX : Glu Receptor (Non-NMDA Type) Antagonist
NMDA : N-methyl-D-Asparagine Acid (A Subtype of Glu Receptor)

b. Neuronal Network formed



- Time : 11th days of Incubation
- Green : Synapsin
- Blue : Nucleus (DAPI)
- Magnification : x 100 (Left)
x 400 (Right)

A neuronal network is formed with good spatial uniformity.

APPLICATION expected

- Cause Elucidation of Intractable Neurological Diseases & Drug Discovery : Alzheimer, Parkinson, SCD, ALS, Stiff-Person Syndrome, etc.
- Neuroscience Research Tool : For research methods to study statistical phenomena in many neuronal network systems

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Licensable Patents (Title of Invention - International Publication No.)

- Planar patch clamp device, electrodes for said device and cell ion channel current measurement method - WO2013094418
- Planar patch clamping device and method using the planar patch clamping device - WO2015030201
- Formation and use of neuronal network, and neuron seeding device - WO2014045618
- Cell-seeding and -culturing device - WO2015111722

