Introduction to Jiksak Organoid Chips

For in vitro Assays

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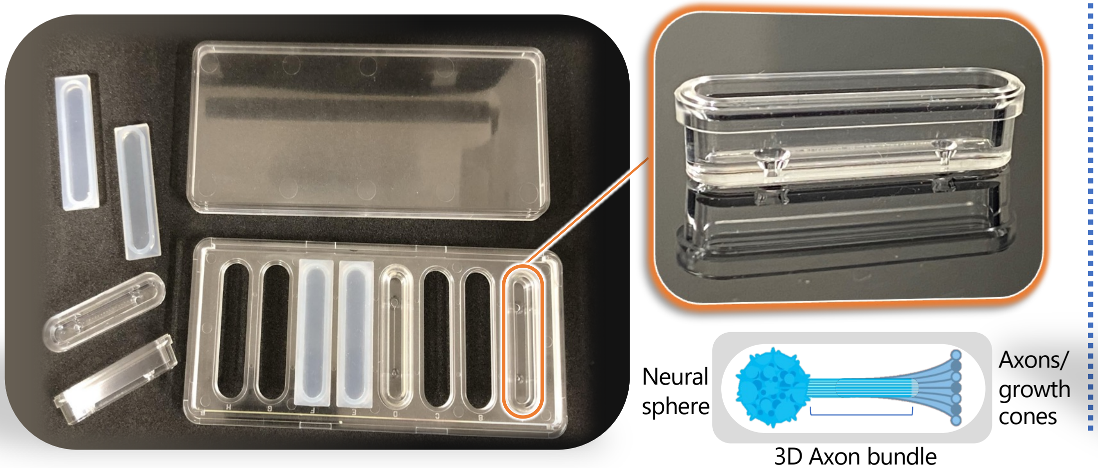
Overview: Nerve Organoid™ Culture Chip

A-chip



B-chip

Jiksak culture chips:

- **Forms Three-dimensional axon bundles**
- **Cell bodies and axon bundles are distinctly segregated**
- **Physically robust axon bundles, can be handled with tweezers**
- **Mass production and high throughput assay capabilities**
- **Several kinds of neurons can be cultured**
- **Mono-culturing and co-culturing options**

Applications: Drug Discovery

- **New Target Molecule Discovery**
- **Target Molecule Validation**
- **Biomarker Discovery**

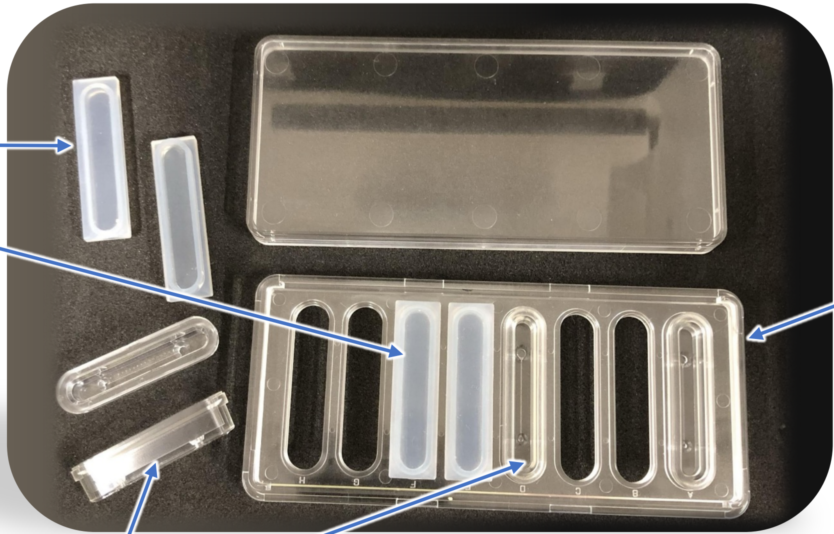
Applications: Pre-clinical Trial

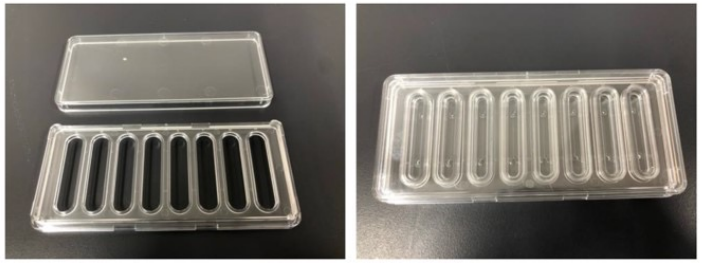
- **Mechanism Analysis**
- **Safety Study**

*Patent #6430680 – “Apparatus for culturing nerve cells, method for culturing nerve cells, cultured nerve cells, method for analyzing and identifying proteins in axon bundles, and method for using nerve cells”（Patented in Japan and the USA）

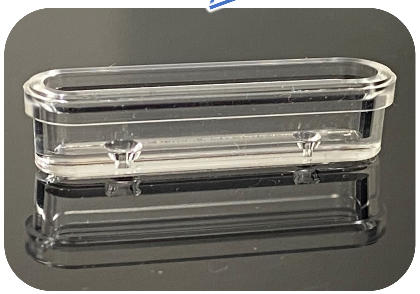
A-chip and Accessories

Dummies replaces unused wells to prevent medium evaporation in A-chips



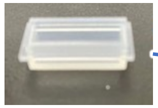


A-chip holder plate for 8 A-chips

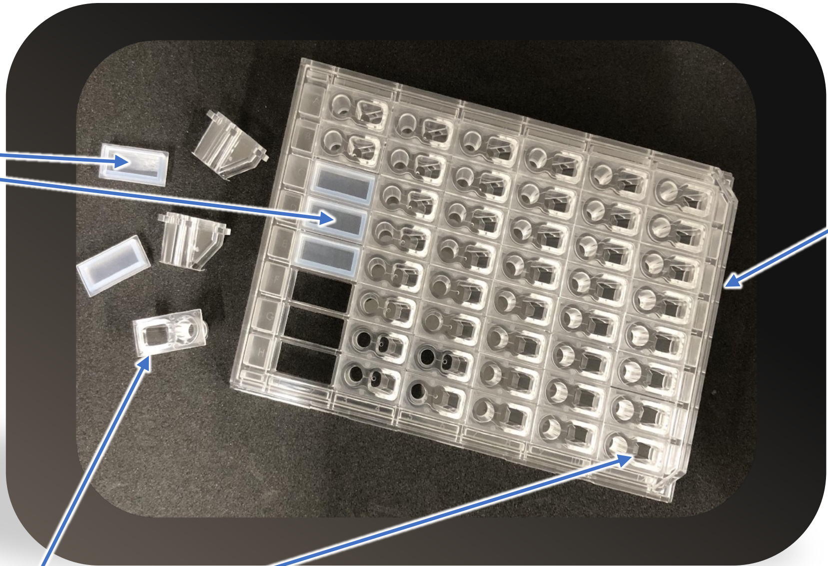


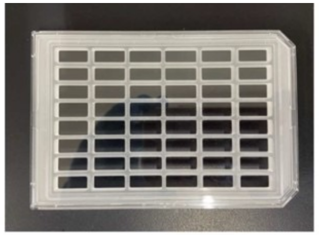
The **A-chip** is made from the following materials.
PDMS+Glass - The chip is made of PDMS material and the bottom is made of glass. This is similar to the XONA company's product but this generates 3D axon bundles.

B-chip and Accessories



Dummies replaces unused wells to prevent medium evaporation in B-chips



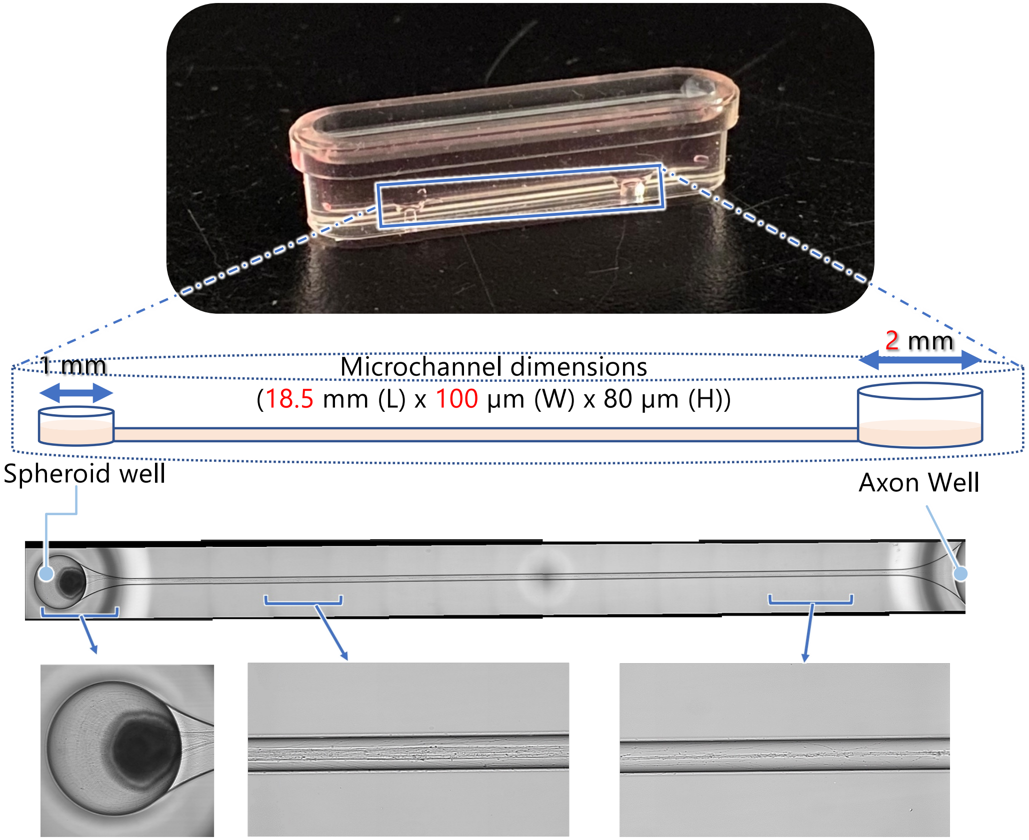


B-chip holder plate
for 48 B-chips in a 96 well plate size holder

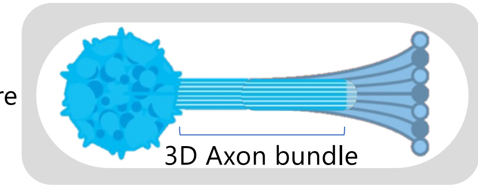
B-chip is made from the following materials.
COP: Cyclo-olefin polymer, manufactured by ZEON Corporation with high transparency, chemical resistance, high heat resistance, low protein adsorption and low elution (US Pharmacopeia Class VI compliant).

Details of A-chip

Cross sectional diagram of A-chip



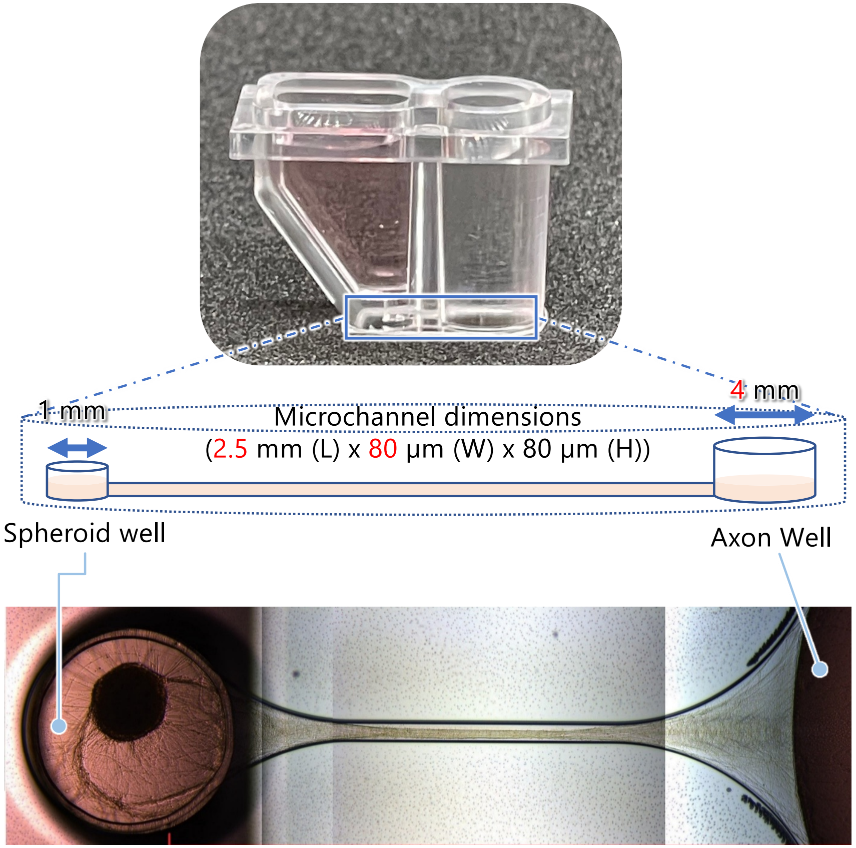
For long axon bundle production



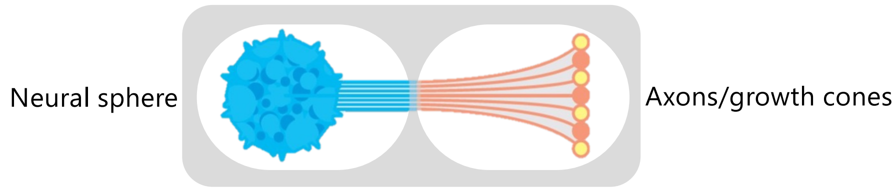
- When a spheroid nerve cells is cultured in one of the wells, the axons outgrowth extends into the microchannel
- The axons elongates in the microchannel and form 3D bundles in an organized manner. After a few weeks of culture, the axon bundles extend towards the end of the microchannel
- Axon bundles can be isolated for proteins and RNA extraction

Details of B-chip

Cross sectional diagram of B-chip



Separate culture of spheroid and axon



- The design of B-chip enables uniform elongation of axon bundle in the microchannel and the axons are fanned out at the axon well.
- The spheroid and axons are separated by a barrier at the middle of the microchannel. Hence different mediums can be used for culturing at spheroid well and axon well. This also allows co-culture with different cell types in either wells on the B-chip.
- This system can be integrated to our synaptogenesis mcirobeads technology that mimics motor neuron and skeletal muscle co-culture system can be use to detect and quantify secreted neurotransmitters

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Product Summary

Suitable for：	A chip	B Chip
Immunostaining	○	○
Calcium imaging	○	○
DNA/RNA extraction	○	
Western Blotting	○	
Neurotransmitter quantification		○
Co-culture with other cell types/medium/substances		○
Toxicity testing	○	○
Axon growth comparison	○	
TEM/SEM images (Nerve Organoid®)	○	
High-throughput screening		○
Co-culture	○	○

Download link

ALS research

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- Mitsuzawa, Shio, et al. "Reduced PHOX2B stability causes axonal growth impairment in motor neurons with TARDBP mutations." Stem cell reports 16.6 (2021): 1527-1541.
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Others

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- Nishijima, Takayuki, et al. "Novel artificial nerve transplantation of human iPSC-derived neurite bundles enhanced nerve regeneration after peripheral nerve injury." Inflammation and Regeneration 44.1 (2024): 6.
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- Martins-Costa, Catarina, et al. "ARID1B controls transcriptional programs of axon projection in an organoid model of the human corpus callosum." Cell Stem Cell 31.6 (2024): 866-885.
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- Koyanagi, Madoka, et al. "Development of a 3-dimensional organotypic model with characteristics of peripheral sensory nerves." Cell Reports Methods 4.8 (2024).
  https://www.cell.com/cell-reports-methods/fulltext/S2667-2375(24)00208-X?elqTrackId=3c55c6d9834e4ae0a11f3f80b8c49f6e&elqTrack=true