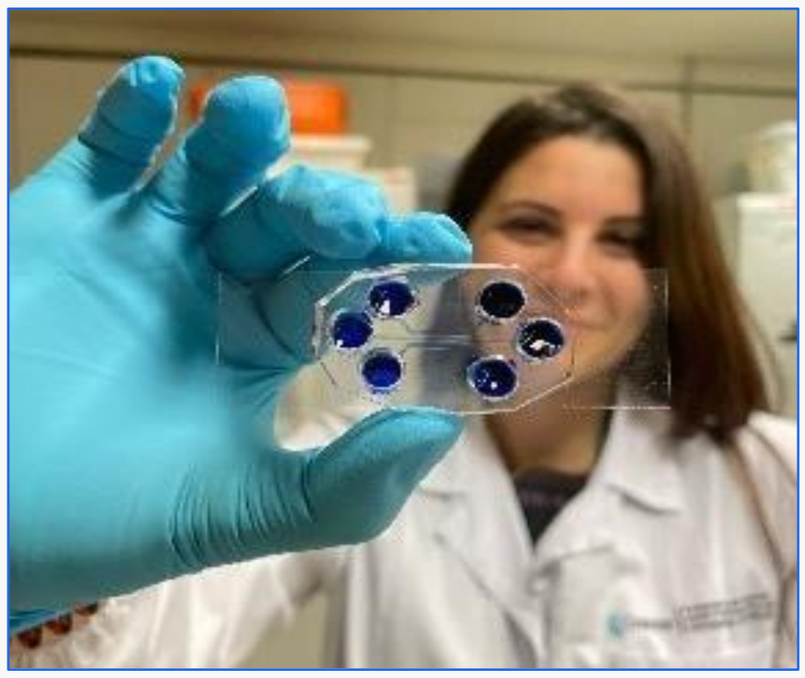
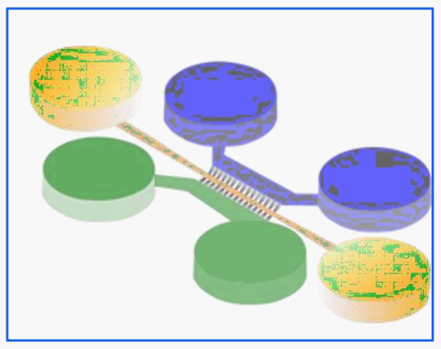
BRAIN-ON-A-CHIP TECHNOLOGY FOR BIOMEDICAL RESEARCH



Abstract

Human-based Brain-on-a-Chip technology is a viable solution for studying the human biology of neuronal connectivity in normal and disease conditions. avantdrug's Brain-on-a-Chip is a new platform based on the combination of different human pluripotent stem-cell-derived neurons. The flexibility of our platform allows for the combination of different neural cell types to assess the maturation and functionality of neuronal connections.

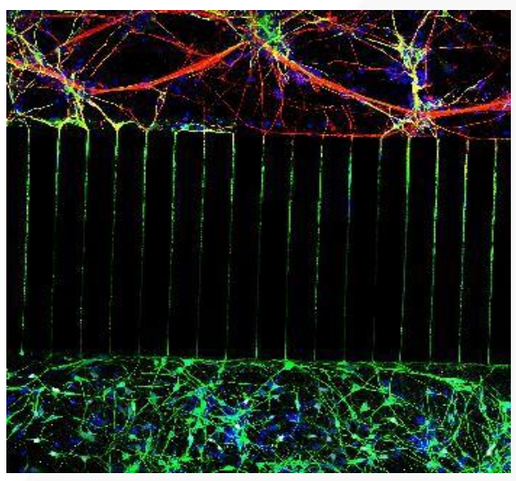
- ✓ avantdrug's multi-chamber brain-on-a-chip design allows the combination of up to three parallel neural differentiations.
- ✓ Different seeding strategies combining several developmental stages allow for the analysis of afferent connections on neuronal maturation.
- ✓ The directional axonal growth of avantdrug's Brain-on-a-Chip mimics the brain's neuronal networks.
- ✓ The platform permits studies of functional neurological processes in health and disease to test drug effects and toxicity.



Applications of the avantdrug Brain-on-a-Chip

1. Neurodevelopmental studies and synaptic plasticity.
2. Modelling of human neurodegenerative disorders to understand biological mechanisms.
3. Drug testing to assess impact on development and maturation of neuronal connections.
4. Toxicological studies during neurodevelopment and of neuronal connectivity.

High-content analysis

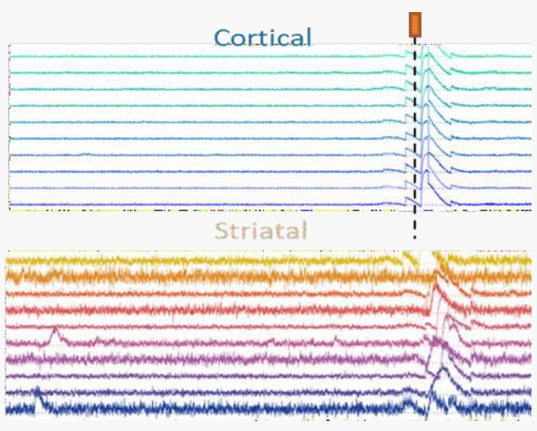


- ✓ **Compatible with high-content analysis:** simultaneous characterization and quantification of different cell types in each chamber.
- ✓ **Establishment of and impacts on connections can be measured:** combination of functional and morphological methods to characterize connectivity.
- ✓ **Detection of synaptic connections by monosynaptic anterograde tracer:** analysis of synaptic connections by combination of viral-based monosynaptic tracer.

Drug testing & toxicology

- ✓ **Drug testing:** testing the efficacy of new drugs on neuronal connectivity and synaptic function, applying new drugs to control or disease-derived human cells to analyze their therapeutic effects.
- ✓ **Developmental toxicology:** analysis of the toxicity of new drugs on neuronal function, connectivity, and synaptic function.

Analysis of synaptic function



- ✓ **High-throughput functional analysis:** compatible with high-throughput calcium imaging to assess neuronal functionality and network formation.
- ✓ **Drug testing:** capable of performing functional pharmacological studies of neuronal connectivity in independent chambers.
- ✓ **Evoked neuronal response:** allows analysis of drug-evoked responses or optical stimulation using optogenetics of individual chambers, to test the putative positive and negative effects of drugs on evoked responses.
- ✓ **RNAseq:** compatible with genetic characterization using bulk-RNAseq or single cell/nuclei- RNAseq as well as the genetic modification of neural cell types at different stages.

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We ensure all projects are compliant with applicable UNE-EN-ISO 9001:2015 and/or GLP guidelines, and the Creatio Quality System.