Scalable Neural Stem Cells Differentiate Into Mature Human Neurons With Excitatory and Inhibitory Synaptic activity

- Human HIP-009 neural stem cells isolated from human brain tissue
- Differentiates into multiple neural sub-types, astrocytes and oligodendrocytes
- Scale $>10^9$ cells with consistent reproducible results
- Proprietary media formulated for growth, transition and directed differentiation to enrich for specific neural sub-types
- Functional human neurons measured by electrophysiology patch clamp and on multi-electrode arrays (MEAs)
- Compatible with High Throughput Screening (HTS) Platforms

- Pan-neural model
- Spontaneous action potentials.
- Spontaneous network activity with Glutamatergic and GABAergic characteristics.
- Correlates well with High-Content endpoints
HIP-009 NSCs were differentiated into mature functional pan-neurons.
Following 28 days neural cells were treated with 10μM A-Beta (Ab) oligomer 1-42 for 24 hours then fixed and immunostained for Tuj1, GFAP and Synaptophysin.
Image analysis was performed on Cellomics VTI.
High-Content analysis demonstrates significant synaptic deficit induced by Ab 42 oligomers.
This model is being used to screen for drugs to prevent/treat Alzheimer's Disease.
• HIP-009 NSCs differentiated into pan-neurons on MEAs and maintained in culture beyond 70 days
• Typical response to Picrotoxin (10µM) observed in HIP-009 human neurons was comparable to rat primary neurons
• Vehicle control (DMSO 0.2%) – data not shown
• Representative electrodes for each well were chosen for raster plot images
• Raster plots show increased
  – Firing rate
  – Burst rate
  – Burst length
  – Synchrony
  – Number of active electrodes
Parkinson's Disease Model

- DA-H9 NSCs differentiated into dopaminergic neurons on MEAs
- 70% of the neurons were TH+
- Developed neural networks with spikes and bursts
- Responded to MPP+ in a dose response curve
- This model was used to screen for drugs to treat/prevent Parkinson's Disease

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