Psilocybin’s Effects on Neuritogenesis in Cancer Associated Neurons
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Introduction
- Psilocybin is a psychoactive component in psychedelic mushrooms.
- Used medically for PTSD and Depression
- Why are we interested?
  - Experiments showed ability to increase neuronal filament generation (neuritogenesis)
  - Cancer cells have been suggested to interact with neurons and damage the neuronal filaments
- Our investigation focuses mainly on hiPSC DRG neurons and PCI-13 cancer cells

Hypothesis
- Overall Goal: Determine if Psilocybin is a potential drug therapy to reduce effects of cancer on neurons in patients.
- Hypothesis: Psilocybin will cause change in neuronal structure in presence and absence of cancer.

Methods
- Neurofilament Tracing (Imaris)
- hiPSC DRG
- PCI-13
- Andor Zyla
- Psilocybin
- Measurement of Neuronal Electrical Activity (Maestro Edge (MEA))
- Dissociated TG
- Maestro Edge (MEA)
- Electrical Activity Metrics
- Every 2-3 days
- MOC1

Results

Morphology
- Dose Dependent Effect (Neurons)
  - Segment Length
  - Branch Points
  - Number of Segments

Day of Administration Effect (Neurons)
- At higher doses, Psilocybin increases branching and # of segments while decreasing segment length
- At later time points, Psilocybin increases branching, # of segments and segment length

Dose Dependent Effect (Cancer + Neurons)
- In Cancer Associated Neurons, a trend differing from neurons alone appeared with increasing doses of Psilocybin.

Electrical Activity
- Activity of TG in Presence of Moc1

Real Time Activity Plots (Raster Plot)
- Activity and organization of activity fluctuates with time
- Activity only present in coculture and 50K-100K neurons

Conclusions
- Psilocybin leads to increase in filament growth, branching, and number of segments at higher doses and a later administration of the drug.
- In Neuron + Cancer Coculture, Psilocybin trends toward a decrease in filament length, branching and number of segments but needs further investigation.
- Neurons give electrical activity in the presence of cancer.

Future Experiments
- Investigate Cancer Associated Neuronal structure and electrical activity in vitro and in vivo by using neurofilament tracing, RNA sequencing, Antibody Staining, Electron Microscopy and a microelectrode array.

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References