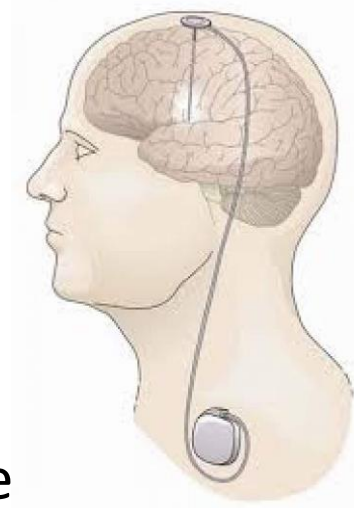


How Does Simulated Physiological Micromotion Affect Oxygen Demand at Neural Interfaces?

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Problem/ Need

- Neuromodulation devices/ implants used as therapeutic tools in neurological disorders such as Parkinson disease leads to many biological changes in the cells around the brain implant interface.

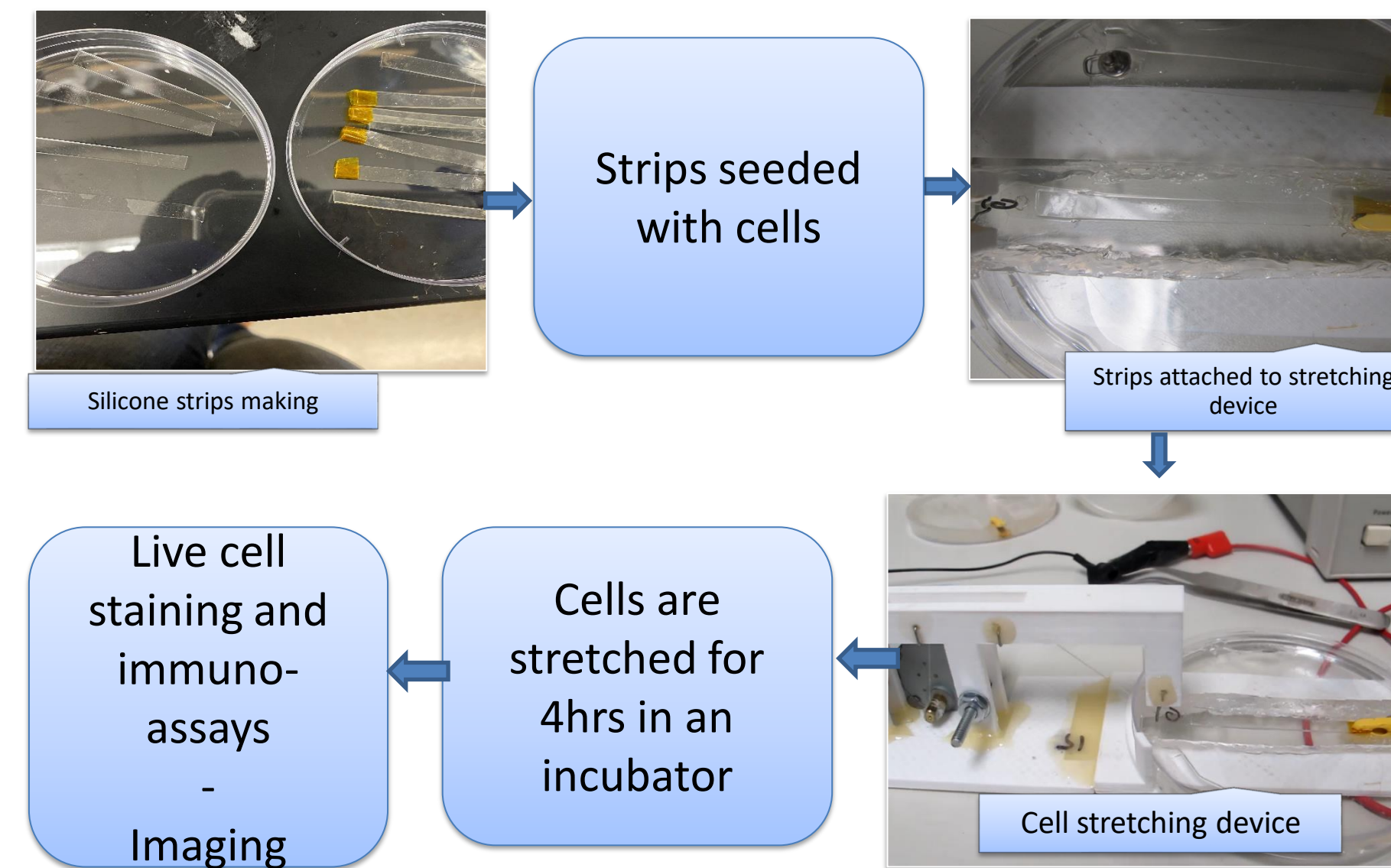


- The need to find and understand the **mechanisms** that underly the biological and mechanical changes that occur in neuronal cells around a brain implant interface.
- Thus, this study seeks to investigate how physiological micromotion stress and strain modulates oxygen demand/ metabolic activities at neural interfaces.
- Preliminary data shows that physiological micromotion(heart pulsations and breathing) affects local oxygen demand in vivo and increases mitochondrial activity in neurons.

AIMS

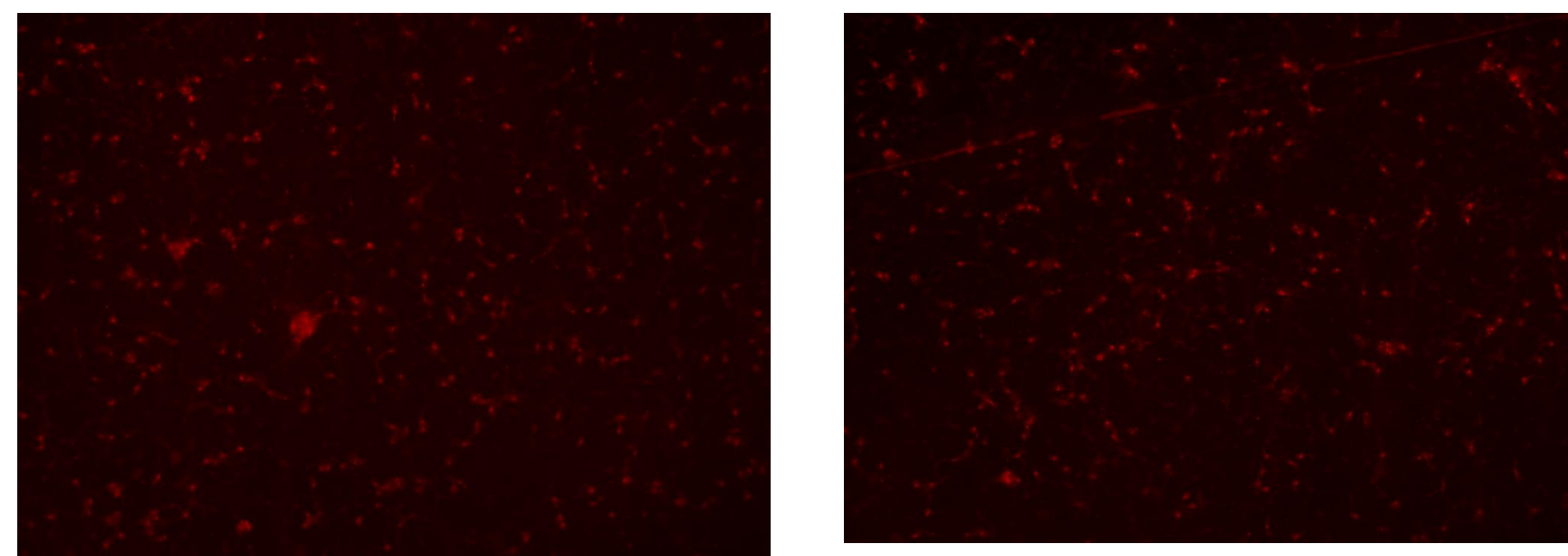
- We will assess the production of mitochondrial superoxide (indicative of metabolic activity in the cell) at 3% strain and 1 Hz cyclic stretch conditions
- We will also assess relative changes in level of neural activity by evaluating the expression of carbonic anhydrase enzyme in neuronal cells using immunocytochemical techniques
- We will test how PO₂ (oxygen) levels change in the pericellular environment of neuronal cultures

Methods/ Materials

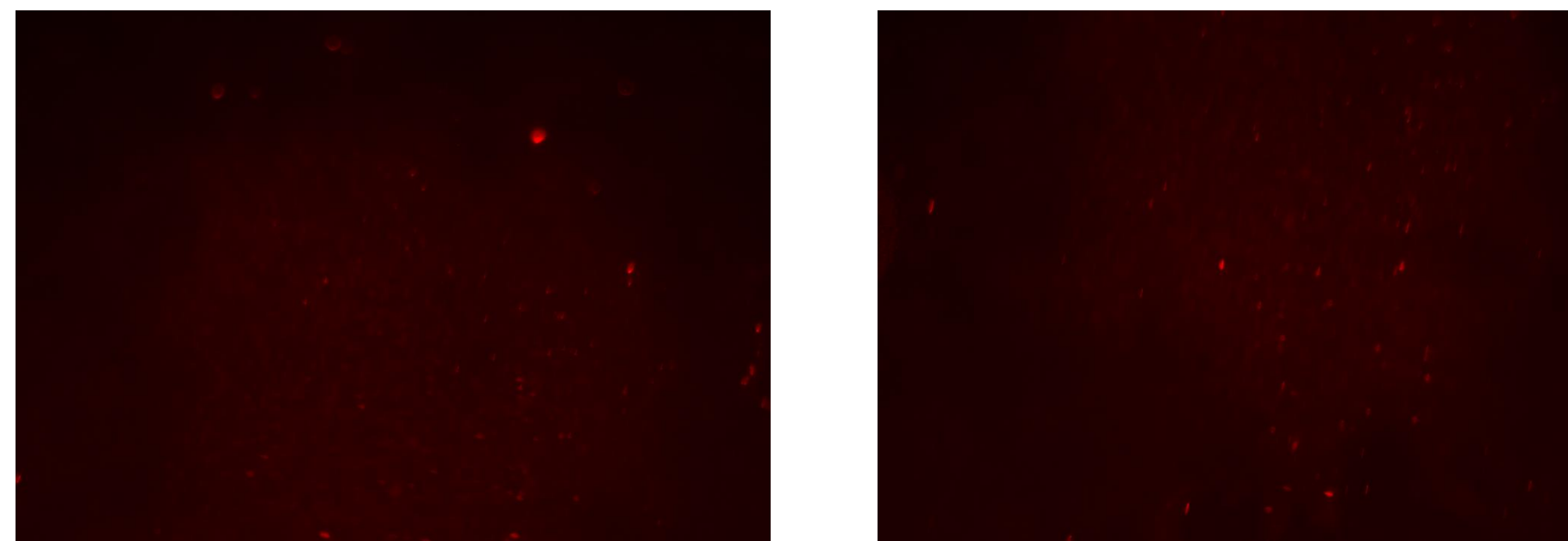


Preliminary baseline results

- MitoSox Live cell image for assessing mitochondrial activity(superoxide production)



- Carbonic Anhydrase- assess production of carbonic anhydrase enzyme (indicative of metabolic activity)



Challenges and Future works

- Corroded hook contraction on strips
- Cell death during 14-day culturing on strips
- Failed cell stretching device
- New hook contraptions to prevent cell death
- Analysis (Quantification) of different intensities in fluorescence imaged for the various assays/ biomarkers
- Live cell staining/ Immuno-assays and imaging of stretched strips with cultured neurons.
- Final quantification and analysis of controls and stretched



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