A TOOLBOX FOR STUDYING ISCHEMIC STROKE IN NON-HUMAN PRIMATE CORTEX

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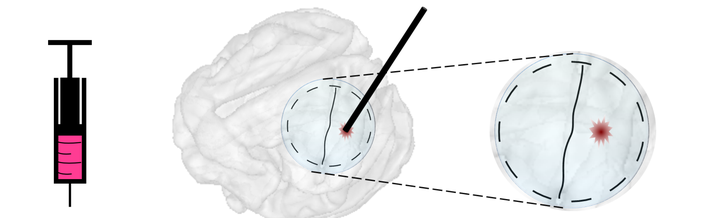
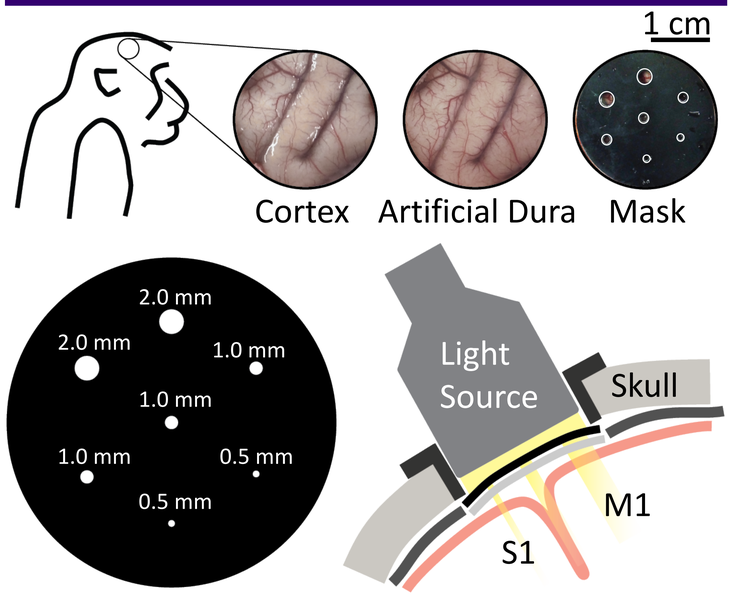
Abstract

Stroke is a leading cause of disability with few treatment options. Current non-human primate models of ischemic stroke lack precision, have variable efficacy, require surgical skill, and don't exhibit platelet activation. We propose the photothrombotic model in which intravenous infusion of Rose Bengal followed by illumination of target tissue photoactivates Rose Bengal. This results in the release of reactive oxygen species that damage endothelial cells, resulting in focal thrombi controlled by light parameters. We implemented this technique in 5 adult macaques. Optical coherence tomography angiography (OCTA) imaging validated the formation of lesions *in vivo*, histological staining was used to validate neuronal cell death and estimate the volumes of the lesions. A Monte Carlo simulation of light propagation through brain tissue was developed to predict lesion sizes based on light parameters. Neural activity was recorded with a semi-transparent µ-electrocorticography array as lesions developed.

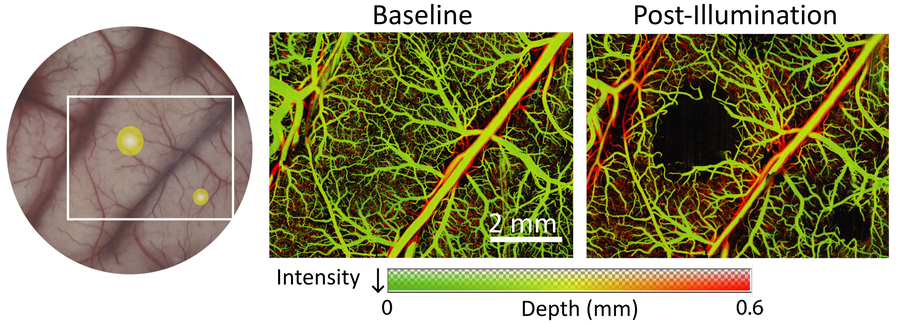
Photothrombotic Stroke Method



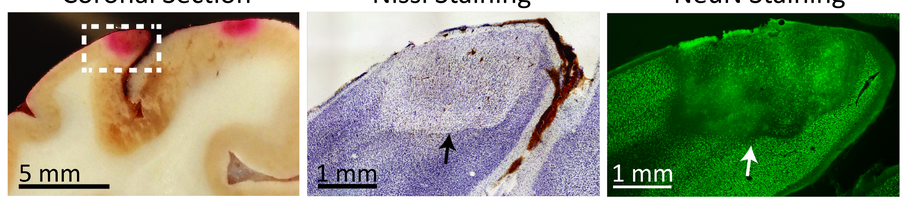
Implementation



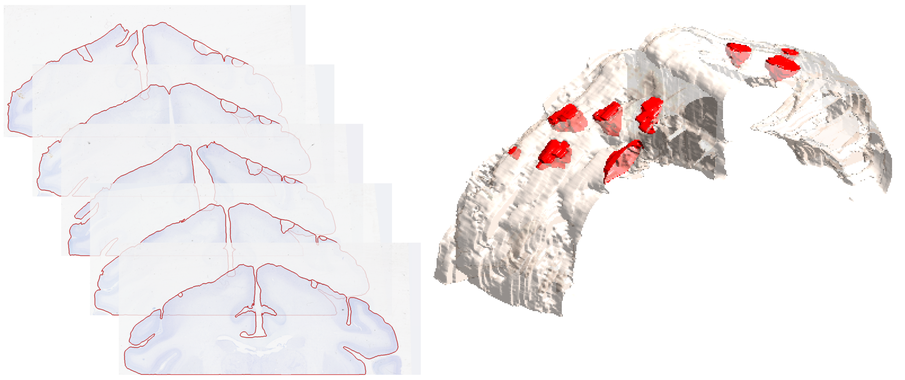
Vivo Optical Coherence Tomography Angiography (OCTA) Imagir



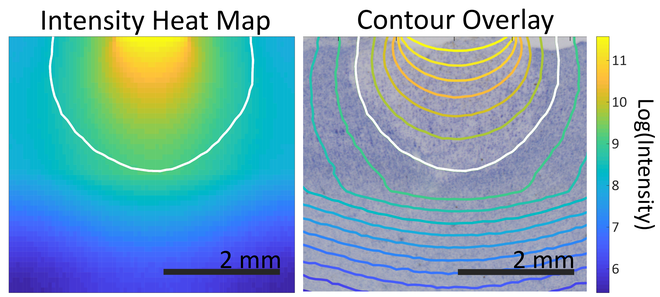
Histology and Immunohistochemistry Validation



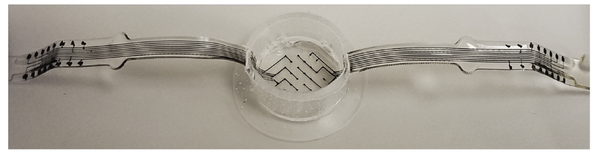
Lesion Volume Estimation

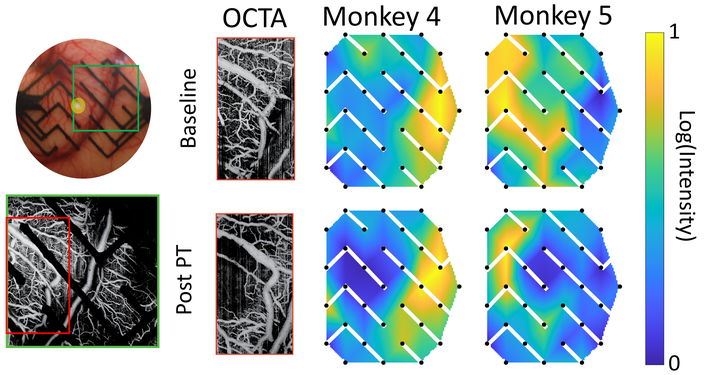


Predictive Quantitative Model



µ-Electrocorticography Recording





Acknowledgments

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