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SUPPLEMENTARY INFORMATION

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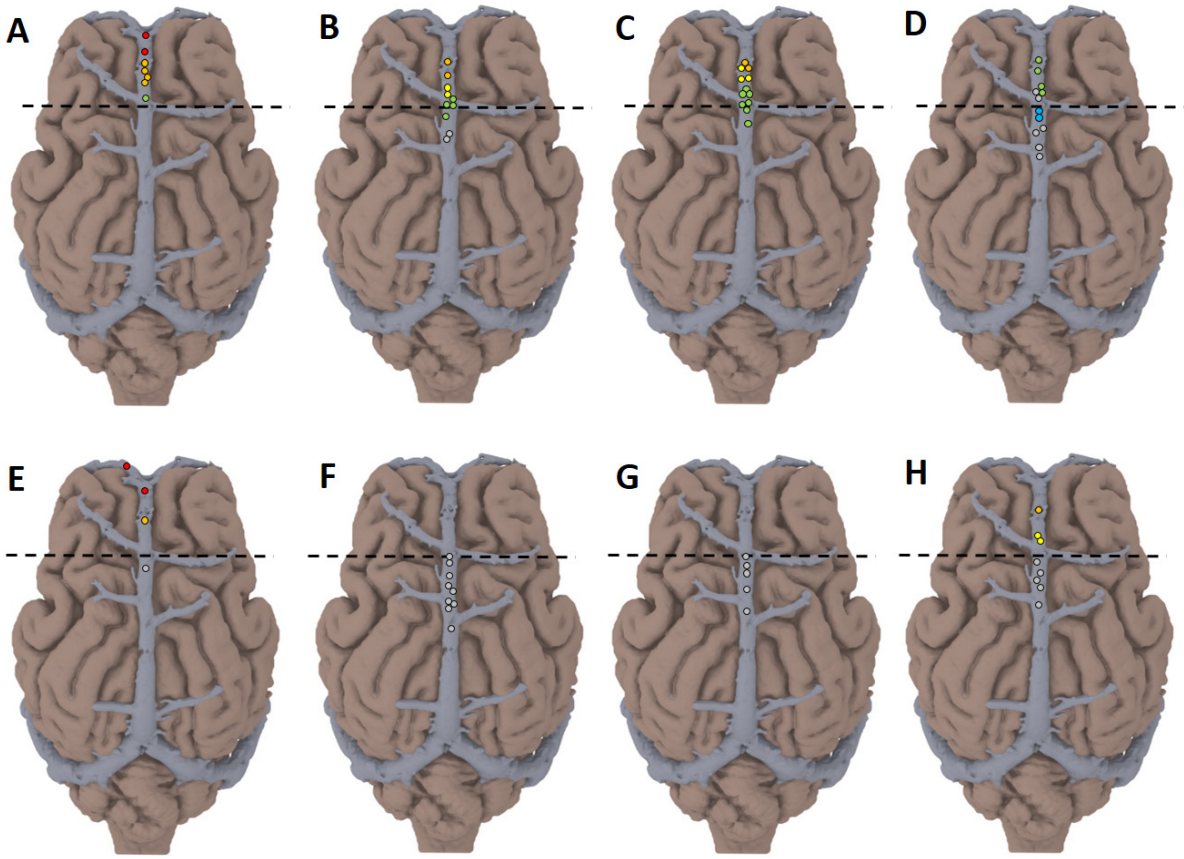
Focal stimulation of the sheep motor cortex with a chronically implanted minimally invasive electrode array mounted on an endovascular stent

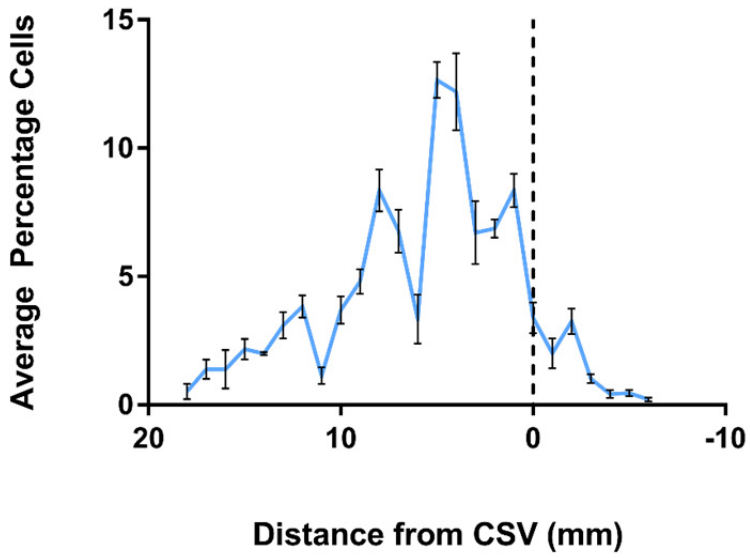
Nicholas L. Opie[1,2,3,9*], Sam E. John[1,2,4,9], Gil S. Rind[1,2,3], Stephen M. Ronayne[1,2,3], Yan T. Wong[1,5,6], Giulia Gerboni[1,4], Peter E. Yoo[1,7], Timothy J. H. Lovell[1,8], Theodore C. M. Scordas[1], Stefan L. Wilson[1], Anthony Dornom[3], Thomas Vale[3], Terence J. O'Brien[1], David B. Grayden[1,4], Clive N. May[1,3] and Thomas J. Oxley[1,2,3]

[1]Vascular Bionics Laboratory, Department of Medicine (Royal Melbourne Hospital), University of Melbourne, Parkville, Victoria, Australia. [2]Synchron Inc., Palo Alto, CA, USA. [3]Florey Institute of Neuroscience and Mental Health, University of Melbourne, Parkville, Victoria, Australia. [4]Department of Biomedical Engineering, University of Melbourne, Parkville, Victoria, Australia. [5]Department of Physiology, Monash University, Clayton, Victoria, Australia. [6]Department of Electrical and Computer Systems Engineering, Monash University, Clayton, Victoria, Australia. [7]Department of Anatomy and Neuroscience, University of Melbourne, Parkville, Victoria, Australia. [8]Department of Radiology, Royal Melbourne Hospital, University of Melbourne, Parkville, Victoria, Australia. [9]These authors contributed equally: Nicholas L. Opie, Sam E. John. *e-mail: Nicholas.opie@unimelb.edu.au

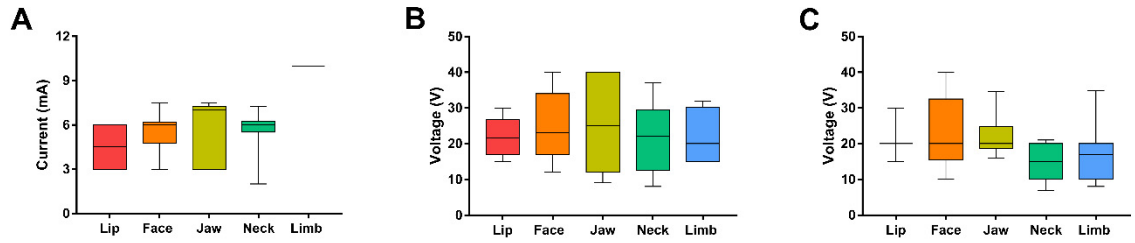
Content



Supplementary Figure 1. Effect of electrode placement on stimulation induced response. a-h) Schematic representations of stimulation-elicited movements of the lip (●), face (●), jaw (●), neck (●) and forelimb (●) observed from electrodes implanted in the eight sheep. Grey markers (●) denote where no response was observed, with dashed line (---) indicating approximate location of the intersection of the central sulcal vein and the superior sagittal sinus.



Supplementary Figure 2. Location of pyramidal cells observed using retrograde tracing. Average percentage (± SD) of fluorescent pyramidal cells observed from three sheep following retrograde tracing as a function of distance from the CSV (---).



Supplementary Figure 3. Stimulation thresholds for implanted neural arrays. Box and whisker plots showing the mean, inter-quartile range and range for stimulation of the lip, face, jaw, neck and limb from **a)** electrodes mounted on the Stentrode and implanted within the superior sagittal sinus (n=4 lip, n=10 face, n=7 jaw, n=14 neck and n=2 limb responses), **b)** electrodes mounted on a subdural grid that was placed on the surface of the brain following a large craniotomy (n=12 lip, n=33 face, n=19 jaw, n=25 neck and n=12 limb responses), and **c)** a needle electrode that was penetrated into the brain directly following open brain surgery (n=14 lip, n=29 face, n=10 jaw, n=30 neck and n=26 limb responses). For the subdural and penetrating electrodes, the animals were anaesthetized throughout the experiment and threshold voltages are a combination of voltage thresholds and converted current stimulation thresholds. It should be noted, that determination of thresholds for the subdural and penetrating electrodes was not the primary aim of this research, and often supra-threshold currents and voltages were administered to elicit a visually observable response.

Supplementary Video. Minimally invasive angiographic delivery and deployment of a stent-electrode array to the motor cortex in sheep. Time lapse video taken using a mobile C-Arm showing the navigation of a telescopic catheter system comprising of a microwire (Transend, Stryker NV), 2F microcatheter (Excelsior SL-10, Stryker NV) and 4F delivery catheter (Reperfusion 041, Penumbra) delivered through a 6F sheath (NeuronMax, Penumbra) from an incision in the central jugular vein. Following superior sagittal sinus access of the 4F catheter, the microwire and microcatheter were removed and a contrast enhanced video was acquired to highlight cortical vessels. The microwire and microcatheter were replaced, navigated to the desired location and removed to allow the stent-electrode array to be delivered via the 4F catheter and deployed in the target region.