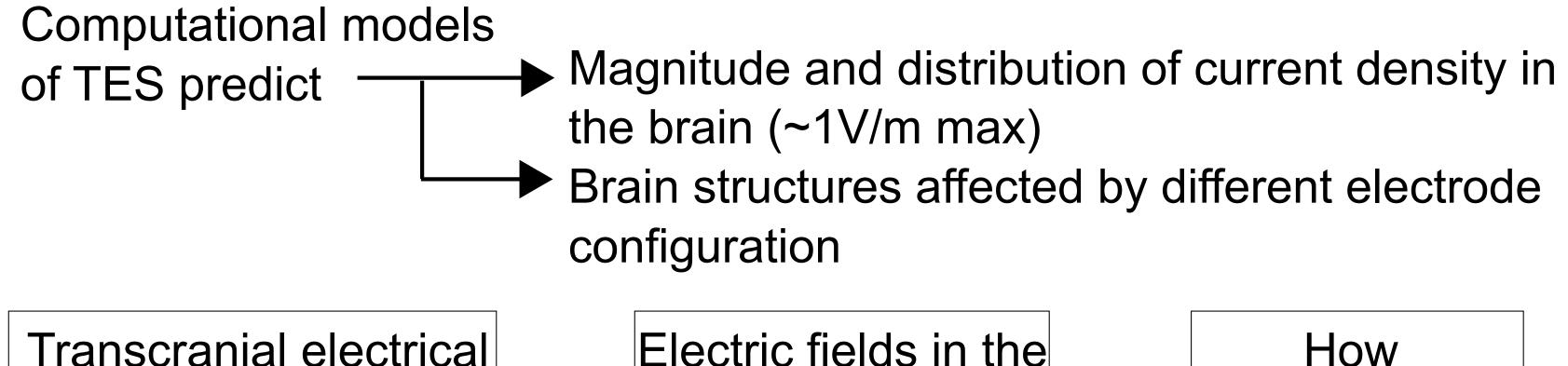


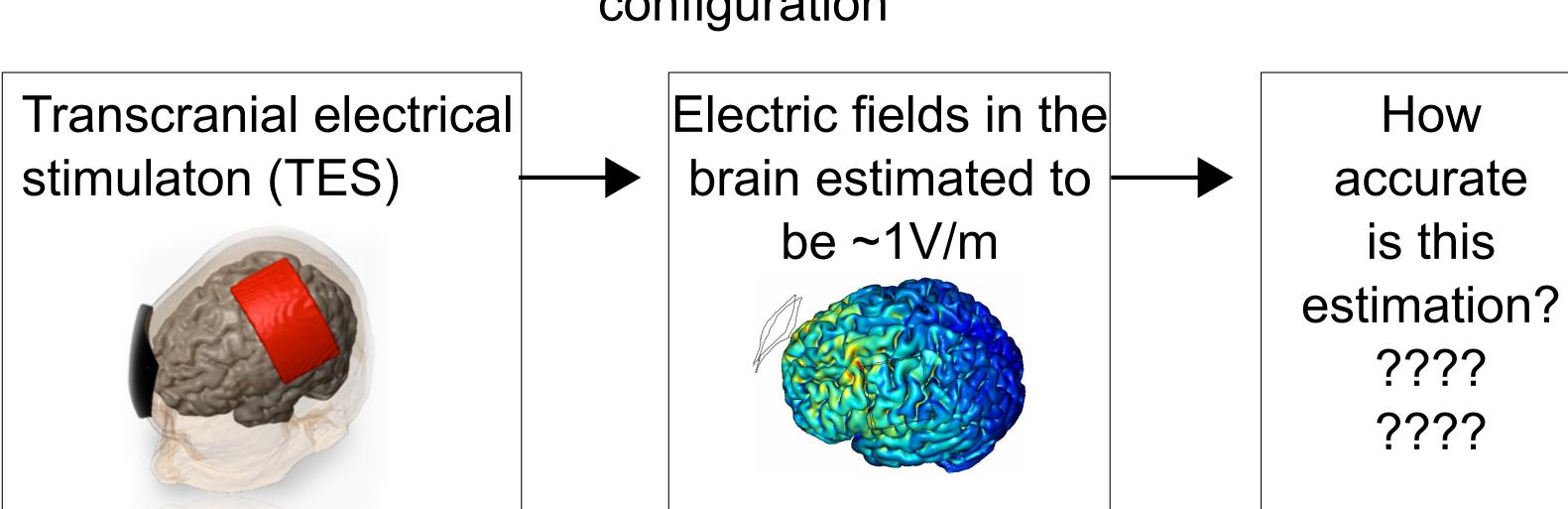
Direct experimental validation of computational current flow models with intra-cranial recordings in human and non-human primates



Belen Lafon*, Anli Liu*, Yu Huang, Preet Minas, Kohitij Kar, Marom Bikson, Daniel Friedman, Bart Krekelberg, Lucas C. Parra

TES: BACKGROUND & SIGNIFICANCE



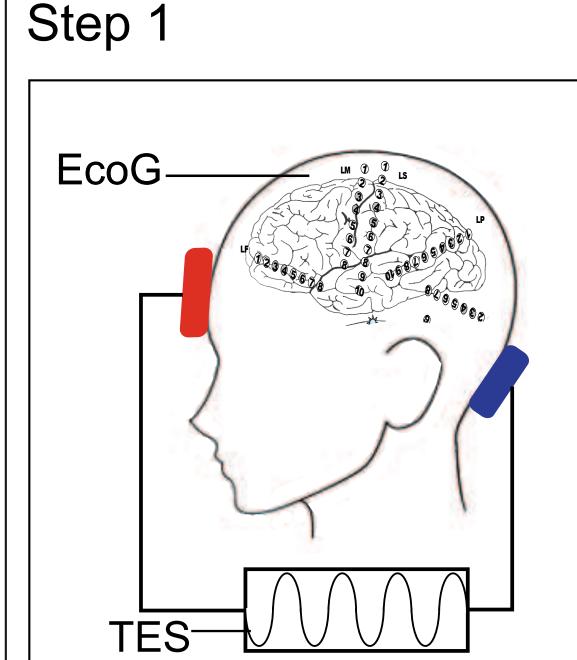


Step 2

How precise are the predictions? What is the current density generated in the brain?

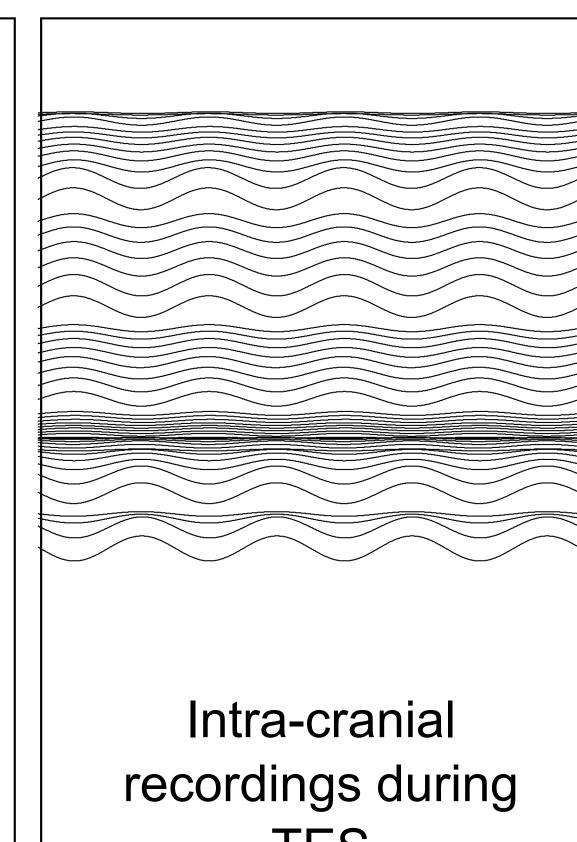
METHODS

MODEL VALIDATION

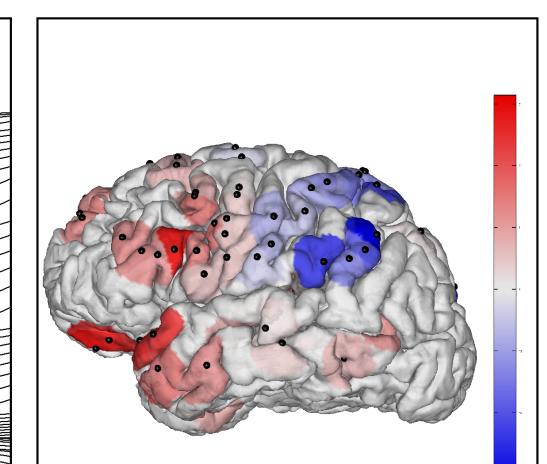


Patient undergoing epileptic surgery monitoring during TES

(1 mA, 1Hz)



TES



Step 3

accurate

is this

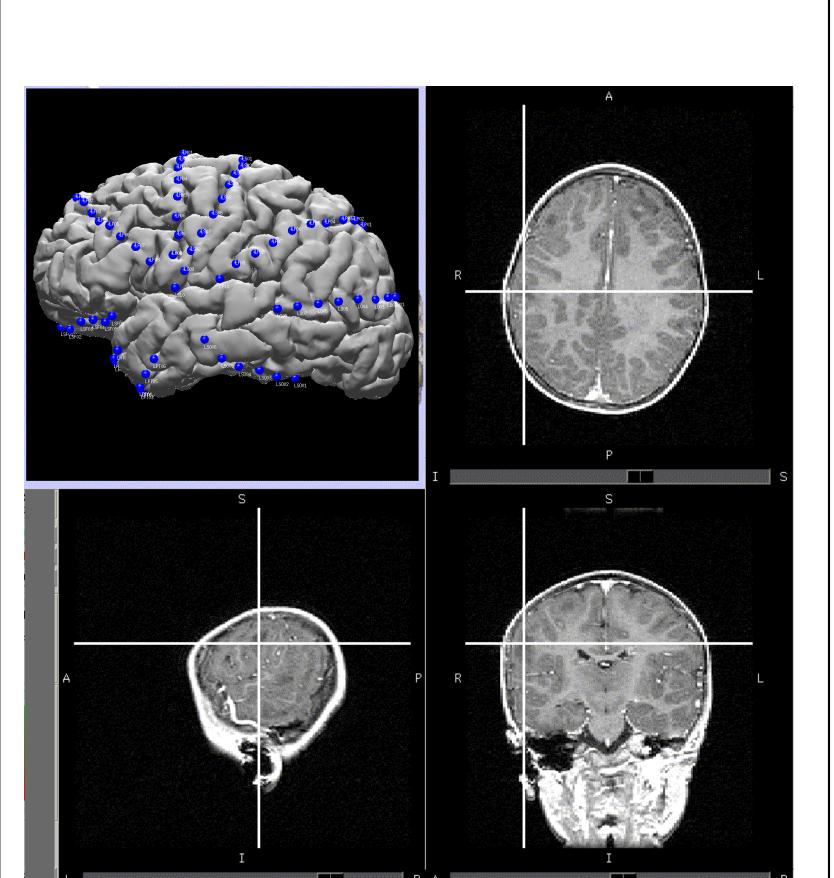
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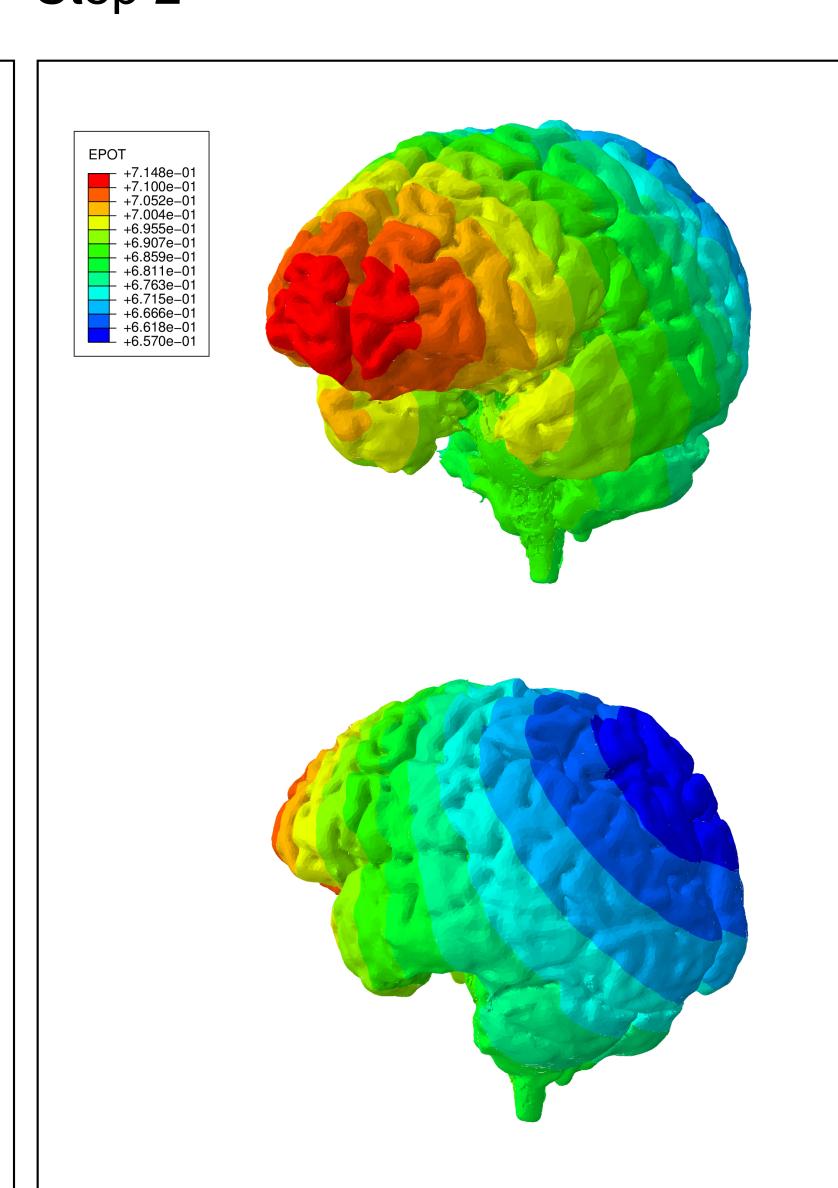
Measured voltage distribution in the brain

MODEL PREDICTION

Step 1 Step 2

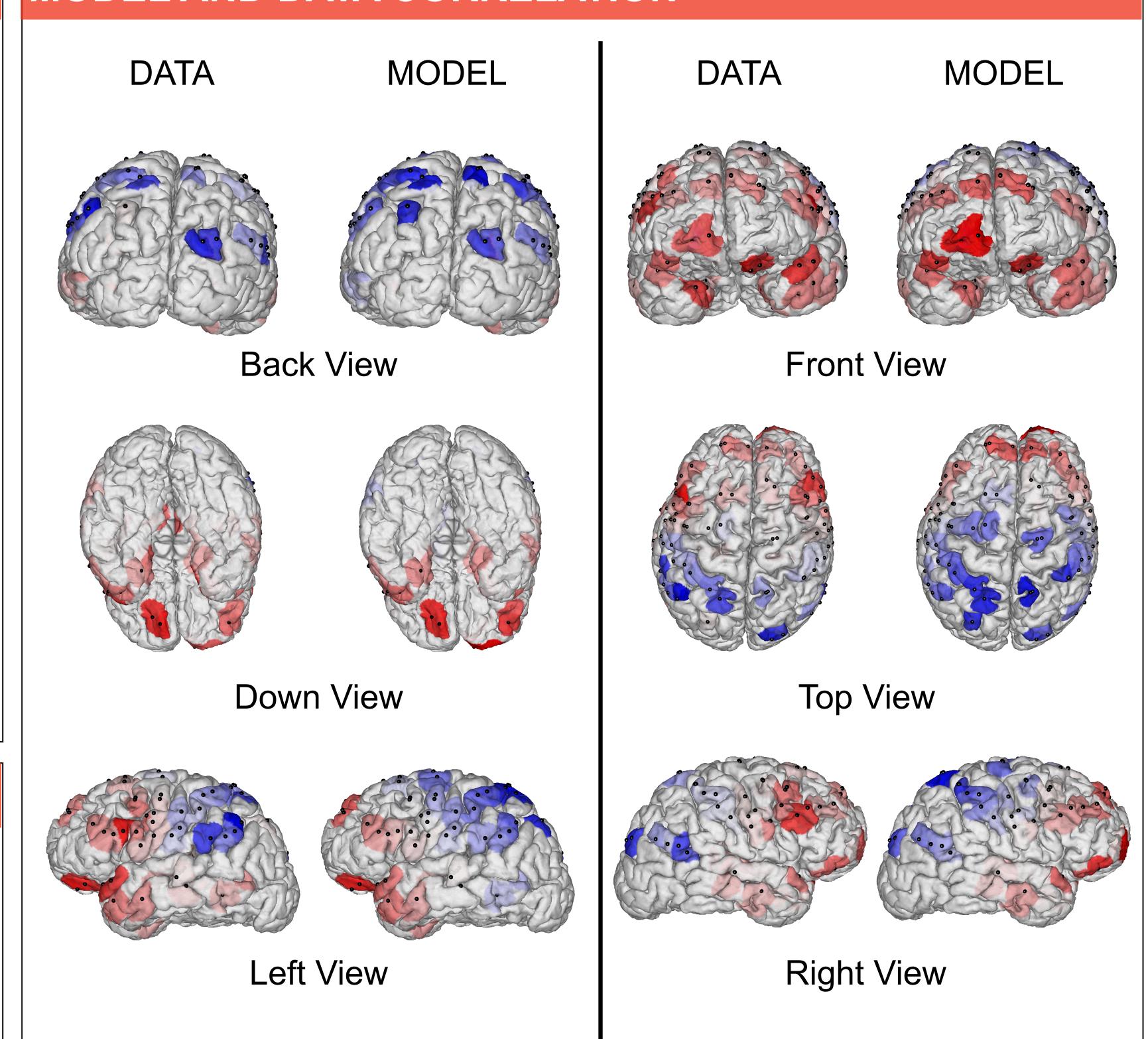


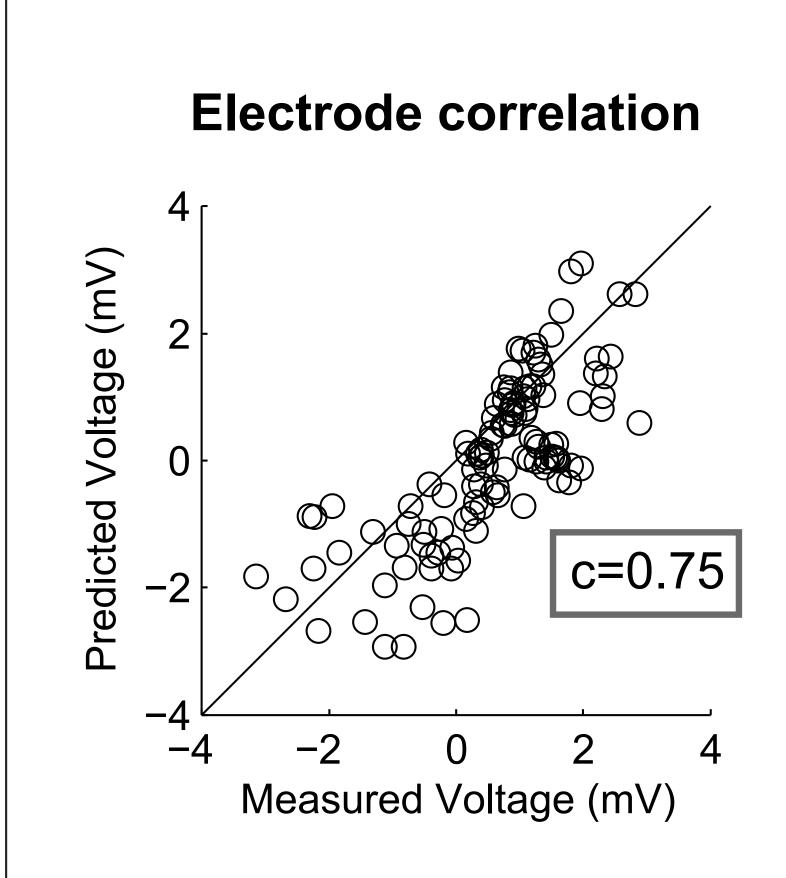
Post-surgery MRI (within 24 hs of the experiment). Automaticmanual segmentation to build the computational model



Computational model prediction for a current injected of 1 mA

MODEL AND DATA CORRELATION



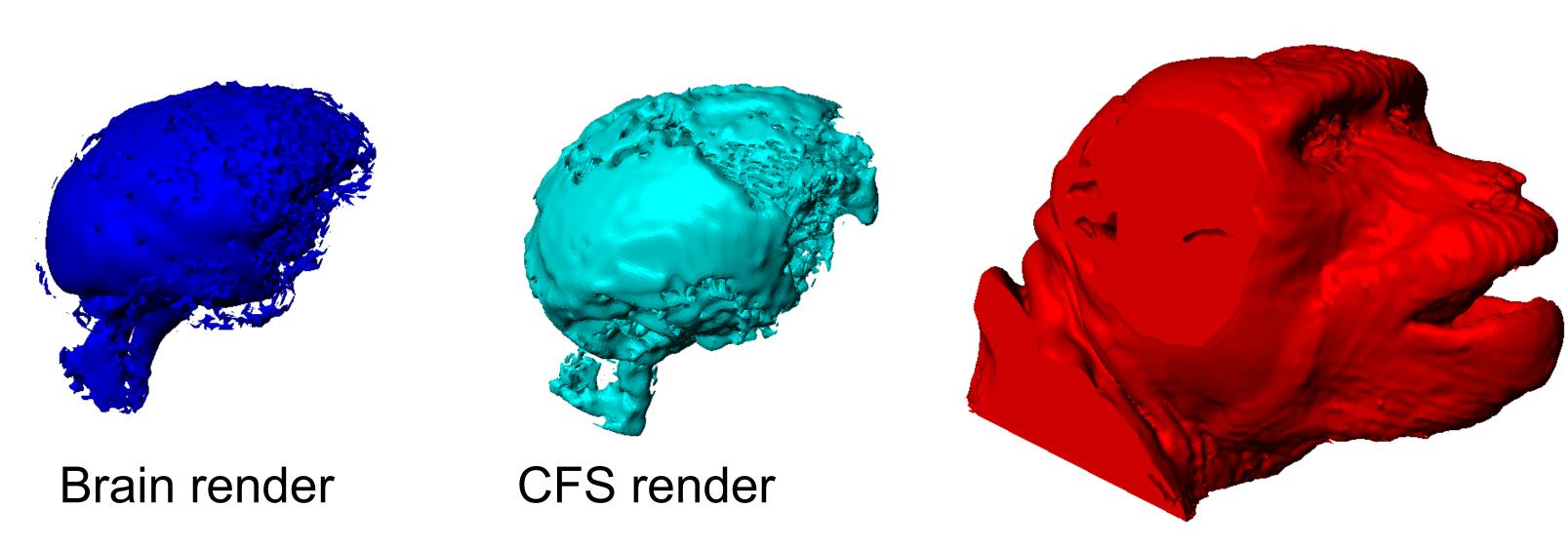


- >> General correspondence of the model and the intra-cortical measures
- >> There is a correlation between the measured voltage distribution and the estimated by the model of 0.75.
- >> Patients are under medication which might be a cofounder

Studies in non-human primates

NON-HUMAN PRIMATES VALIDATION

Segmented macaque head anatomy at 1 mm3 resolution



Skin render

>> MRI studies on macaque monkey will be followed by intra-craneal recordings to validate the model and study behaviour under TES.

CONCLUSIONS AND FUTURE WORK

- >> Preliminary work to establish a firm empirical foundation for future clinical studies with TES that aim to target specific cortical and subcortical brain regions
- >> Work on non-primate humans will provide the opportunity to do study the interaction between areas targeted in the brain and behavioral changes