

# Accepted Manuscript

Feasibility of imaging evoked activity throughout the rat brain using electrical impedance tomography

Mayo Faulkner, Sana Hannan, Kirill Aristovich, James Avery, David Holder



PII: S1053-8119(18)30427-0

DOI: [10.1016/j.neuroimage.2018.05.022](https://doi.org/10.1016/j.neuroimage.2018.05.022)

Reference: YNIMG 14947

To appear in: *NeuroImage*

Received Date: 12 February 2018

Revised Date: 26 April 2018

Accepted Date: 8 May 2018

Please cite this article as: Faulkner, M., Hannan, S., Aristovich, K., Avery, J., Holder, D., Feasibility of imaging evoked activity throughout the rat brain using electrical impedance tomography, *NeuroImage* (2018), doi: [10.1016/j.neuroimage.2018.05.022](https://doi.org/10.1016/j.neuroimage.2018.05.022).

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Feasibility of imaging evoked activity throughout the rat brain using electrical impedance tomography

Mayo Faulkner<sup>a,\*</sup>, Sana Hannan<sup>a</sup>, Kirill Aristovich<sup>a</sup>, James Avery<sup>a</sup>, David Holder<sup>a</sup>

<sup>a</sup>University College London, London WC1E 6BT, UK

---

### Abstract

Electrical Impedance Tomography (EIT) is an emerging technique which has been used to image evoked activity during whisker displacement in the cortex of an anaesthetised rat with a spatiotemporal resolution of 200  $\mu\text{m}$  and 2 ms. The aim of this work was to extend EIT to image not only from the cortex but also from deeper structures active in somatosensory processing, specifically the ventral posterolateral (VPL) nucleus of the thalamus. The direct response in the cortex and VPL following 2 Hz forepaw stimulation were quantified using a 57-channel epicortical electrode array and a 16-channel depth electrode. Impedance changes of  $-0.16 \pm 0.08$  % at  $12.9 \pm 1.4$  ms and  $-0.41 \pm 0.14$  % at  $8.8 \pm 1.9$  ms were recorded from the cortex and VPL respectively. For imaging purposes, two 57-channel epicortical electrode arrays were used with one placed on each hemisphere of the rat brain. Despite using parameters optimised toward measuring thalamic activity and undertaking extensive averaging, reconstructed activity was constrained to the cortical somatosensory forepaw region and no significant activity at a depth greater than 1.6 mm below the surface of the cortex could be reconstructed. An evaluation of the depth sensitivity of EIT was investigated in simulations using estimates of the conductivity change and noise levels derived from experiments. These indicate that EIT imaging with epicortical electrodes is limited to activity occurring 2.5 mm below the surface

---

\*Corresponding author

Email address: [mayo.faulkner@ucl.ac.uk](mailto:mayo.faulkner@ucl.ac.uk) (Mayo Faulkner)

Download English Version:

<https://daneshyari.com/en/article/8686729>

Download Persian Version:

<https://daneshyari.com/article/8686729>

[Daneshyari.com](https://daneshyari.com)