

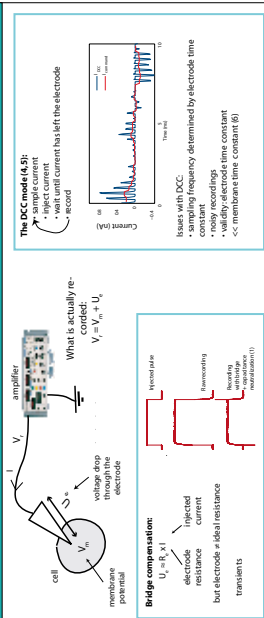
Abstract

In the HR-CORTEX project, we collectively developed the "Active Electrode Compensation" (AEC) method to obtain high-resolution intracellular recordings. The AEC method is based on a computational model of the electrode interfaced in real time with the electrophysiological setup. The characteristics of the model are first estimated using white noise current injection in the cell membrane, then used to compensate the electrode impedance in real time. With AEC it is possible to record at high sampling rates (only limited by the hardware) while injecting fluctuating current. We illustrate the technique with various demanding protocols in vitro and in vivo, such as injecting non-filtered white noise and injecting conductance noise in dynamic clamp mode, not feasible with a single high-resistance electrode until now. AEC should be particularly useful to characterize fast neuronal phenomena intracellularly, especially in vivo.

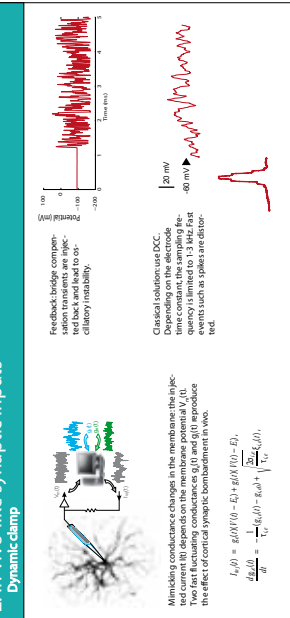
This work was published in:
 Brette R, Piwkowska Z, Monier C, Rudolph-Lilith M, Fournier J, Levy M, Frégnac Y, Bal T and Destexhe A. High-resolution intracellular recordings using a real-time computational model of the electrode. *Neuron* 39: 379-391, 2006.

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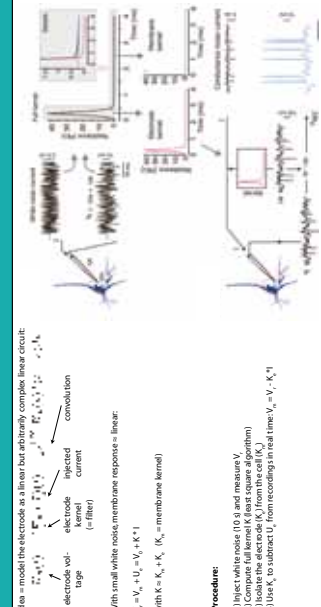
1. Single-electrode intracellular recording



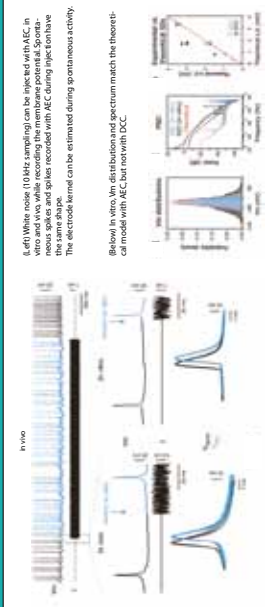
2. In vivo-like synaptic inputs



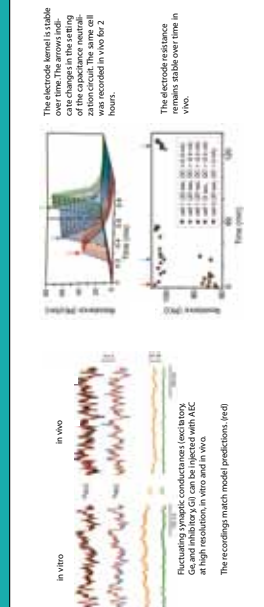
3. Active Electrode Compensation



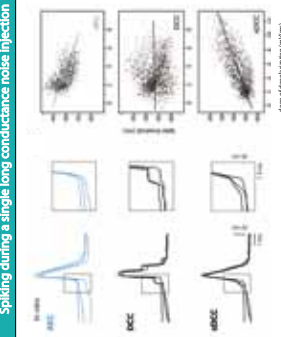
4. White noise injection



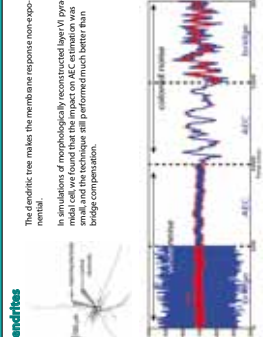
5. Conductance noise injection



6. Spike shape



7. Discussion



8. Methods and references

