

Extracellular potentials of axonal projections including terminations and bifurcations

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Introduction

- EFPs have recently been shown to be not only of synaptic origin
- The aim of this study is to understand how the EFP is influenced by the anatomical structure of the axons which are the source of the potential.

Methods

- Experimental Methods
- Multicompartment Model
- Analytical Model

Results

- Axonal projections generate a dipole-like field potential
 - long range
 - low frequency
- General results for axonal projections:
 - The low-frequency (eg population rate pulse) parts are governed by the local density of bifurcations and terminations
 - The high-frequency (eg individual spikes, ‘noise’, neurophonic) parts are governed by the local fiber density
 - The low-frequency component exceeds the high-frequency component in reach
 - The high-frequency component shows a steady increase in latency along the projections’ depth, while the low-frequency can have stationary parts caused by sharp increases or decreases of fiber number (bifurcations or terminations).

Discussion

- Relevance of Findings
 - Interpretation of CSD
 - Dipole has far field, ABR response?
- Compare to other auditory systems (Chicken NL, MSO)
 - Speculate on functional relevance of polarity shift (a la Rinzel & Goldwyn)
- compare to other fiber bundle systems