Accepted Manuscript

Organization of orientation-specific whisker deflection responses in layer 2/3 of mouse somatosensory cortex

Sung Eun Kwon, Vassiliy Tsytsarev, Reha S. Erzurumlu, Daniel H. O'Connor

PII: S0306-4522(17)30553-5
DOI: http://dx.doi.org/10.1016/j.neuroscience.2017.07.067
Reference: NSC 17944

To appear in: Neuroscience

Received Date: 29 March 2017
Revised Date: 24 July 2017
Accepted Date: 27 July 2017

Please cite this article as: S.E. Kwon, V. Tsytsarev, R.S. Erzurumlu, D.H. O'Connor, Organization of orientation-specific whisker deflection responses in layer 2/3 of mouse somatosensory cortex, Neuroscience (2017), doi: http://dx.doi.org/10.1016/j.neuroscience.2017.07.067

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.
Organization of orientation-specific whisker deflection responses in layer 2/3 of mouse somatosensory cortex

Sung Eun Kwon¹, Vassiliy Tsytsarev², Reha S. Erzurumlu², Daniel H. O’Connor¹

¹The Solomon H. Snyder Department of Neuroscience, Kavli Neuroscience Discovery Institute, Brain Science Institute, The Johns Hopkins University School of Medicine, Baltimore, MD
²Department of Anatomy and Neurobiology, University of Maryland School of Medicine, Baltimore, MD

*Co-first authors

Correspondence: dan.oconnor@jhmi.edu

Abstract
The rodent whisker-barrel system is characterized by its patterned somatotopic mapping between the sensory periphery and multiple regions of the brain. While somatotopy in the whisker system is established, we know far less about how preferences for stimulus orientation or other features are organized. Mouse somatosensation is an increasingly popular model for circuit-based dissection of perceptual decision making and learning, yet our understanding of how stimulus feature representations are organized in the cortex is incomplete. Here, we used in vivo two-photon calcium imaging to monitor activity of populations of layer (L) 2/3 neurons in the mouse primary somatosensory cortex during deflections of a single whisker in two orthogonal orientations (azimuthal or elevational). We split the population response to whisker deflections into an orientation-specific component and a non-specific component that reflected overall excitability in response to deflection of a single whisker. Orientation-specific responses were organized in a locally heterogeneous and spatially distributed manner. Correlations in the stimulus independent trial-to-trial variability of pairs of neurons were higher among neurons that preferred the same orientation. These correlations depended on similarity in both orientation-specific and non-specific components of responses to single whisker deflections. Our results shed light on L2/3 organization in mouse somatosensory cortex, and lay a foundation for dissecting circuit mechanisms of perceptual learning and decision-making during orientation discrimination tasks.

Keywords: rodent whisker system; neural coding; barrel cortex; orientation tuning; two-photon calcium imaging; noise correlation.
دریافت فوری متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات