Abstract View

INDEPENDENT COMPONENT ANALYSIS OF INTRINSIC OPTICAL SIGNALS FOR GAIN FIELDS IN INFERIOR PARIETAL CORTEX OF BEHAVING MONKEY

R.M. Siegel[1*]; J.R. Duann[2]; T.P. Jung[2]; T.J. Sejnowski[2]

1. Center for Molecular and Behavioral Neuroscience, Rutgers Univ, Newark, NJ, USA
2. Computational Neurobiology Laboratory, The Salk Inst for Biological Studies, La Jolla, CA, USA

Optical imaging of the intrinsic signal from deoxyhemoglobin at 630nm shows that the IPL is tuned for the eye gain field (Siegel et al, 2001). A temporally averaged optical signal varies as a function of eye position and optic flow. Clearly definable blood vessels often are observed to carry signals tuned similarly to the nearby tissue. Was it possible to exploit the time course of the optical signal to identify sub-regions of the cortex and differentiate between cortex and vessels? Independent component analysis (Bell and Sejnowski, 1995) utilizes the time-dependent characteristics to parcellate spatial signals into subsets. The independent components define small (~1-2mm) regions of IPL cortex, or individual branches of blood vessels, that have similar time dependent characteristics. The time lags between these components show that signal occurred first in cortical tissue and then a later signal follows in the blood vessels that drained that region. The signals in these different ICs depends upon the position of the eye and time. Thus, we hypothesize that the incoming neural activity first activates cortex and then leaves a trace in the draining veins; the different time courses across the tissue may indicate the strength of the inputs, local circuits, vascular inhomogeneities, and may carry the information for slow changes in blood flow. In fMR, these changes are likely low-pass filtered. Whether or not these ICA blood flow defined regions correspond to specific anatomically defined functional boundaries remains open.
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