Abstract View

DIRECT MEASUREMENT OF HEMODYNAMIC RESPONSE IN EVENT-RELATED FMRI.

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The currently exploited analytical techniques for fMRI data require a priori knowledge the time course of hemodynamic response (HR) and assume homogeneity across different brain regions. This approach may be problematic when the expected time course is unknown or assumptions on the hemodynics are invalid. Here we described a data-driven method based on Independent Component Analysis (ICA) to uncover an expected HR in event-related fMRI experiments. A subject participated a fMRI study where brief checkerboard visual stimulation of 8-Hz were presented 10 times for 0.5 sec with inter-stimulus intervals of 40 sec. Four axial slices were acquired by Bruker 3.0 T MR imager (Ettlingen, Germany) with inter-scan interval of 500 ms. ICA consistently revealed in all 3 sessions a two-humped HR pattern. In each session, the latency of the second peak increased systemically. In a separate but similar experiment on the same subject, the HR resembled a single longer hump when the stimuli lasted longer (3 sec). These results verified that ICA is effective in deciphering task-related activations, including ones (McKeown et al. (1998) Human Brain Mapping 6(3):160-88.) that are undetectable by standard hypothesis-driven or HR-template approaches. ICA shows great promise in revealing important information about the hemodynamic signal in fMRI recordings that has not yet been exploited with other methods.

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