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Dissociation of auditory N100m into anterior and posterior foci using combined fMRI/MEG

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Abstract

Introduction

Previous magnetoencephalography (MEG) studies have documented that a good portion of the human auditory N1 response (1) is generated within the auditory cortex. Further studies, utilizing multiple equivalent current dipole (ECD) fitting approaches, have dissociated the N1m into anterior and posterior subcomponents, termed N1m(A) and N1m(P), with the ECD-estimated loci ~10 mm apart along the anterior-posterior axis (2-4). The N1m(P) was also described to dominate the ascending phase of the N1m response, preceding the N1m(A) by ~20¡V40 ms. These results could imply that the center of gravity of activity, which is approximated by the ECD fits (5), shifts towards anterior direction during the course of the N1 response. Here, our goal was to investigate whether we could characterize this phenomenon using the recently developed fMRI-biased MEG linear inverse estimates (6).

Methods

3 Tesla fMRI was collected using a ¡¥silent¡¦ paradigm (7) wherein each gradient-echo 16-slice EPI volume acquisition was spaced 10 s apart, thus allowing the hemodynamic responses elicited by the scanner noise to subside before the next volume acquisition (8). 60 volumes were acquired for both silent baseline and auditory stimulation conditions utilizing a 10-cm diameter transmit-receive surface coil placed over the left temporal bone. 306-channel MEG was recorded (600-Hz sampling rate, 0.03¡V172 Hz passband) on a separate day using identical stimuli. The stimuli were 1/5 octave noise bursts with center frequency of 482 Hz, presented at a rate of 0.3 Hz at 60 dB above hearing threshold. The single subject was a 28-year old healthy right-handed volunteer male. The cortical surface was rendered from