

Comparison of the lateralization using the activation of the Brocas and the Wernickes area with that of total cortical activation amount of cerebral hemisphere in the functional MR for measuring language lateralization based on Wada test

Sang Hyun Lee · Kee-Hyun Chang · Chun-Kee Chung¹ · In Chan Song · Moon Hee Han

¹Departments of Diagnostic Radiology and Neurosurgery,
Seoul National University College of Medicine, Seoul, South Korea

- 목적** : The activation of the Brocas and the Wernickes area in the language functional MR (fMR) well-known phenomena. We want to evaluate correlation of that activation with language lateralization. So we evaluate the lateralization using the activation of the Brocas and the Wernickes area comparing with total cortical activation amount of cerebral hemisphere in the functional MR for measuring language lateralization based on Wada test.
- 대상 및 방법** : 32 right-handed patients, one left-handed patient, one bilateral handed patient, who underwent Wada test, were evaluated by fMRI using BOLD technique and EPI on a GE 1.5 imager. Language tasks included categorical word generation (n=19), cued word generation (n=19), verb generation (n=32), noun generation (n=22), adjective generation (n=16), and adverb generation (n=16). We visually evaluated activation of both inferior frontal gyrus (Brocas area), both posterior superior gyrus (Wernickes area) and classified four grade (0: no activation, 1: weak, 2: moderate, 3: strong activation), and decided lateralization of Broca and Wernicke activation. We also evaluate total cortical activation of each cerebral hemisphere and decided lateralization of the total cortical activation. We evaluated correlation lateralization of the Brocas area activation, the Wernickes area activation, and total cerebral hemisphere activation with result of Wada test. We calculated successful lateralization rate (=number of successfully lateralized study/ number of evaluable study), concordant rate (=number of concordant study with Wada test/ number of successfully lateralized study), an true concordant rate with Wada test(=number of concordant study with Wada test/ number of evaluable study) of Brocas, Wernickes, and total cortical activation of general cerebral hemisphere.
- 결과** : The successful lateralization rate of Brocas activation was 77.1%, that of Wernickes was 80.0%, and that of total cortical activation was 93.0%. The concordant rate with Wada test of Brocas was 77.0%, that of Wernickes was 79.1%, and that of total cortical activation was 84.1%. The true concordant rate of Brocas activation was 59.3%, that of Wernickes was 64.0%, and that of total cortical activation was 78.3%. Eight studies were impossible to lateralize in cortical activation, but half of that case could be lateralized when Brocas and Wernicke activation were considered.
- 결론** : The lateralization using the activation of the Brocas and the Wernickes area in the language functional MR is not sufficiently concordant with Wada test comparing with lateralization comparing with total amount of cortical activation of cerebral hemisphere. But may be useful in the case, which cannot determine lateralization by amount of cortical activation.