

Evaluation of noun, verb, adjective and adverb generation paradigms on language dominance in functional magnetic resonance imaging of normal volunteers

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목적(Objective): To study the effect of 4 different noun, verb, adjective and adverb generation paradigms in determining language lateralization in functional magnetic resonance imaging of normal volunteers

대상 및 방법(Materials and methods): Functional MRI was performed on a 1.5T MR unit in eight normal volunteers with left-handedness (men=8, mean age:27 years). A single-shot GRE-EPI sequence (TR/TE/flip angle = 3000ms/50ms/90, FOV = 240 mm, matrix= 64x64, slice thickness/gap = 5mm/0mm, 20 axial slices) was used. Four different word generation paradigms were used for each volunteer; noun, verb, adjective and adverb. Each volunteer was instructed to shout covertly the correspondent words such as noun, verb, adjective and adverb that could make incomplete phrases or sentences meaningful. Simple 8 phrases/sentences were presented at a rate of 1 / 3 seconds during each activation period of 24 seconds. Rest periods consisted of only seeing the + symbol during 24 seconds. All tasks consisted of 48 phases including 3 activation and 3 rest periods. Activation map images were obtained by using correlation method. Language lateralization indices were defined as the ratio (L-R)/(L+R), L being the number of activated pixels with p value under 0.000001 in the left hemisphere and R in the right hemisphere. We evaluated the detection rates of Broca and Wernicke areas in our language paradigms and the differences of language lateralization between four different word generation paradigms.

결과(Results): In a total of 32 trials, Broca and Wernicke areas were detected at a very high rate (94%) bilaterally (Broca=94%, Wernicke=81%) or unilaterally (Wernicke=13%). Language dominance in 5 of all 8 volunteers (63%) was found to have the same results for all paradigms (left dominance=3, right dominance=2) and 2 of them showed the same dominance for at least 3 different paradigms (no dominance=1, left dominance=1). One case showed contradictory result in language dominance for 4 different paradigms (noun and verb=right,

adjective and adverb=left).

결론(Conclusions): High detection rates of Broca and Wernicke areas showed noun, verb, adjective and adverb generation paradigms may be feasible for evaluating language system, but inconsistent language dominance for different paradigms in some volunteers suggest that the combination of different types of paradigms may be needed for robust and reliable determination of language lateralization.