The neural mechanism of figurative comprehension for Alzheimer’s disease

Dae Yul Kim
University of Ulsan, Republic of Korea

Introduction: Language deficits occur early in the course of Alzheimer's disease. Applied correctly, nonliteral language is a worthwhile diagnostic tool to evaluate language and abstract thinking in dementias. The present study examined the neural mechanism in processing proverbs, and the difference in activation region according to characteristics of proverbs, using functional magnetic resonance imaging (fMRI).

Methods: Twenty healthy adults with age from twenty to thirty-five were enrolled. Ten proverbs each in four categories—familiar, unfamiliar, opaque (difficult to understand), transparent (easy to understand) - were selected. Ten literal sentences were included for comparison. The sentences were presented on a screen while the subject was lying inside the MRI. Each sentence was shown for 4800 ms, and 200 ms was given between sentences. Total of 40 proverbs and 10 literal sentences were presented pseudo-randomly, in one of 4 predesigned sequences. We contrasted the activation regions of literal with figurative sentences, transparent with opaque proverbs, and familiar with unfamiliar proverbs.

Results: Proverbs recruited right anterior cingulate cortex in comparison with literal sentences (uncorrected p-value <0.01). Opaque proverbs showed higher activity in the right dorsolateralprefrontal cortex, compared to transparent proverbs (uncorrected p-value <0.01). Familiar proverbs recruited the left dorsolateralprefrontal cortex when contrasted to unfamiliar proverbs (uncorrected p-value <0.01).

Conclusion: The right anterior cingulate cortex is involved in processing of figurative language. In proverbs difficult to understand, the right dorsolateral prefrontal cortex is more activated. The right hemisphere shows to have a significant role in understanding proverbs in normal adults. These data will give the basic information of figurative comprehension of Alzheimer’s dementia.

dykimsmart@gmail.com