

A PET Study Divided Auditory Attention

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IV. 8. A PET Study of Divided Auditory Attention

Goto R., Kawashima R., Satoh K., Ono S. and Fukuda H.

*Department of Nuclear Medicine and Radiology, Division of Brain Sciences,
Institute of Development, Aging and Cancer (IDAC), Tohoku University*

Functional anatomy of auditory attention were investigated in responding vowel targets under presence of distractors and condition of divided attention.

Methods:

The regional cerebral blood flow (rCBF) was measured in 7 right-handed normal healthy male volunteers using positron emission tomography (PET). The subjects wore earphones lying supine with their eyes closed in the PET system. Auditory inputs consisted of random series of five vowels (a,e,i,o,u) with or without coupling of six consonants (h, k, m, n, s, t), namely 35 discriminative monosyllables (for example; a, ki, u, me, ho, tu, i, se,). For each subject, two vowels out of five vowels were allocated as auditory targets. The task design was as follows ; Right attention task: Inputs from bilateral ears were different random series of monosyllables and subjects were asked to respond to right side stimuli. Left attention task: Inputs were same as Right attention task, but subjects were asked to respond to left side stimuli. In both cases subjects had to lift their right thumb when they hear any monosyllables containing the allocated two vowels. Divided attention task: Inputs were same as in the Right or Left attention task, but subjects must respond to one of two vowels on one side and another vowel on the other side. All rCBF images were anatomically standardized¹⁾, then descriptive t-images were calculated to find significant changes between tasks.

Results:

The figure represents commonly activated areas both in Divided attention minus Right attention and Divided attention minus Left attention images. Activations were located in the left lingual gyrus, the right lingual gyrus, the right pulvinar, the left inferior frontal gyrus, the right medial frontal gyrus and the left cingulate gyrus, shown in the figure from left to right.

Conclusions:

In the Divided attention task, regions demonstrated here were Broca's area, thalamus, paralimbic and its adjacent structures. Previous divided attention study on visual discriminations

indicated activations in nonstriated areas as shown here²). Various studies recently demonstrated the importance of the cingulate gyrus in attention. The lingual and parahippocampal gyri were involved in human memory function. The pulvinar was supposed to participate in focal attention combined with scrutinizing. In conclusion, our result suggests that between areas disposing sensory input and involving attention and memory subsist the areas collating these informations.

References

- 1) Roland P.E. et al. Hum. Brain Map. 1994, 2:1.
- 2) Corbetta M. et al. The Journal of Neuroscience, August 1991, 11 (8): 2383.

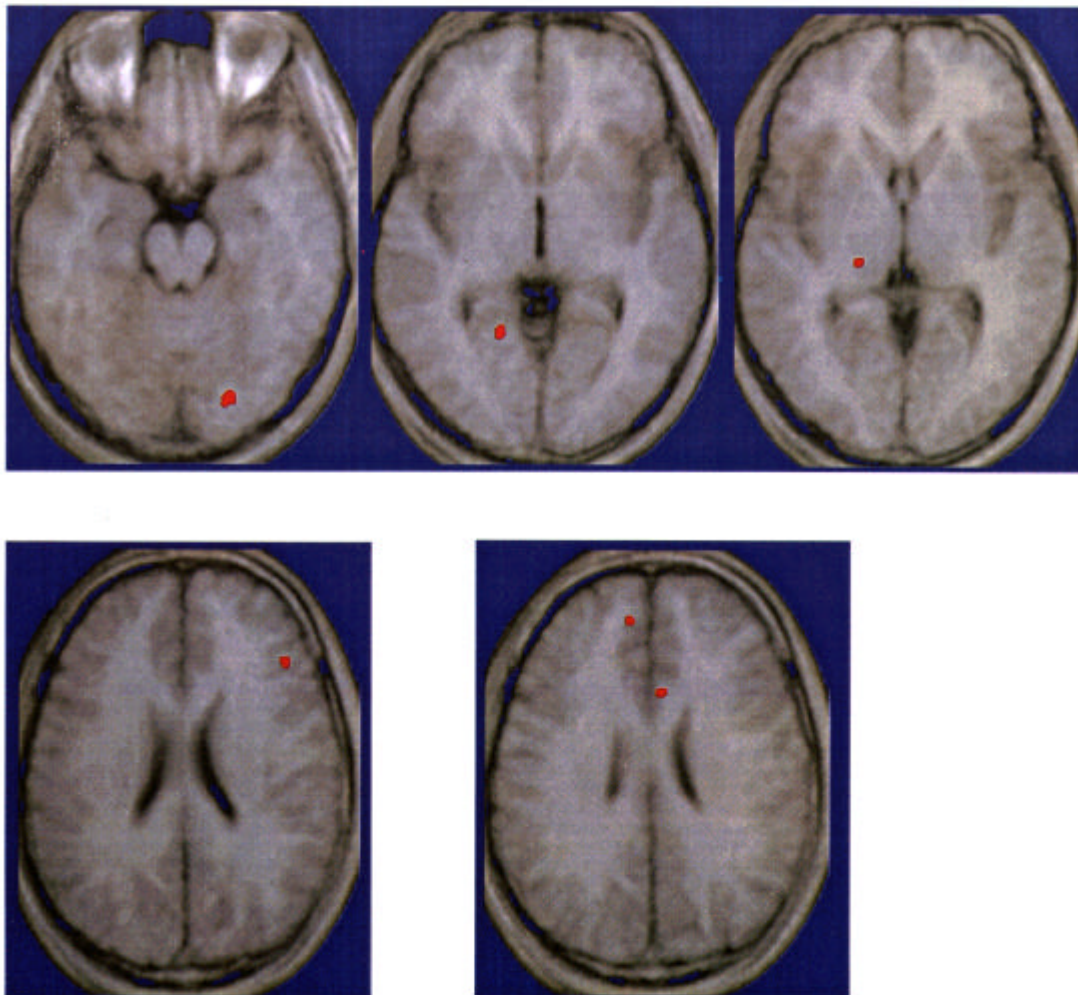


Fig. 1. The location of the specific activation areas supposed to be relevant to divided attention. Sections are - 18, -1, 3, 22 and 25 mm above AC-PC line from the left side to the right side of the figure. The regions are the left lingual gyrus, the right lingual gyrus and the right pulvinar (upper column) ; the left inferior frontal gyrus, the right medial frontal gyrus and the left cingulate gyrus (lower column), pointed from the left side to the right side of the figure.