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Lecture

The prefronto-temporal circuit for the controlled retrieval of information from memory

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Abstract

The findings from a series of studies on patients with damage to the prefrontal cortex, as well as experiments with functional neuroimaging on normal subjects, have highlighted the specialized role of the ventral part of the lateral prefrontal cortex in the controlled retrieval of information from memory. The cytoarchitectonic areas 45 and 47/12 that constitute this part of the prefrontal cortex are connected via a bundle of axons that course through the extreme capsule with areas of the temporal cortex where the processing of auditory, visual and multisensory stimuli occurs. Controlled retrieval is required when recall from memory cannot simply be the result of automatic recognition or strong stimulus-stimulus associations and depends on interaction between the prefrontal cortex and specific temporal cortical areas. In a recent study, patients with damage to the prefrontal cortex that included the ventrolateral region exhibited reduced memory recall only when the stimuli had been presented in various contexts and therefore retrieval could not depend on simple recognition or stable relations between stimuli. In experiments with normal volunteer subjects with functional magnetic resonance imaging, we observed increases in activity of cytoarchitectonic areas 45 and 47/12 and the interaction of these areas with specific parts of the temporal cortex during controlled memory retrieval.

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