

Effects of acute tryptophan depletion on brain activity in an episodic memory task: an fMRI study

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Serotonin (5-HT) has been implicated in memory function. Acute tryptophan depletion (ATD), a well-recognized research method for reducing central 5-HT, impairs episodic memory performance by affecting the consolidation phase. We used functional magnetic resonance imaging (fMRI) to examine changes in brain activation during the encoding and retrieval phase of an episodic memory task. Ten young, healthy, right-handed males, performed an episodic memory task following either a tryptophan-balancing or a tryptophan-depleting drink (in a counterbalanced, double-blind design). The task consisted of two phases, an encoding and an retrieval phase. In the encoding phase, subjects were instructed to determine whether the presented words gave them a pleasant or an unpleasant feeling. In the retrieval phase the subjects determined if they had seen the words in the encoding phase. Preliminary results show that ATD did not affect performance in both the encoding and the retrieval phase. Furthermore, encoding was accompanied by enhanced brain activation in the left inferior prefrontal cortex (BA 47). ATD enhanced brain activation in the medial wall of the frontal cortex (peak voxel at Talairach coordinate [10, 40, 29]). This finding is consistent with our previous research in which we reported enhanced activation in the same area to aversive stimuli in the depletion condition (Evers et al., 2003). Further analyses have to show whether these data are consistent with the proposal that ATD affects encoding by modulating the processing of aversive stimuli.

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