

A Brain fMRI Study of The Effects of Nicotine on Emotional Memory

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Abstract

The cognitive neuroscience field has focused on understanding how emotional information is processed in the brain however the neurobiology associated with this form of memory has yet to be elucidated. A better understanding of how emotional events are remembered and learned in the brain is crucial to facilitate research into prevalent clinical disorders such as depression and anxiety. This study combined a psychopharmacological manipulation with functional brain imaging to learn more about the neurobiology underlying emotional memory. The effects of nicotine, a cholinergic agonist, on emotional memory in normal, healthy, young adults were examined using nicotine patches to stimulate the nicotinic system. Functional magnetic resonance imaging (fMRI) was used to examine the brain circuitry affected by this nicotinic stimulation during emotional memory encoding. Brain activation was observed during the encoding of neutral, positive, and negatively-valenced words and images on two study days. One day subjects received a 7 mg nicotine patch for 45 minutes and the other day was a matching placebo. The data showed decreased activation in the hippocampus during emotional memory encoding on the nicotine day compared to the placebo day. This decreased activation may indicate more efficient processing after nicotine. Additionally, there was increased anterior cingulate activation after nicotine treatment suggesting nicotine has effects on attention which has been shown previously. Mechanisms for activation/deactivation could be linked to more efficient use of neural pathways and further studies to examine the effects of nicotine on memory performance will be needed to answer this question.