Control/Tracking Number: 2009-S-14933-SfN
Activity: Scientific Abstract
Current Date/Time: 5/14/2009 2:14:49 PM

Effects of alcohol intoxication on oculomotor control: An fMRI study

AUTHOR BLOCK: *K. MARINKOVIC[1], E. RICKENBACHER[1,2], S. AZMA[3], E. ARTSY[2], A. K. C. LEE[2];
[1]UCSD, La Jolla, CA; [2]Martinos Ctr. for Biomed. Imaging, MGH, Charlestown, MA; [3]Georgetown Univ., Washington, DC

Abstract:
Moderate alcohol intoxication impairs cognitive control by interfering with the ability to inhibit prepotent but inappropriate responses and generate a voluntary response. This function can be investigated with an antisaccade task which includes a stimulus-response incompatibility, requiring subjects to look in the opposite direction from the stimulus. Execution of saccades relies primarily on the fronto-parietal circuit and superior colliculus, overlapping with the system subserving spatial attention. Dorsolateral prefrontal cortex and anterior cingulate areas are additionally recruited in situations with higher cognitive demands such as the antisaccade task, as they exert the top-down inhibition of unwanted reflexive saccades and contribute to the attentional shifts. In order to investigate effects of alcohol intoxication on cognitive control of oculomotor responses, 22 young healthy subjects (11 women) took part in both alcohol (0.6 g/kg ethanol for men, 0.55 g/kg women) and placebo conditions in a counterbalanced manner as they participated in a cued antisaccade paradigm. On each trial subjects were instructed whether to look towards (prosaccade - PS) or away from the stimulus (antisaccade - AS). Trials were randomly interleaved and were balanced for left and right eye movements. During the task, event-related BOLD-sensitive images of the whole brain were acquired with a 3T Siemens Trio scanner. In addition, eye movements were concurrently recorded with the ISCAN pupil/corneal reflection tracker system.
Overall, AS trials elicited more errors and slower gaze-shift responses relative to PS. Alcohol-induced increase in reaction times and error rates were observed on AS trials only. Compared to PS, the AS trials elicited stronger activity in frontal eye fields, superior parietal lobule, precuneus, and anterior insula. Alcohol suppressed activity to AS trials in the anterior cingulate area. Taken together, these results indicate that alcohol primarily exerts its effects on top-down cognitive control of eye movements in situations evoking inhibitory control. Intoxication diminishes the executive, supervisory role of the anterior cingulate in inhibiting reflexive PS and generating AS responses. Instead, generation of correct eye movements may rely on the contributions of the fronto-parietal oculomotor system. Alcohol-induced impairment of executive functions may result in poor self-control and inability to refrain from drinking.
: