Does caffeine modulate verbal working memory processes? An fMRI study.

To assess the effect of caffeine on the functional MRI signal during a 2-back verbal working memory task, we examined blood oxygenation level-dependent regional brain activity in 15 healthy right-handed males. The subjects, all moderate caffeine consumers, underwent two scanning sessions on a 1.5-T MR-Scanner separated by a 24- to 48-h interval. Each participant received either placebo or 100 mg caffeine 20 min prior to the performance of the working memory task in blinded crossover fashion. The study was implemented as a blocked-design. Analysis was performed using SPM2. In both conditions, the characteristic working memory network of frontoparietal cortical activation including the precuneus and the anterior cingulate could be shown. In comparison to placebo, caffeine caused an increased response in the bilateral medial frontopolar cortex (BA 10), extending to the right anterior cingulate cortex (BA 32). These results suggest that caffeine modulates neuronal activity as evidenced by fMRI signal changes in a network of brain areas associated with executive and attentional functions during working memory processes.