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## EEG FREQUENCY BAND SLORETA SOURCES DURING MENTAL ARITHMETIC COMPARED TO RESTING

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Introduction: Arithmetic reportedly involves left parietal areas.

Objectives: To test this in independent groups of healthy persons.

Aims: Which brain regions are activated / inhibited during mental arithmetic compared to task-free resting?

Methods: We examined four independent groups of healthy adults (N=15, 14, 14, 23, respectively) during simple arithmetic (continuous subtraction of 7) and task-free resting before and after arithmetic, all with closed eyes. Multichannel head surface EEG (19-58 channels) was continually recorded, then recomputed (using sLORETA functional tomography) into current density for 6239 cortical voxels, for each of the eight EEG frequency bands (delta through gamma, 1.5-44 Hz). Pre- and post-arithmetic resting was averaged. Using paired t-tests, frequency band-wise normalized and log-transformed current density was compared between arithmetic and resting for each group. The resulting p-values were combined across groups using Fisher's combination procedure. For each frequency band, sLORETA voxels differing between conditions at Fisher's (across groups)  $p < 0.05$  were computed into centers of gravity separately for increased and decreased activation.

Results: Activity that was stronger during arithmetic compared to resting had gravity centers in midline anterior regions for slow frequency bands (delta, theta, alpha-1) and in right posterior regions for fast frequency bands (alpha-2 through gamma). Activity that was weaker during arithmetic compared to resting was centered around left parietal areas for all eight frequency bands.

Conclusions: The results suggest that arithmetic compared to resting involves frontal inhibition coupled with increased right parietal activation, and left parietal reduced facilitatory and reduced inhibitory activity.