

# Abstract

Arch Gen Psychiatry. 2007 Feb;64(2):193-200.

## Reduced prefrontal glutamate/glutamine and gamma-aminobutyric acid levels in major depression determined using proton magnetic resonance spectroscopy.

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**CONTEXT:** Increasing evidence indicates that major depressive disorder (MDD) is associated with altered function of the major excitatory and inhibitory neurotransmitters glutamate and gamma-aminobutyric acid (GABA), respectively. A recently developed magnetic resonance spectroscopy method allows for reliable measurement of glutamate/glutamine (Glx) and GABA concentrations in prefrontal brain regions that have been implicated in the pathophysiologic mechanisms of MDD by studies using other neuroimaging and postmortem techniques.

**OBJECTIVE:** To measure Glx and GABA levels in 2 regions of the prefrontal brain tissue in unmedicated adults with MDD.

**DESIGN AND SETTING:** Cross-sectional study for association. Psychiatric outpatient clinic.

**PARTICIPANTS:** Twenty unmedicated, depressed patients with MDD and 20 age- and sex-matched controls. Intervention Participants underwent scanning using a 3-T whole-body scanner with a transmit-receive head coil, providing a homogeneous radiofrequency field and the capability of obtaining spectroscopic measurements in a dorsomedial/dorsal anterolateral prefrontal region of interest (ROI) and a ventromedial prefrontal ROI.

**MAIN OUTCOME MEASURES:** Glx and GABA levels derived from magnetic resonance spectroscopy signals.

**RESULTS:** Depressed patients had reduced Glx levels in both ROIs. The GABA levels were reduced in the dorsomedial/dorsal anterolateral prefrontal ROI. Levels of GABA and Glx were positively correlated in both ROIs.

**CONCLUSIONS:** For the first time, GABA and Glx concentrations were compared between unmedicated depressed adults and controls in prefrontal ROIs. The abnormal reductions in Glx and GABA concentrations found in the MDD sample were compatible with findings from postmortem histopathologic studies, indicating that glial cell density is reduced in the same areas in MDD.

PMID: 17283286

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