Neuroanatomical correlates of late-life minor depression.

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Clinically significant minor depression is among the most common psychiatric disorder in the elderly. MRI studies demonstrate focal decreases in brain volume and increases in high intensity lesion volumes in patients with late-life major depression (MDD). The neuroanatomical basis of minor depression remains poorly characterized. In an earlier study, we reported that prefrontal brain volumes were smaller in patients with clinically significant minor depression when compared with controls. The purpose of our current study was to expand on our earlier observations and to volumetrically examine specific subregions of the prefrontal cortex in patients with late-life minor depression. Our preliminary focus was on three circumscribed areas - the anterior cingulate, orbitofrontal and gyrus rectus, areas implicated in mood disorders in patients with MDD.

Methods: Our study samples comprised 20 patients with minor depression (9 men, 11 women, mean age 74.2, SD 8.2) and 28 non-depressed controls (14 men and 14 women, mean age73.4, SD 6.8). All patients met standard clinical criteria for minor depression and were free of all other brain disorders including dementia. Patients were drug free for at least 2 weeks prior to the scan and both patients and controls were recruited using community outreach approaches. All subjects were scanned on a 1.5 Tesla GE scanner using a coronal T1 weighted SPGR sequence sequence of 42/5/1 (TR/TE/excitations) with a slice thickness of 1.4 mm contiguous, flip angle of 35 and a matrix size of 256x192 mm. After acquisition all images, non-brain tissue was removed (masked), brain volumes corrected for signal intensity inhomogeneities and automated tissue segmentation methods applied to classify tissue as gray/white and cerebrospinal fluid. Anatomical methods used to define boundaries have been previously described and can be found on the World Wide Web at http://www.loni.ucla.edu/protocols/prefrontal_cortex.html

Anterior Cingulate

	Control		Minor Depressed	
	Mean	Std. Deviation	Mean	Std. Deviation
LCGW	3.615314	1.320700	3.099562	.993790
LCGG	6.609127	2.159590	6.393621	1.686189
RCGW	3.939885	1.337815	3.133829 *	1.025874
RCGG	6.806714	1.535837	5.728712 *	1.293251
TOTLCG	10.224441	3.274219	9.493183	2.452977
TOTRCG	10.746599	2.685926	8.862541	2.207116
TOTCG	20.971040	4.828112	18.355724 **	3.888185
TOTCGG	13.415841	2.982234	12.122333	2.478499
TOTCGW	7.555199	2.202607	6.233391	1.702991

* $p < .05$, ** $p < .057$

Statistics and Results: Analysis of covariance (ANCOVA) was used to compare absolute brain volumes in the anterior cingulate, orbitofrontal and gyrus rectus regions between groups controlling for age, gender and intracranial volumes. Comparisons were made for gray and white matter volumes. Patients with minor depression had smaller gray and white matter volumes that were statistically significant ($p<0.05$) in the right anterior cingulate region when compared with controls. Total cingulate volume differences between groups approached statistical significance. None of the other volumes differed significantly between groups.

Conclusions: These data demonstrate, for the first time, that smaller frontal volumes in patients with late-life minor depression may be circumscribed and specific to the anterior cingulate - a region implicated in behavioral and cognitive functions. These findings indicate the anterior cingulate cortex and its circuits may be pathophysiologically relevant in mood disorders in the elderly and have broad implications in behavioral neuroscience.

References

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