Introduction

The entorhinal cortex (Figure 1) has intimate connections with the hippocampus, and abnormal entorhinal cortex volumes may result in impaired functioning of the frontal-limbic circuits involved in the pathophysiology of mood disorders.\(^1\)

To date, the role of entorhinal cortex in Major Depressive Disorder has not been properly addressed.\(^2\)

We carried out a morphometric MRI study of the entorhinal cortex and medial temporal lobe structures (amygdala and hippocampus) in patients with unipolar depression and healthy controls.

Figure 1: MRI Delineation of the Entorhinal Cortex

Materials and Methods

**Settings:** The study was conducted at the Division of Mood and Anxiety Disorders of the Department of Psychiatry at the University of Texas Health Science Center at San Antonio.

**Participants:** The sample consisted of 67 unmedicated patients who met DSM-IV criteria for Major Depressive Disorder (19 males, 48 females; mean age 39.9 ± 13.5 years; 39 depressed, 28 euthymic; 19 single episode, 48 recurrent) and 64 healthy controls (17 males, 47 females; mean age 33.4 ± 11.5 years). This study was approved by the respective Institutional Review Board, and informed consent was obtained from all subjects and their parents or legal representatives.

**Magnetic Resonance Imaging:** MRI images were obtained with a Philips 1.5 TMR system (Philips Medical System, Andover, MA), at the University of Texas Health Science Center at San Antonio. Images were acquired using a three-dimensional T1 weighted fast field echo sequence (Spoiled Gradient Recalled Acquisition) in the coronal plane (TR=25ms, TE=5 ms, slice thickness=1.5 mm, NEX=1, matrix size=256 X 192).

**Volumetric Analysis:** The MRI volumetric analysis was performed using the automated software FreeSurfer.

**Statistical Analysis:** patients and controls were compared regarding the volumes of the medical temporal lobe structures obtained. We utilized analysis of covariance, adjusting for age, gender and intracranial volume.

Results

The analysis demonstrated smaller right entorhinal cortex volumes among patients (mean volume SD=1.56 ± 0.34 cm\(^3\)) compared to controls (mean volume SD=1.67 ± 0.27 cm\(^3\)); F=4.51, d.f.=1/126, p<0.05 (Graphic 1).

No statistically significant differences were found on the left entorhinal cortex (patients: mean volume SD=2.03 ± 0.31 cm\(^3\); controls: mean volume SD=2.01 ± 0.28 cm\(^3\); p=n.s.) or on any of the other medial temporal lobe structures analyzed (Table 1).

Table 1: Volumes of medial temporal lobe structures among patients with Major Depressive Disorder and Healthy Controls

<table>
<thead>
<tr>
<th>Structure</th>
<th>Volume among patients *</th>
<th>Volume among controls *</th>
<th>p **</th>
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</thead>
<tbody>
<tr>
<td>Left Hippocampus</td>
<td>4.67 ± 0.30</td>
<td>4.81 ± 0.36</td>
<td>n.s.</td>
</tr>
<tr>
<td>Right Hippocampus</td>
<td>4.20 ± 0.20</td>
<td>4.24 ± 0.33</td>
<td>n.s.</td>
</tr>
<tr>
<td>Left Amygdala</td>
<td>1.61 ± 0.10</td>
<td>1.63 ± 0.10</td>
<td>n.s.</td>
</tr>
<tr>
<td>Right Amygdala</td>
<td>1.77 ± 0.10</td>
<td>1.72 ± 0.10</td>
<td>n.s.</td>
</tr>
<tr>
<td>Left parahippocampal gyrus</td>
<td>1.96 ± 0.24</td>
<td>1.99 ± 0.27</td>
<td>n.s.</td>
</tr>
<tr>
<td>Right parahippocampal gyrus</td>
<td>1.60 ± 0.26</td>
<td>1.60 ± 0.30</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

* All volumes are expressed in cubic centimeters (cm\(^3\))
** ANCOVA (with age, gender and intracranial volume as covariates).

Conclusions

These preliminary results suggest that decreased entorhinal cortex volume may play a role in the pathophysiology of unipolar depression.

References

2. Furtado CP, Maller JJ, Fitzgerald PB. A magnetic resonance imaging study of the entorhinal cortex in treatment-resistant depression. Psychiatry Res. 2008;163(2):133-42.

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