INTER-HEMISPHERIC ASYMMETRY AND VISUOSpatial DEFICITS IN DEMENTIA

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INTRODUCTION

Hemispheric asymmetries (HA) play an important role in many cognitive functions (Thiebaut de Schotten et al., 2011) and this could explain the presence of more severe visuo-spatial deficits in Dementia with Lewy Bodies (DLB) when compared to Alzheimer Disease (AD).

To test this hypothesis we took into account the HA of two white matter tracts in DLB, AD patients and Healthy Controls (HC): - the inferior-frontal-occipital-fasciculus (IFOF) (Catani et al., 2003) - the Cingulum (CI) (Bozzali et al., 2012).

Additionally, to clarify the potential role of the HA in visuo-spatial deficits, we correlated an index of HA with visuospatial abilities.

SAMPLE

Participants enrolled for this study had the following characteristics:

- 37 patients with a diagnosis of Alzheimer disease (AD)
- 12 patients with a diagnosis of dementia with Lewy Body (DLB)
- 22 healthy controls participants (HS)

Each participant underwent:

- diffusion MRI at 3T (Magnetom Allegra, Siemens)
- an extensive neuropsychological assessments evaluating several cognitive domains:

<table>
<thead>
<tr>
<th>Group</th>
<th>mean age</th>
<th>SD age</th>
<th>mean education</th>
<th>SD education</th>
<th>Gender</th>
<th>MMSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLB</td>
<td>74.16</td>
<td>6.33</td>
<td>9.58</td>
<td>2.81</td>
<td>21.05</td>
<td></td>
</tr>
<tr>
<td>AD</td>
<td>71.32</td>
<td>6.73</td>
<td>9.02</td>
<td>4.206</td>
<td>22.15</td>
<td>18.77</td>
</tr>
<tr>
<td>HS</td>
<td>61.90</td>
<td>8.70</td>
<td>13.39</td>
<td>2.82</td>
<td>10.18</td>
<td>29.14</td>
</tr>
</tbody>
</table>

* Significant difference between patients (DLB, AD) and HS

RESULTS

Structural connectivity:

- Cross-sectional comparisons revealed a bilateral reduction of FA values in the IFOF of AD patients, and a unilateral (right) reduction in the same tract of DLB patients:

- Group x Side: scF: F = 4.934; p = 0.014; IFOF: F = 3.538; p = 0.034

- A significant positive correlation was found between DLB patients’ HA in FA of the IFOF and visuospatial deficits (r = -0.348; p = 0.038)

Neuropsychological scores and structural correlations:

- A significant positive correlation was found between DLB patients’ HA in FA of the IFOF and visuospatial deficits (r = -0.348; p = 0.038)

CONCLUSIONS

- We speculate that the visuo-spatial deficits in DLB might be explained by the presence of this strong hemispheric asymmetry.
- This study confirms the involvement of the posterior part of the brain (i.e. a prevalence of occipito-parietal areas) in the copy drawing performance (Serra et al., 2014).
- In the present investigation, correlating the asymmetry index with the copy drawing performance in patients with dementia, we confirmed that this unbalanced connectivity was a possible cause of the visuo-spatial deficits in DLB patients.
- This highlights that the parieto-occipital disconnections may have a role in causing symptoms in DLB.

REFERENCES

