**THE IMPORTANCE OF IPSI AND CONTRALESIONAL FRONTAL AND TEMPORAL REGIONS IN LANGUAGE RECOVERY IN APHASIA**

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**INTRODUCTION**

The relationship between spared tissue and ipsi and contralesion activation within language areas of the brain in the process of post-stroke language recovery is not well understood.

- Some studies have underlined the role of LIFG in recovery mechanisms (Sebastian & Kiran, 2011; Saur et al., 2006; Fridriksson, 2010).
- Other studies have implicated the RIFG in compensatory functions (Abo et al., 2004).
- In a systematic review, Turkeltaub et al. (2011), found that participants recruit a normal network that includes LIFG, LMTG, and new regions such as RSFG and anterior Insula and regions in the right hemisphere such as RIFG.
- In patients with large left hemisphere lesions, however the engagement of the contralateral right hemisphere homologues, particularly the RIFG is crucial to successful recovery of language.

**Research Questions:** What is the relationship between % spared tissue and % signal change in ipsilateral and contralesional regions? We hypothesize that: (1) left hemisphere language regions, even if slightly spared, will be engaged in language recovery, and (2) right hemisphere homologues will activate depending on the degree of damage to the left hemisphere.

**METHODS**

16 participants were scanned while performing a semantic processing language task in English. Data from two participants was dropped.

**Participant Information**

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Months Post-Stroke</th>
<th>Lesion Side</th>
<th>ROIs of interest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>55-59 years</td>
<td>11 males</td>
<td>68 months</td>
<td>Left</td>
<td><strong>all Pearson correlations significant at p &lt; 0.05</strong></td>
</tr>
<tr>
<td>60-64 years</td>
<td>5 males</td>
<td>58 months</td>
<td>Right</td>
<td><strong>all Pearson correlations significant at p &lt; 0.05</strong></td>
</tr>
</tbody>
</table>

**Data Acquisition Parameters:**

- T1: 140 sagittal slices, 1mm³ voxels, 240 x 240 matrix, FOV = 240 mm, flip angle = 8, fold-over direction = AP, TR = 8.2ms, TE = 3.8ms
- BOLD: 31 axial slices (3mm thick, 0.3 inter slice gap), 3mm³ voxels, 80 x 78 matrix, FOV = 240 mm, flip angle = 90, fold-over direction = AP, TR = 2000ms, TE = 35 ms

**RESULTS**

1. **CORRELATIONS BETWEEN TASK ACCURACY AND PERCENT SIGNAL CHANGE**

   - Task accuracy is significantly correlated to r = -0.05 with signal in LIFGop (r=0.54) and LIFGtri (r=0.54), suggesting that the more accurate patients were on a task, the stronger the signal in LIFGop and LIFGtri.

2. **CORRELATIONS BETWEEN PERCENT SPARED AND PERCENT SIGNAL CHANGE**

   - More spared tissue in LIFG (op,tri,orb), LMTG and LAng/SMG, the less activation in ipsilesional regions (LMFG, LSFG) and contralesional regions (RMTG, RAngular/SMG).

   - RH regions show positive correlations with each other, and a general upregulation of RH homologous regions

3. **CONCLUSIONS**

   - LIFGop is the most lesioned tissue (Lesion core); 12/14 patients show damage in LIFGop and 11/14 patients show damage in LIFGtri.
   - Increased accuracy is positively correlated with activation in LIFGop and LIFGtri.
   - The more the spared tissue in LIFG (op,tri,orb), LMTG and LAng/SMG, the less activation in ipsilesional regions (LMFG, LSFG) and contralesional regions (RMTG, RAngular/SMG).
   - The more the spared tissue in LIFG and LACCC, the more the activation in RH frontal regions.
   - RH regions show positive correlations with each other, and a general upregulation of RH homologous regions

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**REFERENCES**