Deep Brain Stimulation in Obsessive Compulsive Disorder: Where are we now?

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Brief overview

• Snapshot of our cohort
• New research directions and potential biomarkers
• Individualising treatment
• Unexpected challenges
DBS for OCD

• First report by Bart Nuttin and colleagues in 1999
• Since then approx 200 cases in the literature
• Variety of targets: ALIC, NAC, VC/VS, ITP, BNST, STN, amGPI
• Typically 50% response rate
• Symptom reduction of 40-60% on average (range is ~0-85%).
Recent History of Psychosurgery in Australia

- 1980's – 10-20 surgeries per year, usually anterior capsulotomies or leucotomies
- 1990's – one or two a year
- 2001-2006 no operations in Victoria
- 2007-2012 – 12 applications in Victoria for DBS (for depression and OCD) made to the Psychosurgery Review Board
- VIC and QLD only states offering DBS at present
Our Cohort

• 2011-2018: 9 patients completed, 1 pending surgery date, 1 pending assessment.
• Different challenges at different stages
• How can we:
  • Individualise treatment
  • Find better ways of illness subtyping, selecting targets, monitoring response?
  • Provide recovery-focused follow up.
## Current Results

<table>
<thead>
<tr>
<th>ID</th>
<th>Base YBOCS</th>
<th>LFU</th>
<th>LFU YBOCS</th>
<th>% Reduction</th>
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<td>1</td>
<td>37</td>
<td>36</td>
<td>21</td>
<td>43.24</td>
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<tr>
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<td>50</td>
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<td>Mean</td>
<td>32.56</td>
<td>38.22</td>
<td>23.22</td>
<td>27.77</td>
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</tbody>
</table>

Reduction in YBOCS is significant, p=0.015

Data is an update since published results, Farrand et al, 2018 ANZJP
Emerging research and biomarkers
Use of cognition as a biomarker: Cognition in OCD (1)

- Cognitive deficits have been identified in people with moderate-to-severe OCD symptoms.
- The profile seems to reflect frontal-striatal dysfunction and appears to be related to the illness (Purcell, Maruff, Kyrios & Pantelis, 1998).
  - Deficits have been identified in areas such as spatial working memory, visual memory, attention and cognitive flexibility across a range of different studies.
Use of cognition as a biomarker: Cognition in OCD (2)

• In our cohort, we have found evidence to support the generalised frontal-striatal dysfunction on neuropsychological tests

• There is also a trend of specific impairments which appear to be related to the severity and nature of their individual symptomatology
  • Reduced processing speed in those who have predominant 'checking' behaviours
  • Meta-memory deficits in those with predominant 'doubting'
Use of cognition as a biomarker: Preliminary results

![Graphs showing use of cognition as a biomarker](image)
Use of cognition as a biomarker: preliminary results (2)

• Initial results on the cognitive safety of DBS have been promising

• Individuals who have participated in a cognitive follow up have either shown stability across cognitive domains, or some improvements (e.g. speed of processing) mirroring the improvements in their symptomatology

• These findings are in keeping with other research in this area (e.g. Bergfeld et al, 2013)
Personality and psychopathology in OCD

• Very little in the existing literature regarding normal personality profiles in people with OCD
  • Most are symptom based (e.g. YBOCS)

• New research project which aims to
  1. Describe the personality and psychopathology profiles of our OCD-DBS cohort
  2. Describe changes in these measures post-DBS
Personality Assessment: Pre-DBS
Personality Assessment: Post-DBS
Personality Assessment: a case example
Individualising treatment
DBS post leucotomy: Individualising treatment
Tractography for Surgical Planning
Above: E1- most distal electrode, E4- most proximal

Below: Overlap with anterior thalamic radiations
Early results, n=2

• n=2 patients where tractography has been utilised to assist DBS planning/programming
• Both have achieved full response in 12 weeks.
• Average for the rest of the cohort – 8 months
• Other confounding factors – experience, different programming.
Unexpected challenges
Unexpected Challenges: Overstimulation

YBOCS over time from 0-70 months
Conclusion

• Many areas for further exploration!
• Any questions?
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