The Deep and Frequent Phenotyping (DFP) CANTAB cognitive assessment from the feasibility study

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Background

- The Deep and Frequent Phenotyping Study (DFP) is a multi-centre, observational study of prodromal Alzheimer’s disease (AD).
- The study uses a wide range of established and novel biomarkers and aims to identify a set of multi-modal markers for phenotyping prodromal AD.
- Prior to study initiation, a pilot study was conducted as a proof of concept to assess task suitability and participant acceptability of extensive and repeated phenotyping.
- Here, we report the results of the CANTAB cognitive testing (Barnett, 2016) during the pilot study.

Methods

- Pilot data were collected at six centres (Oxford, Cambridge, Newcastle, University College London, Imperial College, and Kings College London).
- Participants were classified as early AD (NIA-AA) with MMSE >20, with a Rosen Modified Hachinski Ischemic score of <4.
- Following screening and enrolment participants undertook four assessments over six months: Baseline, Day 29, Day 85 and Day 169.
- Measurements included clinical, cognitive, gait and ophthalmological assessment, molecular markers of AD and imaging technologies (e.g. PET, MEG, MRI, EEG).
- Feedback on the experience of completing the computerised CANTAB tasks was also collected at Day 169.
- Cognition, measured with the CANTAB battery covered the following cognitive domains:
  - Episodic Memory - Paired Associates Learning (PAL)
  - Working Memory - Spatial Working Memory (SWM)
  - Sustained Attention - Rapid Visual Processing (RVP)
  - Processing Speed - Reaction time task (RST)
- Data were analysed using a repeated measure mixed model. Performance on CANTAB tasks were compared against normative data from a large epidemiological sample (Abbott, 2015).

Results

CANTAB Task Completion and Engagement

- Twenty-two participants (M=10, F=12) completed screening assessments and 19 were followed up to Day 169. Age ranged from 54-84 years (mean=72, SD=8.6).
- 97% of CANTAB tasks were completed, with only 3% aborted or not run.
- Participant feedback showed (Figure 1, A-C) the majority found the test instructions to be clear and would be happy to complete the tests again.
- At baseline 75% reached the 6 pattern stage of PAL and 25% progressed to the 8 pattern stage. This supports the suitability of the task in this cohort, with graded assessment and adaptation according to ability. This performance is as expected for early AD. Comparable figures for the general population are 85% and 40% respectively (Figure 2).

Performance on CANTAB Tasks - Sensitivity to Change

- There was notable decline in performance on PAL, (+5.5 errors over 6 months), spatial working memory (+3.1 errors) and processing speed (+1.2ms) (Figure 3A-C).
- There was no significant change in RVP A’ prime over 6 months. However, mean scores at baseline (0.83) showed a deficit compared to expected norms (0.87) (ES = 0.5).
- Performance on all tasks showed a deficit compared to age adjusted norms. (Figure 4).
- Deficits reflect those reported for an aMCI sample (Nathan, 2017)

Conclusions

- The CANTAB tasks were well tolerated by participants with a high completion rate
- Cognitive profiles reflected those expected for an early AD sample.
- The pilot results show sensitivity to decline in performance over six months
- The CANTAB results are similar to those reported for aMCI participants in the Pharmacog (EU_ADNI Study)
- The CANTAB computerised platform provides a validated sensitive cognitive assessment for use in prodromal AD (Barnett, 2016).

References


www.dementiasplatform.uk