Brief Digital Cognitive Assessment in Immune-Mediated Inflammatory Diseases: Findings from a Large Longitudinal Multi-Cohort Study

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Introduction

- Cognitive impairment is a recognised, clinically meaningful symptom of immune-mediated inflammatory disorders (IMIDs), with patients frequently reporting difficulties in attention, processing speed and executive function.[1]
- Despite the relevance of cognition to patient quality of life and daily function,[2,3] existing cognitive assessments are often time-consuming, clinic-based, and reliant on the availability of trained personnel, limiting their application in IMID clinical trials or routine care.
- This analysis of the IDEA-FAST study aims to evaluate the feasibility, reliability, and disease sensitivity of the PVT and DSST, brief cognitive assessments delivered repeatedly, remotely, and at scale across a range of IMIDs.

Methods

- The IDEA-FAST COS is a prospective, European, multinational, observational study in people with IMIDs (inflammatory bowel disease [IBD], rheumatoid arthritis [RA], systemic lupus erythematosus [SLE] and primary Sjögren's syndrome [PSS]), neurodegenerative disorders (NDDs; Parkinson's disease [PD] and Huntington's disease [HD]) and healthy volunteers (HVs).[4]
- Participants completed morning, afternoon and evening assessments across four assessment phases (APs)(**Figure 1**).
- Sustained attention was assessed with PVT, administered remotely via the CANTAB™ app on the patients' own or provisioned smartphones.
- Global cognition was assessed using CognitionKit DSST.
- Age-adjusted sensitivity to disease-related cognitive differences were assessed for all measures across all APs.
- Completion rates were calculated per-patient over the whole study, excluding familarization days.
- Test-retest reliability was assessed for PVT reaction time, DSST total correct and DSST correct movement duration during AP1 using ICC(3,1).

See the **supplementary material** for further details on the study design and statistical methods.

E-poster **References** **Supplementary material**

Scan QR code to access these materials.

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Results

Figure 1. IDEA-FAST study design (A) and daily assessment schedule (B)

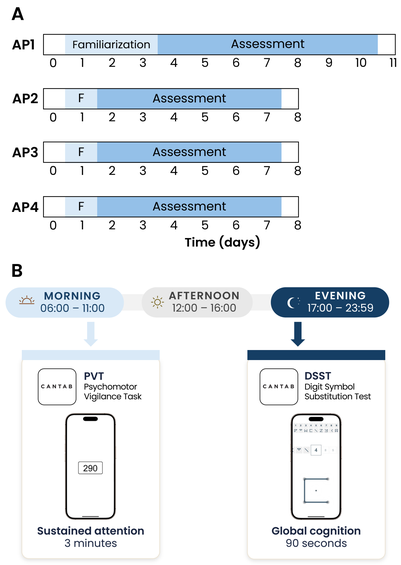
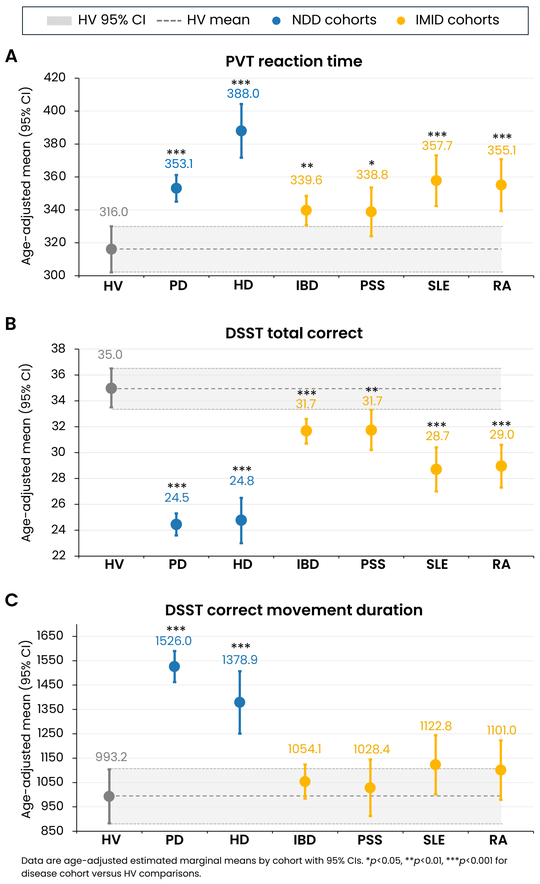


Table 1. Baseline demographics

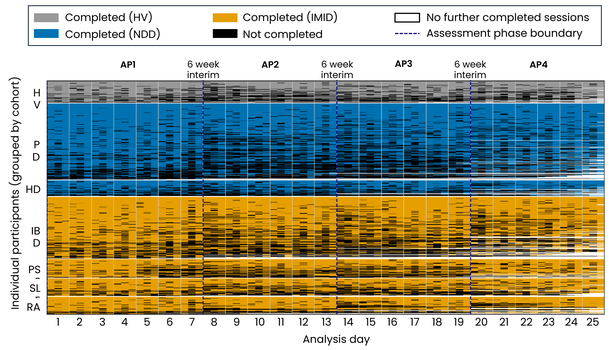
Disease group	Cohort	N	Age, mean (SD)	Female, n (%)
	HV	94	47.2 (15.1)	67 (71.3)
NDD	PD	321	64.3 (8.8)	119 (37.1)
	HD	68	48.5 (12.5)	33 (48.5)
IMID	IBD	262	45.4 (14.1)	154 (58.8)
	PSS	81	56.8 (12.5)	72 (88.9)
	SLE	77	47.0 (11.2)	75 (97.4)
	RA	74	59.6 (11.2)	58 (78.4)
Overall		977	54.1 (14.5)	578 (59.2)

Figure 2. IMID cohorts performed significantly worse than HV on age-adjusted mean PVT reaction time (A) and DSST total correct (B) but not correct movement duration (C)



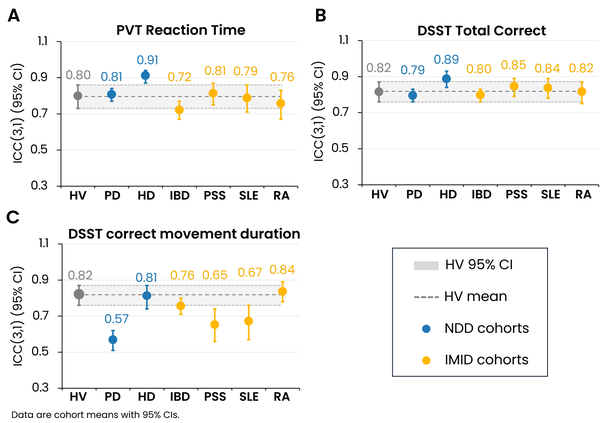
Data are age-adjusted estimated marginal means by cohort with 95% CIs. *p<0.05, **p<0.01, ***p<0.001 for disease cohort versus HV comparisons.

Figure 3. Participation was high across all phases and sessions, peaking in the evenings and in AP1



Per-patient session completion proportions were consistent across disease cohorts and HV (**Figure S1**).

Figure 4. Test-retest reliability was high in PVT reaction time (A) and DSST total correct (B), and moderate in DSST correct movement duration (C) across patient cohorts within AP1



Data are cohort means with 95% CIs.

Conclusions

The PVT and DSST brief digital cognitive assessments provide a **feasible and reliable** approach to capturing objective cognitive differences across IMIDs.

The PVT and DSST demonstrated **sensitivity to IMID-related cognitive impairment** while remaining acceptable across cohorts both in single use and with repeated assessments.

IMID-related **cognitive differences were readily distinguishable** using the same brief assessments that differentiated NDD cohorts.

Low-burden assessments delivered at home could help **address longstanding barriers** to implementing cognitive assessment in large-scale studies and disease monitoring in IMIDs.

Abbreviations

AP, assessment phase; **COS,** clinical observation study; **DSST**, Digit Symbol Substitution Test; **HD**, Huntington's disease; **HV**, healthy volunteers; **IBD**, inflammatory bowel disease; **ICC**, intraclass correlation coefficient; **IMID**, immune-mediated inflammatory disorders; **NDD**, neurodegenerative disorders; **PD**, Parkinson's disease; **PSS**, primary Sjögren's syndrome; **PVT**, Psychomotor Vigilance Task; **RA**, rheumatoid arthritis; **SD**, standard deviation; **SLE**, systemic lupus erythematosus.

Disclosures

AJK, **NT** and **FC** are employees of Cambridge Cognition and may own stock or stock options in Cambridge Cognition.

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