

# Factors associated with HIV associated neurocognitive disorder in an unselected cohort in East and South London- The HAND study

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## BACKGROUND

- People living with HIV remain vulnerable to HIV associated neurocognitive disorder despite the presence of highly active antiretroviral therapy.
- Severity ranges from asymptomatic neurocognitive impairment to HIV associated dementia<sup>1</sup> and prevalence rates of 20-50% have been reported<sup>2-5</sup>.
- Factors that have been linked with HAND include CPE score<sup>6,7</sup>, age<sup>8</sup>, education level<sup>9</sup>, CD4 count less than 350<sup>10</sup>, and plasma HIV viral load<sup>2</sup>.

## AIMS

- In the first study of HIV associated neurocognitive disorder in an unselected diverse cohort in London, we aimed to:
  - determine the extent of neurocognitive disorder in this cohort
  - establish correlation with other demographic and HIV related factors, mood, anxiety, medical comorbidities, antiretroviral regime and CNS penetration effectiveness score.

## METHODS

- A cross sectional study
- **786 HIV positive** participants aged >18 were recruited from 4 HIV clinics in East and South London.
- Past medical history, antiretroviral drug history, drug and alcohol use, and demographic data were collected and mental state assessment was completed.
- Computerised assessment of neurocognitive function was performed using the following *Cogstate* tests:
  - Detection (psychomotor function)
  - Identification (attention)
  - Groton maze learning test (executive function)
  - One card learning (visual learning)
  - One back (working memory)
- Participants were determined to have impairment if they were >1 standard deviation (SD) outside of the population mean in 2 or more cognitive domains (Frascati criteria)<sup>1</sup>.

## RESULTS

The median age of the participants was 46 (IQR 39-52), 510 (65%) were Caucasian. 81% had HIV VL <100. Median CD4 count was 566 (IQR 412, 741). Median CD4 nadir was 206 (IQR 89, 311). 26% were current smokers. Of the 710 who completed the Cogstate tests 84% were men. 37.2% had 2 or more tests with a score >1SD below the population mean. The frequency of impairment for each of the cognitive domains is illustrated in figure 1.

Variables associated with NCI in both the univariate analysis are shown in figure 2, and in the multivariate analysis are shown in figure 3.

Cognitive domain	Frequency of impairment (%)
Detection (psychomotor function)	197 (27.7)
Identification (attention)	199 (28.0)
Groton maze learning test (executive function)	136 (19.2)
One card learning (visual learning)	179 (25.2)
One back working (memory)	177 (24.9)

Figure 1. Frequency of impairments for each of the cognitive domains

Variables associated with NCI	Variables not associated with NCI
Female Gender	Age
Non MSM transmission risk	Detectable vs undetectable viral load
Non white race	Raised cholesterol
English not first language	Diabetes
Non college level of education	
Non skilled employment	
Positive Simoni screening questions	
Abnormal score on IHDS	
Positive screen for anxiety on IHDS	
Positive screen for depression on IHDS	
Lower CD4 count	
Previous psychiatric diagnosis	
Current psychiatric diagnosis	
Previous CNS infection	
Smoking tobacco	
Heavier alcohol use	
Drug use	
Past syphilis	
Being Hepatitis C IgG positive	
Use of abacavir in regime	
Higher CPE score	

Figure 2. Factors associated with NCI in univariate analysis

Variable	n	odds ratio	p value	
Anxiety	Normal	354	1.00	
	Borderline	143	1.41	0.15
	Abnormal	193	2.47	0.0001
Summarised IHDS	Normal	553	1.00	
	Abnormal	137	3.90	0.0001
Race	Black African	129	1.00	
	Black Caribbean	32	0.88	0.78
	Caucasian	475	0.22	0.0001
	Other	22	0.31	0.041
Education	College/ University	458	1.00	
	Other	232	1.73	0.004
Transmission route	MSM	446	1.00	
	Other	244	1.96	0.003
CPE score	0-5	42	1.00	
	6-8	530	1.35	0.47
	>8	35	3.22	0.037

Figure 3. Factors that were independently associated with HAND on multivariate analysis. IHDS= international HIV dementia scale, CPE= CNS penetration effectiveness

## CONCLUSIONS

NCI was observed in 37.2% of this cohort. Anxiety (as measured in Hospital Anxiety and Depression scale), abnormal IHDS, non Caucasian ethnicity, below college level education, non-MSM transmission route and CPE score >8 were associated with HAND in the multivariate analysis. No individual antiretroviral regimes were associated with HAND. The CPE score effect is at variance with that observed in other studies. This could be due to intensification of ART in those with prior NCI or even a degree of drug toxicity. More research is needed on the effects of ART on HAND.

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