

Neuropsychological Functioning in HCV and HIV Co-infected subjects

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ABSTRACT

Objectives: Approximately a third of patients with HIV are co-infected with hepatitis C virus (HCV). The purpose of the study was to compare the neurocognitive performance of patients with HIV to those with both HIV and hepatitis C virus (HCV), before and after treatment with highly active antiretroviral therapy (HAART).

Design: Prospective study examining group and treatment effects.

Methods: Forty-seven HIV positive/HCV negative (mono-infected) and 20 HIV positive/HCV positive (co-infected) patients were evaluated with a battery of neuropsychological tests comprising seven cognitive domains: attention/concentration, psychomotor speed, executive functioning, verbal memory, visual memory, gross motor functioning, and fine motor speed. Thirty-one of the mono-infected and 13 co-infected patients were reevaluated after six months of treatment with HAART.

Results: There were significant baseline differences in cognitive functioning related to HCV status ($p < .05$) accounting for 22% of the test variance. Further examination showed HCV status was significantly related to visual memory ($p = .005$) and fine motor speed ($p = .01$), with worse performance found on both domains within the co-infected group than in the mono-infected group. Following treatment with HAART, significant differences in cognitive functioning related to HCV status were no longer present. No significant differences were found in relation to treatment effects.

Conclusions: The results indicated co-infection with HIV and HCV was associated with reductions in visual memory and manual dexterity, over and above those found in the HIV group alone. Therefore, it is possible that HCV may hasten the progression of HIV dementia in co-infected patients. Though there were no significant treatment effects of HAART within each group, it is of interest that the co-infected subjects improved from baseline with HAART, to have similar functioning as the HIV mono-infected group, suggesting the possibility that HAART may have greater benefit in the co-infected group.

INTRODUCTION

As the lifespan of patients with HIV increases with HAART, so does the risk for development of other diseases. One of the most debilitating diseases that commonly co-occurs with HIV is hepatitis C virus (HCV), with estimates of the incidence of co-infection ranging between 16% and 40% of patients with HIV. The progression of neurological symptoms has not been elucidated among samples of patients co-infected with HIV and HCV.

HIV has been found to enter the central nervous system (CNS) during the early stages of the virus. Recent studies suggest that HCV also enters the CNS, as genetic viral material was found in postmortem studies (Forton et al., 2004). Very few studies have examined changes in cognitive functioning related to co-infection with HIV/HCV and no studies to date have examined the influence of HAART on cognitive symptoms in a co-infected sample. The purpose of the present study was to characterize cognitive changes associated with HIV/HCV co-infection before and after treatment with HAART. We hypothesized that co-infected patients would demonstrate worse cognitive functioning than mono-infected on a battery of neuropsychological tests. Both patient groups were expected to improve cognitively following six months of treatment with HAART.

METHODS

Subjects

Two groups comprised of

47 patients mono-infected with HIV

20 patients co-infected with HIV and HCV.

Neuropsychological evaluation

Attention/Concentration (2 and 7 test, PASAT)

Speed of Processing (Reaction Time, Digit Symbol, Trails A, Stroop)

Executive functioning (Trailmaking B, Stroop CW, COWA)

Verbal Memory (RAVLT)

Figural memory (Rey Complex Figure Immediate, Delay)

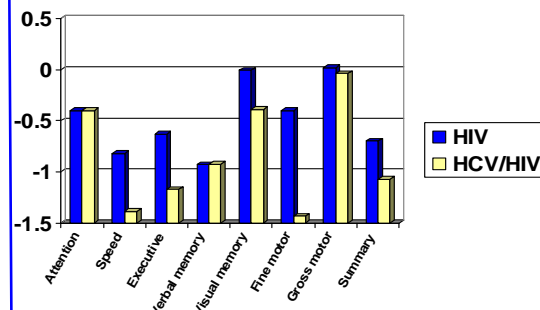
Gross motor (Timed Gait)

Fine motor (Grooved Pegboard, Finger Tapping)

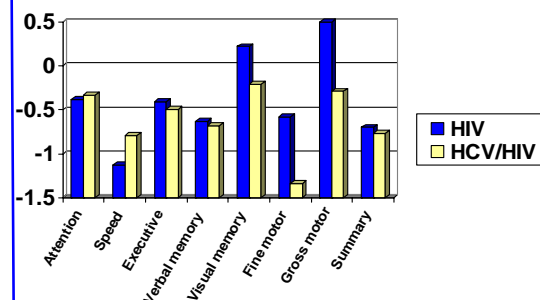
Demographics

	Mono-infected		Co-infected		<i>p</i> <
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Age	40.0	6.8	42.8	4.9	ns
Sex, male	68%		60%		ns
Education	13.1	2.1	11.5	2.1	.01
Ethnicity	32% Caucasian		10% Caucasian		.05
CD4	267.9	222.1	223.5	168.6	ns
Asymptomatic	23.4%		19%		
Symptomatic	14.9%		14.3%		
AIDS	61.7%		66.7%		

Baseline Neuropsychological Functioning



Follow-up Neuropsychological Functioning



RESULTS

• Significant differences at baseline between the co-infected group and mono-infected group: Wilks' $\Lambda = .79$, $F(7, 57) = 2.23$, $p < .05$.

• Twenty-two percent of the variance of the neuropsychological variables was associated with HCV status, $\eta^2 = .22$.

• Follow-up t-tests showed significant between-group differences in the visual memory and fine motor domains, respectively $F(3, 63) = 4.65$, $p = .005$; $F(3, 63) = 4.00$, $p = .01$. The co-infected group performed significantly worse than the mono-infected group within both the visual memory and the fine motor domains.

• Following six months of treatment with HAART, 31 of the HCV negative patients and 13 of the HCV positive patients were reevaluated. Differences between the co-infected and mono-infected groups were no longer significant following treatment with HAART.

CONCLUSIONS

The results of our study were suggestive of difficulties with cognitive tasks requiring processing of visual information among patients with HCV. A possible reason for this difficulty may be due to treatment with pegylated interferon for HCV, as there have been reports of visual changes associated with this treatment (Farela et al., 2004; Wilson et al., 2004). With regard to possible reasons for worse motor functioning in the co-infected group, both HCV and HIV have been associated with metabolic abnormalities in the basal ganglia (Forton et al., 2002). Therefore, co-infection with HIV and HCV may result in more extensive changes in the basal ganglia than either disease alone, leading to further decreases in motor speed.