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Supplementary Material



Development of a Nomogram-Based Tool to Predict Neurocognitive Impairment Among HIV-positive Charter Participants

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Supplemental Table 1. Baseline characteristics by neurocognitive status among HIV-infected participants of the CNS HIV Antiretroviral Therapy Effects Research (CHARTER) study, 2003-2007.

Characteristics	Sample	Neurocognitive status n (%)		P Value
	n (%)	Impaired T-score<40	Unimpaired T-score≥40	
Total	1,307 (100.0)	283 (21.6)	1,024 (78.3)	
Age (years)*				<0.001
≤50	1,067 (81.6)	184 (65.0)	883 (86.2)	
>50	240 (18.4)	99 (35.0)	141 (13.8)	
Education				0.167
Less than high school	242 (18.5)	50 (17.7)	192 (18.7)	
High school or equivalent	336 (25.7)	72 (25.4)	264 (25.8)	
Certificate or Associates degree	169 (12.9)	39 (13.8)	130 (12.7)	
Some college	328 (25.1)	65 (23.0)	263 (25.7)	
Bachelor's degree	151 (11.6)	30 (10.6)	121 (11.8)	
Graduate degree or graduate work	81 (6.2)	27 (9.5)	54 (5.3)	
Race/Ethnicity				0.005
Non-Hispanic African American	620 (47.4)	109 (38.5)	511 (49.9)	
Non-Hispanic White	537 (41.1)	131 (46.3)	406 (39.7)	
Hispanic	116 (8.9)	33 (11.7)	83 (8.1)	
Other	34 (2.6)	10 (3.5)	24 (2.3)	
Gender				0.252
Male	1,012 (77.4)	212 (74.9)	800 (78.1)	
Female	295 (22.6)	71 (25.1)	224 (21.9)	
Currently employed*				<0.001
No	952 (72.8)	238 (84.1)	714 (69.7)	
Yes	355 (27.2)	45 (15.9)	310 (30.3)	
Lifetime diagnosis of diabetes mellitus				0.004
No	1,185 (90.7)	244 (86.2)	941 (98.9)	
Yes	122 (9.3)	39 (13.8)	83 (8.1)	
Current diabetes medication*				0.002
No	1,181 (90.4)	242 (85.5)	939 (91.7)	
Yes	126 (9.6)	41 (14.5)	85 (8.3)	

(Table 3) contd.....

Diagnosed hypertension No Yes	1144 (87.7) 161 (12.3)	242 (85.8) 40 (14.2)	902 (88.2) 121 (11.8)	0.287
History of high cholesterol No Yes	1,039 (79.5) 268 (20.5)	195 (68.9) 88 (31.1)	844 (82.4) 180 (17.6)	<0.001
History of high triglycerides No Yes	1,078 (82.5) 229 (17.5)	222 (78.5) 61 (21.5)	856 (83.6) 168 (16.4)	0.044
Current hyperlipidemia medication* No Yes	1,078 (82.5) 229 (17.5)	211 (74.6) 72 (25.4)	867 (84.7) 157 (15.3)	<0.001
Ever used psychotropic drugs No Yes	248 (19.0) 1,059 (81.0)	43 (15.2) 240 (84.8)	205 (20.0) 819 (80.0)	0.067
Current psychotropic drugs* No Yes	547 (41.8) 760 (58.2)	85 (30.0) 198 (70.0)	462 (45.1) 562 (54.9)	<0.001
Lifetime major depressive disorder No Yes	631 (48.3) 676 (51.7)	145 (51.2) 138 (48.8)	486 (47.5) 538 (52.5)	0.261
Beck Depression Inventory-II* 0-13 (minimal) 14-19 (mild) 20-28 (moderate) 29-63 (severe)	728 (55.7) 209 (16.0) 227 (17.4) 143 (10.9)	145 (51.3) 49 (17.3) 47 (16.6) 42 (14.8)	583 (56.9) 160 (15.6) 180 (17.6) 101 (9.9)	0.078
History of head injury No Yes	825 (63.1) 482 (36.9)	178 (62.9) 105 (37.1)	647 (63.2) 377 (36.8)	0.929
History of coma No Yes	1,232 (94.3) 75 (5.7)	259 (91.5) 24 (8.5)	973 (95.0) 51 (5.0)	0.025
History of stroke No Yes	1,232 (94.3) 75 (5.7)	252 (89.1) 31 (10.9)	980 (95.7) 44 (4.3)	<0.001
Family history of neurologic disease¹ No Yes	946 (71.4) 361 (27.6)	201 (71.0) 82 (29.0)	745 (72.8) 279 (27.2)	0.565
Duration of HIV infection (years) ≤15 >15	1,007 (77.1) 300 (22.9)	210 (74.2) 73 (25.8)	797 (77.8) 227 (22.2)	0.199
HIV severity (1993 CDC classification)^{2*} 1=A1+A2+A3 2=B1+B2+B3 3=C1+C2+C3	494 (37.8) 339 (25.9) 474 (36.3)	86 (30.4) 64 (22.6) 133 (47.0)	408 (39.8) 275 (26.9) 341 (33.3)	0.001
ARV use* HAART Non-HAART No Current ARVs ARV Naïve	851 (65.1) 93 (7.1) 175 (13.4) 188 (14.4)	212 (74.9) 23 (8.1) 28 (9.9) 20 (7.1)	639 (62.4) 70 (6.8) 147 (14.4) 168 (16.4)	<0.001
Plasma viral load (IU/mL)* <51 51-10,000 >10,000	527 (40.3) 448 (34.3) 332 (25.4)	143 (50.5) 91 (32.2) 49 (17.3)	384 (37.5) 357 (34.9) 283 (27.6)	<0.001
Any AIDS defining illness^{3*} No Yes	857 (65.6) 450 (34.4)	155 (54.8) 128 (45.2)	702 (68.5) 322 (31.5)	<0.001
Last CD4 count <200 200-500 >500	225 (17.2) 628 (48.1) 454 (34.7)	44 (15.6) 126 (44.5) 113 (39.9)	181 (17.7) 502 (49.0) 341 (33.3)	0.115
CD4 nadir <200 200-500 >500	740 (56.6) 466 (35.7) 101 (7.7)	188 (66.4) 81 (28.6) 14 (5.0)	552 (53.9) 385 (37.6) 87 (8.5)	0.006

(Table 3) contd.....

ARV drug adherence⁴ No Yes	506 (38.7) 801 (61.3)	87 (30.7) 196 (69.3)	419 (40.9) 605 (59.1)	0.002
Hepatitis C lab result (Antibody)* Negative Positive	975 (74.6) 332 (25.4)	203 (71.7) 80 (28.3)	772 (75.4) 252 (24.6)	0.211
Serum glucose (mg/dL)* <140 ≥140	1,211 (92.7) 96 (7.3)	250 (88.3) 33 (11.7)	961 (93.8) 63 (6.2)	0.002
Blood urea nitrogen (mg/dL)* ≤20 >20	1,217 (93.1) 90 (6.9)	255 (90.1) 28 (9.9)	962 (93.9) 62 (6.1)	0.024
Serum creatinine (mg/dL)* ≤1.3 >1.3	1,242 (95.0) 65 (5.0)	263 (92.9) 20 (7.1)	979 (95.6) 45 (4.4)	0.067
Serum chloride (mmol/L)^{5*} <106 ≥106	1,120 (85.7) 187 (14.3)	244 (86.2) 39 (13.8)	876 (85.6) 148 (14.4)	0.775
Serum sodium (mmol/L)^{6*} ≥135 <135	70 (5.4) 1,237 (94.6)	258 (91.2) 25 (8.8)	979 (95.6) 45 (4.4)	0.003
Serum potassium (mmol/L)^{7*} ≥3.6 <3.6	165 (12.6) 1,142 (87.4)	247 (87.3) 36 (12.7)	895 (87.4) 129 (12.6)	0.956
Serum calcium (mg/dL)* <8.9 8.9-10.1 >10.1	158 (12.1) 1,030 (78.8) 119 (9.1)	28 (9.9) 215 (76.0) 40 (14.1)	130 (12.7) 815 (79.6) 79 (7.7)	0.003
Serum total protein (g/dL)* <6.4 6.4-8.3 >8.3	36 (2.8) 873 (66.8) 398 (30.4)	12 (4.2) 176 (62.2) 95 (33.6)	24 (2.3) 697 (68.1) 303 (29.6)	0.074
Serum total bilirubin (mg/dL)* ≤1.2 >1.2	1,093 (83.6) 214 (16.4)	236 (83.4) 47 (16.6)	857 (83.7) 167 (16.3)	0.904
Serum aspartate aminotransferase (iu/L)* ≤40 >40	945 (72.3) 362 (27.7)	198 (69.9) 85 (30.1)	747 (72.9) 277 (27.1)	0.321
Serum alanine aminotransferase (iu/L)* ≤55 >55	1,036 (79.3) 271 (20.7)	222 (78.5) 61 (21.5)	814 (79.5) 210 (20.5)	0.701
Serum alkaline phosphatase (iu/L)* ≤140 >140	1,177 (90.1) 130 (9.9)	243 (85.9) 40 (14.1)	934 (91.2) 90 (8.8)	0.007
Total cholesterol (mg/dL)* ≤200 >200	964 (73.8) 343 (26.2)	196 (69.3) 87 (30.7)	768 (75.0) 256 (25.0)	0.052
Blood WBCs (1000/uL)* <4 4-11 >11	298 (22.8) 988 (75.6) 21 (1.6)	58 (20.5) 217 (76.7) 8 (2.8)	240 (23.4) 771 (75.3) 13 (1.3)	0.119
Serum hemoglobin (g/dL)* ≥13 <13	973 (74.5) 334 (25.5)	202 (71.4) 81 (28.6)	771 (75.3) 253 (24.7)	0.181
Blood monocytes (%)[*] ≤8 >8	623 (47.7) 684 (52.3)	148 (52.3) 135 (47.7)	475 (46.4) 549 (53.6)	0.078
Absolute blood CD4 (cells/ul)* >500 200-500 <200	493 (37.7) 604 (46.2) 210 (16.1)	110 (38.9) 132 (46.6) 41 (14.5)	383 (37.4) 472 (46.1) 169 (16.5)	0.704
Rapid plasma reagin (syphilis) result[*] Negative Positive	1,199 (91.7) 108 (8.3)	255 (90.1) 28 (9.9)	944 (92.2) 80 (7.8)	0.260

(Table 3) contd.....

Urine proteins analysis (mg/dl)*	853 (65.3)	171 (60.4)	682 (66.6)	0.135
Negative	395 (30.2)	99 (35.0)	296 (28.9)	
Trace-30 >30	599 (4.5)	13 (4.6)	46 (4.5)	
Lifetime alcohol use	585 (44.8)	145 (51.2)	440 (43.0)	0.013
No	722 (55.2)	138 (48.8)	584 (57.0)	
Lifetime cocaine use	736 (56.3)	200 (70.7)	536 (52.3)	<0.001
No	571 (43.7)	83 (29.3)	488 (47.7)	
Lifetime hallucinogen use	1,206 (92.3)	266 (94.0)	940 (91.8)	0.221
No	101 (7.7)	17 (6.0)	84 (8.2)	
Lifetime inhalant use	1,260 (96.4)	279 (98.6)	981 (95.8)	0.026
No	47 (3.6)	4 (1.4)	43 (4.2)	
Lifetime cannabis use	918 (70.2)	214 (75.6)	704 (68.8)	0.025
No	389 (29.8)	69 (24.4)	320 (31.2)	
Lifetime methamphetamine use	1,080 (82.6)	245 (86.6)	835 (81.5)	0.048
No	227 (17.4)	38 (13.4)	189 (18.5)	
Lifetime opioid use	1,091 (83.5)	243 (85.9)	848 (82.8)	0.221
No	216 (16.5)	40 (14.1)	176 (17.2)	
Lifetime PCP use	1,280 (97.9)	279 (98.6)	1001 (97.8)	0.383
No	27 (2.1)	4 (1.4)	23 (2.2)	
Lifetime sedative use	1,209 (92.5)	263 (92.9)	946 (92.4)	0.756
No	98 (7.5)	20 (7.1)	78 (7.6)	
Difficulty eating, dressing, bathing, or using the toilet*	1,098 (84.0)	208 (73.5)	890 (86.9)	<0.001
No	209 (16.0)	75 (26.5)	134 (13.1)	
Management of medication*	1,201 (91.9)	255 (90.1)	946 (92.4)	0.214
Independent	106 (8.1)	28 (9.9)	78 (7.6)	
Dependent				
Impaired use of hands*	1,141 (87.3)	221 (78.1)	920 (89.8)	<0.001
No	166 (12.7)	62 (21.9)	104 (10.2)	
Yes				

Lifetime = ever

¹Includes Parkinson's, Alzheimer's, Huntington's, multiple sclerosis and epilepsy recurrent Salmonella septicemia, Toxoplasmosis of brain or HIV related wasting syndrome.

²A1=Asymptomatic HIV infection or acute HIV infection with accompanying illness PGL CD4 >500/mm³ T-lymphocyte >29%, A2=Asymptomatic HIV infection or acute HIV infection with accompanying illness PGL CD4 200-499/mm³ T-lymphocyte 14-28%, A3=Asymptomatic HIV infection or acute HIV infection with accompanying illness PGL CD4 <200/mm³ T-lymphocyte <14%, B1=Symptomatic HIV infection with accompanying illness CD4 >500/mm³ T-lymphocyte >29%, B2=Symptomatic HIV infection with accompanying illness CD4 200-499/mm³ T-lymphocyte 14-28%, B3=Symptomatic HIV infection with accompanying illness CD4 <200/mm³ T-lymphocyte <14%, C1=AIDS indicator condition CD4 >500/mm³ T-lymphocyte >29%, C2=AIDS indicator condition CD4 200-499/mm³ T-lymphocyte 14-28%, C3=AIDS indicator condition CD4 <200/mm³ T-lymphocyte <14%.³Includes diagnosis of Cryptococcus (extra pulmonary), Cytomegalovirus disease (other than liver, spleen or nodes) Cytomegalovirus retinitis, HIV related encephalopathy, herpes simplex, disseminated histoplasmosis, Kaposi sarcoma, Burkitt's lymphoma, disseminated mycobacterium avium complex, any site mycobacterium tuberculosis, Pneumocystis carinii pneumonia, recurrent pneumonia and Progressive multifocal leukoencephalopathy.

⁴Calculated over 4 days preceding the baseline visit as percentage of pills skipped (percentage skipped <5% = "Yes", else = "No").

⁵Originally coded as; hypo<96, normal=96-105, hyper>=106. Less than 5 had hypo so were combined into normal.

⁶Originally coded as hypo <135, normal 135-147, hyper >147. Less than 5 had hyper so were combined with normal.

⁷Originally coded as; hypo<3.6, normal 3.6-5.2, hyper >5.2. Less than 5 had hyper so were combined into normal. PCP=Phenylcyclohexyl Piperidine. ARV=Antiretroviral.

* Variables measured at baseline visit

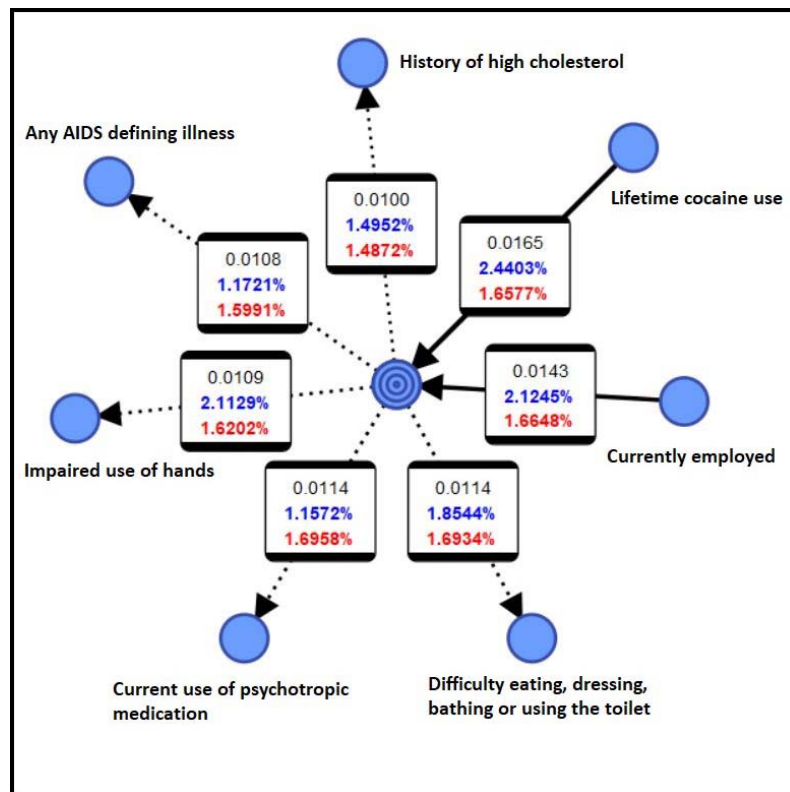


Fig. (1). Markov Blanket model with mutual information between neurocognitive impairment (central node) and other covariates for participants less than 50-years old.

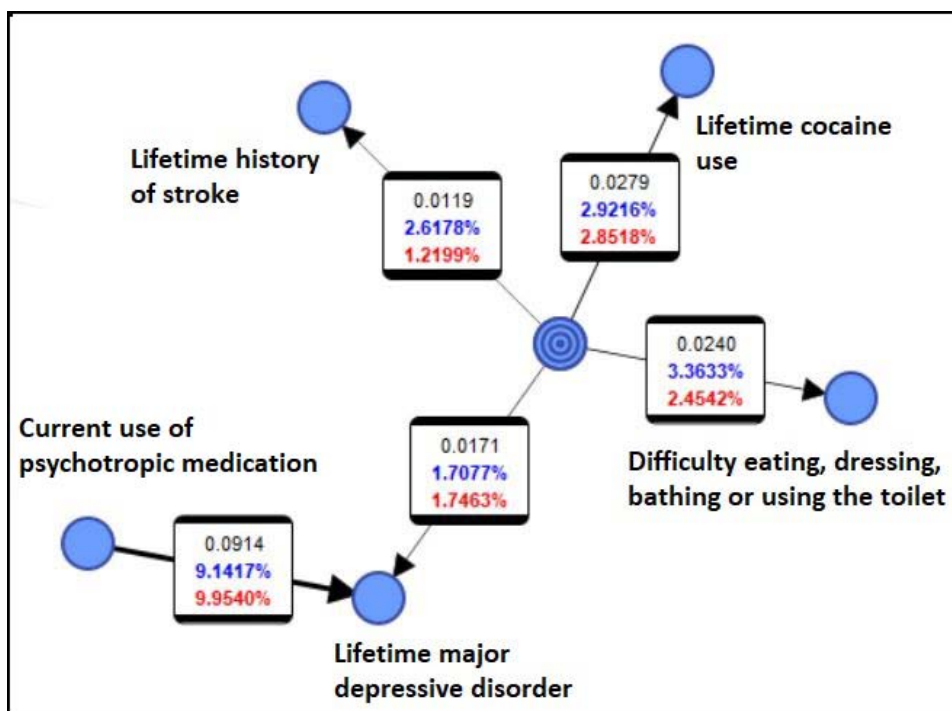


Fig. (2). Markov Blanket model with mutual information between neurocognitive impairment (central node) and other covariates for participants equal to or more than 50-years old.