

table e-1. Cognitive tests used in the neurocognitive battery, categorized by the primary cognitive domain evaluated.

Function Assessed	Cognitive Test	Scoring	Test Details
Cognitive Screen	Mini-Mental State Exam	Number Correct	Thirty-point questionnaire that samples abilities such as arithmetic, memory, and orientation
Intelligence	North American Adult Reading Test	128.7 - (0.89 * # of errors)	Estimation of verbal intelligence quotient that requires subjects to read a list of 61 words out loud
	Immediate Recall*	Total initially correct	Assessment of memory in which a list of 12 words is presented during 4 trials, and retention of these words is tested after a delay of 25 to 35 minutes. Calculated scores include <i>immediate recall</i> (words recalled during the 4 trials), <i>delayed recall</i> (words from trial 4 recalled after a delay), and <i>delayed recognition</i> .
Supraspan Learning & Word Recall	Delayed Recall*	Total number recalled after delay	
	Delayed Recognition*	Number of correctly identified words	
Visual Construction & Fluid Reasoning	Block Design^	Number completed weighted for time	Participants are required to reproduce depicted patterns using a set of colored blocks
	Digit Symbol-Coding^	Number of copied symbols in 2 minutes	Symbols are decoded by matching a given symbol to a digit provided in an answer key
	Digit Span	Total correct number	Participants are asked to repeat lists of numbers read out loud, and to repeat different lists in reverse order.
Attention, Mental Processing Speed, & Executive Function	Trail Making Test A	Time to completion	“Connect-the-dots” for a consecutive number sequence from 1 to 25
	Trail Making Test B	Time to completion	“Connect-the-dots” alternating between numbers (1 to 13) and letters (A to L); limit 300 seconds
	Mental Alternations	Total correct number	Participants asked to alternate between sequential numbers and letters by speaking out loud
	COWAT (animals and supermarket items)	Number of correct examples	Participants asked to name as many animals and supermarket items as they can in 1 minute each

* Derived from the Word List Learning subtest of the Wechsler Memory Scale - III (WMS-III)

^From the Weschler adult intelligence scale

table e-2: Comparison of cognitive function in hemodialysis patients without a history of stroke to normative data

Test	Test Description	Dialysis Patients		Normative Data		Comparisons (proportion below reference)**			
		N	Raw values Mean (SD)	Rescaled Mean (SD)	Reference (SD)	One-sample <i>t</i> -test p-value	1 SD Proportion (95% CI)	1.5 SD Proportion (95% CI)	2 SD Proportion (95% CI)
MMSE	Screen	258	26.8 (2.8)	26.8 (2.8)	"Normal" ≥ 24	NA		12.4 (8.6, 17.1)*	
NAARTVIQ	Intelligence	256	102.0 (12.1)	102.0 (12.1)	100 (15)	0.009	7.8 (4.8, 11.8)	0.8 (0.1, 2.8)	0.0
Delay Recall	Primarily Memory, Learning and Recognition	254	4.6 (2.8)	10.6 (2.6)	10 (3)	<0.001	4.7 (2.5, 8.1)	1.6 (0.4, 4.0)	0.0
Immediate Recall		256	24.4 (7.3)	7.7 (3.2)	10 (3)	<0.001	39.8 (33.8, 46.1)	27.0 (21.6, 32.8)	6.6 (3.9, 10.4)
Recognition		255	20.9 (3.0)	9.4 (3.0)	10 (3)	0.004	15.7 (11.5, 20.7)	10.2 (6.8, 14.6)	4.3 (2.2, 7.6)
Block Design		253	26.5 (10.9)	8.7 (2.7)	10 (3)	<0.001	21.3 (16.5, 26.9)	11.9 (8.2, 16.5)	0.8 (0.1, 2.8)
Digit Symbol		234	41.7 (17.2)	7.0 (2.6)	10 (3)	<0.001	49.2 (42.6, 55.7)	33.3 (27.3, 39.8)	6.0 (3.3, 9.8)
Digit Span	Primarily	136	15.3 (3.7)	9.6 (2.7)	10 (3)	0.107	11.8 (6.9, 18.4)	2.9 (0.8, 7.4)	0.0
Trails A	Executive Functioning, Attention and Processing Speed	242	59.0 (37.5)	38.5 (9.4)	50 (10)	<0.001	52.9 (46.4, 59.3)	36.8 (30.7, 43.2)	16.9 (12.4, 22.3)
Trails B		240	128.4 (59.8) 21.3% non-completion	37.7 (11.4)	50 (10)	<0.001	57.5 (51.0, 63.8)	37.5 (31.4, 44.0)	24.2 (18.9, 30.1)
COWAT Total		138	37.3 (11.0)	40.9 (10.2)	"Impaired" ≤ 40.7 (lowest quartile of general population)	NA		50.0 (41.4, 58.6)*	
Mental Alternations		138	20.9 (7.4)	Same as Raw Score	"Impaired" < 15 Alternations#	NA		20.3 (13.9, 28.0)*	
CESD	Depression	256	10.5 (8.3)	Same as Raw Score	Depression likely present when CESD > 16	NA		21.1 (16.3, 26.6)*	

Test results are mean \pm standard deviation. Raw scores represent number correct, except for Trails A and B, which are reported in seconds required to complete the task. All rescaled scores except Trails A and B are standardized for age and reported as scaled scores centered at 10. Trails A and Trails B report

T scores standardized for age, sex, and education and are centered at 50. Higher scores are consistent with better performance on all tests.

*For tests without established population norms and standard deviations, the % with scores consistent with poor performance is listed. # Defined in an HIV population with the MMSE < 24 as the gold standard (e1). When the proportion was 0% or 100%, the 95% CI was not calculated.

** The proportions in the <1 SD column refer to all people with SD below 1, therefore including those with SD below 1.5 and 2. Similarly, the <1.5 SD column includes those with SD <1.5 and <2 while the SD <2 column refers to only those with SD <2; accordingly the values in these 3 columns cannot be added to obtain the percentage with abnormalities.

e-Reference: e1) Jones BN, Teng EL, Folstein MF, Harrison KS. A new bedside test of cognition for patients with HIV infection. *Ann Intern Med* 1993;119: 1001-1004.

table e-3. Comparison of cognitive function in hemodialysis patients with MMSE score ≥ 24 to normative data

Test	Test Description	Dialysis Patients			Normative Data		Comparisons (proportion below reference)**		
		N	Raw values Mean (SD)	Rescaled Mean (SD)	Reference (SD)	One-sample <i>t</i> -test p-value	1 SD Proportion (95% CI)	1.5 SD Proportion (95% CI)	2 SD Proportion (95% CI)
MMSE	Screen	272	27.5 (2.0)	27.5 (2.0)	"Normal" ≥ 24	NA		100*	
NAARTVIQ	Intelligence	269	103.3 (12.0)	103.3 (12.0)	100 (15)	<0.001	7.4 (4.6, 11.3)	1.1 (0.2, 3.2)	0.0
Delay Recall	Primarily Memory,	269	4.7 (2.7)	10.8 (2.5)	10 (3)	<0.001	6.0 (3.4, 9.5)	1.5 (0.4, 3.8)	0.0
Immediate Recall	Learning and Recognition	270	24.9 (7.0)	7.9 (3.2)	10 (3)	<0.001	35.9 (30.2, 42.0)	25.6 (20.5, 31.2)	6.3 (3.7, 9.9)
Recognition		270	21.1 (2.8)	9.5 (3.1)	10 (3)	0.007	15.6 (11.5, 20.4)	11.1 (7.6, 15.5)	5.2 (2.9, 8.6)
Block Design		268	27.3 (10.6)	8.9 (2.8)	10 (3)	<0.001	19.0 (14.5, 24.3)	10.5 (7.1, 14.8)	0.4 (0.0, 2.1)
Digit Symbol		250	41.6 (16.9)	7.0 (2.7)	10 (3)	<0.001	50.0 (43.6, 56.4)	32.8 (27.0, 39.0)	6.4 (3.7, 10.2)
Digit Span	Primarily Executive Functioning,	139	15.5 (3.9)	9.8 (2.9)	10 (3)	0.43	10.1 (5.6, 16.3)	2.9 (0.8, 7.2)	0.7 (0.0, 3.9)
Trails A	Attention and Processing Speed	259	57.3 (35.6)	38.8 (9.7)	50 (10)	<0.001	52.1 (45.9, 58.4)	35.5 (29.7, 41.7)	15.4 (11.3, 20.4)
Trails B		256	135.4 (64.9) 14.1% non-completion	38.3 (11.0)	50 (10)	<0.001	55.9 (49.5, 62.0)	34.8 (28.9, 41.0)	20.7 (15.9, 26.2)
COWAT Total		142	37.0 (10.8)	40.0 (10.3)	"Impaired" ≤ 40.7 (lowest quartile of general population)	NA		52.8 (44.3, 61.2)*	
Mental Alternations		142	21.0 (7.4)	Same as Raw Score	"Impaired" <15 Alternations#	NA		21.1 (14.7, 28.8)*	
CESD	Depression	271	10.2 (8.0)	Same as Raw Score	Depression likely present when CESD > 16	NA		20.3 (15.7, 25.6)*	

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