

Table 1. Neuropsychological Battery

Test	Method of Administration	Outcome Measure	Task Order
Global Cognitive Status			
Modified Mini Mental State Exam (mMMS)	Paper-and-pencil	Total Score (maximum = 57)	1
Psychomotor Function			
Simple Reaction Time (SRT)	Computerized	Median reaction time on 60 trials	4
Choice Reaction Time (CRT)	Computerized	Median reaction time on correct trials (maximum trials = 60)	5
Stroop Reaction Time (Stroop RT)	Computerized	Median reaction time on correct trials on the Stroop Test (maximum trials = 180)	
Attention			
Stroop Color-Word Interference (Stroop Effect)	Computerized	Interference Score: Ratio of RT on color-word conflict trials (N=90). to color trials (N = 45)	8
Continuous Performance Test (CPT)	Computerized	Sensitivity (d') in detecting consecutive and identical 4 digit targets (150 trials; 28 targets)	6
Anterograde Learning and Memory			
Complex Figure Test (CFT)	Paper-and-pencil	(1). Copying of complex figure (2). Reproduction of complex figure after a 20 min delay	3 9
Buschke Selective Reminding Test (BSRT)	Paper-and-pencil	(1). Total recall of a list of 12 unrelated words on 6 trials (2). Free recall of the 12 words after a 30 min delay	2 7
Autobiographical Memory			

Autobiographical Memory Interview-Short Form (AMI-SF)	Paper-and- pencil	Consistency of report with baseline answers for 30 questions about 5 autobiographical events	10
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Table 2. Clinical and Demographic Characteristics of the Intent-to-treat Sample (N = 347)

Continuous Variable	
Age, mean (SD), y	56.7 (17.6)
Education, mean (SD), y	13.9 (3.2)
Estimated Verbal IQ, mean (SD)	103.0 (12.1)
Hamilton Rating Scale for Depression, mean (SD)	31.3 (6.9)
Beck Depression Inventory, mean (SD)	35.4 (11.7)
Global Assessment Scale, mean (SD)	31.0 (9.2)
Cumulative medical burden, mean (SD)	2.7 (2.3)
Episode duration, median, wk	24.0
No. of medication trials during episode, mean (SD)	4.7 (2.9)
No. of adequate medication trials during episode, mean (SD)	1.2 (1.3)
Age at onset, mean (SD), y	36.3 (19.4)
No. of previous episodes, mean (SD)	2.7 (3.3)
No. of previous psychiatric hospitalizations, mean (SD)	1.8 (1.6)
Categorical Variable	
Women, %	63.1
Race, White, %	85.9
Mood disorder diagnostic subtype	
Unipolar Nonpsychotic, %	59.9
Unipolar Psychotic, %	20.5
Bipolar Nonpsychotic, %	11.8
Bipolar Psychotic, %	3.8
Schizoaffective, %	4.0
Co-morbid psychiatric diagnosis	
Axis 1, %	42.1

Axis 2, %	28.5
Inpatient, %	85.0
Medication resistant, %	64.6
History of previous ECT, %	43.5

Table 3. Baseline Cognitive Test Scores for the Depressed and Healthy Comparison Samples

Measure	Depressed Sample		Healthy Participant Sample				
	Baseline Raw Score		Baseline Raw Score		Baseline z-Score		
	Mean	SD	Mean	SD	Mean	SD	<i>p</i>
mMMS	46.4	7.7	50.5	6.2	0.53	0.77	0.006
SRT	476.3	316.0	460.0	281.0	0.09	0.80	0.84
CRT	974.8	551.8	759.8	435.4	0.40	0.75	0.05
STROOP RT	1054.9	383.2	851.7	308.0	0.57	0.74	0.01
STROOP Effect	0.53	0.35	0.28	0.19	0.58	1.00	0.02
CPT d'	2.1	0.9	2.2	0.99	0.32	0.88	0.11
CFT Copy	29.3	6.5	32.7	4.9	0.52	0.76	0.01
CFT Delay	12.2	8.2	17.3	6.7	0.63	0.80	0.006
BSRT Learn	34.6	12.7	40.2	8.95	0.59	0.77	0.004
BSRT Delay	4.2	3.2	6.4	3.1	0.64	0.82	0.003
AMI-SF	48.9	9.5	54.5	6.4	0.42	1.02	0.04

The *p*-value is from the main effect of diagnostic group (depressed vs. comparison sample). In the ANCOVA on each standardized test score, with age, gender, and grade level as covariates.

Table 4. Results of the ANCOVAs on Neuropsychological Scores Shortly Following the ECT Course

Variable	mMMS		SRT		CRT		Stroop RT		Stroop Effect		CPT d'	
	N = 257		N = 211		N = 227		N = 199		N = 199		N = 167	
	F	p	F	p	F	p	F	p	F	p	F	p
Waveform	6.89	0.009	11.81	0.0007	13.74	0.0003	14.33	0.0002	0.37	0.54	1.82	0.18
Electrode Placement	0.71	0.40	2.32	0.13	3.17	0.08	8.83	0.003	0.62	0.43	1.80	0.18
Electrical Dosage	1.42	0.23	0.59	0.44	0.95	0.33	0.63	0.43	0.01	0.90	0.00	0.98
Number of Treatments	0.78	0.38	0.00	0.97	0.06	0.81	0.00	0.96	0.61	0.44	0.71	0.40
Age (yr)	8.07	0.005	16.08	<.0001	24.91	<.0001	46.67	<.0001	4.68	0.03	11.63	0.000
Sex	9.97	0.002	0.04	0.85	3.15	0.08	3.10	0.08	7.74	0.006	0.65	0.42
Premorbid IQ	10.04	0.002	2.03	0.16	5.43	0.02	15.29	0.0001	0.51	0.48	1.27	0.26
PostECT HRSD	0.43	0.51	0.00	0.95	2.38	0.12	0.95	0.33	0.01	0.94	0.03	0.86
Days from end of ECT	20.57	<.0001	4.84	0.03	8.24	0.005	4.18	0.04	0.01	0.93	0.24	0.63
Baseline Test Score	139.23	<.0001	9.30	0.003	34.48	<.0001	157.10	<.0001	18.22	<.0001	30.52	<.000

Results of the ANCOVAs on Neuropsychological Scores Shortly Following the ECT Course (Continued)

Variable	CFT Copy		Reproducti on		BSRT Learn		BSRT Delay		AMI-SF	
	N = 218		N = 203		N = 236		N = 225		N = 243	
	F	p	F	p	F	p	F	p	F	p
Waveform	0.00	0.99	0.50	0.48	0.01	0.94	0.10	0.75	0.56	0.46
Electrode Placement	6.78	0.009	1.07	0.30	4.10	0.04	4.15	0.04	20.23	<.0001
Electrical Dosage	0.76	0.38	0.11	0.74	0.30	0.58	0.14	0.71	0.28	0.60

Number of										
Treatments	3.12	0.08	1.01	0.32	0.58	0.45	0.90	0.35	33.56	<.0001
Age (yr)	6.06	0.01	2.54	0.11	10.50	0.001	0.80	0.37	1.00	0.32
Sex	2.55	0.11	4.83	0.03	0.98	0.32	1.93	0.17	4.31	0.04
Premorbid IQ	7.25	0.008	0.19	0.67	10.64	0.001	0.79	0.38	2.54	0.11
PostECT HRSD	0.99	0.32	0.24	0.62	0.31	0.58	0.16	0.69	0.35	0.56
Days from end of										
ECT	5.52	0.02	10.07	0.002	19.77	<.0001	30.40	<.0001	1.66	0.20
Baseline Test	127.1	<.000	117.6							
Score	5	1	2	<.0001	60.23	<.0001	55.97	<.0001	78.59	<.0001

Table 5. Results of the ANCOVAs on Neuropsychological Scores at the 6-month Follow-up

Variable	mMMS N = 191		SRT N = 152		CRT N = 169		Stroop RT N = 162		Stroop Effect N = 162		CPT d' N = 153	
	F	p	F	p	F	p	F	p	F	p	F	p
Waveform	0.02	0.88	3.95	0.049	0.01	0.94	3.96	0.048	0.10	0.75	0.49	0.49
Electrode Placement	4.12	0.04	4.33	0.04	1.09	0.30	0.41	0.52	4.12	0.04	0.07	0.79
Electrical Dosage	0.21	0.65	0.09	0.77	0.37	0.54	2.27	0.13	0.10	0.75	3.33	0.07
Number of Treatments	0.51	0.48	1.54	0.22	0.66	0.42	1.40	0.24	0.09	0.76	0.70	0.40
Age (yr)	5.80	0.02	13.28	0.0004	4.11	0.04	19.63	<.0001	2.06	0.15	5.26	0.02
Sex	0.85	0.36	1.41	0.24	0.20	0.66	0.03	0.87	8.22	0.005	1.94	0.17
Premorbid IQ	37.07	<.0001	1.01	0.32	0.00	0.95	3.62	0.06	1.91	0.17	5.74	0.02
HRSD 6-mo Follow-up	4.36	0.04	0.01	0.94	1.28	0.26	0.03	0.86	0.34	0.56	1.37	0.24
ECT during follow-up	0.08	0.77	0.44	0.51	4.52	0.04	1.66	0.20	0.24	0.62	0.10	0.75
Baseline test score	69.03	<.0001	35.57	<.0001	9.22	0.003	31.14	<.0001	19.14	<.0001	43.83	<.0001

Table 5. Results of the ANCOVAs on Neuropsychological Scores at the 6-month Follow-up (continued)

Variable	CFT Copy N = 148		CFT Reproducti on N = 139		BSRT Learn N = 175		BSRT Delay N = 171		AMI-SF N = 186	
	F	p	F	p	F	p	F	p	F	p
Waveform	1.96	0.16	1.53	0.22	2.95	0.09	2.48	0.12	0.02	0.89
Electrode Placement	0.12	0.73	0.08	0.78	3.98	0.048	0.53	0.47	6.19	0.01
Electrical Dosage	0.11	0.74	0.03	0.87	0.00	0.99	0.02	0.88	0.11	0.74
Number of Treatments	1.26	0.26	0.66	0.42	0.33	0.57	0.54	0.46	4.79	0.03
Age (yr)	0.38	0.54	3.58	0.06	18.24	1	17.80	1	0.24	0.63
Sex	0.03	0.87	0.02	0.90	4.74	0.03	5.35	0.02	4.41	0.04
Premorbid IQ	2.83	0.10	5.06	0.03	6.21	0.01	8.69	0.004	4.12	0.04
HRSD 6-mo Follow-up	0.16	0.69	0.46	0.50	1.39	0.24	7.91	0.006	3.82	0.05
ECT during follow-up	1.18	0.28	1.11	0.29	1.83	0.18	0.45	0.50	1.42	0.24

Baseline test					<.000		<.000			
score	73.30	<.0001	52.42	<.0001	77.21	1	96.19	1	109.20	<.0001

Figure Captions

Figure 1. Participant Flow.

Figure 2. Scores on 11 cognitive measures immediately following and six months after a course of ECT. Scores for each test, other than the AMI-SF, were standardized relative to the distribution of scores at baseline.

Figure 3. Scores on the modified Mini-Mental State Exam (mMMS) and the Columbia University Autobiographical Memory Interview: Short Form (AMI-SF) immediately and six months following ECT at each of the seven sites.

Figure 4. Scores on the 11 cognitive measures immediately following the ECT course for patients treated with brief pulse right unilateral (RUL). ECT, brief pulse bilateral (BL). ECT, and sine wave BL ECT. Filled boxes indicate a significant effect of waveform in the ANCOVA (**B** = $p < 0.05$; **BB** = $p < 0.01$; **BBB** = $p < 0.001$). Filled circles indicate a significant effect of electrode placement in the ANCOVA (**J** = $p < 0.05$; **JJ** = $p < 0.01$; **JJJ** = $p < 0.001$).

Figure 5. Scores on the 11 cognitive measures six months following the ECT course for patients treated with brief pulse right unilateral (RUL). ECT, brief pulse bilateral (BL). ECT, and sine wave BL ECT. Filled boxes indicate a significant effect of waveform in the ANCOVA (**B** = $p < 0.05$). Filled circles

indicate a significant effect of electrode placement in the ANCOVA ($J = p < 0.05$).









