Carotid Intervention Improves Mood In Depressed Patients With Carotid Stenosis: What Is The Evidence And Should All Depressed Patients With Carotid Disease Undergo Carotid Intervention

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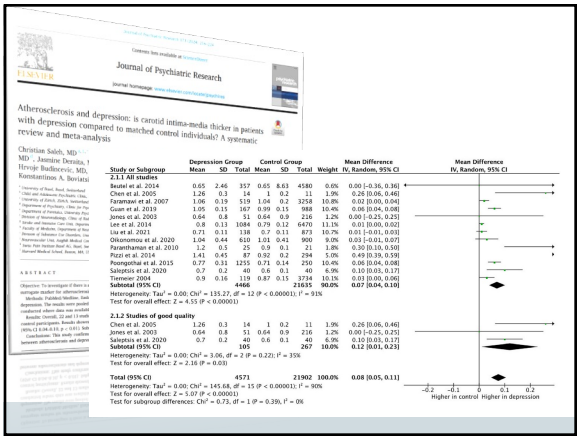
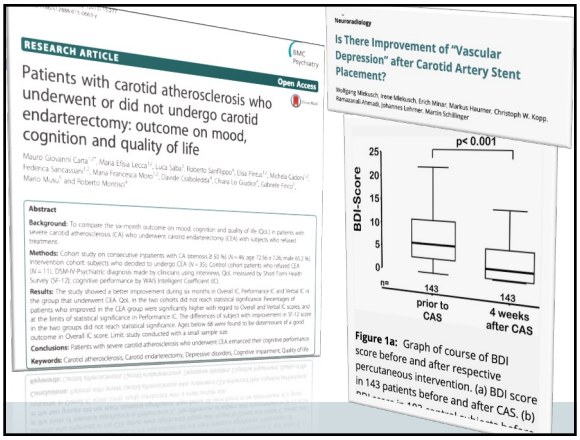
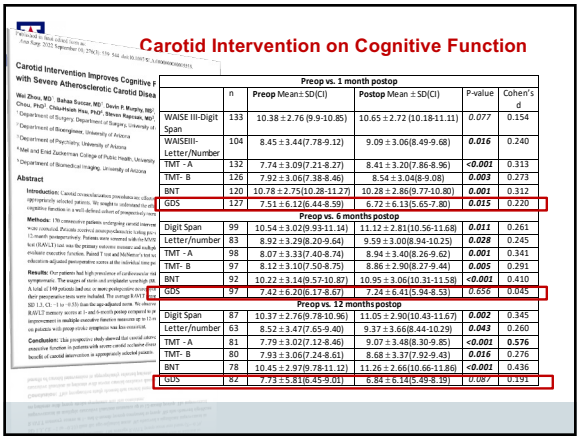
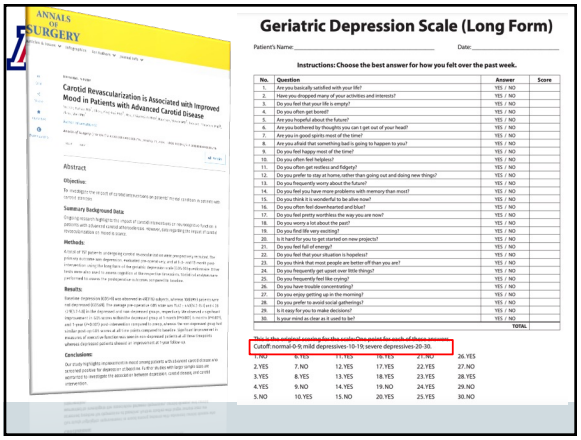




Carotid Intervention on Cognitive Function



	n	Preop Mean±SD(CI)	Postop Mean ±SD(CI)	P-value	Cohen's d
Preop vs. 1 month postop					
WAISE III-Digit Span	133	10.38 ± 2.76 (9.9-10.85)	10.65 ± 2.72 (10.18-11.11)	*0.077*	0.154
WAISEIII-Letter/Number	104	8.45 ± 3.44(7.78-9.12)	9.09 ± 3.06(8.49-9.68)	***0.016***	0.240
TMT - A	132	7.74 ± 3.09(7.21-8.27)	8.41 ± 3.20(7.86-8.96)	***<0.001***	0.313
TMT- B	126	7.92 ± 3.06(7.38-8.46)	8.54 ± 3.04(8-9.08)	***0.003***	0.273
BNT	120	10.78 ± 2.75(10.28-11.27)	10.28 ± 2.86(9.77-10.80)	***0.001***	0.312
GDS	127	7.51 ± 6.12(6.44-8.59)	6.72 ± 6.13(5.65-7.80)	***0.015***	0.220
Preop vs. 6 months postop					
Digit Span	99	10.54 ± 3.02(9.93-11.14)	11.12 ± 2.81(10.56-11.68)	***0.011***	0.261
Letter/number	83	8.92 ± 3.29(8.20-9.64)	9.59 ± 3.00(8.94-10.25)	***0.028***	0.245
TMT - A	98	8.07 ± 3.33(7.40-8.74)	8.94 ± 3.40(8.26-9.62)	***0.001***	0.341
TMT- B	97	8.12 ± 3.10(7.50-8.75)	8.86 ± 2.90(8.27-9.44)	***0.005***	0.291
BNT	92	10.22 ± 3.14(9.57-10.87)	10.95 ± 3.06(10.31-11.58)	***<0.001***	0.410
GDS	97	7.42 ± 6.20(6.17-8.67)	7.24 ± 6.41(5.94-8.53)	*0.656*	0.045
Preop vs. 12 months postop					
Digit Span	87	10.37 ± 2.76(9.78-10.96)	11.05 ± 2.90(10.43-11.67)	***0.002***	0.345
Letter/number	63	8.52 ± 3.47(7.65-9.40)	9.37 ± 3.66(8.44-10.29)	***0.043***	0.260
TMT - A	81	7.79 ± 3.02(7.12-8.46)	9.07 ± 3.48(8.30-9.85)	***<0.001***	**0.576**
TMT- B	80	7.93 ± 3.06(7.24-8.61)	8.68 ± 3.37(7.92-9.43)	***0.016***	0.276
BNT	78	10.45 ± 2.97(9.78-11.12)	11.26 ± 2.66(10.66-11.86)	***<0.001***	0.436
GDS	82	7.73 ± 5.81(6.45-9.01)	6.84 ± 6.14(5.49-8.19)	*0.087*	0.191



Characteristics No. (%)	Overall Cohort N=157	Depressed (GDS> 9) N= 49 (31.21%)	Not-Depressed (GDS≤9) N=108 (68.79%)	P-value
Age, years, mean ± SD	69.63 ±7.59	68.51 ±6.97	70.14 ±7.83	0.214
CAS (vs CEA)	76(48.72%)	29(60.42%)	47(43.52%)	0.051
Prior stroke	29(18.47%)	12(24.49%)	17(15.74%)	0.190
Diabetes	62(39.49%)	17(34.69%)	45(41.67%)	0.407
Smoking	*122(77.70%)*	41(83.67%)	81(75%)	*0.226*
Alcohol	*79(50.32%)*	28(57.14%)	51(47.22%)	*0.249*
Hypertension	136(86.62%)	46(93.88%)	90(83.33%)	0.072
Hyperlipidemia	134(85.35%)	41(83.67%)	93(86.11%)	0.689
Obesity	55(35.03%)	20(40.82%)	35(32.41%)	0.306
Coronary Artery Disease	*68(43.31%)*	24(48.98%)	44(40.74%)	0.334
Congestive Heart Failure	17(10.83%)	**9(18.37%)**	**8(7.41%)**	**0.041**
COPD	20(12.74%)	9(18.37%)	11(10.19%)	0.154
Peripheral Vascular Disease	38(24.20%)	13(26.53%)	25(23.15%)	0.646
Atrial Fibrillation	17(10.89%)	7(14.29%)	10(9.35%)	0.358
Chronic Renal Failure	30(19.11%)	12(24.49%)	18(16.67%)	0.248
Medications				
Antiplatelets	107(68.15%)	31(63.27%)	76(70.37%)	0.376
Anticoagulants	29(18.47%)	10(20.41%)	19(17.59%)	0.673
Statins	139(88.53%)	41(83.67%)	98(90.74%)	0.197
Symptomatic	80(50.95%)	30(61.22%)	50(46.30%)	0.083

Preoperative cognitive performance in both groups

Cognitive measures	Overall cohort (N=157)		
	Depressed (*GDS>9*) N=49 (31%)	Non-depressed (*GDS ≤ 9*) N=108 (69%)	P
RAVLT immediate recall	-0.96±1.1	-0.65±0.96	0.083
RAVLT sum	-0.98 ±1.32 (-1.36;-0.60)	-0.53 ±1.80 (-0.75;-0.30)	**0.041**
TMT-A	6.80±3.14 (5.87;7.73)	8.39±2.90 (7.83;8.95)	**0.004**
TMT-B	6.88±3.26 (5.88;7.88)	8.53±2.85 (7.98;9.08)	**0.005**
Digit Span	10.40 ±3.19 (9.5;11.34)	10.63 ±2.66 (10.12;11.14)	0.641
Digit Symbol	7.15±2.63 (6.37;7.93)	8.89±2.38 (8.43;9.36)	**<0.001**
BNT	9.77±2.89(8.89;10.65)	10.22±3.11 (9.61;10.84)	0.410

Intervention-related change in GDS

Depressed (*GDS>9*) N=49				Non-depressed (*GDS ≤ 9*) N=108			
Preop vs. 1 month postop							
N	**Preop** Mean± SD(CI)	**Postop** Mean ±SD(CI)	P	N	**Preop** Mean± SD(CI)	**Postop** Mean ± SD(CI)	P
35	**15.6**±4.7 (14-17)	**13**±6.4 (10-15)	***0.002***	92	**4.4**±2.9(3.8-5)	**4.3**±3.9(3.5-5)	0.73
Preop vs. 6 months postop							
28	15.4±4.6 (13.7-17.2)	13.2±6.7 (10.6-15.8)	***0.017****	69	4.1±2.9(3.4-4.8)	4.8±4.4(3.7-5.8)	0.12
Preop vs. 12 months postop							
25	15±3.8 (13.4-16.6)	11.6±4.9 (9.6-13.6)	***<0.001****	57	4.5±2.9(3.7-5.3)	4.7±5.4(3.3-6.2)	0.72

Intervention-related Change in Cognitive Function

		Depressed (GDS>9) (N=49)				Non-depressed (GDS ≤ 9) (N=108)			
Time points	**Cognitive measures**	n	Mean difference ± SE	95% CI	P	n	Mean difference ± SE	95% CI	P
1 month Postop vs. Preop	Digit Span	35	0.54 ± 0.33	(-0.12 ; 1.21)	0.11	89	0.18 ± 0.18	(-0.17 ; 0.53)	0.32
	Digit Symbol	34	0.26 ± 0.21	(-0.16 ; 0.68)	0.21	88	0.52 ± 0.15	(0.22 ; 0.82)	<0.001
	RAVLT Immediate recall	35	0.09 ± 0.15	(-0.22 ; 0.40)	0.56	78	0.04 ± 0.09	(-0.14 ; 0.22)	0.67
	RAVLTsum	38	0.19 ± 0.14	(-0.08 ; 0.48)	0.17	86	0.26 ± 0.10	(0.05 ; 0.46)	0.014
	TMT-A	35	0.74 ± 0.33	(0.05 ; 1.43)	0.04	91	0.89 ± 0.23	(0.22 ; 1.15)	0.004
	TMT-B	32	0.56 ± 0.33	(-0.11 ; 1.24)	0.10	88	0.68 ± 0.26	(0.16 ; 1.20)	0.010
	BNT	31	0.64 ± 0.31	(0.01 ; 1.27)	0.05	93	0.48 ± 0.16	(0.15 ; 0.81)	0.005
6 months Postop vs. Preop	Digit Span	29	1.13 ± 0.36	(0.39 ; 1.87)	<0.001*	84	0.31 ± 0.29	(-0.28 ; 0.91)	0.30
	Digit Symbol	27	0.07 ± 0.25	(-0.45 ; 0.59)	0.71*	83	0.62 ± 0.22	(0.17 ; 1.06)	0.007
	RAVLT Immediate recall	26	0.48 ± 0.14	(0.20 ; 0.77)	0.003*	58	0.24 ± 0.10	(0.03 ; 0.44)	0.023
	RAVLTsum	27	0.34 ± 0.22	(-0.11 ; 0.79)	0.17*	85	0.22 ± 0.13	(-0.03 ; 0.48)	0.091
	TMT-A	28	0.39 ± 0.36	(-0.35 ; 1.13)	0.3*	86	1.10 ± 0.34	(0.42 ; 1.79)	0.002
	TMT-B	27	0.35 ± 0.40	(-0.26 ; 1.38)	0.3*	66	0.80 ± 0.33	(0.13 ; 1.47)	0.020
	BNT	26	0.65 ± 0.41	(-0.18 ; 1.48)	0.12*	61	0.85 ± 0.21	(0.42 ; 1.28)	<0.001
12 months Postop vs. Preop	Digit Span	24	1.21 ± 0.39	(0.40 ; 2.01)	0.003*	57	0.51 ± 0.26	(-0.02 ; 1.03)	0.059
	Digit Symbol	23	0.65 ± 0.28	(0.06 ; 1.24)	0.04*	54	0.61 ± 0.23	(0.14 ; 1.07)	0.011
	RAVLT Immediate recall	24	0.26 ± 0.21	(-0.17 ; 0.69)	0.3	46	0.12 ± 0.13	(-0.14 ; 0.39)	0.343
	RAVLTsum	25	0.21 ± 0.19	(-0.19 ; 0.61)	0.44	52	0.03 ± 0.16	(-0.35 ; 0.16)	0.85
	TMT-A	23	1.21 ± 0.47	(0.22 ; 2.21)	0.014*	55	1.27 ± 0.30	(0.66 ; 1.88)	<0.001
	TMT-B	22	1.13 ± 0.48	(0.11 ; 2.16)	0.031*	55	0.62 ± 0.39	(-0.17 ; 1.41)	0.12
	BNT	21	0.95 ± 0.39	(0.13 ; 1.77)	0.022*	51	0.88 ± 0.27	(0.34 ; 1.42)	0.002

Summary

- High prevalence of depression among patients with severe carotid disease
- Favorable post-intervention changes in mood in those who screened positive on the GDS-30 questionnaire before the intervention
- Nondepressed patients had significant and consistent improvement in cognitive function following the intervention, while depressed patients only experienced a late improvement