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Acupuncture in the Treatment of Paralysis Due to Central Nervous System Damage

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This report includes a review of the literature on acupuncture in the treatment of paralysis due to central nervous system damage. The primary topic is paralysis due to stroke (Part I). Results from acupuncture research in the treatment of paralysis due to stroke are summarized in Tables 1 and 2. Results from acupuncture research in the treatment of other types of paralysis are also included, for example, paralysis due to head injury, multiple sclerosis, pseudobulbar palsy, cerebral palsy in babies and children, spinal cord injury, peripheral facial paralysis (Bell's palsy), and coma (Parts II-VIII). These are included as additional supportive data for the general positive effect of acupuncture in the treatment of paralysis due to central nervous system damage. Acupuncture is also used with other types of paralysis, such as polio, and post-polio syndrome; and amyotrophic lateral sclerosis (earlier stages). These are not included here due to limitations on time and space.

A few articles relevant to some possible mechanisms involved with mediating improvement in paralysis following acupuncture treatment (vasodilation and increased cerebral blood flow) are also included (Part IX).

PART I. ACUPUNCTURE IN THE TREATMENT OF PARALYSIS DUE TO STROKE

Stroke is the major cause of disability among adults in the United States (Weinfeld, 1981). Every day, over 1,200 Americans suffer a stroke, and 400 of these patients are permanently disabled. Today, more than 2 million Americans suffer long-term disabilities from stroke; and stroke costs more than $25 billion each year (NIH Report, NINDS, 1992).

Real versus Sham Acupuncture in the Treatment of Arm/Leg Paralysis in Acute Stroke

Naeser et al. (1992) conducted a study on the use of acupuncture (Acptr.) in the treatment (Tx.) of arm/leg paralysis in acute stroke patients starting at 1–3 months poststroke.

The design included real versus sham acupuncture. The study was randomized, and double-blind for pre- and postarm/leg motor evaluation by physical therapists. It was single-blind for the acupuncturists administering the real or sham acupuncture treatments.

The subjects included 10 cases who received real acupuncture (plus regular physical therapy); and 6 cases who received sham acupuncture (plus regular physical therapy); ages 44–74.

For real acupuncture, acupuncture needles were inserted into standard acupuncture points (decreased electrical resistance points) on the body (Pomeranz, Cheng, & Law, 1977; Hyvarinen & Karlsson, 1977). Acupuncture points on the scalp were also used, along "the motor cortex line" contralateral to the paralysis. Electrical stimulation (1–2 Hz) was used on the acupuncture needles at a comfortable level on selected pairs of points for 20 minutes.

For sham acupuncture, acupuncture needles

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TABLE 1. SUMMARY FOR SIX STUDIES THAT USED CONTROLS IN ACUPUNCTURE RESEARCH FOR THE TREATMENT OF PARALYSIS DUE TO STROKE

Study	*Number subjects real acupuncture*	*Number subjects sham acupuncture*	*Number subjects no acupuncture*	*Significance level for good response/markedly eff.*
Naeser et al., 1992	10 acute arm/leg cases	6 acute arm/leg cases	—	$p < .013$ with CT scan lesion site as a variable
Naeser et al., 1994a	10 chronic arm/leg cases	—	3 chronic arm/leg cases	$p < .003$ with CT scan lesion site as a variable
Naeser et al., 1994b	3 acute hand cases	—		
	8 chronic hand cases		2 chronic hand cases	$p < .022$
Johansson et al., 1993	38 acute	—	40 acute	$p < .01$ and beyond
Hu et al., 1993	15 acute	—	15 acute	$p < .02$
Zhang et al., 1987	53 acute	—	41 acute and chronic	$p < .05$
Total number of subjects	137	6	101	

Note. A total of 137 stroke patients received acupuncture treatments across these six studies, and a total of 107 controls received either no acupuncture or sham acupuncture. Across all six of these studies, a significantly greater number of stroke patients who received acupuncture treatments were reported to have an outcome level of "Good Response/Markedly Effective," than the controls who received either no acupuncture or sham acupuncture.

were inserted into several areas of normal resistance (as measured with a Fluke ohm meter) on the nonparalyzed limbs, and left in place for 20 minutes. The patients were told that with acupuncture, needles are used on the nonparalyzed side to treat the paralyzed side (which is sometimes the case). In addition, alligator clips attached to a thin insulated wire were attached to the needles. The patients were told that the clips attached to the wire were pro-

TABLE 2. SUMMARY FOR OUTCOME LEVELS IN EIGHT ACUPUNCTURE STUDIES WHERE STROKE PATIENTS WERE TREATED FOR PARALYSIS AT <3 MONTHS POSTSTROKE VERSUS >3 MONTHS POSTSTROKE

Study	*Number subjects treated beginning <3 mo. poststroke*	*Outcome level good response/ markedly effective*		*Number subjects treated beginning >3 mo. poststroke*	*Outcome level good response/ markedly effective*	
Naeser et al., 1992	10 (arm/leg cases)	4/10	40%	—		—
Naeser et al., 1994a	—	—		10 (arm/leg cases)	3/10	30%
Naeser et al., 1994b	3 (hand cases)	3/3	100%	8 (hand cases)	8/8	100%
Zhang et al., 1987	40	37/40	92.5%	13	7/13	54% ($p < .01$)
Li et al., 1989	92	55/92	60%	—		—
Wen, 1977	304	145/304	47%	196	45/196	23%
Zheng, 1981	14	11/14	78.5%	177 (1–5 years poststroke)	107/177	60%
Wang, 1993	110	86/110	78%	—		—
Total number of subjects	573	341/573	60%	404	170/404	42%

Note. A total of 20 treatments (5 times per week, 4 weeks) was administered to the inpatients at the Veterans Affairs Medical Center, Boston. Brain CT scans were obtained at 2 or more months poststroke, and analyzed after the study was completed. CT scan must be obtained 2–3 months poststroke to visualize the complete borders of the area of infarction; acute CT scans cannot be used for detailed neuroanatomical analysis (Palumbo & Naeser, in prep.).

viding additional stimulation to the acupuncture points. They were further told that the stimulation was low level, and they would not feel anything. (The clips and wire were not attached to an electrical stimulation device, and the clips were only attached to the cord with string, which was not visible.) When 20 treatments had been completed, the patients were informed that they had received sham acupuncture, and real acupuncture treatments were offered at that time.

Good Response was defined as a 10% or greater increase in isolated active range of motion (ROM) for ≥2/7 arm/leg tests (Hooklying hip Abduction/Adduction; Knee Flexion; Knee Extension; Ankle Dorsiflexion; Shoulder Abduction; Forearm Supination, Elbow Flexed; or Forearm Supination, Eblow Extended).

Results. A specific neuroanatomical lesion site pattern was identified on brain CT scan for Good Response to real acupuncture in the stroke patients, that is, cases with lesion in <1/2 Motor Pathway areas on CT scan, with moderate-milder paralysis, had Good Response. A specific subcortical white matter area was isolated on CT scan, which is especially important to evaluate regarding extent of lesion (amount of brain damage) in this area, and response to acupuncture. This area, the periventricular white matter (PVWM) area, is located adjacent to the body of the lateral ventricle, and is shown in Figure 1.

Analysis of Data without Brain CT Scan Information

4/10 Good Response, Acute Cases, Real Acptr.
0/6 Good Response, Acute Cases, Sham Acptr. $p < .115$, *ns* (Fischer's exact test)

Analysis of Data with Brain CT Scan Information

(Real and Sham Groups are each subdivided into 2 lesion patterns: < 1/2 and > 1/2 Motor Pathways Lesion)

3/4 <1/2 Motor Pathways Lesion Pattern, Good Response, Acute Cases, Real Acptr.
0/3 <1/2 Motor Pathways Lesion Pattern, Good Response, Acute Cases, Sham Acptr. $p < .013$

Summary. This controlled study observed that significantly more acute stroke patients with arm/leg paralysis had Good Response following real acupuncture than sham acupuncture, if CT scan lesion site was a variable ($p < .013$). When there was lesion ≤1/2 of the Motor Pathway areas on CT scan (especially the PVWM area as shown in Figure 1), acupuncture was effective. No patients who received sham acupuncture had Good Response, whatever the lesion.

Acupuncture in the Treatment of Arm/Leg Paralysis in Chronic and Acute Stroke

Naeser et al. (1994a) conducted a study on the use of acupuncture in the treatment of arm/leg paralysis in chronic and acute stroke patients. The chronic stroke patients received acupuncture treatment starting after 3 months poststroke; the acute stroke patients, starting at 1–3 months poststroke.

The design included real acupuncture versus no acupuncture. The study was randomized, and double-blind for pre- and postarm/leg motor evaluation by physical therapists. The chronic cases served as their own controls, because most spontaneous recovery from paralysis occurs before 3 months poststroke; also some chronic cases received no acupuncture treatment. The controls for the acute cases were the sham acupuncture treatments presented in the above study (Naeser et al., 1992).

The subjects included 10 chronic cases, who received real acupuncture (starting 4 months to 10 years poststroke); 3 chronic cases, who received no acupuncture (tested at approx. 6-mo. intervals; starting 2–11 yr. poststroke); and 10 acute cases, who received real acupuncture (starting 1–3 months poststroke); ages 42–74.

A total of 20–40 real acupuncture treatments (over a 2–3 month period) was administered with acupuncture needles and electrical stimulation, as described in the above study under "Real acupuncture" (Naeser et al., 1992). Chronic patients were treated on an outpatient basis. Brain CT scans were obtained at ≥2 months poststroke, and analyzed after the study was completed.

Good response was defined as a 10% or greater increase in isolated active range of motion for ≥2/7 arm/leg tests as described in the above study (Naeser et al., 1992).

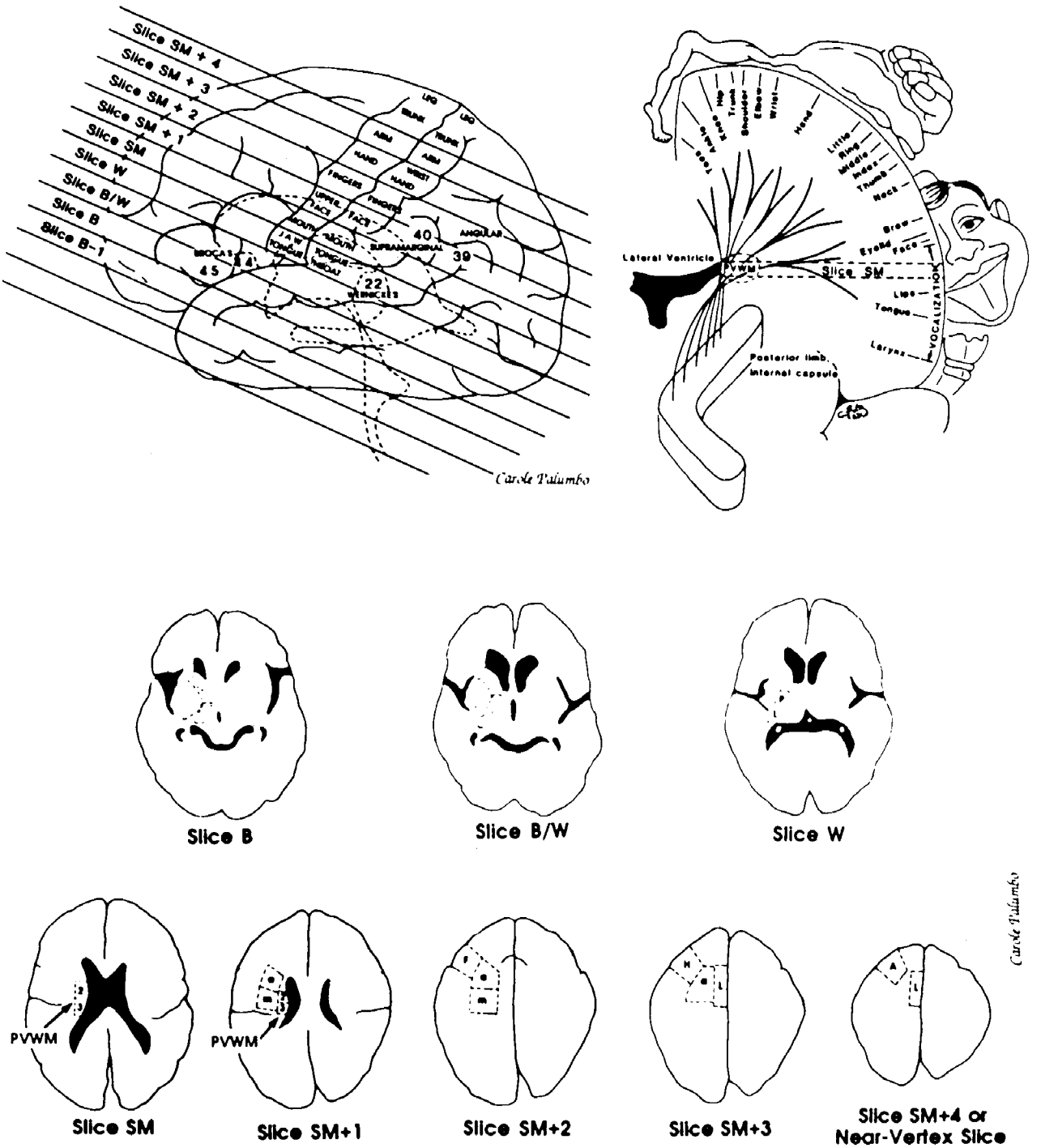

FIG. 1. Lateral, coronal, and cross-sectional diagrams showing location of neuroanatomical areas visually assessed for extent of lesion (amount of infarction) on CT scan, containing, in part, descending pyramidal tract pathways. The deep, subcortical periventricular white matter area (PVWM) is outlined in the upper right coronal diagram and shown on CT scan slices SM and SM +1 (arrows). The total extent of lesion in the second and third quarters of *the PVWM area was related to good response, versus poor response, following real acupuncture treatments.* Key to abbreviations: L = leg cortex area; A = arm cortex area; H = hand cortex area; F = fingers cortex area; a = anterior white matter area; m = middle white matter area; 2 = second quarter PVWM; 3 = third quarter PVWM; PL = posterior limb, internal capsule (continues on slices B and B/W). The head of the caudate and putamen were also assessed for extent of lesion. (CT scan angle is approximately 15–20 degrees to the cantho-meatal line). *Source:* Naeser MA, Alexander MP, Stiassny-Eder D, Galler V, Hobbs J, Bachman D. Real vs. sham acupuncture in the treatment of paralysis in acute stroke patients—A CT scan lesion site study. *Journal of Neurologic Rehabilitation,* 1992;6:163–173.

Results. A specific neuroanatomical lesion site pattern was identified on brain CT scan for Good Response to real acupuncture, that is, stroke patients with lesion in <1/2 Motor Pathway areas, especially the PVWM area, on CT scan (moderate-milder paralysis) had Good Response.

Analysis of Data without Brain CT Scan Information

3/10 Good Response, Chronic Cases, Real Acptr.
0/3 Good Response, Chronic Cases, No Acptr. $p < .419$, *ns* (Fischer's exact test)

Analysis of Data with Brain CT scan Information

(Acptr. and No Acptr. Groups each subdivided into 2 lesion patterns: <1/2 vs. >1/2 Motor Pathways Lesion)
3/3 <1/2 Motor Pathways Lesion Pattern, Good Response, Chronic Cases, Real Acptr.
0/2 <1/2 Motor Pathways Lesion Pattern, Good Response, Chronic Cases, No Acptr. $p < .003$

7/7 <1/2 Motor Pathways Lesion Pattern, Good Response, Chronic & Acute Cases, Real Acptr.
12/13 >1/2 Motor Pathways Lesion Pattern, Poor Response, Chronic & Acute Cases, Real Acptr. $p < .001$

Specific Arm/Leg Tests with Improvement Following Real Acupuncture Treatments

(3 Chronic and 5 Acute Cases, All Good Response Cases, only; see Tables 3 and 4)
Knee Flexion—$p < .02$ (Post 20 Acptr. Tx.'s) $p < .03$ (Post 40 Acptr. Tx.'s)
Knee Extension—$p < .01$ (Post 40 Acptr. Tx.'s)
Shoulder Abduction—$p < .04$ (Post 20 Acptr. Tx.'s) $p < .04$ (Post 40 Acptr. Tx.'s)

Follow-up after Last Acptr. Tx. ($n = 5$ cases)

2 months post last Acptr. Tx: 83% of the improved tests were stable or again better.
4 months post last Acptr. Tx: 88% of the improved tests were stable or again better.

Summary. This controlled study observed that most Chronic or Acute stroke cases with lesion in <1/2 of Motor Pathways (especially the PVWM area) will have Good Response following 20–40 acupuncture treatments.

Upper Extremity—Acute and Chronic stroke cases with some isolated finger movement after 2 or 3 months poststroke tend to have "Good Response" with acupuncture for the upper extremity (especially shoulder abduction). See Table 3. Cases with no isolated finger movement and a "dead limb" type of upper extremity (after 2 or 3 months poststroke) tend to have "Poor Response" with acupuncture for the upper extremity.

Lower Extremity—Knee flexion and knee extension tend to show the most improvement for the lower extremity (+20% isolated ROM, post 20–40 acupuncture treatments). See Table 4. This is important for walking, stair climbing, and so on.

Acupuncture in the Treatment of Hand Paresis in Chronic and Acute Stroke

Naeser et al. (1994a) conducted a study on the use of acupuncture in the treatment of hand paresis in chronic and acute stroke patients. The chronic stroke patients received acupuncture treatment starting after 3 months poststroke; the acute stroke patients, starting at 1–3 months poststroke.

The design included real acupuncture versus no acupuncture. The study was randomized, and double-blind for pre- and posthand motor evaluation by occupational therapists. The chronic cases served as their own controls, because most spontaneous recovery from paralysis occurs before 3 months poststroke; also some chronic cases received no acupuncture treatment. No sham acupuncture was performed on the hand, due to difficulty in locating sham points which could be easily needled (many of these points would be directly over bone).

The subjects included 8 chronic cases, who received real acupuncture (starting 6 months to 8.5 yrs. poststroke); 2 chronic cases, who received no acupuncture (tested at approximately 6-month interval, starting 4 yrs. & 12 yrs. poststroke); and 3 acute cases, who received real acupuncture (starting 2 months poststroke); ages 43–72.

A total of 20–40 real acupuncture treatments

TABLE 3. PAIRED *t* TEST RESULTS COMPARING PRE- AND POSTACUPUNCTURE UPPER EXTREMITY TEST SCORES FOR THREE CHRONIC AND FIVE ACUTE PATIENTS

		Pre acptr. tx.	*Post 20 tx.'s*	*Change pre-20 tx.'s*	*Pre acptr. tx.*	*Post 40 tx.'s*	*Change pre-40 tx.'s*	*Change 20–40 tx.'s*
	n	*8*	*8*	*8*	*5*	*5*	*5*	*5*
Shoulder Abduction	Mean %	32.9	39.5	6.6	39.4	51.0	11.6	3.4
	SD	36.6	42.4	9.8	38.4	47.3	11.9	4.98
	p value	—	—	*.04	—	—	*.04	.10
No. cases improved by at least 10%		—	—	2 of 8	—	—	3 of 5	1 of 5
Supinate Forearm, Elbow Flexed	Mean %	17.4	26.3	9.0	7.8	28.8	21.0	16.6
	SD	36.1	39.2	18.3	17.4	26.9	24.8	28.7
	p value	—	—	.10	—	—	.06	.13
No. cases improved by at least 10%		—	—	2 of 8	—	—	3 of 5	2 of 5

Note. Only patients with Good Response are included. Source: Naeser et al., 1994a.
*Significant at $p < 0.05$ level.

(over a 2–3-month period) were administered with acupuncture needles and electrical stimulation, as described in the above study (Naeser et al., 1992). Chronic patients were treated on an outpatient basis. Brain CT scans were obtained at ≥2 months poststroke, and analyzed after the study was completed.

Good Response was defined as improvement on ≥4/6 timed dexterity and/or finger/hand strength tests.

Results. All hand paresis cases (acupuncture or no acupuncture cases) had lesion in <1/2 Motor Pathway areas on CT scan (milder paralysis), that is, appropriate lesion pattern for potentially "Good Response" to acupuncture

8/8 Good Response, Chronic Cases, Real Acptr.
0/2 Good Response, Chronic Cases, No Acptr. $p < .022$

3/3 Good Response, Acute Cases, Real Acptr.

TABLE 4. PAIRED *t* TEST RESULTS COMPARING PRE- AND POSTACUPUNCTURE LOWER EXTREMITY TEST SCORES FOR THREE CHRONIC AND FIVE ACUTE PATIENTS

		Pre acptr. tx.	*Post 20 tx.'s*	*Change pre-20 tx.'s*	*Pre acptr. tx.*	*Post 40 tx.'s*	*Change pre-40 tx.'s*	*Change 20–40 tx.'s*
	n	*8*	*8*	*8*	*5*	*5*	*5*	*5*
Knee Flexion	Mean %	16.9	35.5	18.6	22.4	44.6	22.2	4.8
	SD	19.8	34.9	21.3	22.2	40.0	19.6	15.7
	p value			*.02			*.03	*ns*
No. cases improved by at least 10%				5 of 8			3 of 5	1 of 5
Knee Extension	Mean %	47.9	65.8	18.9	53.2	81.0	27.8	18.2
	SD	37.8	31.2	32.4	24.3	14.5	17.1	21.8
	p value			.08			**.01	.06
No. cases improved by at least 10%				5 of 8			5 of 5	3 of 5

Note. Only patients with Good Response are included. Source: Naeser et al., 1994a.
*Significant at $p < 0.05$ level.
**Significant at $p < 0.01$ level.

Specific Hand Tests With Improvement Following Real Acupuncture Treatments (See Tables 5 and 6 and Figure 2)

8 Chronic Cases Only	*8 Chronic Cases and 3 Acute Cases*
Time to turn over 5 index cards—$p < .05$	$p < .04$
Time to pick up 6 small common objects—$p < .05$	$p < .01$
Finger Tip Pinch Strength—$p < .04$	$p < .02$
Three-Jaw Chuck Strength—$p < .01$	$p < .002$
Lateral Pinch Strength:	$p < .04$
Grip Strength:	$p < .03$

Correlation between number of Acptr. treatments and number of improved hand tests: $r = 0.725$, $p < .01$, $n = 11$.

Follow-up After Last Acptr. Tx. ($n = 6$ cases)

2 months post last Acptr. Tx: 72% of the improved tests were stable or again better.
4 months post last Acptr. Tx: 47% of the improved tests were stable or again better.

treatment. All chronic and acute hand paresis cases who received acupuncture treatment had Good Response.

Summary. This controlled study observed that all stroke cases who had hand paresis had Good Response following 20–40 acupuncture treatments, even if the acupuncture treatments were started several years poststroke, including as late as 6–8 years poststroke. Stroke patients who have a weak and clumsy hand, with some preserved isolated finger movement poststroke, are the best candidates for acupuncture treatments. It is likely that most, if not all, of these patients will have Good Response.

Summary, Naeser et al., Three Acupuncture Studies (1992, 1994a, 1994b)

All stroke cases ($n = 18$) who had lesion on brain CT scan in <1/2 of the Motor Path-

TABLE 5. PAIRED *t* TEST RESULTS COMPARING PRE- AND POSTACUPUNCTURE TIMED DEXTERITY TEST SCORES FOR SEVEN CHRONIC STROKE PATIENTS WITH RIGHT-HAND PARESIS

		Pre acptr. tx.	*Post 20 tx.'s*	*Change pre-20 tx.'s*	*Pre acptr. tx.*	*Post 40 tx.'s*	*Change pre-40 tx.'s*	*Change 20–40 tx.'s*
	n	7	7	7	5	5	5	5
Turn, Over 5 Index Cards	Mean sec.	19.3	16.1	−3.1	19.0	12.0	−7.0	−2.2
	SD	15.7	13.4	5.2	16.4	9.9	7.1	2.8
	Min./Max.	5/47	6/36	1/−11	5/47	5/29	0/−18	0/−7
	p value			.08			*.05	4.19
No. cases improved by at least 1 sec.				4 of 7			4 of 5	4 of 5
Pick Up 6 Small Common Objects†	Mean Sec.	19.5	16.3	−3.2	15.8	12.0	−3.8	−2.0
	SD	12.1	9.1	3.7	9.7	7.4	6.5	3.9
	Min./Max.	7/39	7/31	2/−8	7/26	7/23	2/−13	2/−7
	p value			*.05			.17	.37
No. cases improved by at least 1 sec.				2 of 4			4 of 6	3 of 4

†Missing data for this test for one additional subject; thus, $n = 6$ for pre- versus post-20 Tx.'s, and $n = 4$ for pre- versus post-40 Tx.'s. Source: Naeser et al., 1994b.
*Significant at $p < 0.05$ level.

TABLE 6. PAIRED *t* TEST RESULTS COMPARING PRE- AND POSTACUPUNCTURE HAND STRENGTH TEST SCORES FOR EIGHT CHRONIC STROKE PATIENTS WITH RIGHT-HAND PARESIS

		Pre acptr. tx.	*Post 20 tx.'s*	*Change pre-20 tx.'s*	*Pre acptr. tx.*	*Post 40 tx.'s*	*Change pre-40 tx.'s*	*Change 20–40 tx.'s*
	n	*8*	*8*	*8*	*5*	*5*	*5*	*5*
Tip Pinch	Mean lbs.	6.4	8.3	1.9	9.2	12.2	3.0	2.4
	SD	4.1	3.7	3.5	1.1	1.9	2.7	2.7
	Min./Max.	0/10	0/12.1	−1.5/9	8/10	10/15	0/7	−2.1/5
	p value			.09			*.04	.06
No. cases improved by at least 1 lb.				4 of 8			4 of 5	4 of 5
3-Jaw Chuck	Mean lbs.	11.9	14.9	3.1	14.6	17.0	2.4	−0.2
	SD	6.3	5.1	2.9	8.0	2.2	3.4	3.6
	Min./Max.	0/21	0/22	0.9/9.5	8/21	14/20	−1/6	−4/5
	p value			**.01			.09	.45
No. cases improved by at least 1 lb.				7 of 8			3 of 5	2 of 5
Lateral Pinch	Mean lbs.	15.8	16.6	0.73	19.4	19.9	0.5	0.8
	SD	7.2	5.3	2.5	6.5	4.2	2.7	1.4
	Min./Max.	6.5/24.5	10/23	−4/3.9	8.2/24.5	12.5/22	−2.5/4.3	−1/2.5
No. cases improved by at least 1 lb.				.22 4 of 8			.36 4 of 5	.13 4 of 5
Grip Strength	Mean lbs.	48.0	56.6	8.6	64.0	64.5	0.4	0.6
	SD	31.0	25.0	18.0	27.7	24.9	5.2	4.1
	Min./Max.	14.3/96.8	23.1/90	−6.8/51.7	24.2/96.8	27.5/88.7	−8.1/5.5	−6/5.5
	p value			.11			.43	.38
No. cases improved by at least 1 lb.				6 of 8			3 of 5	1 of 5

Source: Naeser et al., 1994b.
*Significant at $p < 0.05$ level; **significant at $p < 0.01$ level.

way areas (especially the PVWM area) who had (moderate-milder paralysis) had Good Response following 20–40 acupuncture treatments (i.e., 7/7 arm/leg cases with this lesion pattern; chronic and acute cases); and 11/11 hand paresis cases with this lesion pattern (chronic and acute) had Good Response. Almost all stroke cases (12/13) who had lesion on brain CT scan in >1/2 of the Motor Pathway areas (severe paralysis) had Poor Response following 20–40 acupuncture treatments. Across all 3 studies, a total of 31 cases were treated; 19/31 cases (61%) had Good Response.

Stroke patients who have lesion in <1/2 of the Motor Pathway areas on CT scan, with moderate-milder paralysis, are good candidates to show some improvement following 20–40 acupuncture treatments. Stroke patients who have no arm/leg paralysis, but only a weak and clumsy hand, with some preserved isolated finger movement poststroke, are the best candidates for acupuncture treatment and will show the most dramatic improvement. A chronic CT scan obtained after 2 months poststroke is helpful to evaluate which chronic stroke patients are likely to have improvement following acupuncture treatments.

Functional Outcome and Cost-Effectiveness of Acupuncture in the Treatment of Paralysis in Acute Stroke

Johansson et al. (1993) conducted a study on the use of acupuncture in the treatment of paralysis in acute stroke patients. The design included acupuncture versus no acupuncture. The study was randomized.

The subjects included 38 stroke patients in the acupuncture group (who received acupuncture plus physical therapy and occupational therapy), starting at 4–10 days poststroke, mean age 76; and 40 stroke patients in the no acupuncture