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The Correspondence Between Some Motor Points and Acupuncture Loci*

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Abstract: A double blind study was conducted to establish the possible correspondence between some motor points and acupuncture loci. The protocol calls for the acupuncturist marking the first group of volunteers with invisible ink at the acupuncture loci. Then the motor points in the same volunteer are found by electrodiagnosis. The error is made visible by UV illumination. In the second group, the procedure is reversed. A statistical analysis of the error yields the following classes of correspondences: (a) Excellent: 1st Dorsal Interosseus (hand) = LI-4; Abductor Pollicis Brevis = Lu-10; Abductor Minimi Digiti = SI-4; 1st Dorsal Interosseus (foot) = LI-3; Tibialis Anterior = Curious Locus; Orbicularis Oculi = GB-1; Frontalis = GB-14; Splenius Capitis = GB-20; Sternocleidomastoid = LI-18; Semi-Spinalis Capitis = Bl-10. (b) Good: Opponens Pollicis = Curious Locus; Peroneus Longus = Curious Locus; Flexor Digitorum Longus = Ki-3 (Ki-6); Trapezius (upper) = GB-21; Rectus Abdominis = Ki-15; Vastus Medialis = Sp-10.

LOCALIZATION OF ACUPUNCTURE LOCI has always been of interest to the practitioner of the art and of late to scientific investigators of its physiological mechanism in analgesia and therapeutics. Besides the classical palpation technique for finding the acupuncture loci, several objective methods exist for the localization of acupuncture loci in humans. Most of them are based on the premise that the skin impedance at an acupuncture locus is a local minimum. Because of the large number of independent variables associated with the galvanic skin response (GSR), which will be briefly discussed below, there appears to be a need for a technique which is more definitive and thus suitable for both clinical and scientific research experiments associated with acupunctural analgesia and therapeutics. Motor point determination, described in the present paper, could be such a technique. Experiments to establish the correspondences between motor points and acupuncture loci have been undertaken and their results form part of the content of this paper.

In reference to the above mentioned skin impedance method, such a "point detector" may be useful only when the neighborhood of the locus is known and even then it has the inherent disadvantage of requiring the application of an electric current to the skin in

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order to measure its resistance to the passage of that current. With repeated probing the amplitude of the response decreases until it no longer gives a visible response. The reason for this phenomenon is that the electrical threshold of the skin site has become elevated with each application of the probe until the induced current is no longer sufficient to penetrate the skin. Additionally, such galvanic skin response (GSR) measurement varies with the moisture, probe pressure, blood pressure, emotional state, etc. of the subject. To remove some of the above objections, various means have been devised. Brown *et al.* (1) devised a skin potential recording technique which depended solely on the electricity generated by the body itself for the identification of the acupuncture loci. Nyboer (2) and Lifshitz (3) show that the impedance of the skin gave only incremental changes beyond a critical frequency of about 200 KHz, i.e., above 200 KHz one approached the infinite frequency impedance of the skin tissue so that the reactive components became negligible. Ghaznavi and Chrucky (4) have verified the previous results and used a 200 KHz source to localize acupuncture loci. Wu (5) has implied from his preliminary results with the voltage clamp method that because the transient and steady state current responses at an acupuncture locus are much larger than at a non-acupuncture locus there are specific structures in and/or under the skin at the acupuncture locus. Additionally, his current responses were obtained using a constant probe pressure device. As seen by the above briefly discussed methods for the objective localization of acupuncture loci, if the correspondence between motor points and acupuncture loci is in fact established, much would have been achieved inasmuch as motor point determination is a relatively simple and well-known technique to the Western physician.

Method of Procedure

In electroacupuncture many of the important acupuncture loci produced substantial muscle contractions when electrically stimulated. These muscular contractions are obviously due to the impingement of the applied current density onto the motor nerve and/or its branches, or the neuromuscular junctions themselves. The concept of the motor point is well-known to workers in the field of physical medicine as part of electrodiagnosis and electrotherapy.

The definition and the electrodiagnostic technique for the determination of motor points is classical and well-stated by Walthard and Tchicaloff (6):

(a) "Cöers (7) developed a technique for vital staining of neuromuscular biopsies with which he was able to study microscopically the motor points as determined by electrical stimulation. He was able to demonstrate in muscle bundles underlying the motor points, a zone of low threshold of excitability, more or less perpendicular to the main direction of muscle fibers. In these zones of maximum excitability he always found a terminal band of innervation. In his opinion, the motor point corresponds not necessarily to the entrance of nerves into muscles, but rather to the region where a great density of terminal elements is found near the surface. He found that muscle biopsies at the motor points are not injurious since they do not compromise important branches of the motor nerves. The evidence clearly indicates that the motor point is an anatomical entity and not a physiological property of muscle fiber."

(b) "The motor point may be sought with the direct current stimulus of the tetanizing (faradic) current. The tetanizing current offers the advantage of a prolonged contraction and thus more time to identify the tensed tendon or the moved joint. In quantitative testing, it is the brief direct current impulse which is usually employed. The operator places the tip of the electrode on the skin at the supposed motor point and introduces the electrical stimulus. When contraction is obtained the current is reduced until there is a barely visible or palpable contraction. With this reduced current the electrode explores adjacent areas of the skin. If no contraction occurs, the first point was the motor point. If some other point is stimulated to a greater contraction with the same current, it is probably the motor point and its location is verified by once more reducing the current to learn whether it responds to a smaller stimulus than any of its neighboring skin areas."

The motor point determination was done using a Burdick Model MS 600 Faradic and Tetanizing Stimulator connected to a standard probe of 8 mm diameter. The clinical set up for motor point electrodiagnosis is well-known; the interested reader is referred to the book mentioned in (6) for further detailed information.

The technique for the palpation of classical acupuncture loci has been described in a number of books, e.g., the ones by Kao (8) and Tan *et al.* (9) are typical. Acupuncture loci localization is much more subjective than motor point determination. The exact location of each motor point varies slightly from individual to individual, as is also true for acupuncture loci. In fact, the acupuncturist, after locating the general area where the locus should be, begins to palpate for indurations in muscles, ovals or depression in the joints, areas of tenderness and pain under pressure, regions of discoloration, and so on.

Even with a cursory glance at any recent acupuncture atlas from China and a motor point chart, such as the one illustrated in Chusid (10), one cannot help but notice a considerable number of coincidences. Of course, not all of the 360-odd classical and 300 or so new and curious acupuncture loci are motor points and vice versa. We hypothesize that motor points are but one class of acupuncture loci. For example, another class of acupuncture loci might be a dense cluster of encapsulated mechanoreceptor sites containing either Pacinian, Meissner, Golgi-Mazzoni corpuscles or Krause end organs. In fact, Kellner (11) studied a fairly large number of shallow acupuncture loci histologically and found that certàin loci had a preponderance of one type of receptor as compared with another.

The motivation to test the idea that correspondences indeed exist between motor points and acupuncture loci is the hope that should this prove to be correct, then the veil of mystery surrounding at least one class of acupuncture loci will be removed and correlated with an anatomical entity well-known to Western medicine.

In order to achieve statistical significance, 22 healthy volunteers, 11 males and 11 females, were divided into two groups for a double blind study:

Group I. The acupuncturist, using well-known standard palpation techniques, located and marked with *invisible* ink the acupuncture loci chosen for study. Then the volunteer was sent to the electrodiagnostician and the motor point located by electrostimulation and similarly marked. During the electrostimulation a gross anatomist was present to confirm the characteristic motion response.

Group II. The order of Group I was reversed, i.e., the electrodiagnostician first, then the acupuncturist.

The anatomist recorded the following three measurements made visible by ultraviolet illumination: (a) the error, if any, between the acupuncture locus and the motor point; (b) the distance from the acupuncture locus to some easily palpated local anatomical landmark; and (c) the distance of the motor point to the same landmark. The absolute discrepancy between the two markings is a measure of the correspondence. The measurements with respect to the anatomical landmarks serve to identify the location, so that if a consistent absolute discrepancy appears (as measured by the mean and standard deviation), it may be possible to assign a different correspondence to the localization.

Results

In order to prepare for possible volunteer drop-outs in the midst of the study, 22 volunteers were scheduled. One volunteer withdrew from the study because of hypersensitivity to electrical stimulation. In Group I, data was gathered from 6 females and 5 males, whereas in Group II there were 5 males and 5 females. The demographical and pertinent anthropometric data of the volunteers are shown in Table I.

Thirty-one (31) tentative correspondences between motor points and acupuncture loci were established by inspection of standard acupuncture and motor point charts. These are listed in Table II together with the raw data from a typical volunteer. The data from each point from the 21 volunteers are compiled in tabular form and then statistically analyzed. Table III is the result from the famous *Ho-ku* (LI-4) locus and is typical. Note that we have given three statistics. Means and standard deviations were computed for each group and each side. The grand statistics refer to the results for all 21 volunteers. The ensemble statistics make no distinction between left and right side.

The experimental errors are many. The most obvious one is that the diameter of the stimulating probe for motor point determination is 8 mm. Based on this consideration, we have classified as *excellent* all those correspondences whose ensemble mean error is either less than 4 mm or have at least 10 bullseyes *bilaterally*. Given that motor points and acupuncture loci vary from individual to individual in addition to varying from the right to left side, we have arbitrarily classified all correspondences with an ensemble mean error between 0.4 to 1 cm as *good* and between 1 and 2.5 cm as *fair*. Any ensemble mean error beyond 2.5 cm denotes failure of the correspondence test. Based on the above criterion, the points showing excellent to fair correspondence are given in Table IV.

Some corroborative gross morphological work was undertaken with the two most used loci in acupuncture, i.e., ***Tsu-San-Li*** (St-36) and *Ho-Ku* (LI-4). Following the classical palpation technique for St-36, e.g. see page 39 of Kao (8), needles were placed bilaterally on the lower extremities of a cadaver. Dissection revealed (Figure 1) that the needle location corresponded to the upper innervation point of the tibialis anterior, i.e., one branch of the deep peroneal nerve enters the muscle belly at this point. The results of the dissection are qualitatively confirmed by the drawing in the text of Hollingshead (12) which is reproduced here as Figure 2.

Electrodiagnosis on volunteers revealed that the motor point, i.e., the locus over the skin which elicited the maximum characteristic muscular contraction when stimulated either by galvanic or faradic current, was generally two inches directly distal to the *Tsu-San-Li* (St-36) locus, which fits the precise location of the locus known in Chinese as *Lan-Wei-Hsueh* or the appendicitis locus, or XL3 in the alphanumeric system of Mann (13). This is a so-called Curious Locus, because it is not part of the 361 acupuncture loci identified on the 14 principle meridians. When both St-36 and *Lan-Wei-Hsueh* were stimulated in volunteers, the ***Lan-Wei-Hsueh*** locus elicited ***slightly more*** muscular contraction than St-36. No other location over the tibialis anterior produced a more vigorous

	No.	Volunteer	Age (yr)	Weight (lb/N)	Height (in/cm)
GROUP I	1	♀ S.K.	22	132/587	65/165
	2	♂ B.S.	21	180/801	72/183
	3	♂ M.H.	20	175/778	72/183
	4	♂ G.H.	27	190/845	73/185
	5	♂ I.F.	22	194/863	75/191
	6	♀ S.B.	23	105/467	63/160
	7	♀ J.W.	21	160/712	66/168
	8	♀ J.A.D.	25	117/520	63/160
	9	♀ S.M.	56	115/512	64/163
	10	♂ R.H.	25	157/698	70/178
	11	♀ L.J.	22	130/578	65/165
Mean			25.82	150.45/669	68.00/173
Std. Dev.			10.23	32.05/143	4.45/11.30
GROUP II	1	♀ G.I.	48	142/632	67/170
	2	♂ D.B.	22	170/756	70/178
	3	♂ C.McA.	28	180/801	72/183
	4	♀ A.M.	23	110/489	65/165
	5	♀ L.J.	22	130/578	63/160
	6	♀ K.D.	22	185/823	69/175
	7	♂ F.C.	28	152/676	73/185
	8	♂ R.G.	22	160/712	69/175
	9	♂ K.O.	27	165/734	70/178
	10	♀ L.L.	22	115/512	64/163
Mean			26.40	150.90/671	68.20/173
Std. Dev.			8.03	26.11/116	3.36/8.53
Grand Mean			26.10	150.67/670	68.1/173
Grand S. D.			9.02	28.64/127.4	3.87/9.83

TABLE I Demographic and anthropometric data of the volunteers.

NO.	MOTOR POINT OF MUSCLE (M)	IDENTIFICATION OF ACUPOINT (A)	LANDMARK (L)	Distance (cm) A→L		Distance (cm) M→L		Error (cm) A→M	
				Right	Left	Right	Left	Right	Left
1	Brachialis	Chih-tse (Lu-5)	Lateral Epicondyle	9.0	7.0	9.0	7.0	2.5	2.5
2	Flexor Pollicis Longus	Lieh-chueh (Lu-7)	Distal Palmar Crease	6.5	7.5	6.0	5.0	0.5	2.5
3	Abductor Pollicis Brevis	Yu-chi (Lu-10)	Distal Palmar Crease	3.5	3.5	3.0	3.5	0.5	0.0
4	1st Dorsal (hand) Interosseus	Ho-Ku (LI-4)	Carpo-Metacarpal Joint	4.0	4.0	4.0	4.0	0.0	0.0
5	Extensor Carpi Radialis Longus	Chn-chih (LI-11)	Lateral Epicondyle	4.0	2.5	4.5	3.0	0.5	1.5
6	Deltoid (Middle)	Chien-Yu (LI-15)	Acromion Tip	6.0	8.0	4.5	5.0	4.0	5.5
7	Extensor Pollicis Longus	Wai-kuan (TB-5)	Distal Palmar Crease	5.0	5.5	5.0	5.5	0.0	0.0
8	Posterior Deltoid	Chien-liao (TB-14)	Tip of the Acromion	5.0	4.0	5.5	4.0	3.0	3.0
9	Abductor Digiti Minimi	Wan-ku (SI-4)	Distal Palmar Crease	3.0	3.0	3.0	3.0	0.0	0.0
10	Biceps Brachii	Kung-Chung New Point	Epicondyle Line	10.5	9.5	10.5	10.0	0.0	1.5
11	Opponens Pollicus	Pan-Men Curious Point	Wrist Distal Crease	3.0	3.5	2.5	3.5	0.5	0.5
12	Flexor Sublimis	Hsi-shang (New Point)	Distal Palmar Crease	12.0	11.5	12.5	12.0	0.5	0.5
13	Vastus Externus	Yin-Shih (St-33)	Lateral Femoral Condyle	8.0	7.5	13.5	12.5	5.5	5.0
14	Tibialis Anterior	Lan-Wei (Appendicitis) Curious Pt.	Tibial Tuberosity	6.5	6.5	6.5	6.5	0.0	0.0
15	Extensor Digitorum Longus	Feng-lung (St-40)	Head of Fibula	15.0	15.0	17.5	23.0	2.5	8.5
16	Abductor Hallucis Brevis	Kung-sun (Sp. 4)	1st Metacarpophalangeal Joint	7.5	8.5	6.0	6.5	1.5	2.5
17	Vastus Internus	Hsueh-hai (Sp.-10)	Medial Femoral Condyle	6.0	5.5	6.0	5.0	0.0	0.5
18	Peroneus Brevis	Hsuan-chung (GB-39)	Lateral Malleolus	8.0	7.5	8.0	7.5	0.0	0.0
19	Peroneus Longus	Ling-Hou Curious Point	Head of Fibula	3.5	3.5	3.0	5.0	0.5	1.5
20	Flexor Digitorum Longus	Tai-Hsi (Ki-3) [Ki-6]	Medial Malleolus	4.0	4.5	4.0	4.5	0.0	0.0
21	Lumbricalis or Interosseus (1st) (foot)	Tai-Chung (Li-3)	Metatarsal Phalangeal Joint	3.5	4.0	3.5	3.5	0.0	0.5
22	Orbicularis Oculi	Chung-Tze-Liao (GB-1)	Lateral Canthus	1.0	1.0	1.0	1.0	0.0	0.0
23	Frontalis	Yang-Pai (GB-14)	Nose Midline	4.5	4.5	4.5	4.5	0.0	0.0
24	Splenius Capitis	Feng-chih (GB-20)	External Occipital Protuberance	8.5	8.0	8.5	8.0	0.0	0.0
25	Semi-spinalis Capitis	Tien-chu (BL-10)	External Occipital Protuberance	6.0	6.0	6.0	6.0	0.0	0.0
26	Sternocleidomastoid	Fu-tu (LI-18)	Sternal Notch	12.0	11.5	12.0	12.0	0.0	0.5
27	Upper Trapezius	Chien-Ching (GB-21)	Tip of Acromion	11.0	9.0	11.0	8.5	2.0	0.5
28	Rectus Abdominis	Mang-Shu (Ki-16) Chung-Chu (Ki-15)	Anterior-superior Iliac Spine	11.0 10.5	11.0 10.5	13.0 10.0	13.5 9.0	4.5 1.5	3.0 1.5
29	External Oblique	Tai-mo (GB-26)	Anterior-superior Iliac Spine	13.0	15.0	14.0	14.0	1.0	1.0
30	Gluteus Maximus	Chih-Pien (Bl-54) [Bl-49]	Trochanter	20.0	20.0	19.5	18.0	1.0	2.0
31	Gluteus Medius	Chu-liao (GB-29)	Greater Trochanter	2.5	5.0	2.0	3.0	0.5	4.0

TABLE II Typical raw data from a volunteer. For the acupuncture loci, the alpha-numeric system recommended by this Journal is used and shown in ( ) parentheses. Where confusion can occur the system devised by Mann (13) is shown in [ ] brackets. Distances are measured in centimeters.

Point LI-4 (Ho-Ku) = 1st Dorsal Interosseus		Distance A→L Right	Distance A→L Left	Distance M→L Right	Distance M→L Left	Error A→M Right	Error A→M Left
GROUP I	1	4.0	4.0	4.0	4.0	0.0	0.0
	2	4.0	4.0	4.0	4.0	0.0	0.0
	3	4.5	4.5	4.5	4.5	0.0	0.0
	4	4.5	4.0	4.0	4.0	0.5	0.0
	5	4.5	4.5	4.5	4.5	0.0	0.0
	6	3.5	3.5	3.0	3.0	0.5	1.0
	7	4.5	4.5	4.5	3.5	0.0	1.0
	8	4.0	3.5	4.0	3.5	0.0	0.0
	9	4.0	4.0	4.0	4.0	0.0	0.0
	10	4.0	4.0	3.5	3.0	0.5	1.0
	11	4.0	4.0	3.0	3.0	1.0	1.0
Mean		4.14	4.05	3.91	3.73	0.23	0.36
Std. Deviation		0.32	0.56	0.54	0.56	0.34	0.50
GROUP II	1	4.0	4.0	4.0	4.0	0.0	0.0
	2	3.5	4.5	3.5	4.5	0.0	0.0
	3	4.5	4.5	3.0	4.5	1.5	0.5
	4	3.5	3.5	3.5	3.5	0.0	0.0
	5	3.0	3.0	3.0	3.0	0.0	0.0
	6	4.5	3.5	4.5	3.5	0.0	1.0
	7	3.5	4.0	3.5	4.0	0.0	0.0
	8	3.0	3.5	3.0	3.0	0.0	0.5
	9	4.0	4.0	4.0	4.5	0.0	0.5
	10	4.0	4.0	4.0	4.0	0.0	0.0
Mean		3.75	3.85	3.6	3.85	0.15	0.25
Std. Deviation		0.54	0.47	0.52	0.58	0.47	0.35
Grand	Mean	3.95	3.95	3.76	3.79	0.19	0.31
	Std. Dev.	0.47	0.42	0.54	0.56	0.40	0.43
Ensemble	Mean	3.95		3.77		0.25	
	Std. Dev.	0.44		0.54		0.42	

TABLE III Tabular form of the data used in the statistical analysis of the correspondence between the motor point of the 1st dorsal interosseus of the hand and the *Ho-ku* (LI-4) locus. Grand statistics refer to the population of all volunteers, while ensemble statistics make no distinction between the left and right sides.

MOTOR POINT OF	ACUPUNCTURE LOCUS	ENSEMBLE ERROR MEAN	ENSEMBLE ERROR STD. DEV.
EXCELLENT			
1st Dorsal interosseus (hand)	Ho-ku (LI-4)	0.25	0.42
Abductor pollicis brevis	Yu-chi (Lu-10)	0.26	0.37
Abductor minimi digiti	Wan-ku (SI-4)	0.26	0.61
1st Dorsal interosseus (foot)	T'ai-ch'ung (Li-3)	0.55	0.94
Tibialis anterior	Lan-wei (Curious Locus)	0.77	1.14
Orbicularis oculi	Chung-tze-liao (GB-1)	0.00	0.00
Frontalis	Yang-pai (GB-14)	0.24	0.55
Splenius capitis	Feng-chih (GB-20)	0.25	0.47
Sternocleido-mastoid	Fu-tu (LI-18)	0.33	0.78
Semi-spinalis capitis	Tien-chu (BL-10)	0.39	0.82
GOOD			
Opponens pollicis	Pan-men (Curious Locus)	0.89	0.62
Peroneus longus	Ling-hou (Curious Locus)	0.95	0.89
Flexor digitorum longus	Tai-hsi (Ki-3) [Ki-6]	0.86	1.05
Trapezius (upper)	Chien-ching (GB-21)	0.81	0.75
Rectus abdominis	Chung-chu (Ki-15)	0.80	0.80
Vastus medialis	Hsueh-hai (Sp-10)	1.00	0.90

TABLE IV The statistical ranking of correspondences: Excellent = either ensemble error mean is less than 0.4 cm or at least 10 bilateral bullseyes in the double blind data; Good = ensemble error mean is between 0.4 and 1.0 cm. Any ensemble mean error beyond 1.0 cm denotes below average or failure of the correspondence test and is not included.

contraction. Hollingshead (12), Fig. 2, showed the tibialis anterior innervated by two branches of the deep peroneal nerve. We assigned the following correspondence to our determination: upper and lower motor points of tibialis anterior are *Tsu-San-Li* (St-36) and *Lan-Wei-Hsueh* (XL-3), respectively.

A similar procedure was also followed for *Ho-Ku* (LI-4). Figure 3 shows the point revealed by dissection. Figure 4 shows, on the motor point illustration, the motor point of the first dorsal interosseus muscle of the hand. This was again confirmed, to within experimental error, by electrodiagnosis.

Discussion

In Table II we note that as the distance from the landmark increased, so did the error. This is, without a doubt, due to the inaccuracy of the acupuncturist's subjective measurement and/or palpation technique. No matter how hard he tries to compensate for the differences between himself and the volunteer some discrepancies are bound to occur. For example, using the so-called amalgamation method of measurement, the distance between the wrinkled lines of the patient's second to fifth finger across the back of the hand is three divisions. If the acupuncturist were to be 5 mm off either way, then in measuring off twelve divisions there would be an error of at least 2 cm even when one knows exactly the direction along which to measure.

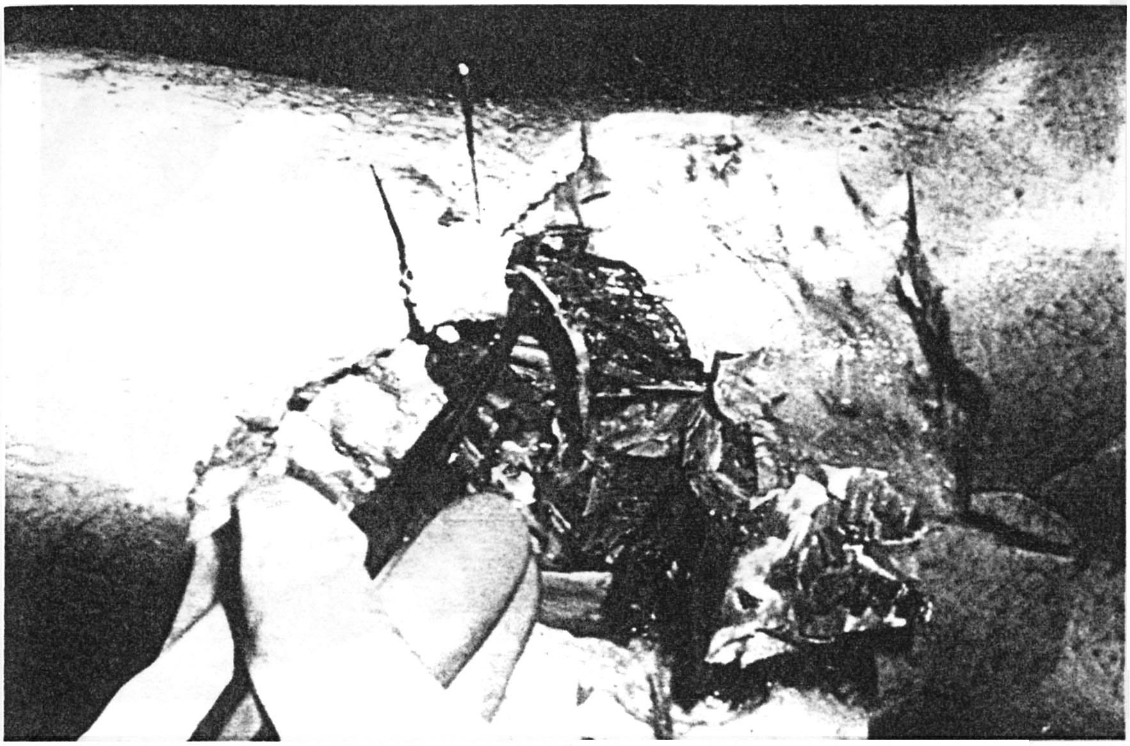

Figure 1. The relationship between the location of acupuncture needle at locus *Tsu-San-Li* (St-36) and the upper innervation of the tibialis anterior muscle. The entrance of the nerve branch into the muscle is displayed by the probe. Note the location of the needle.

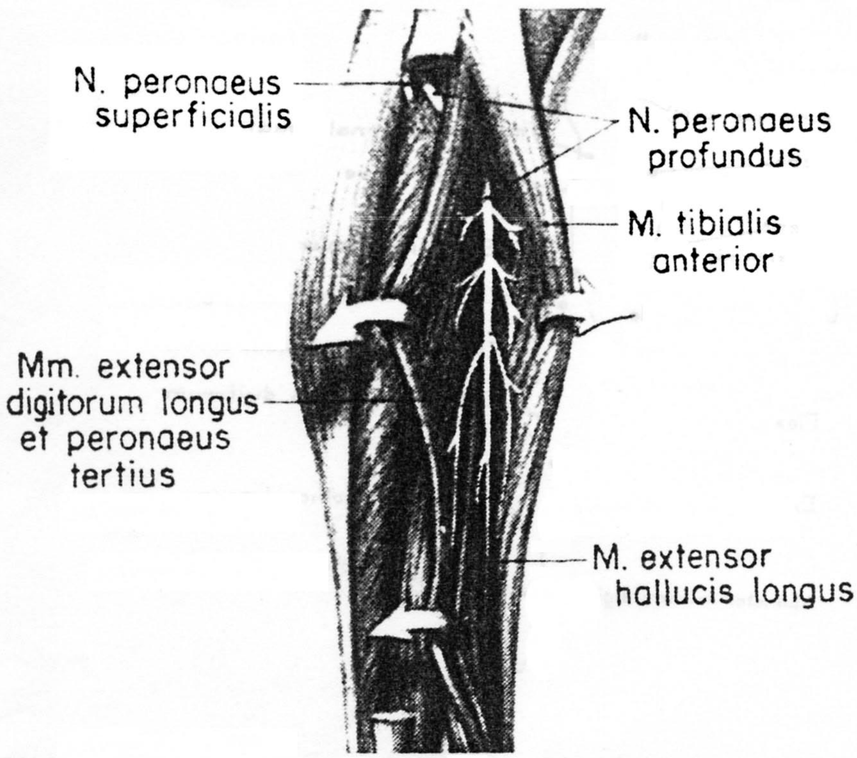

Figure 2. Gross dissection exposing the deep peroneal nerve and its innervation of the tibialis anterior as illustrated in Hollingshead (12). Reproduced by permission of the author.

Figure 3. Gross dissection revealing the location of the first dorsal interosseus muscle of the hand. The location of the acupuncture needle in the muscle corresponded to the acupuncture locus *Ho-Ku* (LI-4).

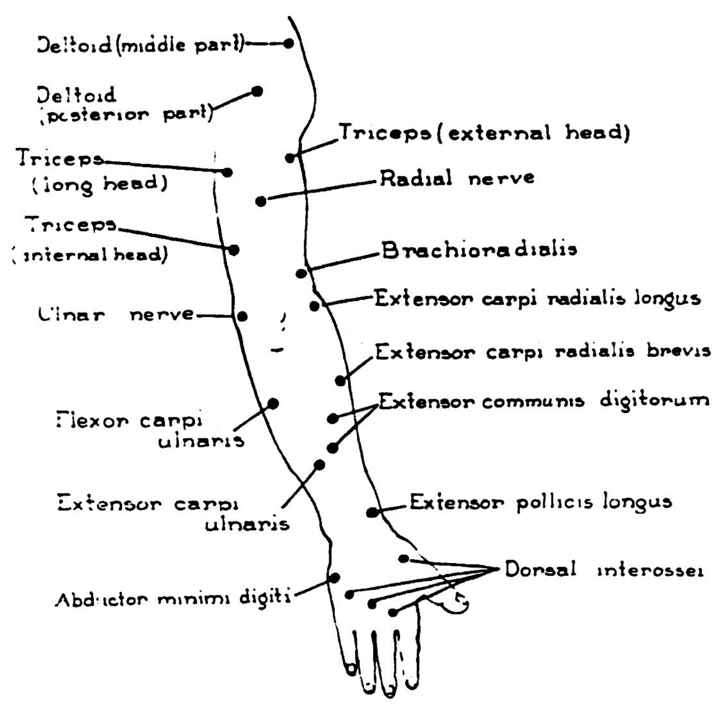

Figure 4. The location of the motor point of the first dorsal interosseus as given in Chusid (10). Reproduced by permission of the publisher.

The use of acupuncture loci as locations for peripheral nerve stimulation were hinted at in a booklet by the Peking Acupunctural Anesthesia Coordinating Group (14):

> Though a great deal of research into the Ching-Lo (meridian) theory has been done, the system as described in old Chinese literature has yet to be conclusively identified or confirmed by any known anatomic or histological method. In fact, it was found that about half the known acupuncture points are located right over various nerves and the rest are within half a centimeter of one or another nerve. From this, the conclusion was drawn that acupuncture acts in fact on the nervous system, and it is through a nerve that the stimulus produced by needling or applying a mild electric current is transmitted to a certain part or organ of the body where it effects a cure or brings about a state of analgesia.
>
> With this knowledge, additional acupuncture points have been located along the nervous system, and they are not necessarily found on any of the Ching described hereto. By following the nervous system, medical workers have been able to pinpoint spots which are even more effective for anesthesia than points formerly known.

Although it did not state so explicitly, the above statement appeared to suggest that many of the *new* acupuncture loci given in the latest Chinese acupuncture charts and books were found experimentally as sites most advantageous for peripheral nerve stimulation. Thus, it would not be too far-fetched to hypothesize that ***all motor points are acupuncture loci, but not all acupuncture loci are motor points.***

Such somatic nerves as mentioned above are generally *mixed* nerves, containing sensory and motor fibers of varying sizes. The fiber diameter is inversely proportional to the threshold of stimulation, i.e., larger diameter fibers possess lower thresholds to stimulation and vice-versa. Thus, when a motor point is electrically stimulated, it produces a muscle contraction but also afferent sensory inputs. How such sensory inputs are processed by the CNS is still poorly understood in terms of present day neuroanatomy and neurophysiology; for example, see Melzack (15). Can such sensory inputs evoke the analgesic and therapeutic effects of acupuncture? This is the principal question to be answered by scientific research.

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