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Understanding of Myofascial Trigger Points (2): Acupuncture vs Dry Needling

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The use of acupuncture and dry needling has been widely debated, and the main point of contention is whether dry needling has been derived from acupuncture. This paper comprehensively discusses the two aspects of basic theory, diagnosis and treatment of traditional acupuncture, meridian, acupoints, and myofascial trigger points (MTrPs). Except the difference between two theories, many aspects are related in terms of clinical practice and basic laboratory studies. Nevertheless, two aspects are highly similar in terms of treatment action, applicable disease, and physiological experiments. Therefore, MTrP theory is considered a basis for modern acupuncture, which is different from traditional acupuncture theory. MTrP is also easily accepted and learned by individuals with a background in modern medicine and those with knowledge in traditional acupuncture. Hence, MTrPs may be the precise acupoints in traditional Chinese medicine under modern scientific research, and meridian involves the synthesis of referred pain, nerves, vessels, and fascia mechanics. The scientific basis of Chinese and Western medicines should be coherent, although the origin of these two theories varies because of the distinctiveness of the identity between ancient and modern knowledge. The final goals of the two theories are the same, and their results are highly similar. Therefore, one theory should not belong to the other one. Meanwhile, as human behavior or thinking is essential for acupuncture development, a person often attempts either to experience nostalgia based on ancient knowledge or to develop new appropriate theory along with modern experiment technology.

Keywords: Myofascial Trigger Points; Acupoints; Acupuncture; Dry Needling; Meridian; Referred Pain; Local Twitch Response

Abbreviations

TCM: Traditional Chinese Medicine; TCA: Traditional Chinese Acupuncture; MTrP: Myofascial Trigger Point; DN: Dry Needling; WN: Wet Needling

The Difference between Traditional Acupuncture and Dry Needling

Acupuncture is based on traditional Chinese medicine (TCM) theory and Yellow Emperor's Inner Classic, which is one of the main textbooks [1] with records of over 3000 years of clinical experience. A total of 361 acupoints distributed in 12 meridians with dialectical diagnosis have been described, and needling and heat treatments have focused on unclear structures or any structures to address health problems, dysfunctions, and disorders. Therefore, a unique traditional Chinese acupuncture (TCA) and moxibustion have been formed in China [2]. By contrast, dry needling (DN) derived from wet needling (WN) is based on modern medicine and myofascial trigger point (MTrP) theory. In DN, symptoms, signs, and palpation are diagnosed, and physical examination is performed. However, needle and heat treatments have focused on all skeletal muscles to alleviate health conditions, dysfunctions, and disorders in humans. Hence, DN belongs to modern clinical medicine and physiotherapy [3-5]. However, we have to define acupoints and meridians and to locate their precise positions in the body. Actual results have yet to

be obtained because they are too abstract without real anatomical, physiological, and pathological bases. Needling acupoints should achieve Qi, such as feeling of soreness, swelling, and numbness with pain [6]. As such, these acupoints are not easily understood by beginners or ordinary individuals who have earned education in modern medicine. In clinical treatment, most patients have benefitted from traditional acupuncture at beginning, but such effects have subsequently become invalid. When experiences in acupuncture practices have accumulated for acupoint positioning without the use of traditional textbooks as references, acupuncture skills of most doctors with a background in traditional acupuncture have been improved. This accumulated skill is unrelated to textbooks of TCA.

MTrPs are pathological structures that undergo morphological changes in muscle fibers with spontaneous electromyographic discharges [7-9]. Needling MTrPs should cause some alterations, such as a local twitch response (local muscle jump), a puncture referred pain, or a strong feeling of soreness, swelling, and numbness [10-12]. Therefore, this procedure can be easily understood by beginners with a medical background, especially human anatomy, physiology, and pathology. The effect of needling treatment is stable and quick because of the precise positioning of MTrPs. When their experiences have accumulated, the effects will be enhanced and long lasting.

Two systems have different theoretical sources, and diagnostic methods and point localizations vary. In TCA, the general positioning

Table 1: Local ACh, AChR, AChE concentrations at two weeks after acupuncture treatment (double control with upper two lines), n = 16.

Groups	Ach (uM/ml)	AChR (pg/ml)	AChE (u/ml)
Normal muscle fiber	101.98±25.67	125.97±19.57	173.91±102.53
MTrPs model	141.49±32.41*	254.3±112.89*	204.67±66.01
Needling MTrPs	107.04±36.82	133.88±37.11	446.6±175.11**
Needling out MTrPs	119.65±25.14	234.5±108.21*	188.39±64.82

Note: *p <0.05, **p <0.01, variance analysis between groups. From Liu GG, Liu L, Huang Q-M et al., [13].

of acupoints consists of three methods: “self-body surface”, “self-bone degree” and “self-finger inch”, simplified for positioning acupoints in strict arrangement on 12 meridian lines. By contrast, other acupoints outside the 12 meridians have their independent and specific body surface positions, so each point has a unique location in the human body [2,6]. Some doctors suggest “to speculate points,” although others promote “rather lose its point, do not lose it in meridian” [1,6]. Therefore, the positioning of acupoints should be accurately determined for an effective treatment. However, all of these acupoint positioning methods cannot accurately locate points because the definition and location of an acupoint are unknown, except that one can give up traditional theory and earn more clinical experience. It is said that Yi Jin Jing Classics can help precisely locate acupoints [10], but a vague description in this Classics lacks experimental data has been presented. Therefore, it always has a debate with meridian theory.

Positioning MTrPs generally needs clinical symptoms, physical signs, and dysfunctions as a diagnostic basis to determine affected muscles, and MTrPs can be accurately palpated as a painful taut band through a finger [5,11-13]. Palpation should be employed to accurately identify the location of MTrPs because their location varies from person to person [11-13]. Therefore, the anatomical and physiological characteristics of each muscle and the pathological properties of MTrPs have been described. The localization of MTrPs should satisfy three conditions [11-13]: 1) a palpable taut band with obvious pressing pain (Figure 1 left); 2) referred pain (Figure 1 middle); and 3) local twitch responses (local muscle jumps, or long-distance muscle jumps (Figure 1 right).

The patterns of referred pain are often applied to guide and localize MTrPs with palpation. Once a local twitch response is induced by needling at MTrPs, precise MTrPs can be identified [11-13]. If these three conditions cannot be met during a treatment, then a particular location is not a possible MTrP. Therefore, some tender points are not MTrPs.

In clinical practice, acupuncture and DN not only exhibit similarities but also show differences. The former is too abstract and the latter is objective. Acupuncture emphasizes to “achieve Qi” upon puncturing. “Achieve Qi” is considered a key to whether the efficacy is or not, such as “Qi speed to the quick effect, late and not to” [1-2]. To obtain Qi on acupuncture, many doctors in practice of CTA have documented various acupuncture measures in many ancient books on acupuncture operative technology since 2000 years ago [1-2]. Such measures include a back-and-forth approach, twisting, “make-up and drain” methods, and complex techniques, such as flying through meridians for Qi (dragon tailing, white tiger shaking its head, turtle exploring a tomb, and red wind meeting its source) and

eight treatment measures (burning mountain fire, cooling through the sky, hiding yin within yan or hiding yan within yin, pounding mortar in the meridian, fighting between dragon and tiger, taking in, retaining, and extracting Qi) [2,6]. Different auxiliary techniques called the eight other ways with hand include speculating, clawing, rubbing, plucking, shaking, palpating, following, and twisting [2,6]. Acupuncture stimulation is an alternative to the “strong in draining, the weak in making-up” because general health conditions in a human body vary between strong and weak individuals. Regardless of its achievements and how the myth of the noun is, any acupuncture method is to obtain Qi in fact. In ancient acupuncture, achieving Qi in various puncturing methods has been widely explored to address the lack of data on experimental condition and knowledge gap rather than to determine the structure and function that can create “Qi.”

DN and WN are simpler and more practical than CTA in terms of puncturing because the positioning of MTrPs should be accurate to achieve Qi, but the “obtained Qi” is to induce a local muscle jump with soreness and swelling sensations or puncturing referred pain. Therefore, Qi can be achieved in MTrP acupuncture by employing “turtle exploring tomb” to look for local muscle jumps sequentially through puncturing back and forth and thus trigger more “jumps.” Weak patients require few jumps, whereas strong patients need numerous jumps, which correspond to “draining and. making up”. For example, the number of jumps (stimuli) depends on how healthy a patient is. Deep and shallow punctures rely on the depth of MTrPs, and straight and oblique punctures are determined by the shape and thickness of a muscle and the anatomical locations of local risks. For DN and WN, the success of acupuncture is generally attributed to whether a muscle jump can be induced and how many jumps can be achieved. The more jumps are, the higher the efficacy is. If a trigger point is on a tendon, a needling sensation is characterized by soreness, swelling, and stabbing of referred pain without a jump but with the same efficacy. However, 90% of DN and WN targets focus on MTrPs in a muscle belly. Few targets are found on trigger points in tendons, and these targets are often called tender points or affiliated trigger points. After MTrPs are inactivated, the active tender points at the origin and insertion of a muscle are naturally relieved if the course is relatively short [11-12]. In current scientific experiments, a doctor or a therapist practicing modernized acupuncture is not required to develop complex skills from traditional acupuncture; instead, they should conduct experiments to determine the actual anatomical structure, accurately identify the needling position, and verify its feasibility [7-9,14-16].

In a rat model, precise acupuncture MTrPs yield a decreased spontaneous electrical discharge in terms of frequency and amplitude, and acupuncture structures from MTrPs induce a decreased frequency of spontaneous electrical discharge [17]. Accurate acupuncture reduces the concentration of acetylcholine, especially an acetylcholine-reactive substance, at MTrPs, and the concentration of acetylcholinesterase significantly increases (Table 1). By contrast, the acupuncture of MTrPs, which are similar to an acupoint, exhibits a slight decrease in acetylcholine concentration. This result suggests that the accurate position of acupuncture (MTrPs) can obtain an enhanced efficacy, but acupuncture in any position (out of MTrPs) can show slight efficacy [17].

The mechanism of MTrP pathogenesis is explained on the

Table 2: Differences between dry and acupuncture.

Items	Acupuncture	DN and WN
Theory	TCM foundation and meridian theory	Modern anatomical, physiological and pathological foundations and MTrPs theory
Needle position	Acupoints in meridian and Ashi	MTrPs in muscle belly and insertions
Needling structure	Unclear or any structures	taut band with abnormal muscle fibers
Acupoints and MTrPs selection	Selecting the acupoints along with meridian and in anyplace for Ashi	Palpating taut bands for general pain guided by a path of referred pain, nerve, vessel and fascia mechanics.
Acupoint location method	The same body "self-body surface", "self-bone degree", "self-finger inch" positioning and speculating point	Clinical symptoms and function examination and palpation.
Acupuncture response	Get "Qi"	Get "Fa"
Needle types	Various (numerous) types of needle with and without destroying local structures.	Any Φ 0.2-0.8mm of needle without or less of tissue damage.
Puncturing methods	Flying through meridians for Qi, Eight measures for treatment, and so on. A variety of auxiliary techniques: speculating, clawing, rubbing, plucking, shaking, palpating, following, twisting, retaining	Repeated swift needling and light stabbing for both WN and DN. Retaining the needle only for DN
Acupuncture manipulation	All kinds one can think for.	Forth and Back leading to local twitch reaction (jump) and puncturing referred pain.
Effects on the fascia	not quite clear	Deformation and shrinkage
Indication range	All kinds of pain and miscellaneous diseases.	All kinds of pain and miscellaneous diseases.

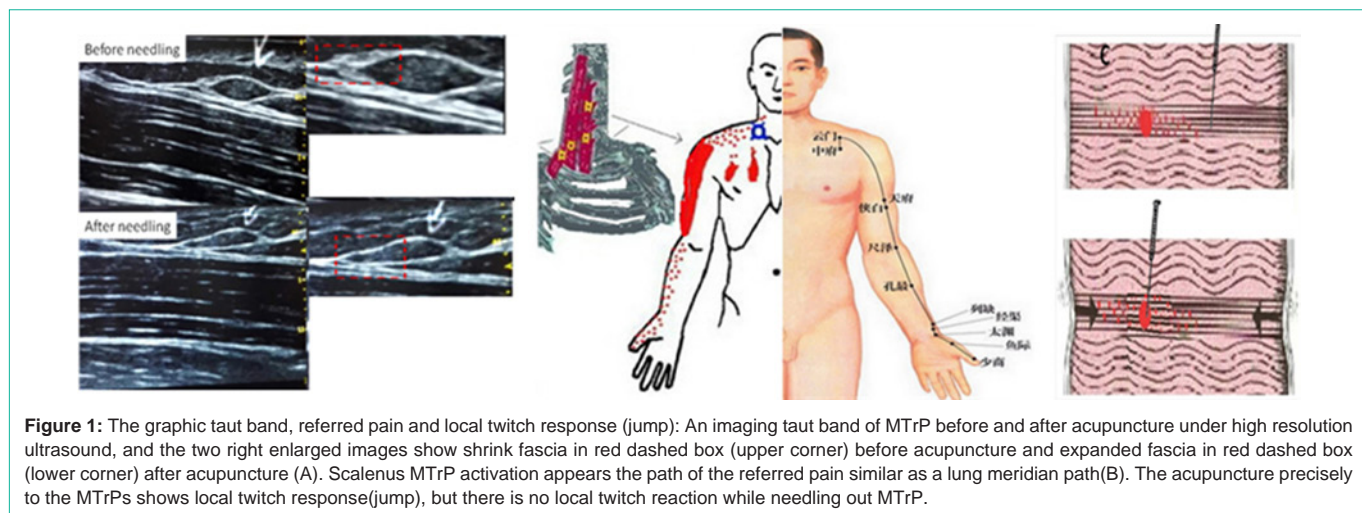


Figure 1: The graphic taut band, referred pain and local twitch response (jump): An imaging taut band of MTrP before and after acupuncture under high resolution ultrasound, and the two right enlarged images show shrink fascia in red dashed box (upper corner) before acupuncture and expanded fascia in red dashed box (lower corner) after acupuncture (A). Scalenus MTrP activation appears the path of the referred pain similar as a lung meridian path(B). The acupuncture precisely to the MTrPs shows local twitch response(jump), but there is no local twitch reaction while needling out MTrP.

basis of comprehensive results combining experimental studies and clinical experiences, but such findings differ from those in acupoint practice, which is described according to clinical experiences. Once an MTrP is formed, the parts of muscle fibers shorten and stiffen, thereby possibly deforming and shrinking a local fascia (Figure 1 left). This deep fascial deformation may narrow some outlets or inlets to incompletely block nerves and vessels. These outlets or inlets may lead to various syndromes, such as varicose veins, nutrient loss in the skin, or skin diseases. Therefore, accurate acupuncture at MTrPs can open these narrow outlets or inlets and solve related problems (Figure 1 left). This procedure is a clinical basis for the treatment of miscellaneous diseases with MTrP acupuncture (data unpublished). Ultrasound observation has revealed that local ischemia may also occur (data unpublished).

In Table 2, many differences may be in evident, but some similarities may be observed. The TCA is wide with some unclear parts and the DN and WN is accurate and clear. However, the attending scopes between two are almost identical. Their differences are not essential distinction. Therefore, the traditional and modernized

acupuncture appear as an outdated version versus an updated version, similar to a promotion of computer software. If the outdated version is preferred, then it can still be used, but the updated version is more advanced, more effective, more functional, faster, simpler, and easier to be operated than the other version. Therefore, the updated version is highly recommended.

Major Issues of Acupuncture versus DN

Some doctors in a TCA background argued that any person with a needle should base on TCA theories while applying needle, particularly by using the Yellow Emperor Nei Jing as a guide. DN originates from WN without applying TCA theories instead of palpating MTrPs based on MTrPs theories and guided by the paths of referred pain [5], combined with the paths of nerves, vessels, and fascial mechanics. Doctors or therapists of DN use acupuncture needles as a tool and focus on palpable MTrPs to conduct needling [11-13,18] (Table 2).

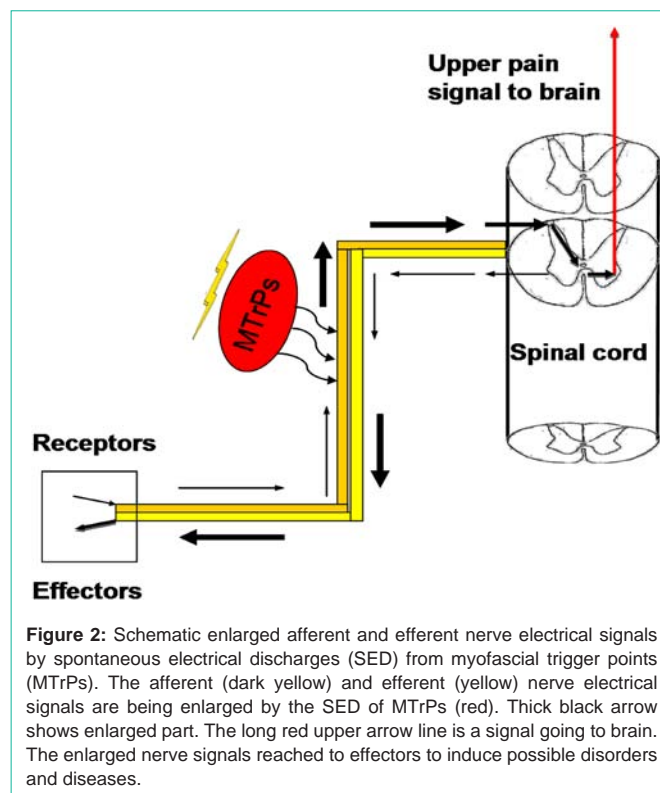
After a long-term clinical practice with needling, researchers may realize that MTrPs are also distributed along the patterns of referred

pain, which is almost the same as the distribution of meridian acupoints. For example, Dr. Dorsher [19] linked the patterns of referred pain from different muscle MTrPs by a computer drawing and found that 12 meridians are extremely similar to these points. Likewise, in our clinical practice, a thin line of meridian deduced from referred pain can be calibrated in an intermediate zone around 3cm in the middle meridian line (Figure 1 middle). Therefore, 361 acupoints may be correspondingly located in all of the intermediate zones of meridians.

Most traditional acupuncturists have yet to understand what MTrPs and their referred pain are. They have yet to learn that a meridian should have an intermediate variation. Therefore, they often believe that an MTrP is an ashi point out of 12 meridians [20] and consider that DN therapists are needing their ashi points. As a result, their conclusion is that DN should be a small part of acupuncture; consequently, DN therapists must admit that they have replicated acupuncture [21] rather than creating an independent development from the knowledge worked by Travell and Simons.

Under this situation, two questions are raised: do ashi points differ from MTrPs? Are they similar? In TCA, an ashi point corresponds to any tender or sensitive point associated with local illness originating from “pain for an acupoint” of “Yellow Emperor’s Inner Classic” [1, 20-21]. In current medicine, an ashi point refers to a tender point in any part of the body. The main difference is that MTrPs must clinically satisfy three conditions. MTrPs are a palpable taut band in a muscle belly [22-23]. Under an optical microscope, contracture knots can be observed as abnormal bead-like muscle fibers in a longitudinal section and as large and deeply stained circular cells in a cross section [7,9]. Tendons and the origin and insertion of muscles are thick because of inflammation [11-12]. What are ashi points and pain-sensitive points? Despite these questions, no structural morphological description has been provided. In some instances, the position of referred pain may have tenderness, but it does not necessarily need acupuncture. Therefore, an acupoint is a concept for any tender point without relevance and purpose. By contrast, the acupuncture of MTrPs is a purposeful, targeted, and experiment-based therapy but is not in accordance with traditional acupuncture theory [5]. Unfortunately, doctors from traditional acupuncture disregard two different theories developed in various times, that is, a modern theory and an ancient theory, similar to writings of classical and vernacular Chinese.

If a meridian is similar to the referred pain of MTrPs, ashi points are in the scope of a meridian (referred pain) with only individual discrepancy, so an MTrP is possibly a real acupoints [24]. For example, once active MTrPs of a scalene occurs, the referred pain appears from the colpus down to the first finger in the radial side along the shoulder and the upper limbs (Figure 1 middle) and coincides with the line of both the lung meridian and the cephalic vein [3,11-12]. Therefore, the acupuncture of the scalene and its satellite MTrPs can be treated as a pain in the neck, chest, shoulder, and upper back, chest tightness, numbness of the thumb [3,11-12], and skin and lung problems. The referred pain of the active MTrPs of the quadratus lumborum and the gluteus, especially the gluteus minimus, spreads along the lateral lower leg from the lateral waist and hip down to the lateral malleolus, similar to a move meridian of the foot shaoyang



gallbladder [4,11,18]. Therefore, needing these points can eliminate lateral pain and discomfort in the leg, hip, abdomen, and other parts. Furthermore, 12 meridians may correspond to the referred pain from different MTrPs [24]. As such, obtaining the meridian can be easily understood if referred pain is identified. If the paths of referred pain are considered as meridians, then such paths are sufficient for the treatment of general fascial pain. Hence, MTrP theory can be considered to promote the development of traditional acupuncture theory and to expand the diagnostic method of acupuncture and moxibustion of ancient Chinese in another rule.

Few points of DN have been debated by doctors who practice traditional acupuncture because the manuals of Travell and Simons only seemingly listed 255 main MTrPs [12,18]. They argued that TCA includes a total of 361 acupoints in 12 meridians. In eight additional meridians, 600 to 1000 more acupoints may be obtained. Therefore, the number of acupuncture points is more than that of MTrPs. The human body anatomically has more than 400 different muscles, and each muscle can have MTrPs. The smallest muscle may have one MTrP, so more than 400 MTrPs are certain. Large muscles may have more than one MTrPs, so at least more than 600 MTrPs exist. In the attached MTrPs, more than 1000 MTrPs may be obtained. Therefore, arguing about the different numbers between acupoints and MTrPs is unnecessary.

Considering that TCA was often described verbally, some Chinese ancestors recorded relevant information in handwritten books based on their experiences and formulated theories. Therefore, numerous specific acupoints, such as those for lumbago, dysmenorrhea, gallbladder, and appendix, or possible acupuncture prescriptions were handwritten, but no scientific experiments were verified. These

acupoints were possibly related to MTrPs around some internal organs because they manifested the same symptoms similar to a disease affecting a specific internal organ. However, according to MTrP theory, a differential diagnosis should be considered to differentiate whether it is an activation of MTrPs or a problem of an organ itself [11-12,18]. If such a problem originates from a muscle, and a point is precisely localized, then the treatment is effective. Otherwise, treatment becomes invalid or ineffective. Hence, a system of TCA is dependent on experience without any experimental evidence. Therefore, the location of an actual point becomes vague in TCA.

Based on modern medicine, the teaching system of MTrPs is different from TCA because of various theories for diverse systems. As such, colleges of Chinese and Western medicines vary. Physiotherapists are educated with modern medicine system, and their curriculum design is different from students taking up TCA [25]. However, some acupuncture classes for physiotherapists are only 36–48 or 72 hours because they puncture MTrPs in muscles, and this procedure exhibits simplicity and does not influence treatment effects. Therefore, acupuncture and manipulation in accordance with MTrP theory on muscular pain is easily understood and handled as long as an individual is familiar with human anatomy, physiology, and pathology. Learning these areas take time and require continuous clinical practice before they can be applied properly. Nevertheless, people with good medical education can learn and understand them.

However, an acupuncturist does not want to consider the pain of MTrPs as a precise acupoint on the basis of modern scientific studies because of numerous similarities between the two approaches. This phenomenon is possibly attributed to two reasons. (1) Some doctors in TCA fear that old theories are influenced by new theories, and (2) they are conservative and nostalgic about ancient theory, which has been considered superior knowledge [20-21]. However, further experimental research and clinical practice on MTrPs should be performed to persuade outdated doctors, to make up for shortcomings, and to correct wrong ideas from ancient theories. Valuable information, especially the rich experiences in TCA treatments, should be preserved. After a large number of clinical practices with needling have been carried out, TCA theory seems useless for actual practices and needs to be rebuilt on the basis of modern medicine [26-27]. Otherwise, future generations may misunderstand this theory. However, disputations between TCA and modern acupuncture are attributed to inconsistencies in theories but not in tools and technology. If a traditional theory cannot be reformed, and a new theory cannot be established, traditional acupuncture can become obsolete (although it seems widely supported by a national policy). Therefore, TCA and moxibustion should be further improved through theoretical reconstruction and innovation [22-23].

Future Developments

The discovery of MTrPs will inevitably promote the development of TCA meridian theory and explain the diagnosis of TCA from another point of view. Therefore, regardless of their differences and descriptions, similarities can still be observed (mentioned above). Considering that no modern scientific knowledge and methods were available in ancient China, researchers established a theoretical system of TCA only with phenomena and experiences to explain

them according to a post-limited thinking from nature, so they were only recorded the location of vague points that could be treated to alleviate the corresponding symptoms. Since then, researchers have determined the relationship of referred pain [19] and superficial vein with the meridian [28]. Therefore, with the development of modern science and technology, the essence of acupoints should be revealed and the theory of meridian can be re-established to provide novel data, in addition to empirical summary and ratiocination. To achieve a unified understanding of traditional Chinese and Western medicines, Chinese and Western medical practitioners should work together to accomplish this mission and collect data that address the knowledge gap. It is well known that MTrPs can be localized along the path of referred pain, which is the same as the acupoints of meridian selection. Morphological changes have been observed in MTrPs, but structural changes in acupoints have yet to be described. Nevertheless, almost most of the MTrPs appear on the body surface close to or coincident with many acupoints. A spontaneous electrical discharge occurs in a MTrP, but such a phenomenon is not present in a TCA acupoint. If MTrPs appear around peripheral nerve trunks or branches for a long period, a spontaneous electrical discharge at 20–60 μV from MTrP may enlarge signals of afferent and efferent nerve fibers to cause a possible neural abnormality in their two dominant ends (Figure 2). Considering this hypothesis, medical practitioners use needling with these MTrPs to cure specific aches and pains, such as trigeminal neuralgia, sequela neuralgia of herpes zoster, and all kinds of itching in hands, feet, and trunk (data unpublished). Therefore, the path of peripheral nerves is created to treat neurogenic pain effectively.

To address problems associated with blood vessels in extremities, especially varicose veins and vasculitis, traditional treatments were employing bloodletting and surgical treatment. Since MTrPs can result in allosteric deep fascia or shrinkage (Figure 1 left), and a vascular path can be used to localize MTrPs. Needling MTrPs can improve the narrow entrances and outlets of vessels in deep fascia and cure varicose veins in lower extremities. Using this hypothesis, we obtained 85% efficacy in more than 200 cases (data unpublished).

Fascial mechanical stress, active mutual confrontation between antagonistic and agonistic muscles, or fascial chain imbalance has been observed in many musculoskeletal pain cases [29], in which MTrPs in affected muscles may be localized according to a mechanical thinking path to test the mechanical balance in the fascial chain of the human body. This phenomenon is similar to the effect of TCA treatment, that is, diseases in the upper part can be treated by managing the lower part and vice versa. For example, the waist is subjected to treatment to control hand tremor.

These findings imply that meridian theory should be reconstructed, and its uncertainties should be clarified and redirected to the origin of medicine. Modern doctors should disregard existing knowledge that meridians are a kind of invisible gas that flows in the human body and that individuals with supernatural extrasensory perception can feel their existence.

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