



Journal of Acupuncture Research

Journal homepage: <http://www.e-jar.org>

Original Article

What is the Intelligent Tissue Theory and How Does it Relate to Acupuncture?



Fletcher Kovich *

Curepoint Acupuncture in Bristol, Bristol, UK

ABSTRACT

Article history:

Submitted: February 17, 2020

Accepted: April 28, 2020

Keywords:

acupuncture, Chi, intelligent tissue, Nei Jing

The intelligent tissue theory states that organ information is conveyed on electromagnetic waves and these are interpreted by bodily tissue, so that real-time organ states are reflected in the tissue at each organ's related meridian. This article describes the practical implications of this, how this relates to acupuncture, and how it accounts for the common acupuncture-related phenomena. The Chinese medicine notion of "chi" is also explored. Its history is described, including the 1970's reinterpretation. This article suggests that both the Nei Jing and also the 1970's model of how acupuncture works are merely metaphorical; do not describe reality; and that "chi" (which is central to these models) does not really exist. Alternative explanations are provided for all the common phenomena that are usually attributed to "chi", and a simple account of how acupuncture works is given.

<https://doi.org/10.13045/jar.2020.00045>
pISSN 2586-288X eISSN 2586-2898

©2020 Korean Acupuncture & Moxibustion Medicine Society. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

The intelligent tissue theory states that an organ's real-time states are reflected in the bodily tissue at that organ's related meridian [1,2]. It is thought that organ information is communicated body-wide on electromagnetic waves, and that the tissue at meridian locations interprets this information. Hence the tissue at a key acupoint would be constantly changing its physical makeup as the strength of the related organ's function changes [1].

These changing states have been frequently measured. Since the 1950's, the electrical impedance of acupoints has been measured [3-5] when it was found that the skin at acupoints tends to have a lower impedance than the surrounding skin. And since then, it has been shown that the impedance reduces when the related organ's function becomes poor, and increases when the organ's function becomes stronger. This has been shown in relation to the lungs [2,6,7], heart [8,9], and stomach [10,11].

But what does this mean in practical terms? The electrical impedance of any substance is simply a measure of its resistance to the flow of alternating electrical current. Regarding the impedance

of human skin (and the tissue and fluids beneath it), the impedance can only change when there is a physical change in that tissue. Therefore, when the above studies found a change in impedance at an acupoint due to illness (or "stress") in the related organ, this is to say that the studies found there to be a physical change in the structure of the tissue at a key acupoint when the related organ was stressed.

In Chinese medicine, it is well known that when an organ needs treating, its key acupoints are usually tender when pressed. And a simple test that any properly qualified acupuncturist can perform is this. When a key acupoint is tender, and the related organ is treated by needling a different key acupoint for that organ, and then the original acupoint is then immediately retested, it is often the case that the tenderness at that acupoint would have cleared within around 1 second of the start of the treatment, even though that acupoint was not needled. What is the explanation for this phenomenon?

When an organ is stressed, and the impedance at its key acupoints is reduced, this indicates that the tissue at that acupoint has physically changed in some way. When such an acupoint

*Corresponding author. Fletcher Kovich
Curepoint Acupuncture in Bristol, Bristol, UK
E-mail: fletcher@curiouspages.com

ORCID: Fletcher Kovich <https://orcid.org/0000-0002-9098-8520>

©2020 Korean Acupuncture & Moxibustion Medicine Society. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

feels tender, the sensation is akin to the feeling when flesh has been bruised, or damaged. The implication is that this changed physical structure in the tissue is akin to damaged tissue, and this "damaged" state was produced as a result of that tissue interpreting the information from the related organ. In other words, because the organ was not working properly (its stressed states could be regarded as being akin to "damaged" tissue), the distal tissue at its related acupoints also ceased to work properly. But as soon as the organ's function was corrected with acupuncture and was then working normally, the local tissue at the distal acupoint interpreted this new information and consequently returned to functioning normally. This would explain why the tissue was no longer tender when pressed.

This situation provides a good example of how responsive the tissue at a meridian location is to changing states in the related organ.

Fig. 1 shows the impedance at left Lung-6 (Kongzui) on a patient as he recovered from exercise [12]. The upper plot shows the general impedance level, which falls and rises a few times during the 250 seconds of the plot. This indicated the changing strength of the lung function in real time. The implication is that when the local tissue at this acupoint interpreted the real-time information from the lungs, this caused the local tissue to change something in its makeup to reflect these fine changes in the lung function; and it is these small physical changes that produced the changes in impedance that are shown in the plot of Fig. 1.

However, the detail captured is even more fine than this. It has been shown that the organs that feature regular contractions (such as the heart, lungs, stomach and duodenum) produce a "pace signal" which is a regular sinusoidal wave that determines the target frequency of the contractions for those organs when the person is at rest [2]. In the lower plot of Fig. 1, the pace signals are shown for the lungs, duodenum, and also the stomach's slow wave. The impedance of these waves has a low amplitude of around $2-8 \Omega$, and these pace signals are superimposed on the general impedance level. In Fig. 1, it can be seen that the lung pace signal (as reflected in the tissue at left Lung-6) had a notably higher amplitude than the other pace signals. So much so, that the ripple that can be seen on the surface of the upper plot (the general impedance level) appears to consist entirely of waves from the lung pace signal. All the other pace signals were also present (including that from the heart), but because their amplitude as reflected at this bodily location was notably lower than that of the lung pace signal, their waves could not be seen on the "surface" of the upper plot.

What these plots demonstrated was that the bodily tissue at meridian locations, contains fine physical variations that reflect all these pace signals, and also the general strength of each organ. And as can be seen from Fig. 1, these physical states change many times a second.

This is a remarkable phenomenon. It suggests that our entire body's tissue is constantly producing these fine physical patterns to reflect our real-time organ states, and that all these patterns are

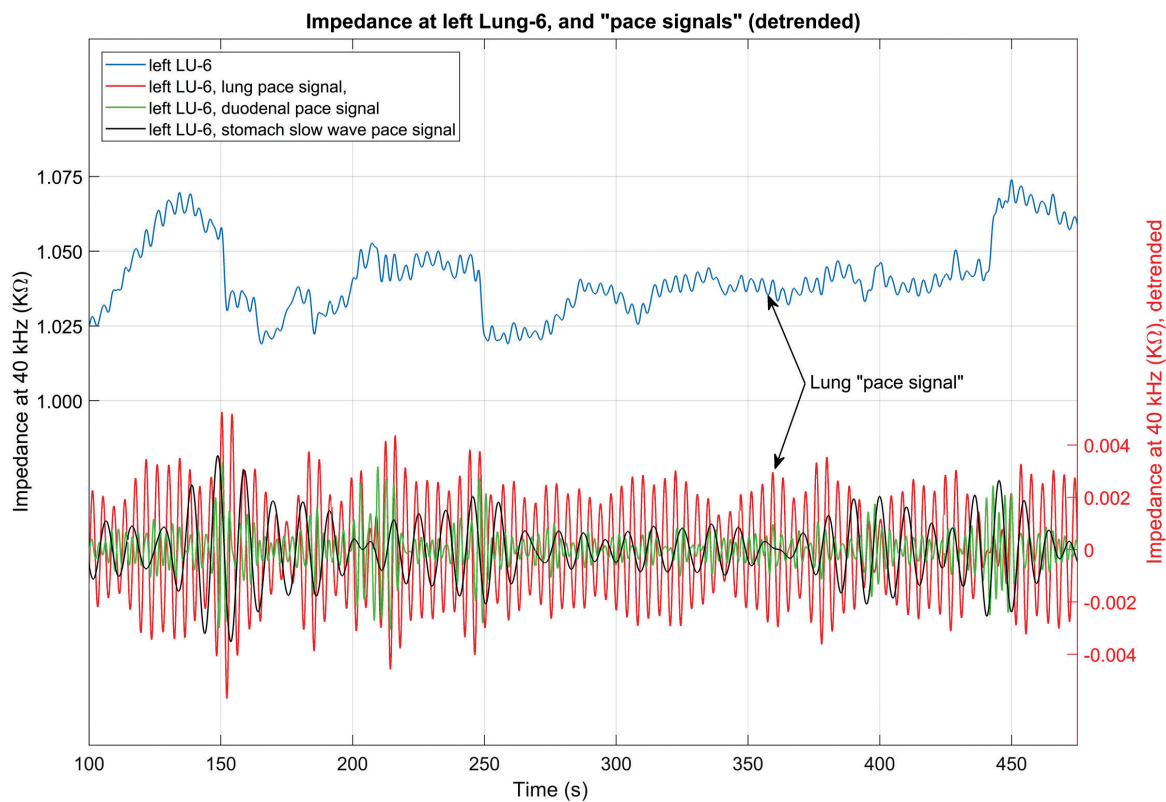


Fig. 1. The impedance at left Lung-6 (Kongzui) on a patient as he recovered from exercise.

organized in relation to the meridians [13].

These physical patterns in the tissue can produce signs and symptoms at meridian locations to reflect a variety of states in the related organ. When an organ is stressed, the local tissue at its related meridian does not merely fail to function normally (and hence produce tenderness at an acupoint), but the state in the tissue tends to reflect the exact type of malfunction in the organ [14]. When the organ function is notably poor, the skin and flesh at its key acupoints can feel cold to the touch in relation to the skin around it. When an organ function contains “heat” (in Chinese medicine terms), the skin at its key acupoints can appear reddened, or even feel warm to the touch. Pimples, or acne can also appear to reflect this same “heat” or “dampness” (again, in Chinese medicine terms). When an organ’s function becomes notably stagnated, this can produce shooting pains along its related meridian (sometimes called sciatica or neuralgia). This same mechanism can also produce aching or sore joints along the path of a meridian [15].

All these phenomena suggest that a meridian merely consists of tracts of tissue that can reflect states in the related organ [15]. In other words, a meridian does not have a dedicated structure of its own, and nothing flows along it; but instead, it consists of normal bodily tissue that reflects the real-time states in a particular organ [14].

How does “chi” fit into all this?

The term “chi(氣)” is frequently used in Chinese medicine. Practitioners of traditional acupuncture usually use this term to describe many of their own experiences related to healing. But what does the term mean? Is it referring to something real? And if not, what do the practitioners who use the term, mean by it? And how does it fit into all the above descriptions related to the intelligent tissue theory? To properly understand this topic, it is necessary to fully appreciate the history of the term; how it was used in the past; and how its current meaning evolved. The term was first used in the medical context in the *Nei Jing*, which is a collection of separate scripts written by different authors around the 2nd century BC [16]. But there are two aspects to these scripts—the practical observations related to acupuncture, and the theoretical deductions.

The practical observations include the signs and symptoms that result when a particular organ is stressed, including mental and emotional factors; and also the layout on the body of each organ’s meridian, the key acupoints along those meridians, and the general results of stimulating those acupoints. And another source of practical knowledge was the patients’ experiences related to the treatments, which would have been the same then as they are today, and would have included the following sensations.

- When an acupoint is needled, the patient usually feels a sensation at that acupoint, whose strength is usually proportional to the degree of stress in the related organ.
- On some patients, when an acupoint is needled, they sometimes feel a tingling sensation propagating a short distance along the meridian near to the needled acupoint; or they sometimes feel a tingling at another related acupoint.
- When an organ’s function is poor, the skin at its key acupoints can feel cold to the touch in relation to the surrounding skin; and this coldness tends to clear immediately the organ is treated with acupuncture.
- A similar experience is that patients will sometimes feel a warmth flowing along a particular meridian during the treatment.

All these (and similar) experiences, and also the above knowledge of each organ’s related signs and symptoms, are fact based. That is, they are real. This is confirmed in clinic today, where this ancient knowledge of an organ’s related signs and symptoms is repeatedly encountered, and remains impressively accurate.

All well and good. But then the problems began. The *Nei Jing* intellectuals (be they practitioners or pure theorists) then attempted to explain what was happening inside the body to account for all these observations.

The Nei Jing model of how acupuncture works

Over 2,000 years ago, there was no useful knowledge of the body’s internal anatomy [18], and no knowledge at all of the microscopic detail of the body’s tissue, of its chemistry, nor of the body’s communication systems, such as the nervous and hormonal systems. In the absence of all this knowledge, how on earth could the internal workings of the body and the organs be explained? Their solution was to invent a metaphorical system, based on what they saw in the world around them.

When food was cooked in a pot, this produced steam which appeared to contain some essence of the food (it smelt like the food being cooked). It was theorized that the stomach worked in the same way. Food entered the stomach and was “cooked”, so that a vapour rose from the food, containing its essence, and this vapour was imagined to travel around the body, delivering the food’s nourishment to every part of the body. This vapour is the substance that was named chi. But how was it thought to be transported?

Bloodletting was then a common practice, and the superficial veins that blood was let from, the *Nei Jing* referred to as the *luo mai* (絡脈), or collaterals [18]. From the rudimentary dissection of corpses, it would have been discovered that these superficial veins (and arterioles) flowed into deeper and larger vessels (what are known today as the arteries and deep veins). It is also clear that the *Nei Jing* practitioners would have been aware of the presence of “pathways on the skin” (what we today call the meridians), and it appears that they assumed that the arteries and deep veins followed these same pathways. It was these imaginary, deep vessels that they referred to as the *jing mai* (經脈), or “meridians” [19].

Hence, an imaginary system of deep, artery-like tubes was assumed to exist, which lay deep to the “pathways on the skin.” These tubes were thought to flow into one another, and also into the abdominal organs. And the blood, together with those imaginary vapours (chi), were thought to circulate within these deep, artery-like tubes.

This highlights the root of a significant misunderstanding. In the *Nei Jing*, it was further theorized that when a person was cold, these deep artery-like tubes (the “meridians”) could shrink, and thus obstruct the flow of the blood and vapours [20]. And it was also theorized that by piercing acupoints on the “pathways on the skin,” the needle would go deep and penetrate these underlying tubes (the “meridians”) and thereby release blood from the system; or even that the vapours could be affected by manipulating the needle in certain ways.

These notions were perhaps born from other assumptions—that when certain signs or symptoms existed in the patient, this was thought to be due to the blood and these vapours being excessive or deficient.

A practical observation was that when a person experienced certain signs or symptoms, and a needle was inserted into a certain acupoint, this would clear the condition. This was factual, but the intellectuals then appeared to have theorized that this therapeutic effect was achieved by enhancing the amount or flow of these vapours. This notion was convincing but entirely fictional, because

there were no such vapours circulating the body and there was no network of artery-like tubes that lay deep to the “pathways on the skin,” and since these did not even exist, nothing, including vapours extracted from food (chi), could flow through them. Hence, this system could not possibly account for how the body works, nor for the effects of acupuncture. However, it is clear from the *Nei Jing* and its later commentaries that this model was understood to be literally true. Over a thousand years later, practitioners cited aspects of this model, clearly understanding it to be as true as any mathematics equation today [21].

The 1970’s model of how acupuncture works

In the 1970’s, there was a revived interest in Chinese acupuncture in the West. The therapy clearly worked and was extremely powerful, yet there was no explanation in today’s physiology that could explain how it worked.

The *Nei Jing* was the earliest written account of acupuncture, and it also described their model of how acupuncture worked. In the 1970’s, this was the only model available and the practitioners simply wanted to know how acupuncture worked, therefore this model may have initially been understood to be factual.

It may have been assumed that the ancient Chinese invented acupuncture, therefore they ought to know how it worked. This is still a common misconception today. The ancient Chinese did not invent acupuncture. By this, I mean that the mechanism that enables certain points on the body to be stimulated to correct health issues, such as stress in any of the main organs, this mechanism had always been present in the body. The ancient Chinese did not invent this system, they only discovered how to utilize it. Therefore, the *Nei Jing* model of how acupuncture (and the body) works, does not have any authority. It is merely a fictional model created by the *Nei Jing* authors to try to account for acupuncture-related phenomena.

Consequently, when the *Nei Jing* model was closely read in the 1970’s, many aspects of it would have seemed clearly fictional. There were no food vapours circulating in deep artery-like tubes (which the *Nei Jing* referred to as “meridians”), which followed those “pathways on the skin” (which are what we today call the meridians). And since these fictional tubes did not exist, they could not be shrunk when exposed to cold, so that the flow of blood and vapours would be blocked. And clearly when an acupoint was needed, the needle did not penetrate these deep artery-like tubes—to free up such blockages of food vapours and blood and thereby effect a treatment; or to let out excess blood or to strengthen the deficient vapours, to also effect a treatment. If the *Nei Jing* was read closely, such a model would have seemed fictional. However, the *Nei Jing* model was the only one available to explain how acupuncture worked, so all these ideas were taken to be factual, but modified using insights from today’s anatomy and physiology.

It was decided that the reference to food vapours (chi) was really referring to some type of energy, and that it did not flow through deep, artery-like tubes (because it was now known that arteries did not generally align with the “pathways on the skin”), but instead it was assumed to somehow flow through those “pathways on the skin”, which it was also decided was what the *Nei Jing* authors were really referring to when they used the term *jing mai* (or “meridian”). Hence chi was regarded as being some vague type of energy that today’s physics had not yet discovered [22].

Another key concept that was adopted from the *Nei Jing* model was that of those fictional artery-like tubes (the “meridians”) being shrunk by cold and hence causing the flow of blood and food vapours to be blocked within them. But this concept was

reapplied to the “pathways on the skin” (what we today call the meridians), and it was assumed that the flow of this vague energy (what chi is now generally regarded to be) could be blocked within those “pathways on the skin” and that acupuncture appeared to work by unblocking this flow, or, on other occasions, by somehow strengthening this vague energy, so that the function of the organ related to that meridian was improved.

Hence, in the absence of any scientific explanation, this was the general model that was adopted to explain acupuncture. This was done, despite the fact that no-one knew what this newly imagined energy really was, and no-one therefore had any idea of how such an imagined substance could flow through these “pathways on the skin” which did not seem to have a dedicated anatomical structure. In this way, parts of the *Nei Jing* model were dismissed as being clearly untrue, and instead those parts were reinterpreted, based on the assumption that the overall model was still largely correct (even though it was based on fictional assumptions, such as vapours circulating the body in artery-like tubes). Hence, the 1970’s model was derived, which is still widely adhered to today.

Common experiences that seem to support the 1970’s model

The following common experiences are all apparently consistent with the 1970’s model of how acupuncture works.

- When an acupoint is needed, and a sensation is felt at the needed acupoint by the patient, this could be interpreted as being a rush of this energy (chi) to that acupoint, whose conduction was previously blocked. And it might be thought that the “removal of this block” somehow allowed this energy to now flow along the meridian, which somehow “restored the meridian system to good health,” which then accounted for the patient’s overall health being restored. Though this is the usual perception, there is no specific notion of how this “energy flow” might interact with the patient’s health (i.e. no idea of the specific physiological mechanisms involved), except perhaps the vague idea that when this energy is “flowing around the meridians”, this somehow establishes the patient’s good health.
- On some patients, when an acupoint is needed, they sometimes feel a tingling sensation propagating a short distance along the meridian near to the needed acupoint; or they sometimes feel a tingling at another related acupoint. These sensations are usually interpreted to be produced by the freshly unblocked flow of this energy, and hence interpreted to be direct evidence of the existence of this energy.
- When an organ’s function is poor, the skin at its key acupoints can feel cold to the touch in relation to the surrounding skin; and this coldness tends to clear immediately the organ is treated with acupuncture. This returning warmth would also usually be interpreted as being due to the returning flow of this energy, which was previously not flowing in those locations. Again, this would be perceived as being direct evidence of the existence of this energy.
- A similar experience is that patients will sometimes feel a warmth flowing along a particular meridian during the treatment. Again, this would be interpreted as the effect of the return of this energy to those locations.

All these (and similar) experiences help to reinforce the 1970’s model. They appear to be evidence of energy (of an unspecified type, which is unknown to today’s physics or biology) “flowing along” the meridians and producing effects as a direct result of the acupuncture.

But the model does not stand up to scrutiny. For example, when an organ’s function is corrected by acupuncture, the model cannot account for the communication between the acupoint and its

related organ. The tingling feeling that some patients sometimes feel propagating along a meridian has been measured to travel at 18 cm per minute [23]. However, by taking a patient's pulses before and after needling an acupoint to correct an organ's function, it is clear that needling one of an organ's key acupoints usually corrects that organ's function in around 1 second. But if chi is thought to travel at 18 cm per minute, and it were manipulated at an acupoint, it would take several minutes for any change in that energy to reach the related organ, and several minutes for that change to then propagate out from the organ back to all its other related acupoints.

Using today's anatomy and physiology, attempts have also been made to explain acupuncture's effects. In 2010 it was hypothesized that sensory nerves may be responsible for communicating the needling sensation to the brain [24], but this idea also does not stand up to scrutiny for many reasons [25], and clearly cannot account for acupuncture's rapid effects on organ function. And the same is true of the primo vascular system. Primo vessels are thought to coincide with the main meridian paths, yet the primo fluid that flows within this system, flows at the even slower rate of 0.3 mm per second [26] (or 18 mm per minute, which is 10 times slower than the propagation rate of "needle sensation" along a meridian). So, there is also no explanation in contemporary anatomy and physiology to account for the rapid effect of acupuncture treatment.

The fact that science (up until 2018) had no explanation for acupuncture's effect or for what meridians are, was perhaps a good reason for the 1970's model to be adopted by Chinese medicine. They had to have some explanation; science could offer none, so it must have seemed there was no choice but to invent a new model, loosely based on the Nei Jing model. But until such myths (that form the basis of the 1970's model) are dispelled, Chinese acupuncture can never be taken seriously by other disciplines.

The intelligent tissue model of how acupuncture works

This model states that all bodily tissue interprets organ information conveyed on electromagnetic waves, which theory is described in greater detail elsewhere [27]. The model is able to explain all common phenomena familiar to Chinese medicine; and the phenomena listed previously are now explained as follows.

When an acupoint is stimulated and the patient feels the so called "de chi" sensation, this occurs when the related organ starts to correct its function. The local tissue at the acupoint constantly interprets information from the related organ, and as the organ function returns to normal, this process is reflected at the needled acupoint, producing the sensation felt by the patient. This explains why, when the needle is first inserted, there is sometimes no sensation. But when the needle is then stimulated, the appropriate local tissue relaxes, and this is reflected back to the related organ, causing it to also relax and release its stress. At this point, this change in organ function is interpreted by the tissue at the acupoint, producing the sensation. This also explains why the sensation is proportional to the degree of stress in the organ. When that stress is high, the needle sensation is stronger and often occurs the moment the needle is inserted, with no stimulation needed. On the other hand, when an organ's function needs no correction, and one of its key acupoints is needled, it can be difficult to obtain a needle sensation. This is because there is no great change of function to be induced in the organ, therefore a needling sensation (which is the reflection of a change in organ function) cannot be obtained.

During treatment, the patient sometimes feels a tingling sensation propagating along the meridian, or at other key

acupoints related to the same organ. This sensation also represents the changing state of the organ function. After the organ is stimulated by acupuncture, it would begin to return to normal function (i.e. it begins to shed its stress). When information about this process is interpreted by the tissue near the needled acupoint, this produces a tingling sensation that moves a little way further along the meridian, in a "yin-to-yang" direction. That is, the stress moves to a more superficial (i.e. a more "yang") level of the organ's function, which movement is reflected at a gradually more and more "yang" location along the meridian (i.e. it moves towards the tip of the limb where the meridian is located). The sensation usually moves along a short section of the meridian only, which reflects the fact that the majority of the stress only had a short "distance" to move to be completely shed by the organ.

A tingling is also sometimes felt at a related acupoint. For example, if one of the back shu acupoints for the lungs were needled (Bladder-13 Feishu), then the patient may feel a tingling at the acupoint Lung-9 (Taiyuan), at their wrist. Such a key acupoint for that organ (Lung-9) would reflect any major functional improvement in the lungs. Therefore, when such an improvement is induced (in this case, by needling Bladder-13), a sensitive patient may feel a tingling at this related acupoint, Lung-9, which would be simply reflecting the fact that the lungs' function was improving. This situation would be reflected at this distal acupoint, even though that acupoint was not needled, which confirms that the tingling sensation was not produced directly by the needling, but by the local tissue at the acupoint interpreting the organ's new information (which is instantly transmitted body-wide on electromagnetic waves [28]).

When the skin at a meridian is colder than the surrounding skin, this absence of normal warmth can also be explained by the local tissue interpreting organ information. When an organ's function is poor, and this state is interpreted by the local tissue at that organ's key acupoints and meridian, this may cause the temperature of the skin in those locations to be correspondingly reduced. And when the organ's function is corrected by acupuncture, the skin at its acupoints and meridian would also tend to return to normal temperature, which can even cause the patient to feel this returning warmth, as though it were "flowing" along the meridian.

How can practitioners who've learnt the 1970's model, accept the intelligent tissue model?

The intelligent tissue model accounts for every phenomena related to Chinese acupuncture, but without the need for any substance or dedicated energy to flow in the meridians at all. Does this mean that chi does not exist? To practitioners of Chinese acupuncture, this very suggestion may provoke outrage.

In the 1970's model, the phenomena and experiences listed previously are convincingly accounted for by the notion of energy flowing along meridians. And indeed, once the 1970's model is accepted, the very existence of these phenomena (such as the needling sensation, etc.) seem to constitute evidence of the existence of this vital energy that is thought to produce such phenomena. Once a practitioner has experienced these phenomena for many years and always accounted for them by using the 1970's model of chi and its flow around the body, it is understandably difficult for them to then dismiss the 1970's model. And when reading this article, many such practitioners may think "But I can even feel my chi, so of course it exists."

There is no doubt that all these phenomena and experiences are real, and what practitioners and patients feel, is real. However, the 1970's definition of chi is only an abstract model that does not describe any real phenomena in the body. In reality, there is no

life-giving substance that “flows along the meridians.”

But if practitioners want to continue to refer to these experiences as chi, they just need to appreciate that chi is not a substance in its own right, but instead it could simply be regarded as the expression of an organ's health (good or bad) at locations along that organ's related meridian. Followers of the 1970's model may still then continue to use all their other thoughts related to that model, so that only a slight adjustment (in the definition of chi) is required.

In truth, there is little difference between all the models described here (including the Nei Jing model); and this whole discussion could be regarded as a merely philosophical exercise, or even as an academic distinction. In all three models, all the same experiences and phenomena occur and are explained, and the therapy works today as well as it always has done, whatever thoughts are in the minds of the practitioner.

However, when looked at from a scientific point of view, the 1970's model of how acupuncture works, and the 1970's notion of chi, are pure fiction. Therefore, when talking to patients, healthcare workers, scientists, or the media, if Chinese acupuncture is going to have any credibility, it is necessary to use explanations that directly refer to reality (rather than using a metaphorical model). Here, the intelligent tissue theory provides a credible explanation for all the phenomena related to acupuncture, including its ability to immediately correct organ malfunction; and its central concept (that bodily tissue interprets organ information) has now been validated experimentally [2,11].

At the simplest level, rather than referring to chi, acupuncture might be described as achieving its effects by manipulating organ information. If curious patients then wonder what mechanism it uses to manipulate organ information, the overall process could be summarized as in this article. That is, due to the resonance between an organ and its related acupoints, the organ's health is reflected at those acupoints, which become tender when the organ is stressed; and by stimulating one of these acupoints, the local tissue returns to normal function, which then (due to this same resonance) persuades the related organ to also return to normal function.

Conflicts of Interest

The author has no conflicts of interest to declare.

References

- [1] Kovich F. Acupuncture Today and in Ancient China. Bristol (UK): CuriousPages Publishing; 2019. p. 372-373.
- [2] Kovich F. The lungs' real-time states are reflected in the tissue at its related acupuncture points. *J Acupunct Res* 2019;36:88-91.
- [3] Nakatani Y. Skin electric resistance and Ryodoraku. *J Autonomic Nerve* 1956;6:52.
- [4] Niboyet JEH. Nouvelle constatations sur les proprietes electriques des ponts Chinois 10. *Bull Soc Acup* 1958;30:7. [in French].
- [5] Voll R. Twenty years of electroacupuncture diagnosis in Germany: A progress report. *Am J Acupunct* 1975;3:7-17.
- [6] Serisawa K. An Approach on Meridians and Acupuncture Points in Modern Medicine. *J Compr Rehabil* 1978;11:789.
- [7] Sullivan SG, Eggleston DW, Martinoff JT, Kroening RJ. Evoked electrical conductivity on the lung acupuncture points in healthy individuals and confirmed lung cancer patients. *Am J Acupunct* 1985;13:261-266.
- [8] Rosenblatt S. The Electrodermal Characteristics of Acupuncture points. *Am J Acupunct* 1981;10:131-137.
- [9] Saku K, Mukaino Y, Ying H, Arakawa K. Characteristics of reactive electropermeable points on the auricles of coronary heart disease patients. *Clin Cardiol* 1993;16:415-419.
- [10] Kovich F. The Daily Variance in Impedance at Acupuncture Points. *J Acupunct Res* 2018;35: 176-181.
- [11] Kovich F. The stomach's communication with its related acupoints, and the “intelligent tissue” hypothesis. *J Acupunct Res* 2019;36:21-27.
- [12] Kovich F [Internet]. The relationship between regular sinusoidal waves in the tissue at lung-related acupuncture points and the respiration pacesetter mechanism. *Mendeley Data* 2019, v2. Available from: <http://dx.doi.org/10.17632/xzjv2h943.2>.
- [13] Kovich F. Acupuncture Today and in Ancient China. Bristol (UK): CuriousPages Publishing; 2019. p. 345-360.
- [14] Kovich F. Acupuncture Today and in Ancient China. Bristol (UK): CuriousPages Publishing; 2019. 55 p.
- [15] Kovich F. A new definition of an acupuncture meridian. *J Acupunct Meridian Stud* 2019;12:37-41.
- [16] Unschuld P. *Medicine in China: A History of Ideas*. Berkeley (CA): University of California Press; 1985. 63 p.
- [17] Kovich F. Acupuncture Today and in Ancient China. Bristol (UK): CuriousPages Publishing; 2019. 16 p.
- [18] Kovich F. Acupuncture Today and in Ancient China. Bristol (UK): CuriousPages Publishing; 2019. 31 p.
- [19] Kovich F. Acupuncture Today and in Ancient China. Bristol (UK): CuriousPages Publishing; 2019. 29 p.
- [20] Kovich F. Acupuncture Today and in Ancient China. Bristol (UK): CuriousPages Publishing; 2019. 28 p.
- [21] Kovich F. Acupuncture Today and in Ancient China. Bristol (UK): CuriousPages Publishing; 2019. p. 37, 267.
- [22] Porkert M. *The theoretical foundations of Chinese medicine*. Massachusetts Institute of Technology, MIT Press; 1974.
- [23] Kim BH. *On the Kyungrak System*. Pyongyang (Korea): Medical Science Press (English); 1963. 32 p.
- [24] Longhurst JC. Defining meridians: a modern basis of understanding. *J Acupunct Meridian Stud* 2010;3:67-74.
- [25] Kovich F. Acupuncture Today and in Ancient China. Bristol (UK): CuriousPages Publishing; 2019. p. 401-406.
- [26] Sung B, Kim MS, Lee BC, Yoo JS, Lee SH, Kim YJ et al. Measurement of flow speed in the channels of novel threadlike structures on the surfaces of mammalian organs. *Naturwissenschaften* 2008;95:117-124.
- [27] Kovich F. Acupuncture Today and in Ancient China. Bristol (UK): CuriousPages Publishing; 2019. 54 p.
- [28] Kovich F. A curious oversight in acupuncture research. *J Acupunct Meridian Stud* 2017;10:411-415.