

Energy – Meridian Misconceptions of Chinese Medicine

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Presently, there are numerous practitioners of Chinese needling therapy (acupuncture) in Europe and the United States, including a few thousand physicians and veterinarians. Western interest in Chinese medicine started gaining serious attention in the 1970s. Few books in English were available at that time and fewer yet students and practitioners could read or translate the original Chinese texts. The first serious textbooks were written by Georges Soulié de Morant and published in French in 1939 and 1941. English translation of this effort eventually followed, even including books published in China. This work had one major problem in that it replaced the physiologically correct Chinese idea of continuous blood circulation of vital substances by the cardiovascular system with the Western metaphysical construct of energy and blood circulating by means of yet-to-be discovered meridians.

During the past few years the Chinese/Oriental medicine community came to realize that the term “meridian” was problematic. So they started replacing “meridian” with “channel” which now circulates energy and blood. However, the reality has not changed and channels are also yet-to-be discovered. The energy-meridian idea has had an unintended impact on education standards by not emphasizing the essential need for science-based training in anatomy, physiology, and pathology. As a result, many new graduates of acupuncture schools are ill-prepared to enter clinical practice and be able to communicate with other health care providers. In addition, valuable research funds

Numerous lay and medical practitioners of Chinese needling therapy (acupuncture) rely on the Western metaphysical construct of energy and blood circulation by meridians/channels. This scheme was put forth by Georges Soulié de Morant in 1939 in his rendering of the Chinese vessel theory of cardiovascular circulation of vital substances. This idea is contrary to the historic facts of Chinese medicine, as well as to known anatomy and physiology. Soulié de Morant interpreted the Chinese character “*qi*” (air and vapor) as “vital energy” and “*jing*” (longitudinal) as “meridians.” He believed meridians were: “an additional circulatory system having no relation to the nervous, circulatory, or lymphatic systems.” Later in his life, Soulié de Morant concluded that the vascular system actually supplied blood and energy to all the body cells. Converting potential energy sources to “vital energy” was thought to be in the realm of metaphysics. It has been known for some time that energy production within the cells involves oxidation of glucose to convert ADP to ATP which then fuels cellular processes. The energy-meridian misconceptions need to be replaced with physiologically correct understanding to best serve public interests and to provide a solid basis for valid research.

Key Words: acupuncture, meridians, metaphysics, vessel branching, neurovascular nodes, adenosine triphosphate

Missverständnisse bei der Interpretation des Energie-Meridian-Systems der Chinesischen Medizin

Zahlreiche Anwender (ärztliche wie nicht-ärztliche) der Chinesischen Akupunktur berufen sich auf das westliche metaphysische Konstrukt der Energie- und Blutzirkulation durch Meridiane/Kanäle. Dieses Modell wurde 1939 von George Soulié de Morant in seiner Interpretation der Chinesischen Gefäßstheorie zur kardiovaskulären Zirkulation von Vitalstoffen propagiert. Ein solches Konzept steht jedoch im Widerspruch zu den historischen Fakten der Chinesischen Medizin sowie zur bekannten Anatomie und Physiologie. Soulié de Morant interpretierte das chinesische Zeichen “*qi*” (Luft und Dampf) als “Lebenskraft (Vitalenergie)” und die longitudinalen “*jing*” als “Meridiane”. Er glaubte, Meridiane seien „ein zusätzliches Zirkulationssystem, das keinerlei Verbindung zu Nerven-, Kreislauf- oder Lymphsystem habe.“ Später zog Soulié de Morant den Schluss, dass das Kreislaufsystem Blut und Energie zu allen Körperzellen transportiere. Dass potentielle Energiequellen in “Vitalenergie” umgewandelt würden, galt als in den Bereich der Metaphysik gehörig. Bereits damals war bekannt, dass an der Energieproduktion in den Zellen, d.h. der Umwandlung von ADP in ATP, die Oxidation von Glukose beteiligt ist. Das Energie-Meridian-Missverständnis sollte endlich durch ein physiologisch korrektes Verständnis ersetzt werden, um eine solide Basis für echte Forschung zu schaffen.

are being expended looking for meridians and channels that do not exist. The energy-meridian misconceptions are examined herein with respect to

the historic facts of key Chinese concepts of cardiovascular circulation of vital substances.

Early Chinese Medicine History

While the West rightfully considers HARVEY'S [1] 1628 verification of blood circulation the single most important discovery, the Chinese actually described it some 2000 years earlier. This first account is found in the *Guanzi* (ca. 375 BCE) in the essay on Water and Earth: "Water is the blood and breath of Earth, functioning in similar fashion to circulation of blood and breath (*qi* 氣 / 气)* in the sinews (muscles) and veins (vessels) [2]." Additional ancient texts recovered in 1973 from a tomb in Mawangdui China dated to 168 BCE provided detailed information about the Chinese blood vessel (*mai* 脈 / 脉) theory [3,4]. Similar vessel texts were also found in 1983 at Zhangjiashan in a tomb dated to 150 BCE. These texts provide the first universal model of pathology based on the blood vessel theory. Neither needling therapy nor acupoints (*xue*) are mentioned in these particular texts [4, p.39, p.87].

The first mention of Chinese needling therapy related to a known physician is found in the *Historical Records of the Han Dynasty* (90 BCE), Chapter 105 of Sima Qian (ca. 145–86 BCE). His name was CHUNYU Yi (ca. 216–150 BCE) [4,5] who treated patients with herbs, moxibustion, and needling therapy. Chunyu Yi considered blood vessels to be the most important structures compared to other constituents of the body.

First Comprehensive Chinese Medical Text

From the Warring States period (475–221 BCE) forward, Chinese physicians participated in a text-based alignment of knowledge leading to more complete medical texts. Most important of these is the *Yellow Emperor's Internal Classic (Huangdi Neijing)* (ca. 200–100 BCE). It is often referred to as the "*Neijing*" and the date it was first compiled is unknown. A fair copy was placed in the Han Dynasty court library by LIU XIN after 26 BCE [6]. The *His-*

tory of the Former Han Dynasty by BAN GU (32–92 CE) lists the *Neijing* consisting of 18 scrolls. By the 2nd and 3rd Century CE it was viewed in terms of the *Suwen (Common Questions)* and the *Zhenjing (Needling Classic)* containing nine scrolls each [5, pp.3, 22–24; 7]. The *Neijing* was then lost until 762 CE when a Tang dynasty minister named WANG BING set out to restore a recovered copy. He added text to the *Suwen (SW)* [5, pp.39–58; 7] and renamed the *Zhenjing* the *Lingshu (LS) (Center of Knowledge)*. Commentaries were also made in 1056–1066 CE during the Song Dynasty by GAO BAOHENG [5, pp.59–66; 7]. Additional commentaries on the *Suwen* continued up to the 19th century [5, pp.66–75].

The *Neijing* is a compilation of Chinese medical concepts and is still relevant today and provides an amazing understanding of the human body that is still 80–90% accurate [8]. Reasons for this level of understanding is the fact that the ancient Chinese conducted postmortem examinations as noted in *LS 12* [8, p.32–34]. Here, external measurements could be made by a trained practitioner if the body was intact. In case of death a postmortem dissection study could be performed using a standard procedure to obtain quantitative information.

Longitudinal Blood Vessels

Both the *Neijing* and *Mawangdui* vessel books used an anatomical notation

approach in terms of *yin* and *yang* regions that divided the body into 12 longitudinal areas on each side of the body [8, Fig 4.2]. Six of these were associated with the hand and 6 with the feet (**Table 1**). The *Neijing (LS 10, LS 11)* provides a full description of 12 longitudinal blood vessels (*jingmai* 經脈 / 经脉) either supplying (arterial) or draining (venous) each side of the body. Their pathways descriptions are in sufficient detail to identify the actual vessels as they are presently understood [8, CH 9, CH 11]. This category of *jingmai* represents the main longitudinal vessels that supply the muscles and superficial body regions and gives rise to neurovascular nodes (acupoints). The *Neijing* vessel descriptions are far more comprehensive than those in the Mawangdui vessel texts which, in addition, does not describe a vessel for the hand *jueyin* region. The 12 main *jingmai* are considered to also supply specific internal organs. Consequently, certain neurovascular nodes have somatovisceral indications (**Table 1**).

A second category of *jingmai* consist of 8 singular (奇 *ji*) vessels to account for the large vessels running lengthwise in the body cavity as well as superficial venous networks to account for the fact there are 70% more veins in the body than arteries. The main singular vessels in the body cavity are the aorta (thoroughfare – *chongmai* 衝脈 / 冲脉), the vena cava (allowance – *renmai* 任脈 / 任脉), and the azy-

Table 1. Chinese and modern anatomical notation scheme for 12 longitudinal (*jing*) body regions, related vessels, and muscle distributions

Chinese Anatomical Divisions (pinyin)	Longitudinal Region, Vessel, and Muscle Distributions	Longitudinal Vessel Type	Somatovisceral Vessel Relationship
Hand Taiyin	Anterior Medial Hand (AMH)	Artery	Lungs
Hand Yangming	Anterior Lateral Hand (ALH)	Vein	Large Intestine
Foot Yangming	Anterior Lateral Foot (ALF)	Artery	Stomach
Foot Taiyin	Anterior Medial Foot (AMF)	Vein	Pancreas-Spleen
Hand Shaoyin	Posterior Medial Hand (PMH)	Artery	Heart
Hand Taiyang	Posterior Lateral Hand (PLH)	Vein	Small Intestine
Foot Taiyang	Posterior Lateral Foot (PLF)	Artery	Bladder
Foot Shaoyin	Posterior Medial Foot (PMF)	Vein	Kidneys
Hand Jueyin	Medial Hand (MH)	Artery	Pericardium
Hand Shaoyang	Lateral Hand (LH)	Vein	Internal Membranes
Foot Shaoyang	Lateral Foot (LF)	Artery	Gallbladder
Foot Jueyin	Medial Foot (MF)	Vein	Liver

* Chinese characters: Classical Characters are used immediately before the simplified version after a back slash (/). The simplified characters are not repeated thereafter.

gos, hemiazygos, and ascending lumbar veins (governing – *dumai* 督脈 / 督脉)(See Figure 1) [8, pp.149–158]. The *chongmai* is the arterial supply for the *jingmai* terminating in the hands, feet, trunk, and head. The *renmai* drains the *jingmai* veins originating in the feet, hands, and head. The *dumai* drains veins of the trunk and the bronchial veins.

The character *jing* (經 / 经) has several meanings, the most important being longitudinal or lengthwise orientation, including Chinese classics consisting of longitudinal scrolls of vertical bamboo strips as used in the word *Neijing*. Soulié de Morant translated this *jing* as meridian. In the *Neijing* it means “longitudinal” as it applies to:

- 1) longitudinal blood vessels (*jingmai* 經脈) (LS10);
- 2) longitudinal muscles distributions (*jing jin* 經筋) (LS 13); and
- 3) longitudinal waterways (rivers) (經水) (LS 12).

HARPER notes that the vessels (*mai*) in Mawangdui texts refer to blood vessels [4, pp.82–83] with some running vertically from foot to head (longitudinally); however, the character “*jing*” is not mentioned in these texts. UNSCHULD agrees that “*mai*” refers to blood vessels but he [5,9] and Harper [4] consider “*jing*” to mean “conduit” with respect to vessels. There is no credible support for this translation and even UNSCHULD [5, p.370, note 381] comments that opposed to “conduit” vessels TESSENOW [10] now considers that in his view: “the term ‘*jing*’ was introduced to designate the major vessels running through the body lengthwise in contrast to other secondary vessels forming networks and branching out here and there.” Tessenow’s present view is totally consistent with the historical facts of Chinese medicine.

Branching Vessel Networks

Key to the Chinese discoveries was the understanding of the continuous branching of larger vessels, to form smaller vessels for out-flowing arteries and the reverse process for return-flowing veins. The character *mai* (脈) for vessel depicts the concept of branching and is applied to all arteries and veins

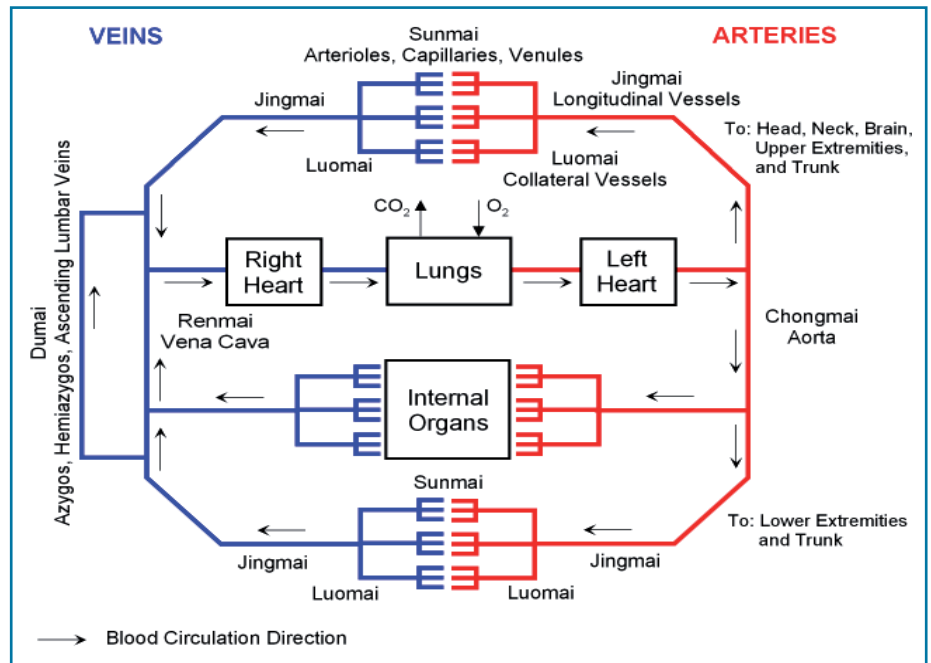


Fig. 1. Schematic view of Chinese cardiovascular system organization and vessel branching.

[8, Fig 9.2]. The main longitudinal vessels (*jingmai*) flowing lengthwise in the body give rise to collateral branches (*luo* 絡 / 络) to form *luomai* (絡脈). The collateral vessels (*luomai*) further branch into micro or fine (*sun* 孫 / 孙) vessels to form *sunmai* (See Figure 1). The *sunmai* consist of arterioles, capillaries, and venules that connect the out flowing arteries to the return flowing veins completing the circulation of blood “like a ring without end.” Marcello Malpighi (1628–1694) confirmed Harvey’s work on continuous blood circulation by discovering capillaries in 1661. The ancient Chinese also correctly noted that the heart pulse wave was not able to pass through the microvessels and hence the pulse is only detectable in the arteries.

The 12 longitudinal vessels supply collateral vessels and then superficial fine vessels associated with nodes (*jie* 節 / 节) (acupoints) [8, Fig 9.3]. Diagrams showing these nodal (acupoint) pathways are referred to as longitudinal-collateral vessel (*jingluo*) charts. Some nodes are considered to have somatovisceral associations with particular internal organs (Table 1) and some also reflect organ referred pain (viscerosomatic) as discovered by the Chinese. Needling sites (acupoints)

are best described as “neurovascular nodes” since needling response involves tissue reactions mediated by underlying fine vessels, associated mast cells, afferent nociceptive nerves, and immune complement alternative pathway participation. This activates ascending spinal cord pathways that subsequently provoke restorative descending control signals [8, CH 14]. None of these responses have anything to do with energy circulation, meridians, or channels.

Blood Circulation of Vital Substances

The essential aspects of Chinese blood circulation includes distribution of:

- 1) a critical component in inhaled air (*qi* 氣) now known to be oxygen, absorbed in the lungs and distributed in the arterial blood supply;
- 2) nutrients (*ying* 營 / 营);
- 3) defensive substances (*wei* 衛 / 卫) (immune cells); and
- 4) refined substances of vitality (*jingshen* 精神) which mediate emotions (hormones and other biologically active substances) [8].The venous blood returns the respiratory carbon dioxide (CO₂) to the heart and lungs which is exhaled as air (*qi*). This highly sophisticated con-

cept is consistent with present understanding.

Most of the misunderstanding about Chinese medicine revolves around the meaning of the character *qi* (氣). As a stand-alone single character *qi* means: air, breath, gases, steam, or vapor [4,5,8]. Other common usage of *qi* to mean air by the Chinese is apparent in their reference to weather conditions as “sky airs” (*tianqi* 天氣) and to the atmosphere as the “big air” (*daqi* 大氣). The atmosphere was noted to be the source of inhaled air which was considered the most vital substance circulated in the blood vascular system. This *qi* is also used in tandem with other characters to refer to manner, demeanor, temper, force, and function.

Early European Exposure

The first European work on Chinese needling therapy was written by GIROLAMO CARDARNO (1508–1576) based on information obtained from individuals returning from visits to China [11]. Cardarno was a physician and medical teacher in Milan. Several other books were written over the intervening years by employees of trade companies and others, including physicians, and even Jesuit Priests. The earliest first-hand account on the anatomical and physiological basis of Chinese medicine by a western physician was provided by WILLEM TEN RHIJNE in 1683 [12;13]. He spent two years working in Japan and had obtained four longitudinal-collateral vessel (*jingluo*) charts from local Chinese medicine practitioners.

Ten Rhijne observed a Chinese hydraulic device that demonstrated how blood continually circulates inhaled air and nutrients by means of the blood vascular system. The Chinese explained that continued branching of larger vessels into smaller vessels was essential to distribute blood throughout the body and that nerves were involved as well. Ten Rhijne conducted his own dissection studies to confirm progressive branching of blood vessels.

Later, ten Rhijne’s dissertation was rediscovered and used by physicians in France, Italy, and the United States

in the 1820s to experiment with Chinese needling therapy (acupuncture) [12,13,14]. They even applied the first known use of percutaneous and transcutaneous electrostimulation [15,16]. However, by 1900 the analgesic effect of electrostimulation was no longer in vogue.[17]

Introduction of Energy – Meridians

Some 30 years prior to GEORGES SOULIÉ DE MORANT developing his energy-meridian idea he had traveled to China as a young man in 1901 to originally fill a position with the Banque Lehideux. He soon took a keen interest in Chinese medicine during his 16 year stay and developed significant skills in the practice of needling therapy (acupuncture). After returning to France he practiced acupuncture and also started teaching his unique view of Chinese medicine to lay people and physicians. He is responsible for the first significant effort to introduce acupuncture to the West and produced a monumental work detailed in two volumes published in 1939 [18] and 1941 [19]. He completed a third volume in 1955 immediately before his death. These three works were then combined into one volume in 1957 by Editor Jacques Laffitte [20]. Two volumes based on Soulié de Morant’s clinical application notes were also produced by his life-long collaborator, DR. THERESE MARTINY. All five of these volumes are included in an English version [21].

Soulié de Morant tried to provide a modern explanation of Chinese medicine in terms of energy circulation by an unknown network of meridians consisting of: “an additional circulatory system having no relation to the nervous, circulatory, or lymphatic systems” [20; 21, pp. viii, 207]. It is clear from his work that he had a vision to: “provide the first scientific and clinical work on the description and utilization of human energy” [20; 21, p.182]. Unfortunately, his fundamental misconception of both energy and meridians is inconsistent with the historic facts of Chinese medicine and known human anatomy and physiology.

Notion of Energy

Soulié de Morant’s main problem was his representation of *qi* (氣) as “energy” for “lack of a better word” [18,21, p.46]. Almost of the all misunderstanding about Chinese medicine revolves around the ubiquitous use of this character *qi* to mean energy. This misconception continues to be used despite the historical facts as previously noted herein. Unschuld [5,9] notes that: “the core Chinese concept of *qi* bears no resemblance to the Western concept of ‘energy’.” SCHNORRENBERGER [22] also notes that *qi*: “is certainly not equivalent to the Western term ‘energy’.” Soulié de Morant expected that his energy would somehow be revealed by science. His notion of energy came from the belief that *qi* was identical to the Hindu concept of *prana* and different from nervous flux [18; 21, pp. xii, 46]. He considered *prana* to mean “vital energy” and supposed that this idea was introduced into China along with Buddhism from the 3rd and 4th centuries A.D.” [18, 21, p.71]. Contrary to Soulié de Morant’s assumption, the Chinese theory on the cardiovascular circulation of air and blood was established at least 600–700 or more years before the introduction of Buddhism into China.

Notion of Meridian

Soulié de Morant translated “*jing*” in the term “*jingmai*” for longitudinal vessel as “meridian” even though he knew that this *jing* meant longitudinal, longitude, or straight lines for laying out fields [18; 21, p.24]. He then substituted the term meridian for the 12 main longitudinal vessels supplying each side of the body. It is interesting that he still used the term “vessel” when referring to both the 8 singular and the collateral vessels. Unschuld points out: “The term ‘meridian,’ introduced by Soulié de Morant in his rendering of the concept of *jing*... is one example among others of what might be called a creative reception of Chinese medicine in Europe and North America in recent years that disassociates itself from historical facts” [5, p.370, note 382].

Understanding the Term “Energy”

Soulié de Morant understood that in-

haling atmospheric air was most essential to maintain life, and that food and water were critically necessary as well. He had a fundamental knowledge of metabolism and that breathing in air containing oxygen and exhaling carbon dioxide by the lungs was considered most important in developing personal “vital energy” [19; 21, p.125]. But his perplexing question was how and when universal (potential) energy transformed into vital energy and the answer to that he considered must be left in the realm of metaphysics [20; 21, p.202].

In Soulié de Morant’s view, meridians supplied and regulated energy that was indispensable to the organs and the tiniest cells [20; 21, p.278]. By deduction he considered that the cells themselves might also be irrigated by the meridians. He recognized that blood also circulates ceaselessly throughout the body which ensures nourishment to the tiniest cells and carries away their waste products. Soulié de Morant then considered that: “this may be the agent of distribution of energy to the cells.” He then continues: “The vital energy is carried by the blood to the cells” [20; 21, p.279]. He finally concludes that energy is actually circulated by the blood vessels: “The blood and energy which it distributes are carried throughout the entire body and to the cells through the vascular network.” [20; 21, p.280]

Soulié de Morant considered that his “vital energy” was qualified by the Chinese concepts of *yuanqi*, *zhenqi*, and *zhengqi* which he respectively translated as ancestral energy, true energy, and correct energy [18; 21, p.46]. It does not appear that he had good understanding of these Chinese terms especially since *zhengqi* is not related to metabolic processes. The present understanding of these topics is discussed as follows:

Source Breath or Function (*yuanqi*)

This is the spark or vitality of life that occurs at conception as noted in *LS 8: Origin of Vitality* [8, p. 111]. *Yuanqi* is considered to provide one’s genetic disposition sometimes referred to as ancestral function. The Chinese further considered the contribution of the

mother supports the foundation of life, while the father’s contribution supports the external defenses, throughout a person’s lifetime as noted in *LS 54: Natural Life Span*.

It is now known that at conception 50% of the nuclear DNA is contributed by each parent that results in the unique genetic disposition of the new individual. Meanwhile, 100% of the mitochondrial DNA is contributed only by the mother showing that energy production within each cell has genetic determinants which influence *zhenqi* to support the foundations of life.

True Function (*zhenqi*)

The concept of *zhenqi* correlates with the underlying metabolic processes of the body of converting potential energy supplies to power the body. This represents fundamental metabolism to produce fuel for bodily functions based on the essential intake of air (*qi*) and nutrients (*ying*) [8, Fig 8.1]. Since it is now known that this process is constrained within each cell it should be easily understood that *zhenqi* does not circulate throughout the body. Soulié de Morant translated *zhenqi* as “true energy” but, as it turns out, this is actually his illusive “vital energy” that he relegated to the realm of metaphysics.

Energy production within each cell is initiated by glycolysis of each molecule of glucose (from absorbed nutrients) to form two molecules of pyruvate. Pyruvate produced in cytoplasm is taken up by the cell mitochondria matrix and enters the Citric Acid Cycle. This involves a cyclic series of enzymatic and electron transport chain oxidative reactions that convert adenosine diphosphate (ADP) to adenosine triphosphate (ATP). This requires inhaled oxygen supplied by red blood cells via capillaries. The resulting carbon dioxide (CO₂) produced is absorbed by the capillaries and directed to the lungs for exhalation. ATP then fuels all cellular functions of the body except for mature red blood cells which do not have mitochondria. This is fundamental cell respiration and is basically why breathing in oxygen from atmospheric air is critical to sustain life.

SIR HANS ADOLPH KREBS (1900–1981) first postulated the Citric Acid Cycle

[23] in 1937, for which he received the 1953 Nobel Prize for medicine and physiology. CYRUS HARTWELL FISKE (1890–1978) and YELLAGAPRADA SUBBAROW (1896–1948) discovered ATP in 1925 [24]. ATP fuels cellular functions through a process of hydrolysis (requires water) that breaks the high energy bonds between the last two phosphates thereby releasing energy to fuel cellular processes. The resulting ADP is available again for use. Each glucose molecule plus 6 molecules O₂ is able to convert 36 molecules of ADP to 36 ATP plus 6 molecules each of H₂O and CO₂.

Physiological Balance (*zhengqi*)

The concept of “ *zhengqi*” involves the need to maintain physiological balance over a wide range of pathogenic influences (environmental, dietary, and emotional stresses) called “ *xieqi*” to maintain health [8, Figs 2.3 & 13.1]. This is the Chinese pathogenic model where normal health and function is maintained to counteract pathogenic factors. These ideas are similar to CLAUDE BERNARD’S (1813–1878) balance of the “ *milieu interieur*” or Walter Cannon’s concept of “homeostasis” which operate by stable negative feedback control [25,26]. However, the body also has unstable positive feed-forward mechanisms that can lead to pathology now being referred to as allostatic regulation [27]. Allostatic processes respond to emergency and emotional conditions, and other environmental factors. The Chinese pathogenic model includes all these factors.

Need for Critical Change

Reliance on the energy-meridian misconception needs to be replaced with physiologically based present day understanding if Chinese medicine is ever going to be integrated into mainstream medical care. Practitioners of acupuncture can still use what they already know about neurovascular nodes (acupoints), their locations, and clinical indications. They just need to change their view from meridian/channels to blood vessels, nerves, and muscular distributions. This change is especially important since Soulié de

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Morant himself seemed to realize in his later years that the blood vessels were actually supplying energy to the tiniest cells. He missed the fact that the process of converting this potential energy to his “vital energy” only occurs within the cells and is not circulated in the body. This is understandable since these details were not well understood by science when Soulié de Morant first conceived his energy-meridian idea. However, cellular metabolism was understood before he wrote his last book on the *Physiology of Energy* [20,21] in 1955.

It is essential that educational requirements for Chinese medicine follow its own historical precedence of a thorough understanding of anatomy, physiology, and pathology (biomedical sciences) in addition to the distinctive treatment and clinical approaches that continue to make this medical system unique. Greater understanding and knowledge will only serve to benefit public interest, and will also provide a solid basis for valid research.

References

1. Harvey, W. *Exercitatio anatomica de motu cordis et sanguinis in animalibus*. Francofurti (Frankfurt) 1628. The first English text, “Anatomical exercises on the motion of the heart and blood in animals.” translated and edited by Geoffrey Keynes, London 1653.
2. Rickett, WA. *Guanzi: Political, Economic, and Philosophical Essays from Early China*. Princeton University Press, New Jersey, 1998, pp.100–101.
3. Ma, JX. *Acupuncture and Moxibustion, in Ancient China's Technology and Science*. Foreign Language Press, Beijing, China 1983, pp.345–351.
4. Harper, DJ. *Early Chinese Medical Literature: The Mawangdui Medical Manuscripts*. Kegan Paul International, London and New York, 1998.
5. Unschuld, PU. *Huang Di Nei Jing Su Wen: Nature, Knowledge, Imagery in an Ancient Chinese Medical Text*. Berkeley. University of California Press. 2003
6. Tsien, TH. *Written on Bamboo and Silk: The Beginnings of Chinese Books and Inscriptions, Second Edition*. University of Chicago Press, Chicago. 1962, p.14.
7. Veith, I. *The Yellow Emperor's Classic of Internal Medicine*. California University Press, Berkeley and Los Angeles, California. 1949, 1966, pp.77–90.
8. Kendall, DE. *Dao of Chinese Medicine: Understanding an Ancient Healing Art*. Oxford University Press, London, Hong Kong, New York, 2002.
9. Unschuld, PU. *Medicine in China: A History of Ideas*. Berkeley, Los Angeles, London. University of California Press. 1985.
10. Tessenow, H. *Der chinesische Moralbegriff “i.”* Frankfurt am Main: Peter Lang, 1991. (German)
11. Rocchia, L. Chinese acupuncture in Italy. *Am J Chin Med*. 1974 Jan;2(1):49–52.
12. Carrubba, RW, Bowers, JZ. The Western world's first detailed treatise on acupuncture: Willem ten Rhijne's *De Acupunctura*. *J Hist Med Allied Sci*. 1974 Oct;29(4):371–398.
13. Rosenburg, DB. Wilhelm Ten Rhyne's *De acupunctura: an 1826 translation*. *J Hist Med Allied Sci*. 1979 Jan;34(1):81–4.
14. Cassedy, JH. Early use of acupuncture in the United States. *Bulletin of the New York Academy of Medicine* 1974;50(8):892–896.
15. Sarlandiere le Chevalier JB. *Memories sur l'électropuncture*. Private publication Paris, 1825.
16. da Camino, FS. *Sulla agopuntua con alcuni cenni sulla puntura elettrica*. Antonelli, Venice, 1834.
17. Stillings D. A survey of the history of electrical stimulation for pain to 1900. *Medicine Instrum*. 1975 Nov-Dec;9(6):255-9.
18. Soulié de Morant, Georges. *L'Acupuncture chinoise. Tome I L' énergie (Points, Méridiens, Circulation)*. Mercur de France, 1939. (French)
19. Soulié de Morant, Georges. *L'Acupuncture chinoise. Tome II Le maniement de l'énergie*. Paris, Mercur de France, 1941. (French)
20. Soulié de Morant, Georges. *L'Acupuncture Chinoise*. 3 volumes, Paris, 1957. (French)
21. Zmiewski, P (Ed). *Georges Soulié de Morant, Chinese Acupuncture (L'acupuncture Chinoise)*. Lawrence Grinnell, Claudy Jeanmougin, and Maurice Leveque, trans. Brookline, Mass, Paradigm Publications, 1994.
22. Schnorrenberger CC. Morphological foundations of acupuncture: an anatomical nomenclature of acupuncture structures. *BMAS Acupuncture in Medicine*, 1996 Nov;14(3):89–103.
23. Krebs, HA. The History of the Tricarboxylic Acid Cycle, *Perspect. Biol. Med.*, 14: 154–170 (1970).
24. Fiske, CH, SubbaRow, Y. The Colorimetric Determination of Phosphorus. *J. Biol. Chem*. 66, 1925.
25. Cannon, WB. The emergency function of the adrenal medulla in pain and major emotions. *Amer. J. Physiol*. 1914;33:356–372.
26. Cannon, WB. *The wisdom of the body*. New York, W.W. Norton & Co. 1932.
27. Schulkin, J. *Rethinking Homeostasis: Allostatic Regulation in Physiology and Pathophysiology*. A Bradford Book, MIT Press, Cambridge, Massachusetts, London, England, 2003.

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