

# Modern quantum theories and experimental achievements motivate new exploration of acupuncture in traditional Chinese medicine

## 量子科学与中医针灸理论探索

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### Abstract

Traditional Chinese medicine (TCM), a theoretical medical system founded about three thousand years ago, originated from the richness of Chinese culture with the support and development of ancient astronomy and philosophy. It has illuminated many mysteries of nature and the human body. This has not always been easy for the layperson to understand. In modern times, some of these processes have been gradually discovered or confirmed by frontier science. The experiments of quantum physics have shaken the fundamental concepts of conventional science, refuting criticism of Chinese culture and TCM theories. The new discoveries have triggered a new understanding of TCM theories. For example, the theory of quantum mechanics interfering with certain human functions helps explain a series of phenomena that were previously difficult to understand. The veil of many wonderful phenomena of Chinese culture and TCM acupuncture has not yet been fully pierced. For example, the body's energy system, the invisible qi, and the phenomenon of consciousness and subconscious function remain mysterious. However, quantum theory and numerous scientific experiments can lead to the explanations of difficult problems which were not understood in the past. For example, the nature of the changes in yin and yang, and associated principles; the five-element principles; consciousness and sub-consciousness which might affect scientific experiments and treatment outcomes; the objective existence of qi and qi field; and the essence of the meridian system in the human body and the principles of acupuncture. This article explores the scientific principles of TCM and acupuncture. The unique characteristics of TCM and acupuncture position themselves as Eastern cultural treasures. The authors endeavor to strengthen readers' confidence in theoretical TCM and believe that it is a major step in integrating TCM acupuncture into modern science and medicine.

**Keywords:** Traditional Chinese Medicine; Western Medicine; Qi; Qi Field; Spirit; Consciousness; View of Life and View of Body; Quantum Theory

**【摘要】**传统中医学是创建于约三千年前的理论医学，起源于中国早期文化的繁荣，借助于古天文学及哲学的支持与发展。它深刻地预见和揭示了自然界和人体的许多奥秘，但一直不易为常人所理解，数千年后才逐步被现代科学发现或印证。当代最前沿的量子物理实验正彻底动摇着传统科学的某些基础观念，从而打破那些对中国文化及中医针灸理论的无知指责与批判，引发了对中医理论的重新认识。比如，量子力学理论与某些人体功能相互契合，解释了一系列过去曾难以理解的现象。但中国文化和中医的很多奇妙现象的面纱还尚未彻底揭开。例如，人体能量体系与气的作用及其不可见性，意识与下意识的功能现象。量子理论及大量科学实验范例，启发我们解释了一系列过去不容易理解的难题。例如，阴阳变化的本质、五行的原理、人的意识与下意识确实可能影响科学实验及治病结果、气与气场的客观存在以及人体经络系统的本质及针灸技术原理。本文试图探索中医与针灸的科学原理，支持及维护其人类文化瑰宝的地位，加强我们自身的理论自信和文化自信，为今后正确地弘扬中医事业开路。

**【关键词】**中医学；西医学；气；气场；精神；意识；生命观与身体观；量子论

**【中图分类号】** R2-03      **【文献标志码】** A

Traditional Chinese Medicine (TCM) prior to modern cross-breeding Chinese and Western medicines has been successful in medical diagnosis and treatment for

thousands of years. The theories of TCM are rather conclusive and technical, even without including more complicated inference processes. Through its continuous practice in the past three thousand years, TCM has made substantial contributions to the well-being of China. TCM produces many critical

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mysteries not explainable by conventional sciences. However, in the most recent one hundred years, a skeptical and critical movement has been actively raised against TCM theories. There have been incorrect attempts to teach, learn and practice TCM by adopting the framework of conventional Western medicine (CWM). This trend appears to reform or cross-breed TCM with CWM theories while ignoring the essence of TCM. In fact, TCM and CWM are two different systems in their contents and approaches. Therefore, anti-TCM movements have periodically arisen to mislead and naively influence government policy on TCM practice. TCM and acupuncture as a whole are sometimes ostracized by the Western scientific community and the pharmaceutical industry. The approach of cross-breeding Chinese and Western medicines is to simply analyze the components of Chinese herbs. This is a far-fetched approach and completely deviates from TCM. It would lead traditional Chinese herbal medicine into a dead end. In fact, traditional Chinese herbal prescriptions help to correct unhealthy status or anomalies in the human body by the means of 'four natures and five tastes' of herbs and their energy information instead of chemical components, so as to restore the original balance of the patients' health which mainly relies on their strong self-healing ability. We should not forget the development, history and achievements of TCM in ancient times in order to preserve the essence of TCM.

Three ancient books have influenced not only Chinese culture but also philosophy and thoughts in many other countries. *Yi Jing (The Book of Changes)*<sup>[1-2]</sup>, *Dao De Jing (Tao Te Ching)*<sup>[3]</sup>, and *Huang Di Nei Jing (Yellow Emperor's Classic of Internal Medicine)*<sup>[4]</sup> reflect the fundamental aspects and the essence of the universe. The TCM essence as presented in the three books includes the concepts of the ever-changing universe: appear/disappear, visible/invisible, and material/energy/information<sup>[3]</sup>. It is believed that the mind and physical orders are connected and even form a unity from a point of view focusing on the whole life<sup>[3,5]</sup>. The universe is considered a connected unity and equipped with holographic characteristics, which is not limited to the three-dimensional view of the human body based on the CWM's induction from a point of view focusing on the human body. It is thus critical to clarify TCM principles, maintain proper TCM methodologies, and preserve its integrity. Acupuncture and herbal therapies cannot be effective if the essence of TCM is not truly understood and the treatment is not well performed by TCM practitioners. Experiments from modern scientific frontiers begin to reveal ancient TCM treasures and mysteries. The aspects presented in this manuscript provide some of those new findings and achievements.

## 1 Quantum Mechanics Discoveries

The discovery of quantum mechanics has caused a revolution in various scientific fields<sup>[6]</sup>. It is believed to be one of the major revolutions in 20th Century physics. Advanced scientific findings in quantum mechanics are consistent with TCM theories which were originated or predicted by ancient Chinese sages. These findings reveal the difference between Eastern and Western methodology and ways of thinking.

Quantum theory helps us understand the harmonic micro-world and resolve a series of questions that were previously unexplainable. It has become the foundation of modern electronics and most high-tech achievements. It has completely changed the appearance of modern science and shocked society's conventional thinking<sup>[6-8]</sup>. Take 'the wave-particle essence of quantum theory' as an example. It introduces the concept of wave-particle duality in quantum mechanics and declares that every particle or quantum entity can be partly described in terms of not only particles, but also waves. This concept reflects the transformability of both existing forms of matter and energy in the universe, and the transformation of visibility and invisibility. It is exciting to notice that many 'skeptical or doubtful' TCM theories or essential conclusions of traditional Chinese culture developed 3 000 years ago are coincidentally consistent with quantum theories.

According to the wave-particle concept, the classical concept of 'particle' or 'wave' cannot fully describe the behavior of quantum-scale objects, neither photons nor matter. Wave-particle duality is an example of the principle of complementarities in quantum physics. This implies that the substance is composed of two functions: visible and invisible (or yin and yang) complementary substances. Quantum entanglement is a physical phenomenon that occurs when pairs or groups of particles are generated or interact in ways such that the quantum state of each particle cannot be described independently of the others, even when the particles are separated by a large distance. Quantum entanglement is one of the major parts of quantum mechanics, which makes it hard to understand in terms of the everyday world<sup>[6-8]</sup>.

Quantum entanglement has a clear definition and accurate meaning involving the complete holistic aspects of the quantum system. It seems that information transfer is not impacted by space or time within the same system, but actually may exist in the same state without the need of information transfer. This is like the communication between the mind of separated twins which occurs instantly and without long-distance effects for thoughts, experiments or special healing programs. Heisenberg in 1927 explained that certain pairs of physical properties such as position

and speed can neither be simultaneously measured, nor be defined in operational terms in an arbitrary precision (unlike a car in the macro world). The more precisely one property is measured, or defined in operational terms, the less precisely measured can the other be. This statement is known as the uncertainty principle in quantum mechanics. It unavoidably implies that human consciousness and mind with extraordinarily powerful energy may influence the results of some scientific experiments<sup>[6,8]</sup>. This is contradictory to conventional science.

## 2 Modern Scientific Experiments Relating TCM Theories to Famous Quantum Phenomena

### 2.1 DNA phantom effect

A scientific experiment was conducted by Dr. Vladimir Poponin, a Russian quantum biologist with his colleague Peter Gariaev at the Russian Academy of Sciences. A research paper published in 1995 was based on their collaborative study The DNA Phantom Effect. The results were later repeated in a series of experiments and published in the United States<sup>[9]</sup>. Dr. Poponin designed this pioneering experiment to test the behaviors of DNA on light particles (phantoms). They removed air from a specially designed tube, to create a vacuum, but kept the existing phantom particles in it. In this setup, the exact location of the particles could be detected. At first, the phantom particles were distributed diversely and unordered inside the tube; but when a sample of human DNA was placed inside the closed tube, the DNA had a direct influence on the phantom particles by shaping them into regular patterns through an invisible force. They observed that the phantom particles were never restored to their original unordered status after the DNA sample was moved out of the tube and kept away. It seemed as if the DNA still existed in the tube. The results follow the quantum principle: DNA can change the behavior of phantom particles through invisible force according to the 'uncertainty' principle, and human invisible energy (or perhaps consciousness) has a direct impact on the surroundings. The graphs of light particles seem to demonstrate the connection between life and matter without limitation in space and time through 'entanglement'<sup>[6,8]</sup>.

Some new propositions presented in quantum mechanics may seem confusing to those who are skeptical, but the results show similarity with the ancient Eastern culture and Taoist philosophy. Quantum theory helps answer many unexplainable questions in TCM, such as: the theory of yin and yang; the self-organizing system (five-element) of the human body; the concept of wholeness of the human body and its inseparable connection to its surroundings; the existence of human consciousness and mind as well as their functions; and, the invisible qi system or qi field

that is filling up the universe, being so big that there is nowhere outside of it and so small that there is nowhere inside of it. The system is described 'as above, so below' and 'as within, so without', patterns being contained within patterns, complete in and of themselves and different only in scale<sup>[3,6,9]</sup>; quantum theory may enable further exploration of nature and the source of life, enhance the better understanding of the human body, promote the development of future medicine, and improve human health.

### 2.2 DNA sample responses to the emotion of human beings without space and time limit

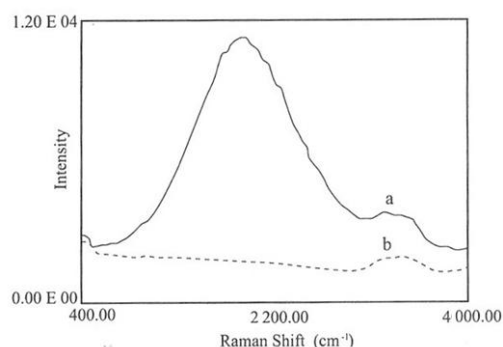
This experiment was initiated in the US Army and continued by Dr. Cleve Backster in the 1990s. It studies the notion that human emotion or consciousness can communicate with the donor's separated DNA sample in the same building or over a distance of 350 miles. The DNA cell's response was gauged by an atomic clock, and the time between the emotion and the cell's response was measured and confirmed simultaneously. Einstein believed that the past and the future are intimately entwined as the stuff of the fourth dimension, a reality that he called space-time<sup>[6,9]</sup>. However, the zero-effect of space and time as indicated in this experiment confirms the hypothesis that the DNA cells are connected by a quantum field within the same system<sup>[9]</sup>. This implies that for the imaginary ideas of one moment in time to become the reality of another, there must be something that links them together. Quantum entanglement supports the statement: once something is joined, it is always connected, whether it remains physically linked or not<sup>[8-9]</sup>.

### 2.3 Qi remotely acts on tap water and <sup>241</sup>Am radioactive property

An experiment demonstrating qi effect on tap water was conducted in late 1986 by a life science scientist with cooperation from the High-energy Research Institute, Chinese Academy of Science located in Beijing. This scientist used his subconscious power (qi) without directly touching the sample to change the Raman spectrum of a tap water sample (the experimental material). There was a peak in the range of 1 000 cm<sup>-1</sup> to 3 000 cm<sup>-1</sup> shown in the Raman spectrum of the treated sample. However, this did not appear in the control sample. The intensity of this peak was identified to be at least 15 times greater than that of the usual peak at 3 410 cm<sup>-1</sup><sup>[10]</sup> (Figure 1).

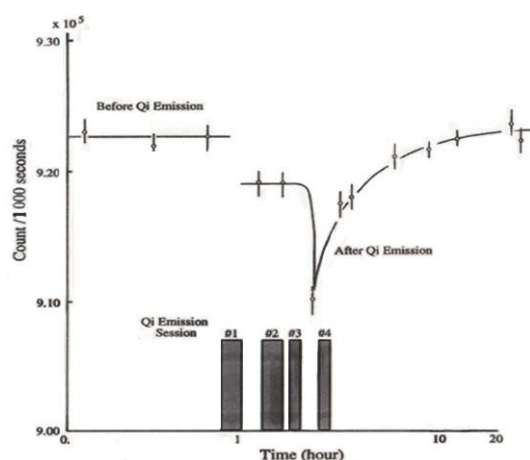
Another experiment was conducted in 1987 by the same scientist in conjunction with the aforementioned group on a relatively stable radioactive source <sup>241</sup>Am that is known for a half-decay time of 458 years. It was believed that nothing could influence the radioactive property of the material. Surprisingly, after being exposed to the subconscious power (qi), the radioactive decay rate dropped by 1.35%. The deviation of 1.35% was seven times the experimental error (Figure 2). This

experiment has been replicated with success many times with conscious power exposure at distances of 7 km, 2 000 km, and over 10 000 km, demonstrating that if aspects found in a quantum theory field link all matter, then everything must remain connected. The distance did not seem to make any differences<sup>[10]</sup>. Without the support of the quantum entanglement principle, it would be very difficult to even consider such a possibility.



**Figure 1. Raman spectrum of tap water before (dashed line) and after (solid line) external qi treatment**

Note: Adapted from *Scientific Qigong Exploration*<sup>[10]</sup>



**Figure 2. The effect of external qi emitted on the count rate of gamma ray decay of <sup>241</sup>Am**

Note: The decreases in count rate during the qi-emission sessions. The error bars in the figure do not include the uncertainty due to the reposition of the <sup>241</sup>Am radioactive source (Adapted from *Scientific Qigong Exploration*)<sup>[10]</sup>

### 3 Quantum Mechanics Helps Reveal the Essence of TCM Meridian and Acupuncture

The wave-particle duality of quantum reflects the unity and convertibility of the two existing forms of matter and energy in the universe, i.e., the conversion of the visible and invisible status<sup>[7,9]</sup>.

Conventional science confined to three-dimensional space only recognizes what can be observed and denies everything that cannot be seen. Consequently, people

who disagree with the conventional scientific concepts are often called 'pseudo-science' believers and are unfairly mistreated<sup>[11-12]</sup>.

About 3 000 years ago, ancient Chinese sages through their deep meditation practiced training to go beyond three-dimensional space. They observed the existing qi, invisible for regular people. 'Qi monism' becomes the theoretical foundation of TCM and acupuncture. TCM believes that qi is an invisible substance existing and filling the universe. It is continuously moving, constantly changing, and contains material, energy, and information. Qi is believed to be the source of all things in the universe, which exists in two forms, one in the temporary state of aggregation and seemingly stable, and the other in spreading out of the chaotic state and not visible. Together it is described as 'combined in a shape and scattered into the wind'<sup>[4]</sup>.

Like many things, qi also divides into two forms: yang qi representing the life force, all things upwards, masculine, aggressive, active; whereas yin qi representing the feminine side, things bearing life, moist, collective, and supplementary to the yang. The two forms are interdependent, transformable, alternative, and opposite to each other, consume each other but not separable, so as to maintain a dynamic equilibrium state.

The human body's meridian systems were originally discovered with 'visual acuity' by ancient TCM masters. About 400 years ago, Li Shi-zhen, one of the greatest TCM physicians in Chinese history, said in his book titled *Ben Cao Gang Mu (Compendium of Materia Medica)*, 'The meridian systems in the human body can only be seen through special visual capacity in a state of deep meditation.'<sup>[13]</sup> The meridian systems are believed to be the pathways of qi running along the gaps and tiny spaces inside the muscle or tissue. Acu-points on the meridian are the flow-through and pour points of qi in the human body. They have no definite anatomical features but provide the network connections to certain parts of the body or system. All of them would disappear with the cessation of life. Some high-level TCM practitioners can use their advanced visual capability to observe them. This is often referred to as inward or internal imagination and observation<sup>[4,13]</sup>. One of acupuncture methods requires acupuncturists to 'guide yang from yin or guide yin from yang'; to 'treat the left side while the illness symptom appears on the right, or treat the right side while the illness symptom appears on the left'<sup>[2,4]</sup>. Because of qi circulation in meridians, yin-yang and left-right work in coordination like a lever to reinforce or improve the effectiveness of acupuncture treatments.

A revolutionary breakthrough in frontier science is consistent with the knowledge of TCM originated thousands of years ago<sup>[4,6]</sup>. Quantum mechanics and some related experiments support the claims that

human' consciousness can influence or change the predicted results of scientific experiments as well. This finding is considered the most important exploration of the scientific frontier, and a satisfactory explanation of TCM principles and practices. TCM has long recognized that people's consciousness and sub-consciousness are a kind of microscopic energy produced by the heart and brain and can often play a key role under the guidance of the 'unity of the will'. Dr. Max Planck, the founder of quantum mechanics, believes that 'all materials are derived from the atomic movement and maintain a close integrated force'. We have to believe that behind this power are consciousness and mind, which are the basis of all things<sup>[7-8]</sup>. Einstein, the most famous contemporary scientist, has repeatedly pointed out that "the most powerful driving force in the universe is 'love'"<sup>[6-8]</sup>. Scientific research shows that people's subconscious minds and ideas can be trained to produce enormous bio-energy and form an energy field. TCM training requires the practitioners to respect patients like their own family members, and to treat them with sympathetic care. The effective treatment not only relies on the practitioners' knowledge and skills, but also requires their heartily treatments.

Quantum entanglement actually reveals that all systems in universe have a property of wholeness, which helps us to further understand the 'holographic principle' of nature. It is in accordance with this phenomenon that the ancient Chinese created methods that use local treatments to influence the whole body, such as abdominal needles, auricular acupuncture, and foot spas (acupressure, massage). If we agree that the human body is a macroscopic quantum body<sup>[8]</sup>, then some wonderful phenomena in TCM acupuncture are themselves quantum experiments. Lay people with the perception of distance in a three-dimensional space can hardly understand the distance between two points in a high-dimensional space. Quantum entanglement helps to understand holographic principles and why TCM acupuncture effects could be transferred or transformed among blood relatives. It also helps explain the effects of qi healing over a long distance. 'Uncertainty of quantum' introduces the influence of human consciousness and mind, whose existence has been considered outside the traditional science realm<sup>[2]</sup> until recent revolutionary breakthroughs in frontier sciences. It is conformed with TCM phenomena. For example, human sub-consciousness can be utilized to guide qi movement. For example, De Qi (arrival of qi at the acu-point) or Qi Zhi Bing Suo (guiding qi to the illness location) is a key technique for achieving positive acupuncture effects. The 'activating qi technique' (AQT) refers to acupuncture treatments that are not applied on the location where the illness symptom appears but rather on the opposite location, besides manipulating needles with the acupuncturist's mind to guide the qi to

the illness. At the same time the patient needs to closely collaborate by gently moving the painful area. Abdominal acupuncture and Dong's extra points have proven AQT to be very effective for releasing stagnation and releasing pains, usually with immediate effects<sup>[5,14]</sup>. Quantum principles can help understand many questions in TCM, such as the emotional effects of the aura light<sup>[13]</sup>.

Quantum mechanics experiments have confirmed that, as a manifestation of consciousness, human emotion can remotely influence DNA samples that have been separated from the human body<sup>[9,15]</sup>. This inspires us to explore and understand relationships of human internal organs with the seven emotions described in TCM theories as: joy, anger, worry, thought, grief, fear, and surprise. This seems incomprehensible and unacceptable to conventional science and CWM, but they have been confirmed by quantum theory. Good intentions or wishes can be used to heal diseases under satisfied circumstances. This is not a superstition but has a scientific basis. We can say that quantum mechanics is the most perfect application of existing abstract mathematics tools next to Einstein's theory of relativity. Quantum mechanics properly expresses the natural laws using mathematical tools and helps support the ongoing scientific and conscious revolution in human society<sup>[7-8]</sup>. The tremendous power of quantum mechanics and its endless scientific experiments have made it possible to understand for TCM acupuncture techniques and theories behind.

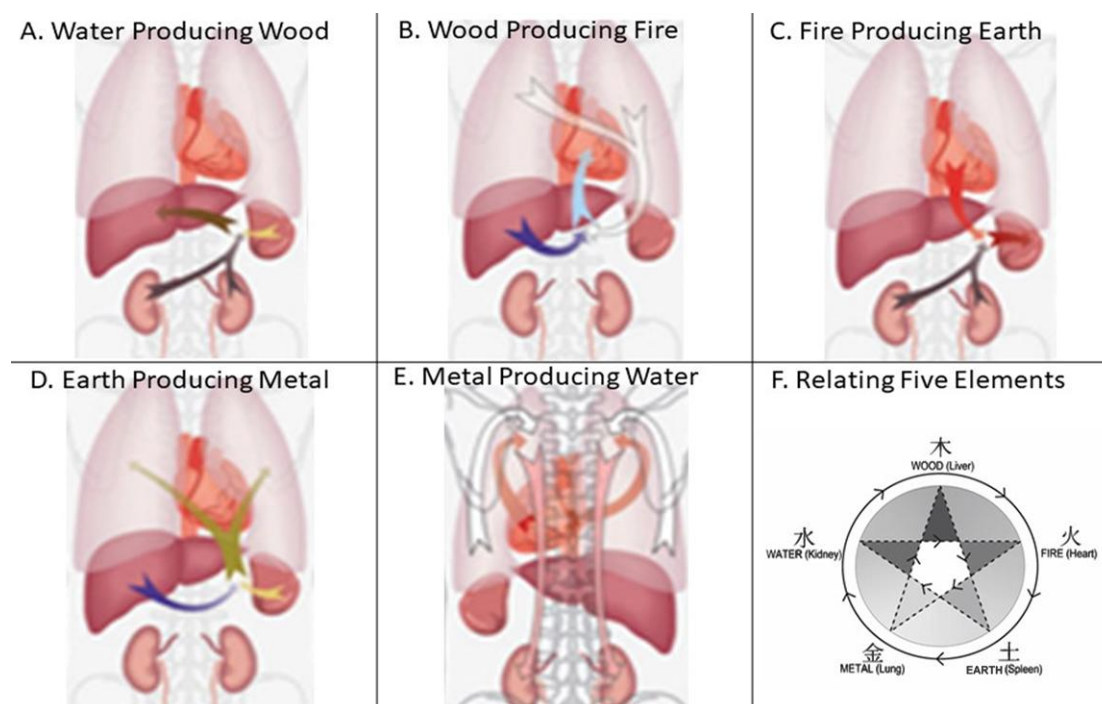
#### 4 The Five Functions of Quantum Corresponding to the Five-element Principles in TCM

The mathematical expression of quantum mechanics is the famous Schrodinger wave-function equation. It describes the volatility of ions not in a three-dimensional space, but rather the abstract waves with multi-dimensional probability. The same equation can show five different functional states of quantum: position, momentum, kinetic energy, potential energy, and angular momentum. They are in correspondence to five different operators (mathematic tools) or matrices, and hence simplify the expression and calculation<sup>[7-8]</sup>. This is similar to TCM's introduction of the five-element idea. TCM expresses the existence of the five functions of nature, not merely being limited to lived objects. But when applying the concepts to the human body within five internal organs, it incisively and vividly explains the relationship between the five internal organs and their perfect harmony of expression together with the five tastes, five colors, five sounds, and five emotions. The functions of the five organs fit so seamlessly that people no longer believe they are results of natural evolution, but rather the great wisdom of a careful design. This is

not a coincidence. It shows the same methodology of observation and thinking in both quantum mechanics and TCM: paying attention to the functional variation and state rather than the structure of solid objects, which is beyond traditional scientific thinking.

In order to reveal the nature of the five elements and

their functions following the operational principles, we use the following diagram to demonstrate the function of the five internal organs and their perfect harmony. This helps to understand the same kind of natural laws revealed by quantum mechanics and traditional Chinese culture (Figure 3).



**Figure 3. Relationships among five elements expressed on five viscera of human beings**

Note: Adapted from *Handbook of Traditional Chinese Medicine*<sup>[5]</sup>

Conventional science usually pays more attention to the superficial structure or a decomposed point of view on objects. Very often the methodology of conventional science is developed so technically and not capable of dealing with universal complex problems<sup>[14]</sup>. For example, the gene has been studied in a great detail. However, one has to admit that more than 1 000 genes in a simple piece of seaweed are not independent. To be sure of finding the best fit statistically, in this case, one should work out the total number of combinations, a multiplier of 2 to its power of 1 000, or  $2^{1000}$  that is about  $10^{300}$ . No matter how advanced the computation is at present time, one cannot avoid such complexity<sup>[12]</sup>. A scientific paper tells how a TCM physician can optimize the gene adjustment in an eye retinal medical experiment<sup>[15]</sup>. The data demonstrated that a special script of TCM product (XY\_995038) greatly prolonged the survival of a cultured retinal neuron sample and inhibited  $H_2O_2$ -induced toxicity; DNA microarray analysis also showed that among 1 176 genes tested, 72 genes were up-regulated, and 77 genes were down-regulated. Both the up-regulation of the 72 genes and the down-regulation of the 77 genes are believed to be beneficial to the prolongation of neuron survival<sup>[15]</sup>.

TCM and CWM are completely different two systems and both have advantages and disadvantages. In the past 100 years or so, some Chinese have lost their confidence in TCM. They criticize the traditional Chinese culture and declare TCM to be feudalism or superficial<sup>[16]</sup>. This paper is prepared to recognize the facts and rebuild confidence in Chinese culture and to promote the legacy of mankind. Modern scientific experiments have been gradually confirming the hidden processes and predictions in TCM, thereby revealing the true value of TCM. Following the effort of a marvelous Chinese culture and the new development of scientific research and exploration, people will recognize the real value of TCM theories and appreciate the great treasure offered to the world. By taking advantages and avoiding disadvantages of the two systems, this attitude and effort would gradually become the kernel and strength for establishing 'future medicine' for mankind. Chinese cultural heritage can be one of the guiding lights to a bright future.

Quantum mechanics itself still has a lot of room for development. Conventional quantum mechanics focuses on problems with fixed structures. The study of dynamic changes in quantum systems is still in its



infancy both theoretically and experimentally. The conjecture that 'the living body is a macroscopic quantum body' lays the foundation for using quantum mechanics as a tool to study life processes, consciousness, emotions, and other subjects that traditional science dared not touch. It can be expected that the future development and application of quantum mechanics in understanding life science will show its amazing power. This is a major study area left for scientists in physics, life sciences, TCM and CWM, neurology, physiology, and psychology.

#### Conflict of Interest

The authors declare that there was no conflict of interest regarding the publication of this paper.

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