

PERSPECTIVE

Acupuncture Meridian of Traditional Chinese Medical Science: An Auxiliary Respiratory System



Liang-Ju Zhao*

College of Power Engineering, Chongqing University, Chongqing, China

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Abstract

The acupuncture meridian system (AMS) is the key concept of Traditional Chinese Medical Science (TCMS). It is a natural network formed by the tissue space that connects human viscera and skin. In this article, a new hypothesis that the AMS is an auxiliary respiratory system is presented. The AMS collects the CO₂ that is produced by tissue supersession and that cannot be excreted via blood circulation, and discharges the CO₂ through the body's pores, thus preventing a pressure increase in the internal environment. Thus, local blood circulation will not be blocked, and the body will remain healthy. In addition to neuroregulation and humoral regulation, AMS regulation is an important method of physiological regulation. Furthermore, the pathological principle of the AMS, therapies of TCMS, and the excellent future of the AMS are discussed.

1. Introduction

Traditional Chinese Medical Science (TCMS), which is based on the acupuncture meridian system (AMS) [1,2], has been used in clinical practice for >2500 years. Due to its efficacy, acupuncture has been recommended by the World Health Organization in 1980 as an effective alternative therapy for

43 different disorders. Although the AMS plays a very important role in the supersession process, it is very difficult to explain the working principle behind this process using modern Western medical science. In the past decades, many researchers have studied different aspects of the AMS. Fujita [3] (Japanese), Zhu and Hao [4] and Zhang [5] (Chinese), and Chang [6] (Taiwanese) have presented their hypotheses on the AMS.

According to Fujita's [3] study, the essence of the AMS has been recognized as the movement of body fluid out of ducts driven by the constriction of muscles, and the structure of the AMS is the gap between the connective tissue. In the book

* Corresponding author. College of Power Engineering, Chongqing University, Chongqing 40044, China.
 E-mail: zhaolj@cqu.edu.cn.

edited by Zhu and Hao [4], many research works are summarized, and the existence of the AMS is proved by the propagation of sensation along the AMS and other evidence. In the book written by Zhang [5], the AMS is recognized as a water channel with a low flow resistance and with the functions of passing nutrition, expelling waste of supersession, and delivering physical or chemical information. Chang [6], based on the chaotic wave theory of fractal continuum, confirmed the AMS to be a network of neurovascular bundles and their smaller branches. Although great progress has been made, a perfect theory of the AMS is still not available. What is an acupuncture meridian, and what does it consist of? What is the physiology principle? What is the pathology principle? These are the three main unsolved problems related to the theories of the AMS.

In this article, a new AMS hypothesis that tries to solve the three main unsolved problems of the AMS will be presented. The relation between the AMS and disease, and the relation between the AMS and the therapies of TCMS will be discussed. Finally, the expected excellent future of the AMS will be presented.

2. AMS hypothesis of an auxiliary respiratory system

Based on past studies, we will present a new hypothesis of the AMS through a comprehensive analysis.

2.1. Auxiliary respiratory system of the AMS

The AMS of Huangdi Neijing is an auxiliary respiratory system separated from the other systems of the human body. Differing from blood vessels or the windpipe, the AMS is a net of gas channels that are naturally formed by gaps within tissues. Acupuncture points exist in the lacunose parts of the AMS, which consist of a larger space to contain more gas. The AMS consists of many meridians connecting each other and connecting with collaterals, which link internal viscera into an interactional ensemble. As shown in Fig. 1, the AMS collects the CO_2 produced by tissue supersession that cannot be excreted by blood circulation, and discharges the CO_2 through the pores of the skin. Primarily, CO_2 flows in the AMS with a little steam and oxygen. In special cases, such as a serious disease, the AMS will act as a channel through which other supersession products can be excreted. Most of the CO_2 produced by supersession is discharged by the lungs through blood circulation, with a little being discharged through the skin by the AMS. Because the AMS fine tunes respiration, it is an auxiliary respiratory system. The AMS is helpful in maintaining the acid–base balance of the internal environment because it can discharge CO_2 .

As a channel connecting the viscera and the outer environment, in addition to discharging CO_2 , the acupuncture meridian adjusts and maintains the stability of the local pressure of the internal environment. When the body is diseased, supersession will enhance, and the local pressure of the internal environment will rise due to increasing levels of CO_2 . Although local blood circulation will be blocked by the pressure rise near a blood capillary, local pressure will be decreased after CO_2 has been discharged through the AMS, and microblood circulation will be free,

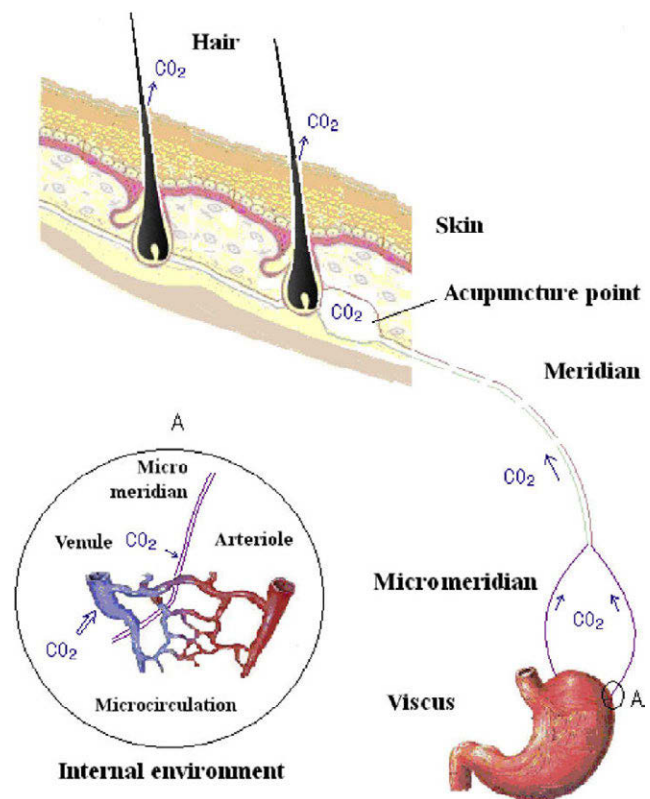


Figure 1 Relation between the AMS, skin, and viscus. AMS = acupuncture meridian system.

which will maintain the supersession and help the immune system to work normally. The relationship between micro-blood circulation and the microacupuncture meridian is shown in the enlarged view of point A in Fig. 1.

The AMS consists of many microchannels, on which there are some wider cavities and joints, called acupuncture points. When the volume of CO_2 in the acupuncture points increases, the body will feel swollen, acidic, and painful, due to increased gas pressure and increased concentration of H^+ resulting from the chemical reaction between CO_2 and H_2O .

2.2. Pathological principle of the AMS

The internal environment is the living space of cells, where supersession occurs. Cells get oxygen and nutrition from the internal environment, and discharge CO_2 and waste through it to the internal environment. In general, we consider that CO_2 will be discharged totally by the lungs through blood circulation. Acting as an auxiliary respiratory system, the AMS carries the CO_2 left in the blood circulation and expels it through the pores of the skin. A very important role of the AMS is to adjust the physiological function of the body. A schematic figure of the relation between the AMS and blood circulation is shown in Fig. 2.

It is difficult to explain the pathological mechanism of some intractable diseases using modern medical science, however, the explanation becomes easy when the hypothesis of the AMS is used. When the viscera develop inflammation, supersession enhances and more CO_2 is produced. If that CO_2 is not discharged in time, local pressure will rise and local

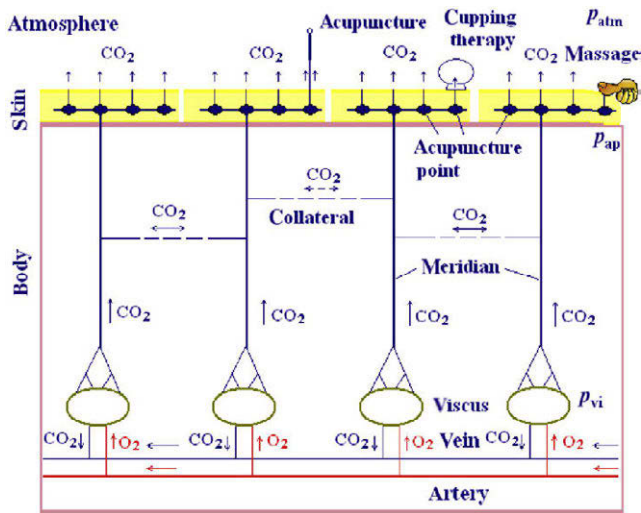


Figure 2 AMS and blood circulation. AMS = acupuncture meridian system.

blood circulation will be blocked. When CO_2 is expelled through the AMS, pressure of the internal environment will decrease and microcirculation will return to normal.

An acidic environment will form, and the disease will worsen if the stability of the internal environment is not recovered. Viscera connected by acupuncture meridians and collaterals will influence each other. The disease of one viscus will result in disorders of other viscera. TCMS considers the heart and small intestine, the lung and large intestine, the spleen and stomach, the liver and gall bladder, and the kidney and urinary bladder to be tightly coupled to each other.

2.3. Experimental data for the hypothesis

In 1984, Hungarian Eory [7] has measured the Transcutaneous CO_2 Emission (TCE) of acupuncture point Laogong on Pericardium Meridian of Hand-Jueyin utilizing Frewil CO_2 determinator with sensitivity of $1/1000 \text{ g}$ [8]. It has been found that the TCE of acupuncture point area was much more than that of no acupuncture point area [7]. Further studies found that fluctuations of the TCE existed for different acupuncture points on the Lung Meridian of Hand-Taiyin [9,10]. In 1992, the Chinese doctor Zhang, utilizing the same Frewil CO_2 determinator, found that the values of the TCE for some acupuncture points were higher than those for other acupuncture points. In addition, the TCE was found to be increased after acupuncture; the values of the TCE for acupuncture points on the left and the right sides were found to be the same for healthy people, but quite different for people with illnesses [11]. The above studies provide powerful evidence supporting the hypothesis of this article that the AMS is an auxiliary respiratory system of CO_2 -expelling channels.

3. AMS therapies of TCMS

Based on our new hypothesis of the AMS, we can reasonably explain AMS therapies using logical deductions.

3.1. Pulse condition and the AMS

Feeling the pulse is a special method of TCMS used to diagnose diseases. A doctor diagnoses a disease by feeling the speed, intensity, and rhythm of the radial artery pulse, as well as by inspection and inquiry. Because the AMS has significant influence on blood circulation, the principle of feeling pulse can be explained by the AMS. When the viscera have pathological changes, supersession enhances and more CO_2 is produced. The local pressure of the internal environment will rise and microblood circulation will be affected. The entirety of blood circulation will also be affected. Thus, the doctor can diagnose a disease by feeling the pulse changes that result from pathological changes.

3.2. Therapy of Chinese medicine

Chinese medicine is the main therapy of TCMS and is greatly different from Western medicine. The principle of most of the Chinese medicines is based on the hypothesis of the AMS, which is different from the direct effect of killing bacteria and viruses. The therapy used for treating a disease relies on the immune system, which can work normally under an unblocked AMS and unblocked blood circulation with the help of Chinese medicine.

3.3. Therapy without medicine

In general, the human body will remain healthy when the AMS is unblocked and has enough resistance to disease. When the body is ill, bacteria and viruses are active, and the immune system fails to kill them. At such a time, expelling CO_2 from the AMS would be effective in restoring the balance of the internal environment. The functions of the immune system will be promoted to protect the body further.

Acupuncture, cupping therapy, and massage are the normal therapies used without any medicine, which have the same curing principle in TCMS. Acupuncture, performed by inserting silver needles into acupuncture points and turning them, will cause CO_2 to be directly expelled via the AMS. Cupping therapy will expand the pores and absorb CO_2 from the skin by producing a subatmospheric pressure. Massage will increase the pressure in the AMS and stir the hairs to help expel the CO_2 . All these methods will be helpful in adjusting the pressure of the internal environment and in promoting blood circulation to cure the disease. A schematic of the principle is shown in Fig. 2.

4. Future of AMS study

As a new hypothesis has been presented in the article, an excellent future can be anticipated for AMS research.

4.1. Research on the AMS itself

Because most of the AMS channels exist in the body, revealing the detailed structure of the AMS is important. Collaterals connect meridians, thus finding the relationship

between them would be helpful for finding the interactions between viscera. Both the AMS and the lymphatic system are spread over the entire body, whether CO₂ exchange takes place at the meeting areas is doubtful.

Based on the principle of interaction between the AMS and blood circulation, feeling pulse is an important method of TCMS for diagnosing a disease. Because feeling the pulse's condition is very difficult for young doctors, development of a modern device for detecting the pulse's condition would be desirable.

4.2. Pathology study

Under some special conditions, the AMS may act as channels for exhausting discharges other than CO₂. When supersession is abnormal, liquid exhausts (e.g., pus) can also be expelled through the pores along the AMS. Many skin diseases such as neurodermatitis may be caused by the excreta being discharged along the AMS. This idea needs more study.

Because a wide space exists in the arthrosis, CO₂ may enter the space through acupuncture points. When the viscera undergo some pathological changes, arthritis may be caused by the excess CO₂ entering the arthrosis. More study is needed because arthritis may be related to many factors.

Rheumatoid arthritis is a chronic and systemic inflammatory disease, the pathological principle of which is not clear. From the viewpoint of the AMS, similar to arthritis, rheumatoid arthritis is due to pathological changes of the viscera. When excess CO₂ runs through the entire body along the AMS, finding an accurate location for the lesion is difficult because discomfort exists everywhere. At present, based on the reflex of acupuncture points and their meridians, the doctor can find the viscera involved in the disease.

A neoplasm is a serious human condition. According to the AMS theory, lack of oxygen for a long time and an acidic environment existing for a long time in tissue due to CO₂ not being discharged over time are two probable factors that can induce a neoplasm. A new way of studying neoplasms should be developed based on the hypothesis of the AMS.

4.3. Psychology study

Because a physiological reason often cannot be found for people's psychological feelings, the AMS hypothesis provides a new way of performing psychological research. Swelling, an acidic environment, and the painful feeling of acupuncture points can be explained by the pressure of CO₂, and the presence of H⁺ resulting from the reaction between CO₂ and H₂O. When local pressure is high due to local blockage of blood circulation, people feel great psychological pressure. From the viewpoint of the AMS theory, psychological pressure is, in reality, a physical pressure.

As a psychological phenomenon, anger causes great harm to the body, however, its physiological mechanism is not clear. Although there are many different reasons for one to be angry, the AMS principle of anger recognizes only one reason. Because local supersession is enhanced due to

anger, increases in CO₂ levels and blockage of local blood circulation causes pain. In Chinese, "anger" means "producing gas," the gas being CO₂.

Because people's psychological pressure becomes higher with increasing social competition, more and more people will experience psychological depression. In modern medical science, the pathologic reason for melancholia is not clear. From the viewpoint of the AMS hypothesis, excess CO₂ in the acupuncture meridians and points on the head will put pressure on the cranial nerve, resulting in mood depression.

5. Conclusion

In this article, a new hypothesis that the AMS is an auxiliary respiratory system is presented. In addition, the relation between the AMS and disease, and the relation between the AMS and the therapies of TCMS have been discussed. Even though some experimental data have provided evidence supporting our hypothesis, further studies are needed to prove it. In any event, based on the existing data, the AMS is expected to have a bright future.

Disclosure statement

The authors declare that they have no conflicts of interest and no financial interests related to the material of this manuscript.

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