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# The Inspiration of “Visceral Manifestations Theory” to the Grassroots TCM Work in Guizhou from the Perspective of Digestion

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## Abstract:

The theory of visceral manifestations is one of the core contents of the theory system of TCM. It holds that the spleen and stomach occupy the middle Jiao, the pivot of the body's Qiji movement and the source of acquired and biochemical Qi and blood. The liver regulates Qiji of the whole body and secures bile to aid digestion. It can be seen that the liver and gallbladder, spleen and stomach are the viscera most closely related to the digestive function in the theory of TCM viscera. Due to the influence of poor lifestyle and eating habits, digestive system diseases have become more and more important diseases that trouble people's health, especially at the grassroots level. The essence of the dirty image is to examine the internal crux, grasp the internal contradiction and solve the internal problem through the external performance. Therefore, it is of great guiding significance and broad clinical application prospect to correctly understand the theory of Tibetan image and to inherit and innovate it in practice, strengthen the construction of classical Chinese medicine wards, strengthen the training of classical Chinese medicine theory and appropriate technology, pay attention to the improvement of scientific research management and research ability of basic Chinese medicine, and carry out the research and high-quality development of complicated diseases in TCM.

## Keywords:

Visceral manifestations theory  
Digestive perspective  
Grassroots traditional Chinese medicine  
High-quality development  
Important enlightenment

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## 1. Introduction

The “Huangdi Neijing” systematically and comprehensively expounds the theory of viscera, which provides solid theoretical support for the clinical practice of TCM and a strong health guarantee for the reproduction and prosperity of the Chinese nation. Later generations of doctors and TCM scholars have continuously enriched the connotation of the viscera theory, and tested and summarized it in many clinical practices, forming a series of TCM works with different characteristics, and promoting the development of TCM. With the change in health concepts and health needs, people’s demand for high-quality Chinese medicine health services is increasing, and people are increasingly pursuing holistic health. As a whole view of the guidance of TCM, more highlights its important position, unique charm and social value. Based on the prevention, diagnosis and treatment of digestive system diseases, this paper expounds the inspiration of the theory of viscera and TCM syndrome differentiation to the work of grassroots TCM in the new period and promotes the high-quality development of grassroots TCM in Guizhou.

## 2. The theory of visceral manifestations and its digestion

### 2.1. “Digestion” function in viscera manifestations theory

The core content of visceral manifestations theory is to study organs, their physiological functions and pathological changes. The theory of the viscera holds that “the so-called five viscera are those who store the essence without draining it, so they are full but not blocking.” People with organs pass on things without hiding them, and the truth cannot be full.” For the digestive system, “storage of essence and Qi” is mainly reflected in the liver storing blood and soul, and the gallbladder storing bile; and spleen manufacturing Qi and blood, dominating Sheng Qing, control of blood and intention. The “transmission” is mainly reflected in the excretion of bile by the gallbladder, the acceptance and maturation of the stomach and the descending of the stomach. These “digestion” functions are related to a series of processes such as the reception, digestion, absorption, transportation, and transformation of the

diet, as summarized in “Huangdi Neijing”: “Why, the entrance of the water valley, then the stomach is full and the intestine is deficient. After eating, the intestine is full and the stomach is weak.” Chinese medicine and Western medicine have a great difference in the understanding of “spleen” function, even in the past time there is still a debate. In TCM, the spleen’s transportation function is a part of the digestive system, the spleen’s blood-regulating function is a part of the coagulation and anticoagulation system, and the spleen’s main muscle function is the skeletal muscle and its auxiliary device in the physical motor system, which is different from the blood storage function, hematopoietic function and blood filtration function of the anatomical spleen <sup>[1]</sup>.

### 2.2. The relationship between “wood and soil” in the new five-element theory

The five-element theory is a theoretical model established based on image thinking to analyze the five-element attributes and mutual relations of various things. By extending and evolving the general characteristics of the five elements, it generalizes into a general methodology for classifying things and deducing their relations and attributes <sup>[2]</sup>. According to the new five-element theory <sup>[3]</sup>, “coexistence” has the meaning of “continuation” and “coexistence” has the function of “monitoring”. Wei *et al.* (2023) <sup>[4]</sup> also believe that “coexistence” is a one-way transmission relationship, “promotion” is “connectivity,” and “connectivity” has the characteristics of “production.” In the new five elements theory, due to the change in the order of “five elements,” the original “wood, fire, earth, gold and water” became the order of “wood, earth, fire, gold and water,” that is, the original “wood and earth” relationship has become the relationship of phase (wood and earth). Therefore, the “organs” corresponding to the five elements change into “bile (wood), stomach (earth), small intestine (fire), large intestine (gold), bladder (water),” which has the characteristics of “continuation” and “one-way transmission,” and these are mainly reflected in the “spleen and stomach,” “liver and gallbladder” and small intestine as the protagonist of the digestive system, as well as the heart of the main storage God and the main blood. It has a continuation effect on structure and function.

### 2.3. Relationship between “digestive” function and organs

The digestive function of TCM includes the digestion, absorption and conduction of dross in modern medicine. On the relationship between digestion-absorption and organs, the spleen and stomach are the first. The stomach is the main receiver and the spleen is the main transporter. The stomach masters to pass, the spleen is responsible for raising subtlety. The stomach prefers moistening to hate dryness, spleen prefers dryness to avoid dampness. The spleen and stomach live in the middle Jiao, and the coordination of transport, dry and wet, and the rise and fall are not only common to complete the accommodation and transportation of food, but also to jointly dominate the rise and fall of Qi. The second is the liver and gallbladder. The liver secretes bile, masters dredging, and modulates the mood and Qiji. The gallbladder stores and excretes bile, and takes charge of making decisions determines. They coordinate and cooperate to complete the digestion of bile to food to facilitate absorption. In addition, the secretion of the small intestine is clear, the large intestine is the main fluid, the heart is the main spirit, and the lungs are all closely related to the digestion and absorption function. Some people believe that TCM may treat functional dyspepsia by regulating the levels of brain and intestinal peptides such as motilin, gastrin, substance P, cholecystokinin, somatostatin, vasoactive peptide, and somatostatin, and its mechanism may be related to promoting gastric emptying, improving gastrointestinal peristalsis, improving gastrointestinal motility and accelerating intestinal propulsion rate<sup>[5]</sup>. Some scholars believe that the balance of gastrointestinal motility is dominated by the rise of the spleen and the fall of the stomach<sup>[6]</sup>. The regulation of liver Qi and the proclamation and descent of lung Qi play an important role in the rise and fall of spleen and stomach Qi, so the disturbance of gastrointestinal motility is closely related to the Qiji regulation of liver and lung and the Qiji disorder of spleen and stomach.

### 3. Features and enlightenment of digestive system diseases in the theory of Zangxiang

The failure of the digestive system related to the function of the viscera can lead to a variety of clinical manifestations. To sum up, there are mainly the following two characteristics.

- (1) The “main syndrome is clear”: Clinical symptoms of abdominal distension, diarrhea, constipation, belching, nausea, vomiting, pantothenic acid and other digestive dysfunction caused by the failure of stomach and spleen transport, intestinal turbidness and large intestine conduction disorder, or the abnormal movement of middle-focal Qi machinery.
- (2) “Multiple syndromes”: The disease location involves other organs and organs, so it can appear a variety of clinical manifestations, such as the patient’s liver Qi discomfort, Qi disorders, clinical manifestations such as poor tolerance, frequent use of vector Qi, pain discharge, intestinal sound hyperactivity. As for the mechanism or principle of TCM treatment of digestive system diseases, what is it? Is it the original drug or does it work through intestinal metabolites?<sup>[7]</sup> These deeper questions need to be answered by systematic research.

These similarities can manifest in several ways, such as the production, storage and change of essence, the production, movement, and function of Qi, the production, circulation and function of blood, the production, distribution, excretion of body fluid, etc. That is, when their function is abnormal, it will be manifested as the clinical characteristics of “the main syndrome are distinct and the syndrome is diverse,” and the clinical treatment also adopts the method of “grasping the main disease and taking care of the syndrome.” This has something in common with the new format of TCM that the medical institutions of TCM must have the surname “Zhong” and encourage cross-disciplinary development at the same time, demonstrating the essence of TCM that the road is simple and the line is consistent. This is exactly the problem that needs to be solved in the development process of grassroots TCM in Guizhou.



## 4. Inspiration from the nature of “visceral manifestations” to the work of grassroots TCM in Guizhou in the new period

### 4.1. What is the nature of the visceral manifestations?

- (1) Be good at tracing the root of the external manifestation

In clinical diagnosis, it is the basic duty of a qualified doctor to fully collect patient information through “looking, hearing, asking and cutting.” Being able to “synthesize” and analyze the collected information in a timely, accurate and comprehensive manner is an important reflection of the professional level of medical workers. Therefore, the word “comprehensive” is particularly important. To sum up, there are two aspects, where we must be accurate and complete in external performance; we also need to find out the reason. For grassroots TCM in Guizhou, the development level of TCM is neither sufficient nor balanced. There are many reasons for this, but the key is “lack of adequate and top-notch talent.”

- (2) Analyze the inner nature through the external phenomenon

The important link of TCM clinical syndrome is “syndrome differentiation,” which is also the core target of the essence of visceral manifestations. Only by processing the collected patient health information through certain syndrome differentiation methods and obtaining a specific “syndrome” can grasp the essence and find the cause. This process of seeking “evidence” is very important, which is the “essence” that doctors seek and need to grasp. So, what is the external manifestation of grassroots TCM in Guizhou? First of all, Chinese medicine (including ethnic medicine) resources are very rich. At the same time, ethnic medicine technology in rural areas is widely used and effective. Moreover, the brand effect of TCM is not obvious, and the characteristics of “Unique skill” are not strong. What is its intrinsic nature? Firstly, there is a shortage of top talents such as

academicians, Jieqing and excellent youth in the field of TCM, and a scientific and technological team with a strong radiation-driving effect cannot be formed. Secondly, the development and utilization of ethnic medicine resources and cross-innovation capabilities are not strong enough, and the advantages of ethnic medicine resources are not prominent enough. Thirdly, the lack of “market entry” standards for ethnic medicine resources leads to the inability of skill inheritors to smoothly apply ethnic medicine stunts to clinical practice.

- (3) Only with thorough knowledge can the study gives accurate strategies based on syndrome differentiation

The purpose of the TCM clinic is to solve the practical problems of patients. Under the guidance of the theory of visceral manifestations, it is necessary to follow the “evidence” of the patient’s condition, to obtain the process of theory, method, prescription, medicine and specific adjustment methods. For the work of grassroots Chinese medicine in Guizhou, three weak links restrict its high-quality development. The first one is that the organization is complete but not “healthy.” At present, the overall situation of grassroots TCM medical institutions in Guizhou province is that unbalanced regional development and inadequate business level. The performances of it are as follows, where the basic replenishment of the district and county hospitals of TCM, but the business ability and scientific research ability need to be improved. Township health centers have all established and relatively complete equipment, but the overall supply capacity of TCM technology is limited, different TCM center business development gap is large, some township health centers can rely on TCM business to drive great development, some TCM center is on the verge of closure. Most village clinics have been renovated with a new look, but it will take time for them to be efficient. The second one is that there are few talents but not “fine.” There is a common phenomenon of “insufficient number of talents



and quality to be improved” in grassroots TCM in Guizhou. Among TCM medical institutions at all levels, TCM hospitals at the district and county levels can operate normally, but there is a lack of top discipline leaders, and there is a gap in the operation of TCM classic wards. Township TCM library is generally short of talent, but it is strange that individual village clinics vigorously carry out TCM health services, which can be described as “master in civil.” The third one is that the characteristics are not “loud.” “Creating characteristics” has almost become the “mantra” of every medical institution, but how many TCM hospitals and TCM museums have special therapies and stunts? Some districts and counties (Tujia medicine, Yao medicine, Dong medicine) have characteristics of ethnic medicine techniques, but this characteristic is not “prominent” and “loud” enough so it is subject to various restrictions when it is included in clinical and medical insurance, and even mainstream media dare not “bold” publicity and reporting. However, the inheritance of such ethnic characteristics of medicine techniques is mostly limited to the people or as a hospital or as a “display” of activity to outsiders and rarely can be openly carried out training, let alone issued without a license.

These problems, which are fed back to the grassroots Chinese medicine work in Guizhou through “the essence of visceral manifestations theory,” have become the main factors restricting the high-quality development of grassroots Chinese medicine work in Guizhou, and are also the way out for Guizhou to strive to solve the problem at present and in the future. To solve this problem, I would like to put forward the following four aspects of the solution.

#### **4.2. The inspiration of “the essence of visceral manifestations” to the grassroots TCM work in Guizhou in the new period**

Relevant state departments party committees and governments at all levels have actively responded to the call and introduced a series of special measures to promote the development of TCM. Guizhou is located

in the western plateau of China, the ethnic medicine resources are extremely rich, has the reputation of “Yelang no idle grass, Guizhou more medicine.” However, due to various reasons, the grassroots TCM work in Guizhou still faces many difficulties and bottlenecks, and the system mechanism, talent team, discipline construction, and scientific research are weak and need to be improved and promoted.

##### **4.2.1. Improve the management mechanism of TCM at the grassroots level, and stimulate the entrepreneurial vitality of officers**

The key value of the visceral manifestations lies in grasping the essence, and the core of grasping the essence is to distinguish the “syndrome” first and then discuss the treatment. “Treatment” pays attention to “principle, treatment, prescription and medicine,” and the composition of prescriptions pays attention to “king, minister, assistant, envoy” and “seven emotions.” These are the “rules” hidden in TCM and are also an important mechanism of TCM to cure and save people. The “dogmatic” model without innovation is also an important factor restricting the high-quality development of grassroots TCM.

##### **(1) Improve the evaluation and advance mechanism of TCM management at the grassroots level**

To measure the management level of TCM at the grassroots level, the study will see whether the sustained, rapid, healthy and innovative development of TCM can be promoted at the grassroots level. Generally speaking, a comprehensive judgment can be made by evaluating the local investment capacity, policy guidance and productivity capacity, business guidance capacity, institutional optimization management capacity, and emergency problem-handling capacity of grass-roots TCM. At the same time, in the construction of a grassroots Chinese medicine management team, it is necessary to establish a “The superior is superior and the inferior is inferior” intervention and regulation mechanism, combining the supervision and early warning of the competent health authorities, the supervision and early warning of cadres and workers and the

quality early warning of the masses are full of dissatisfaction, timely research and judgment, timely communication, and timely correction, to establish a mechanism for cadres to advance and retreat by “matching people to posts, selecting people to posts on the best.”

(2) Improve the evaluation and use of the grassroots TCM talent incentive mechanism

General Secretary Xi Jinping has stressed that “We should do a good job in upholding integrity, innovating, inheriting and developing TCM, and establish a service system, service mode, management mode and personnel training mode that meet the characteristics of TCM, to carry forward traditional TCM.” This puts forward the latest requirements for what kind of TCM talents we cultivate and how to systematically train TCM talents. According to the current situation of TCM talents at the grassroots level in Guizhou, firstly, it is necessary to improve the ability of introducing and cultivating high-quality talents, to provide sufficient intellectual support for the development and leading of TCM at the grassroots level. Secondly, we should scientifically carry out the performance evaluation of professional and technical personnel, and establish and form a fair and just performance evaluation concept and career concept, so that those who can accomplish things and those who accomplish things can feel relieved to do big things. In addition, it is necessary to formulate and implement the policy of rewarding outstanding contributions to TCM at the grassroots level, focusing on improving the sense of gain and happiness of outstanding talents in terms of material rewards, spiritual encouragement and growth treatment, and stimulating their greater enthusiasm for doing business in the field of TCM.

(3) Improve the service capacity and evaluation mechanism of grassroots TCM

To establish and improve the service ability evaluation system of grass-roots Chinese medicine talents and the performance evaluation index system of TCM management. On the

one hand, it is necessary to let the grassroots TCM talents have the direction of struggle, the action has the goal, the work has the motivation, the achievement has the recognition, and the achievement has the return. On the other hand, the management of medical institutions and health authorities must be scientific, management has assessment, management has practical plans, two-pronged, two-way force, and ultimately achieve the improvement of management level and serviceability double assessment and double promotion.

#### **4.2.2. Gradually improve the classic ward of TCM and smooth the channels for seeing a doctor**

Giving full play to the guiding role of TCM classical theories in the clinical work of TCM is an inevitable requirement for implementing the concept of “inheriting the essence, keeping the integrity and innovation” and the relevant national documents on the development of TCM in the new era, an important measure to promote the inheritance development and innovative transformation of TCM, and a source of strength to improve the level of health services of grass-roots TCM.

(1) Solidly build the classic ward of TCM in the general hospital

TCM hospitals at the county level and above should take the solid opening of TCM classic wards as an important work of the hospital to grasp the establishment of TCM classic wards by the president of the “direct management, regular rounds, timely dispatch” of the project, from the ward setting, professional personnel, clinical teaching arrangements, TCM classic course assessment, cultural facilities layout and other aspects. Adhere to the constant grasp, excellent management, and long-term effect, the TCM classic ward as the hospital characteristics, science and technology to strengthen the hospital’s important starting point, and better meet the mass demand for TCM supply. Other general hospitals at the county level and above can combine their actual conditions and superior resources, and build TCM-related departments by referring to the TCM classic ward model of

TCM hospitals, to improve the health service capacity of TCM.

(2) Efficient operation of township health centers of TCM

At present, the township (street) health centers in our province, community health service centers in accordance with the relevant national and provincial requirements, set up TCM or TCM health service centers, but due to the small proportion of grass-roots Chinese medicine talents, the lack of TCM technology supply and many other factors, the operation of TCM centers varies from place to place. To fully activate the health service potential of the TCM museum, it is necessary to vigorously train professionals who are interested in engaging in grassroots TCM work, adjust the operation incentive mechanism of the TCM museum, enrich and improve the professional and technical staff of the TCM museum, strengthen the basic skills of looking, listening, inquiring, and paying attention to the norms of the theory, prescription and medicine system so that the common people can enjoy the original and high-quality TCM diagnosis and treatment services at their doorstep.

(3) Sustainably implement the TCM “Preventive treatment of disease” project

In the history of the development of TCM, doctors of all dynasties have exerted great importance on the “preventive treatment of disease” and passed down through the ages. For example, the well-known story of “The Three Brothers of Bian Que” reflects the important status of TCM in treating diseases before they occur. The TCM classic “Huangdi Neijing” set the precedent of “Treating disease before it occurs” in Chinese medicine. Synopsis of the Golden Chamber says, “Treating before the disease occurs refers to seeing the disease of the liver, knowing that the liver transmits to the spleen, and first strengthening the spleen.” It fully embodies the importance of “preventing the disease from changing.” “Qianjin Fang” contains “the disease that the doctor has not been sick, the disease that the Chinese medicine doctor wants

to be sick, and the disease that the doctor has been sick.” As well as the “Danxi Xinfu” says, “Instead of saving after a disease, it is futile to cover the disease and then the medicine.” and so on, all emphasize the importance of the treatment of disease before it occurs. To carry out the construction of TCM wards (departments), we must establish the orientation of treatment without disease, effectively reduce the medical burden of patients, and maximize the health level of the masses.

#### 4.2.3. Organize TCM classic training well to improve clinical diagnosis and treatment levels

The State Administration of TCM issued the “14<sup>th</sup> Five-Year Plan” for the Development of TCM Talents, which has made specific arrangements for the training of TCM talents conforming to the characteristics of TCM. As a grassroots TCM medical institution, it can adopt the “three-combination” approach to strengthen personnel training and provide a practical platform for the construction of a personnel training system that conforms to the characteristics of TCM.

(1) The combination of online and offline to improve the theoretical learning effect

Classical classes such as the theory of TCM visceral manifestations are regularly opened, special training lectures are regularly held, the cultural layout of TCM in the corridors, sidewalks and green belts of TCM hospitals are optimized, and a good atmosphere is created for the study of TCM classics, and the thinking habits and practical abilities of TCM practitioners are cultivated. At the same time, the advantages of the Internet can be focused and several high-quality Chinese classic course resources can be selected for clinicians to learn and digest, learn from each other’s strengths, learn from advanced successful experience, broaden their professional vision, improve clinical critical thinking ability, and constantly improve the learning effect of the Chinese classic.

(2) The combination of the hospital and the outside, consolidating the level of theoretical application Scientific development of the hospital training

system, the establishment of the hospital academic committee, and under the supervision and guidance of the implementation, the hospital professional and technical personnel and members of the medical and health community business backbone are the objects of attendance. The training is led by the dean, the members of the business team, the director of the department, etc. are all included in the teaching expert database, and the special lecture of “one topic in a month, one competition in a year” and the selection of high-quality lectures are carried out, and the year-end performance is rewarded. At the same time, a certain amount of experts and scholars in relevant fields of Chinese medicine, Chinese medical masters, the national famous Chinese medicine, and academic leaders or inheritors of well-known schools are invited to carry out academic reports on TCM classics online and offline, and continue to improve the transformation and regenerating power of TCM classics to guide clinical practice.

(3) Combine training and testing to improve the level of clinical diagnosis and treatment

Ensuring the operation of the learning and training system in the long term is the key to improving the effect of learning and training. First of all, it is necessary to clarify the test requirements of learning effects, not only to avoid the training process of formality but also to eliminate the training process into a form. Secondly, for professional and technical personnel with different titles, stratified and classified test question banks are established regarding relevant professional and technical qualification examinations or relevant national standards, and professional skill tests are regularly carried out to verify the training and learning effect and clinical practical level. At the same time, given the common weak links, special training and strengthening are carried out, and as an important basis for inviting experts from outside the hospital to give lectures. In the course of implementing the lectures of the director of the internal medicine department of the hospital,

the teaching effect should be evaluated and the teaching staff should be encouraged to improve the quality of lesson preparation.

#### 4.2.4. Build a scientific research platform and strive to overcome difficult diseases

“We should do a good job of innovation, inheritance, and development, actively promote research and innovation in TCM, focus on interpreting the principles of TCM with modern science, promote the combination of TCM and modern science, and promote the complementary and coordinated development of Chinese and Western medicine, to provide better health services for the people.” This not only puts forward clear requirements for the inheritance and development of TCM in the new era but also provides methodological guidance for the scientific research and innovation of TCM and the coordinated and high-quality development of Chinese and Western medicine. As a grassroots TCM medical institution, it can start from the following four aspects to continuously improve the ability to solve complicated diseases.

(1) Start with the theoretical connotation itself and strengthen the collation and study of TCM classics

“Time is the mother of thought, practice is the source of theory,” in the classical theory of TCM, has important enlightening significance. The theoretical system of TCM is extensive and profound, which comes from the extensive clinical practice experience of countless doctors. TCM has a unique and profound culture and is a shining pearl of China’s excellent traditional culture. The science and education departments of TCM medical institutions should fully fulfill the responsibilities of discipline development, actively mobilize the leading role of the academic committee, organize expert teams inside and outside the hospital, strengthen the collation and research of TCM classic theories and ethnic medicine theories with local characteristics, consciously take up the “baton” of TCM inheritance and innovation development in the new era, and promote the output and transformation of scientific research results. Continuously improve the hospital’s diagnosis



and treatment level and core competitiveness.

- (2) Start with basic experimental research and strengthen the exploration and research of theory guiding practice

The seemingly boring and complicated repetition of basic research is a tireless exploration and innovation in pursuit of scientific truth. No matter what field or level, only those who attach importance to basic research are likely to achieve deeper and a fruitful scientific research and academic achievements and better solve the “intractable diseases” in this field. Therefore, the basic medical institutions of TCM should solve the common and complicated diseases in the region as the key direction of basic research. As a discipline leader, it is important to pay attention to the development trend of interdisciplinary disciplines, timely set up clinical science research teams, and take overcoming difficult diseases in this field as a lifelong pursuit and professional belief.

- (3) Start with the development and application of new drugs, strengthen the safety evaluation of new drug formulations

The common saying “medicine and drugs are not divided” can be understood as: the theory of TCM can guide the composition of prescriptions, drugs can serve the clinical practice of TCM and can be tested in clinical application. Medicine and drugs are inseparable, and more emphasis is placed on the fact that “drugs cannot be separated from medicine,” because there are many means of “medicine,” such as clinical treatment of hypochondriac pain, stomach pain, abdominal pain, diarrhea and other digestive system diseases, available drug treatment, you can also choose acupuncture, massage, scraping and other therapies. Therefore, according to the theoretical guiding ideology of TCM, continuously strengthening the research or development of new drugs (formulation) to better meet the actual clinical needs is another important way to promote the inheritance and transformation of TCM and innovative development. However, in the process of research or development of

new drugs (formulations), it is necessary to improve the awareness of the safety of drug formulations, relevant departments of medical institutions should strengthen the evaluation and management of drug use safety, and carry out pre-clinical pharmacological or toxicological tests when necessary to ensure innovation based on safety.

- (4) Start from different logical starting points and strengthen joint efforts to tackle difficult diseases of the digestive system

From the perspective of traditional medical logic, digestive system diseases are mainly caused by the failure of functions such as spleen handling, clearing and regulating blood, stomach handling and lowering, liver handling, bile storing and secreting bile, etc. Common and difficult clinical diseases include lump, accumulation, distention, severe blood syndrome, severe jaundice, etc. From the point of view of modern medical logic, the difficult diseases of the digestive system are mainly some tumors, severe inflammation, and serious hemorrhagic diseases. These diseases are either serious, acute, or both, and often require the cooperation of the treatment team, and even the cooperation of other departments such as surgery and hematology. From the logic of general medicine, human is an organically unified whole of “physiology-psychology-society.” TCM believes that the liver is the master of drainage, regulating Qi machinery, controlling emotions, regulating digestion and reproductive functions, and promoting blood operation and water metabolism, while the spleen and stomach are the acquired basis and the source of Qi and blood biochemistry. It can be seen that the functions of the liver, gallbladder, spleen and stomach are closely related to the whole life activities of the human body. It involves physiological, psychological, and social aspects, which is also the main content of general medicine research. Therefore, careful research and practical solutions to digestive system health problems or diseases is an important part of general medical activities.

## 5. Conclusion

In short, “The theory of traditional Chinese medicine” is profound, its culture is rich, its techniques are diverse, its efficacy is evidenced, and its application is extensive. As the core component of the TCM theoretical system, the theory of visceral manifestations has much important inspirational significance for digestive system diseases and even the clinical work of TCM. This paper only explores the issue from the perspective of the organs.

As TCM exerts great importance on the holistic concept and dialectical treatment, in-depth study and flexible application of the TCM theoretical system have important guiding significance for the high-quality development of grassroots TCM work, and it is also significant and far-reaching for enhancing the self-confidence of TCM culture and cultivating the new quality productivity of TCM.

### Disclosure statement

The authors declare no conflict of interest.

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# Discussion on Controllable Risk Factors and Prevention Strategies of Cardiovascular and Cerebrovascular Diseases Based on the Concept of Preventing Diseases in Traditional Chinese Medicine

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## Abstract:

With the continuous rise in the incidence of cardiovascular and cerebrovascular diseases, effectively preventing and controlling their controllable risk factors has become a pressing issue. The concept of “Preventive treatment of disease” in Traditional Chinese Medicine (TCM), originating from the “Huangdi Neijing,” emphasizes the importance of disease prevention. This paper explores the major controllable risk factors for cardiovascular and cerebrovascular diseases, including hypertension, hyperlipidemia, diabetes, and unhealthy lifestyles, and analyzes the unique advantages of TCM in preventing and managing these risk factors. By integrating methods such as TCM syndrome differentiation and treatment, health preservation, and psychological adjustment, a series of comprehensive prevention and treatment strategies are proposed. These strategies aim to enhance public awareness of the prevention of cardiovascular and cerebrovascular diseases and reduce their incidence.

## Keywords:

Traditional Chinese Medicine  
Preventive treatment of disease  
Cardiovascular and cerebrovascular diseases  
Controllable risk factors  
Prevention and treatment strategies

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## 1. Introduction

Cardiovascular and cerebrovascular diseases are among the leading causes of death and disability worldwide. Their increasing incidence and mortality

rates have imposed a significant burden on society and families <sup>[1]</sup>. Western medical treatments often focus on disease management while neglecting the importance of prevention. In recent years, the concept of “preventive

treatment of disease” in traditional Chinese medicine (TCM) has gained increasing attention. This approach emphasizes prevention and intervention before the onset of disease, focusing on overall health and individual differences. TCM’s “Preventive treatment of disease” philosophy stresses the prevention of disease occurrence through the regulation of the body’s Yin-Yang balance, Qi and blood, and organ functions. This philosophy aligns with modern medicine’s research on controllable risk factors for cardiovascular and cerebrovascular diseases. Factors such as hypertension, hyperlipidemia, diabetes, obesity, and smoking are widely recognized as significant risk factors for these diseases, and TCM has a unique theoretical and practical foundation for managing these factors. This paper aims to explore how to effectively identify and control the controllable risk factors for cardiovascular and cerebrovascular diseases based on the “Preventive treatment of disease” concept in TCM. By integrating TCM theory with modern medical research, the study hopes to provide new insights and methods for the prevention of these diseases, thereby reducing their incidence and improving people’s quality of life.

## 2. The epidemiological trends and challenges of cardiovascular diseases

Cardiovascular diseases (CVD) refer to ischemic or hemorrhagic conditions affecting the heart, brain, and systemic tissues due to hypertension, hyperlipidemia, blood viscosity, and other factors <sup>[2]</sup>. Chronic CVD primarily includes coronary heart disease, stroke, and hypertension, predominantly affecting individuals over 50 years old with a high mortality rate <sup>[3]</sup>. The formation of CVD involves the combined effects of multiple risk factors such as blood pressure, blood glucose, and blood lipids. Wu *et al.* (1969) established the first hypertension prevention and control base in Beijing, China, creating the “Shougang Model” and ushering in a new era of CVD prevention and control in China <sup>[4]</sup>. Currently, preventive medicine proposes the concept of “three-tier prevention” <sup>[5]</sup>. Primary prevention, known as “etiological prevention,” aims to eliminate or reduce the harm caused by pathogenic factors to the human body through effective measures, or to improve the body’s resistance. Secondary prevention, or “pre-clinical prevention,”

emphasizes early detection, diagnosis, and treatment to control disease progression. Tertiary prevention, referred to as “clinical prevention,” focuses on the treatment and management of those already affected to prevent further disease deterioration and the occurrence of complications.

## 3. The scientific connotation and application prospects of the “Preventive treatment of disease” concept in Chinese medicine

The concept of “Preventive treatment of disease” in Chinese medicine can be traced back to the ancient text “Shang Shu: Shuoming,” which states, “Only by being prepared for everything, can one avoid troubles.” Although this statement does not directly involve medical theory, its philosophical idea of “being prepared for everything” has inspired the concept of “preventive treatment of disease”. The earliest embryonic form of this concept appears in the “Su Wen: Si Qi Diao Shen Da Lun,” which says, “Therefore, the sage does not treat existing diseases but prevents them from occurring, does not deal with existing chaos but prevents it from arising. This is what it means.” This passage explicitly introduces the concept of “Preventive treatment of disease” and emphasizes the importance of disease prevention. The “Su Wen: Si Qi Diao Shen Da Lun” divides the understanding of diseases into two stages: “preventive” and “existent.” The core lies in the prevention and treatment of “preventive” diseases <sup>[6]</sup>. Sun Simiao further categorizes diseases into three stages: “preventive disease,” “incipient disease,” and “existent disease” in his “Bei Ji Qian Jin Yao Fang.” “Preventive disease” refers to a state of yin-yang balance where “the vital Qi is stored internally, and evil cannot interfere.” It represents the quantitative foundation for the development and transformation of diseases. “Incipient disease” is a sub-healthy state characterized by “gradual decline of vital Qi and weakened resistance to evil”. “Existent disease” refers to a state of physiological dysfunction caused by “the decline of vital Qi and the internal invasion of evil.” Zhang Zhongjing’s “Treatise on Febrile and Miscellaneous Diseases” extends the ideological connotation of “preventive treatment of disease”. Based on the principles of prevention before illness and prevention of deterioration after illness, it



expands the connotations to include “swift treatment upon the onset of illness, prevention of crisis during the peak of illness, and prevention of recurrence after recovery.” The theoretical connotation of this concept encompasses prevention before illness, prevention of deterioration after illness, and prevention of recurrence after recovery <sup>[7]</sup>.

## **4. Major controllable risk factors for cardiovascular and cerebrovascular diseases**

### **4.1. Unhealthy eating habits and related risk factors for metabolic abnormalities such as high blood lipids and high blood sugar**

Unhealthy eating habits are significant controllable risk factors for cardiovascular and cerebrovascular diseases. A diet high in fat and cholesterol, coupled with inadequate intake of dietary fiber, increases the risk of these diseases. Studies have shown that a high-fat diet leads to elevated LDL-C levels, thereby increasing the risk of atherosclerosis and thrombosis <sup>[8]</sup>. Changes in diet and lifestyle and long-term weight gain in women and men <sup>[8]</sup>. Irregular eating patterns, such as having dinner too late or eating midnight snacks, can also negatively impact cardiovascular health <sup>[9]</sup>. Research indicates that excessive sodium intake can lead to increased blood pressure, subsequently elevating the risk of heart disease and stroke. Additionally, high-sugar and high-fat diets may trigger chronic inflammation, which is recognized as an important mechanism in the development of cardiovascular and cerebrovascular diseases <sup>[10]</sup>. Studies have found that the incidence of cardiovascular diseases is higher among diabetics than non-diabetics. The hyperglycemic state in diabetics can activate the polyol pathway to generate sorbitol, whose accumulation can induce cardiovascular and cerebrovascular diseases <sup>[11]</sup>. Hyperglycemia can promote the production of free radicals and increase the level of oxidative stress, which is considered an important mechanism underlying cardiovascular and cerebrovascular diseases as well as diabetic complications <sup>[12]</sup>. Simultaneously, insulin resistance and a hyperglycemic state can also cause changes in blood lipid levels, further increasing the incidence of cardiovascular and cerebrovascular diseases <sup>[13]</sup>.

### **4.2. Lack of physical activity**

The lack of physical activity is a significant controllable risk factor for cardiovascular and cerebrovascular diseases. Relevant literature indicates that insufficient exercise increases the risk of heart disease and stroke. Prolonged sedentary behavior can lead to the deterioration of cardiovascular health and increase the incidence of atherosclerosis <sup>[14]</sup>. Inadequate exercise often leads to weight gain and obesity, which are major risk factors for metabolic abnormalities such as hypertension, diabetes, and high cholesterol. These metabolic issues further elevate the risk of cardiovascular and cerebrovascular diseases <sup>[15]</sup>. Additionally, the lack of physical activity is associated with symptoms of depression and anxiety, and these mental health issues may indirectly increase the risk of cardiovascular and cerebrovascular diseases by affecting lifestyle and physiological mechanisms <sup>[16]</sup>.

### **4.3. Smoking and drinking**

Smoking is one of the major risk factors for cardiovascular diseases. Studies have found that smoking is closely related to the incidence and mortality of cardiovascular diseases, and smokers have a significantly higher risk of cardiovascular diseases compared to non-smokers <sup>[17]</sup>. The frequency of smoking is positively correlated with the risk of cardiovascular diseases, meaning the higher the frequency of smoking, the higher the incidence of cardiovascular diseases <sup>[18]</sup>. Passive smoking also increases the risk of cardiovascular diseases. Studies have shown that exposure to secondhand smoke significantly increases the incidence of cardiovascular diseases among nonsmokers <sup>[19]</sup>. Tobacco contains nicotine and harmful gases (such as carbon monoxide), which can cause chronic hypoxia and damage to vascular endothelial cells, accelerating the process of atherosclerosis <sup>[20]</sup>.

### **4.4. Family genetic history**

There is a clear familial genetic predisposition to cardiovascular and cerebrovascular diseases. Numerous studies have demonstrated that these diseases exhibit a certain genetic tendency <sup>[21]</sup>. Research has found that among patients with cardiovascular and cerebrovascular diseases, those with a family history have a significantly higher incidence rate compared to the control group without a family history <sup>[22]</sup>. For middle-aged and elderly

individuals living in the same environment, the incidence of cardiovascular and cerebrovascular diseases increases significantly if they have a family genetic history. Therefore, individuals with a family genetic history should pay special attention to preventing these diseases, including undergoing regular physical examinations, maintaining a healthy lifestyle, and actively managing other controllable risk factors.

## **5. Application of traditional Chinese medicine's "Preventive treatment of diseases" concept in the prevention of cardiovascular and cerebrovascular diseases**

### **5.1. Preventive measures before disease occurrence: Adjustment of lifestyle**

#### **5.1.1. Dietary adjustments and nutritional supplementation**

The "Huangdi Neijing" (Yellow Emperor's Inner Canon) emphasizes that "regular daily routines and avoidance of excessive labor" can lead to a long lifespan. Conversely, if one makes "recklessness their norm," they may experience a decline in health even before reaching fifty. Therefore, establishing a scientific and regular lifestyle is a basic requirement for preventive treatment of diseases. The "Su Wen: Si Qi Tiao Shen Da Lun" (Basic Questions of Yellow Emperor's Inner Canon: On the Regulation of the Spirit in Accordance with the Four Seasons) states, "Yin and Yang and the four seasons are the beginning and end of all things, the foundation of life and death. If one goes against them, disasters will arise; if one follows them, illnesses and suffering will not occur. This is what is meant by following the Tao (way)." Hence, people should adapt to the changes of the four seasons, maintain a healthy lifestyle, focus on health preservation and longevity enhancement, and improve their physical fitness to achieve the goal of staying healthy or minimizing illnesses.

In Traditional Chinese Medicine (TCM) theory, excessive consumption of rich, greasy, spicy foods, or overindulgence in smoking and alcohol can lead to dysfunction of the spleen, accumulation of dampness, production of phlegm, transformation into heat, extreme heat generating wind, invasion of the brain collaterals,

and obstruction of the upper orifices, resulting in stroke. Additionally, excessive intake of rich and greasy foods can easily generate phlegm turbidity, block the meridians, obstruct the channels, disrupt the normal flow of Qi, and cause Qi stagnation and blood stasis, leading to chest Bi (obstruction). Research has shown that a simple dietary pattern can reduce the risk of stroke, while a Western-style dietary pattern may increase the risk of stroke<sup>[23]</sup>. Therefore, dietary adjustments and nutritional supplementation to reduce risk are among the preventive measures recommended by public health authorities.

First and foremost, it is crucial to reduce the intake of saturated fatty acids and trans fatty acids, as these fatty acids can elevate the oxidation rate of low-density lipoprotein (LDL), thus accelerating atherosclerosis<sup>[24]</sup>. It is advisable to opt for foods such as deep-sea fish, nuts, olive oil, and avocados. Additionally, the consumption of dietary fiber is paramount for cardiovascular health. Dietary fiber can hinder cholesterol absorption, facilitate its excretion, and aid in the reduction of blood pressure and body weight. Recommended food sources include whole grains, beans, vegetables, fruits, and nuts<sup>[25]</sup>. Maintaining an adequate intake of protein, particularly from plant-based sources, is also essential as it can contribute to lowering the risk of cardiovascular diseases. It is imperative to restrict the consumption of processed meat and red meat<sup>[26]</sup>.

#### **5.1.2. Exercise and physical fitness enhancement**

The "Jin Kui Yao Lue" mentions, "If the meridians are moderately affected and the illness has not spread to the internal organs, immediate medical treatment should be sought. If one feels heaviness or sluggishness in the limbs, practices such as guiding exercises, breathing techniques, acupuncture, and massage with medicinal ointments should be employed. Care should be taken to prevent the nine orifices from being blocked." Traditional Chinese medicine exercise methods like guiding techniques, Tai Chi, and Ba Duan Jin, as non-pharmacological therapies, have certain potential in preventing and assisting the treatment of cardiovascular and cerebrovascular diseases. The Chinese Expert Consensus (2023) points out that traditional Chinese medicine fitness exercises have been incorporated into exercise prescriptions, indicating expert recognition of their positive impact

on cardiovascular health <sup>[27]</sup>. Practicing Ba Duan Jin and Tai Chi can effectively regulate spleen and stomach functions, promote Qi and blood circulation, protect nerve cells, and prevent and improve various neurological diseases <sup>[28]</sup>, thereby indirectly promoting cardiovascular and cerebrovascular health. Research has shown that traditional Chinese medicine exercises, mainly Tai Chi, play an important role in cardiac rehabilitation. Such exercises can help improve heart function and facilitate the process of cardiac rehabilitation <sup>[29]</sup>. Modern research indicates that long-term adherence to moderate aerobic exercise, such as Tai Chi, yoga, and jogging, can enhance myocardial function, improve the heart's pumping efficiency, and reduce the risk of cardiovascular events <sup>[30]</sup>. Additionally, exercise helps improve blood lipid levels, increasing high-density lipoprotein (HDL) and reducing low-density lipoprotein (LDL) and triglycerides <sup>[31]</sup>. For obese individuals, reducing body fat accumulation is particularly important for lowering blood pressure <sup>[32]</sup>. However, it should be noted that patients with diagnosed cardiovascular diseases should follow medical advice and pay attention to exercise intensity when performing these exercises to ensure safety and effectiveness. It is recommended to choose an exercise mode suitable for personal health conditions and establish regular exercise habits, engaging in at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic exercise per week.

## **5.2. Prevention of disease progression, early intervention, and comprehensive treatment**

### **5.2.1. Early screening and diagnosis**

According to “Su Wen: Ci Re,” an ancient Chinese medical text, “In the case of liver heat, the left cheek turns red first; for heart heat, the forehead reddens; with spleen heat, the nose becomes red; lung heat manifests as redness on the right cheek; and kidney heat is indicated by redness on the chin. Although the illness has not fully manifested, puncturing the areas where redness appears can be a form of preventive treatment.” This passage underscores the importance of early intervention when the illness is just emerging, aiming to halt its progression before it becomes severe <sup>[33]</sup>. Therefore, traditional Chinese medicine (TCM) emphasizes syndrome differentiation and treatment, observing and recognizing subtle bodily

changes to promptly identify underlying health issues. The core principle lies in preventing and intervening before the onset of illness, enabling comprehensive and lifecycle management of diseases. Through lifestyle modifications, integrated Chinese and Western medical interventions, health education and promotion, as well as the establishment of a robust prevention and treatment system, it can significantly enhance the prevention and treatment of cardiovascular and cerebrovascular diseases <sup>[34]</sup>. This approach provides theoretical guidance for disease prevention, treatment, and rehabilitation. The TCM theory of preventive treatment resonates with modern early screening and diagnosis practices. By comprehensively assessing risk factors for cardiovascular and cerebrovascular diseases, personalized screening programs can be designed. The integration of TCM's holistic diagnostic approach with modern early screening techniques, such as electrocardiograms, echocardiograms, CT scans, and MRIs, can effectively prevent disease progression.

### **5.2.2. Integrated treatment strategy of traditional Chinese medicine and Western medicine**

The Chinese government has adopted the integration of traditional Chinese medicine (TCM) and Western medicine as a crucial strategy for the prevention and treatment of cardiovascular and cerebrovascular diseases. The “Healthy China Action - Implementation Plan for the Prevention and Treatment of Cardiovascular and Cerebrovascular Diseases (2023–2030)” clearly states the need to adhere to the integration of TCM and Western medicine, innovate institutional mechanisms and work models, and promote a shift from a “disease-centered” approach to a “people's health-centered” approach. The “three-tier prevention” concept in preventive medicine aligns with the TCM philosophy of preventive treatment. TCM believes that “when Yin and Yang are balanced and the spirit is harmonious, good health is achieved.” This state of balance and harmony represents the optimal condition for life activities and is the health status pursued by “preventive treatment,” emphasizing the balance of Yin and Yang and maintaining sufficient vital energy to resist pathogenic factors. The TCM idea of “preventive treatment” fully embodies a proactive and comprehensive prevention and treatment philosophy centered on health. Simultaneously, the treatment of cardiovascular and



cerebrovascular diseases has evolved from a sole focus on “treating the brain” or “treating the heart” to an integrated approach of “simultaneous treatment of the brain and heart” combining TCM and Western medicine. This holistic approach considers the health of both the heart and the brain. Zhang Boli, an academician of the Chinese Academy of Engineering, pointed out that the theory of “simultaneous treatment of the brain and heart” offers new perspectives and methodologies for the treatment of cardiovascular and cerebrovascular diseases with Chinese medicine <sup>[35]</sup>. Wu Yiling, another academician of the Chinese Academy of Engineering, and his team proposed “dredging therapy,” which opens up a new avenue for the prevention and treatment of cardiovascular and cerebrovascular diseases. They suggest that “sun luo-microvessels” serve as the theoretical integration point and therapeutic breakthrough for studying microvascular lesions in Chinese and Western medicine. The integrated strategy of TCM and Western medicine encompasses a combination of drug therapy, lifestyle adjustments, rehabilitation training, and integrated prevention measures <sup>[36]</sup>. Studies have revealed that Qipo Shengmai Granules are highly effective in treating atrial fibrillation with Qi and Yin deficiency syndrome <sup>[37]</sup>. Based on Western medicine treatment, Chinese medicine can be reasonably applied to adjust the internal environment and enhance resistance. Patients are guided to make appropriate dietary adjustments, manage emotions, and engage in moderate exercise. The integrated treatment strategy of TCM and Western medicine is increasingly highlighting its significance in the prevention and control of cardiovascular and cerebrovascular diseases.

### **5.3. Prevention of recurrence after recovery: Rehabilitation and long-term management**

#### **5.3.1. Rehabilitation training and functional recovery**

Rehabilitation training and functional recovery for cardio-cerebrovascular diseases are key to improving quality of life and reducing disability rates. Rehabilitation training, through professional guidance, aids in the restoration of motor, sensory, and cognitive functions. Functional recovery involves training to achieve independent completion of daily life and work activities. Rehabilitation training encompasses physical therapy, speech therapy, cognitive training, psychological counseling, and life

skills training. Specific training plans should be tailored according to the patient’s condition, stage of recovery, personal abilities, and needs, and should be conducted under professional guidance. During the process of functional recovery, the patient’s self-management abilities are also crucial. They need to learn to apply the skills acquired during rehabilitation training, and the support and assistance of family members serve as an important safeguard.

#### **5.3.2. Long-term management and improvement of quality of life**

According to the “Su Wen: Si Qi Tiao Shen Da Lun,” it is stated that “the Yin and Yang of the four seasons are the fundamental principles of all things. Therefore, the wise nourish Yang in spring and summer, and nourish Yin in autumn and winter, following their roots. Thus, they float and sink with all things in the gate of growth. If one goes against their roots, they will damage their essence and destroy their authenticity.” Based on this, traditional Chinese medicine emphasizes preventing diseases by adapting to the changes of the four seasons, which can be applied to the long-term management of cerebrovascular diseases. Improving the quality of life is an important goal, encompassing various aspects such as physical health, mental health, social interaction, and economic burden, as mentioned in Wang *et al.*’s (2020) study on the comprehensive management of cardiovascular diseases <sup>[38]</sup>. Effective management strategies should include controlling related risk factors like hypertension, hyperlipidemia, and diabetes through medication and lifestyle adjustments to achieve stable indicators, and conducting regular medical check-ups to facilitate timely adjustments to treatment plans. Simultaneously, maintaining mental health is crucial, necessitating the provision of psychological counseling and support to assist patients in coping with issues such as anxiety and depression, as highlighted in Chen *et al.*’s (2022) systematic review on the economic burden of cardiovascular diseases in China <sup>[39]</sup>. Additionally, promoting social interaction and participation in social activities can help strengthen patients’ social support networks. Reducing the economic burden can be achieved through medical insurance and assistance measures. By taking these factors into comprehensive consideration

and developing personalized intervention measures, effective disease control, reduction of recurrence risk, and significant improvement in patients' overall quality of life can be achieved.

## 6. Conclusion

Cardiovascular and cerebrovascular diseases are one of the leading causes of death globally, and thus their prevention and treatment are of utmost significance in the field of public health. In the development of modern medicine, the traditional Chinese medicine (TCM) concept of “preventive treatment of disease” offers a fresh perspective and approach to the prevention of cardiovascular and cerebrovascular diseases. As stated in the “Su Wen: Chapter on the Regulation of the Spirit According to the Four Seasons,” “The sage does not treat diseases that have already occurred, but prevents their occurrence; he does not manage disorders that have already arisen but forestalls their arising. This is what is meant by saying that to treat diseases after they have formed is like digging a well when thirsty, or forging a weapon after the fight has begun—it is too late.” This passage profoundly emphasizes the importance of intervening before the formation of diseases, preventing their occurrence by adjusting the overall state of the human body. The significance of this concept lies in its emphasis on early identification and intervention of risk factors for cardiovascular and cerebrovascular diseases, such as hypertension, dyslipidemia, diabetes, etc. By improving lifestyle measures such as moderate exercise, balanced diet, smoking cessation, and alcohol restriction, as well as implementing comprehensive health management including regular health screenings and personalized health education, the incidence and recurrence rates of cardiovascular and cerebrovascular diseases can be reduced.

The concept of “preventive treatment of disease” coincides with the three-tier prevention strategy of

modern preventive medicine. By integrating the advantages of both Western and traditional Chinese medicine, a comprehensive prevention and control technology system can be established. From early monitoring to integrated management, this system can effectively reduce the incidence, recurrence, and mortality rates of cardiovascular and cerebrovascular diseases, thereby significantly improving the health status and quality of life of the population. Therefore, promoting and practicing the concept of “preventive treatment of disease” is one of the important strategies to enhance the prevention and control of cardiovascular and cerebrovascular diseases.

In ancient medicine, the “Synopsis of Golden Chamber” also mentioned, “When the meridians are moderately affected and the disease has not spread to the internal organs, prompt treatment should be administered. If the limbs begin to feel heavy and sluggish, methods such as guidance, exhalation and inhalation, acupuncture, and ointment massage should be employed to prevent the nine orifices from becoming blocked.” This underscores the emphasis placed by ancient medicine on disease recovery, particularly the importance of physical exercise and bodily conditioning. Through appropriate exercises such as guidance, exhalation and inhalation, as well as acupuncture and ointment massage, the body's immune response can be significantly enhanced, preventing the further progression of the disease and alleviating symptoms, thereby promoting the early recovery of patients. This philosophy complements the prevention and recovery concepts of modern medicine, emphasizing the importance of holistic bodily conditioning and health management in the prevention and treatment of cardiovascular diseases. By comprehensively applying Western and traditional Chinese medicine methods, more comprehensive prevention and control of cardiovascular and cerebrovascular diseases can be achieved, providing patients with more comprehensive and effective health management solutions.

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# Distribution and Risk Factors Analysis of Multidrug-resistant Bacterial Infections in ICU Ward Patients

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## Abstract:

**Objective:** To analyze the distribution of multidrug-resistant bacteria and their related risk factors in patients in the intensive care unit (ICU) of hospitals. **Method:** A retrospective analysis was conducted on the clinical data of 902 inpatients admitted to the Intensive Care Unit (ICU) of Longquanyi District Traditional Chinese Medicine Hospital from October 2022 to October 2023. The ICU hospital obtained the distribution location of infectious pathogens and the characteristics of antibiotic resistance of infection-resistant bacteria. **Results:** Among the 902 hospitalized patients, 112 cases developed hospital-acquired infections, with an infection rate of 12.41%. A total of 168 strains of pathogenic bacteria were isolated from 112 hospital samples of infected patients. Among them, 28 cases were multidrug-resistant hospital infections, accounting for 16.67% of the total number of pathogenic bacteria. The types are carbapenem-resistant *Acinetobacter baumannii*, carbapenem-resistant *Klebsiella pneumoniae*, and carbapenem-resistant *Pseudomonas aeruginosa*, accounting for 46.42%, 28.57%, and 17.87%, respectively. Univariate analysis showed that long-term bed rest<sup>[1]</sup>, nutritional risk, multiple hospitalizations within one year, systemic glucocorticoid use, duration of mechanical ventilation and ventilator use, duration of antibiotic use, the combination of antibiotics, duration of indwelling urinary catheters and indwelling catheters<sup>[2]</sup>, duration of indwelling gastric catheters and indwelling catheters, duration of deep vein catheters and indwelling catheters, and length of ICU hospitalization were all influencing factors for the occurrence of hospital-acquired infections in the ICU. Multivariate analysis showed that mechanical ventilation, diabetes, length of ventilator use, length of ICU hospitalization and malignant tumors constituted independent risk factors for multidrug-resistant bacterial infection<sup>[3]</sup>. **Conclusion:** The infection rate of multidrug-resistant bacteria in ICU patients is high, and relevant prevention and control measures can be formulated based on their risk factors.

## Keywords:

ICU  
Multiple drug resistance  
Hospital infection  
Risk factor

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## 1. Materials and methods

### 1.1. General information

A total of 902 patients admitted to the Intensive Care Unit (ICU) of some hospitals in Longquanyi District between October 2022 and October 2023 were selected as subjects for a special investigation on the distribution of multidrug-resistant organism (MDRO) infections and their risk factors among ICU inpatients. Inclusion criteria for patients in the survey were ICU stay of  $\geq 48$  hours, patients who were not infected with MDRO at the time of admission, diagnosis of nosocomial infections referring to the “Hospital Infection Diagnostic Criteria (Trial)”<sup>[4]</sup>, and complete clinical medical record data. Among the 902 patients included in this survey, there were 550 males and 352 females, with ages ranging from 31 to 99 (mean age:  $65.69 \pm 16.99$  years old).

### 1.2. Methods and indicators

A retrospective analysis of the patients’ clinical data was conducted, including general patient information, primary diseases, comorbidities such as chronic obstructive pulmonary disease (COPD) and coronary heart disease, whether patients were transferred after surgery, central venous catheter placement and indwelling time, urinary catheter insertion and indwelling time, ventilator use and duration, antimicrobial drug usage, duration of antimicrobial therapy, and whether antimicrobial drugs were used in combination, length of ICU stay, and whether glucocorticoids were administered. The purpose was to identify risk factors for MDRO infection. The identification of MDRO infection followed the guidelines outlined in the “Technical Guidelines for the Prevention and Control of Nosocomial Infections with Multi-Drug Resistant Organisms (MDROs) in China (Trial).”

### 1.3. Statistical methods

SPSS 26.0 statistical software was used for analysis. Measurement data that followed a normal distribution were described using mean  $\pm$  standard deviation (SD) and compared using the two-sample *t*-test. Skewed data were described using median (M) and interquartile range (Q1, Q3) and analyzed using the Mann-Whitney U test. Count data were expressed as the number of cases (%) and compared using the chi-square test or Fisher’s exact test.

Multivariate logistic regression analysis was performed on variables with statistically significant differences in risk factors.

## 2. Results

### 2.1. Basic information

From October 2022 to October 2023, there were 902 hospitalized patients in the ICUs of some hospitals in Longquanyi District, among which 112 patients developed nosocomial infections, with an incidence rate of 12.41%. Among the patients with nosocomial infections, 28 cases of multi-drug resistant nosocomial infections were diagnosed, accounting for 16.67% of the total infection cases.

### 2.2. Distribution of infection samples

The main sources of ICU-acquired multidrug-resistant organism (MDRO) hospital infection samples are sputum, urine, and pleural/abdominal fluid, with a composition ratio of 53.58%, 14.29%, and 10.71%, respectively. The primary MDRO species infecting ICU patients are carbapenem-resistant *Acinetobacter baumannii*, carbapenem-resistant *Klebsiella pneumoniae*, and multidrug-resistant *Pseudomonas aeruginosa*, accounting for 46.42%, 28.57%, and 17.87%, respectively (Table 1).

### 2.3. Drug sensitivity analysis of multi-drug resistant bacteria

Carbapenem-resistant *Acinetobacter baumannii*, carbapenem-resistant *Klebsiella pneumoniae*, and carbapenem-resistant *Pseudomonas aeruginosa* are generally resistant to second and third-generation cephalosporins. Carbapenem-resistant *Acinetobacter baumannii* and carbapenem-resistant *Klebsiella pneumoniae* are sensitive to trimethoprim/sulfamethoxazole and tigecycline, while carbapenem-resistant *Pseudomonas aeruginosa* is sensitive to amikacin (Table 2).

### 2.4. Analysis of risk factors for infection

#### 2.4.1. Univariate analysis

The results of the univariate analysis indicated that long-term bed rest, nutritional risk, diabetes, frequent hospitalizations within one year, systemic glucocorticoid

**Table 1.** Distribution of MDRO infection samples among ICU in-patients

Sample type	Carbapenem-resistant <i>Acinetobacter baumannii</i>	Carbapenem-resistant <i>Klebsiella pneumoniae</i>	Multidrug-resistant <i>Pseudomonas aeruginosa</i>	Others	Total
Sputum	9 (32.14)	5 (17.87)	3 (10.71)	1 (3.57)	18 (53.58)
Urine	2 (7.14)	1 (3.57)	1 (3.57)	0 (0.00)	4 (14.29)
Pleural/Abdominal fluid	0 (0.00)	2 (7.14)	1 (3.57)	0 (0.00)	3 (10.71)
Catheter	0 (0.00)	0 (0.00)	0 (0.00)	1 (3.57)	1 (3.57)
Secretion	1 (3.57)	0 (0.00)	0 (0.00)	0 (0.00)	1 (3.57)
Others	1 (3.57)	0 (0.00)	0 (0.00)	0 (0.00)	1 (3.57)
Total	13 (46.42)	8 (28.57)	5 (17.87)	2 (7.14)	28 (100)

**Table 2.** Drug resistance profile of major multi-drug-resistant bacteria

Antibacterial drug	Carbapenem-resistant <i>Acinetobacter baumannii</i> (n = 13)		Carbapenem-resistant <i>Klebsiella pneumoniae</i> (n = 8)		Carbapenem-resistant <i>Pseudomonas aeruginosa</i> (n = 5)	
	Number of resistant plants (n)	Drug resistance rate (%)	Number of resistant plants (n)	Drug resistance rate (%)	Number of resistant plants (n)	Drug resistance rate (%)
Ampicillin	13	100.00	8	100.00	5	100.00
Cefazolin	-	-	8	100.00	5	100.00
Gentamicin	13	100.00	8	100.00	0	0.00
Cefoxitin	13	100.00	8	100.00	-	-
Amikacin	13	100.00	8	100.00	0	0.00
Ceftriaxone	13	100.00	8	100.00	5	100.00
Ampicillin/Sulbactam	13	100.00	8	100.00	5	100.00
Trimethoprim/ Sulfamethoxazole	13	100.00	0	0.00	5	100.00
Piperacillin/Tazobactam	13	100.00	8	100.00	2	40.00
Cefuroxime	-	-	8	100.00	-	-
Meropenem	13	100.00	8	100.00	5	100.00
Cefepime	13	100.00	8	100.00	1	20.00
Levofloxacin	13	100.00	8	100.00	5	100.00
Ceftazidime	13	100.00	8	100.00	0	0.00
Aztreonam	13	100.00	8	100.00	5	100.00
Minocycline	0	0.00	8	100.00	5	100.00
Furantoin	13	100.00	8	100.00	-	-
Tigacycline	0	0.00	0	0.00	5	100.00
Colistin	13	100.00	8	100.00	0	0.00
Cefoperazone/Sulbactam	13	100.00	8	100.00	5	100.00
Amoxicillin/Clavulanic acid	-	-	8	100.00	-	-

use, duration of mechanical ventilation and ventilator use, duration of antimicrobial use, combination antibiotic therapy, indwelling urinary catheter and its duration, indwelling gastric tube and its duration, deep venous catheter placement and its duration, and length of ICU stay were predictive of drug-resistant bacterial infections in patients ( $P < 0.05$ ) (Table 3).

#### 2.4.2. Multi-factor analysis

Multi-factor logistic regression analysis was conducted on

the variables selected through single-factor analysis. The results showed that mechanical ventilation (OR = 4.239, 95% CI: 1.092–36.186), nutritional risk (OR = 4.291, 95% CI: 1.091–23.065), duration of ventilator use (OR = 9.290, 95% CI: 1.116–1.659), length of ICU stay (OR = 14.196, 95% CI: 1.279–2.178), and malignant tumors (OR = 7.949, 95% CI: 5.345–11178.303) are independent risk factors for drug-resistant bacterial infections in ICU patients ( $P < 0.05$ ) (Table 4).

**Table 3.** Univariate analysis results

Variable	MDRO group ( $n = 28$ )	Non-MDRO group ( $n = 84$ )	Significance ( $P$ )
Long-term bed rest (% of cases)	20 (71.4)	28 (33.3)	0.001
Nutritional risk (% of cases)	18 (64.3)	31 (36.9)	0.011
Diabetes (% of cases)	19 (67.9)	32 (38.1)	0.006
Malignant tumor (% of cases)	3 (10.7)	1 (1.2)	0.019
Number of hospitalizations in one year (mean $\pm$ SD, times)	2.07 $\pm$ 0.900	1.45 $\pm$ 1.366	0.027
Use of glucocorticoids (% of cases)	20 (71.4)	40 (47.6)	0.029
Mechanical ventilation (% of cases)	17 (60.7)	30 (35.7)	0.020
Duration of ventilator use (mean $\pm$ SD)	8.82 $\pm$ 4.627	2.86 $\pm$ 3.117	0.000
Indwelling urinary catheter (% of cases)	24 (85.7)	51 (60.7)	0.015
Indwelling gastric tube (% of cases)	21 (75.0)	45 (53.6)	0.046
Deep venous catheter placement (% of cases)	21 (75.0)	42 (50.0)	0.021
Duration of urinary catheter (mean $\pm$ SD)	10.25 $\pm$ 3.051	6.93 $\pm$ 5.703	0.004
Duration of gastric tube (mean $\pm$ SD)	4.61 $\pm$ 3.635	3.04 $\pm$ 2.818	0.020
Duration of deep venous catheter $\geq$ 1 week (% of cases)	26 (92.9)	46 (54.8)	0.000
Length of ICU stay (mean $\pm$ SD)	8.82 $\pm$ 3.422	5.26 $\pm$ 2.990	0.000
Duration of antimicrobial use (mean $\pm$ SD)	8.54 $\pm$ 4.069	5.44 $\pm$ 5.230	0.005
Combination antibiotic therapy (% of cases)	26 (92.9)	52 (61.9)	0.001

**Table 4.** Multi-factor logistic regression analysis

	Regression coefficient	Standard error	OR	95% CI	$P$ value
Mechanical Ventilation	1.838	0.893	4.239	1.092–36.186	0.040
Nutritional risk	1.613	0.778	4.291	1.091–23.065	0.038
Duration of Ventilator use	0.308	0.101	9.290	1.116–1.659	0.002
Length of ICU stay	0.512	0.136	14.196	1.279–2.178	0.000
Malignant tumors	5.499	1.950	7.949	5.345–11178.303	0.005
Constant	-9.115	2.064	19.503	...	0.000

### 3. Discussion

ICU patients are critically ill and have low immunity, making them susceptible to nosocomial infections <sup>[5]</sup>. According to relevant literature, ICU inpatients have a significantly higher risk of developing nosocomial multidrug-resistant bacterial infections compared to other departments, and poor treatment outcomes can exacerbate the patient's condition, further leading to life-threatening situations <sup>[6]</sup>. Therefore, analyzing the distribution of multidrug-resistant bacterial pathogens and risk factors among ICU patients is extremely important for controlling the infection rate of multidrug-resistant bacteria in the ICU.

The results of this study show that the main sources of multidrug-resistant bacterial infection specimens are sputum and urine. The primary multidrug-resistant bacteria identified are carbapenem-resistant *Acinetobacter baumannii*, carbapenem-resistant *Klebsiella pneumoniae*, and carbapenem-resistant *Pseudomonas aeruginosa*. Overall, multidrug-resistant bacteria are mainly Gram-negative bacilli, which is consistent with the distribution characteristics of nosocomial infection pathogens <sup>[7]</sup>. Proper hand hygiene practices among healthcare workers, disinfection and isolation measures, and strict aseptic techniques during various procedures, especially invasive ones, play a crucial role in preventing multidrug-resistant bacterial infections <sup>[8]</sup>. Multivariate regression analysis identified mechanical ventilation, nutritional risk, duration of ventilator use, length of ICU stay, and malignancy as risk factors. ICU patients are often critically ill with multiple comorbidities, frequently including pulmonary diseases. Many of these patients undergo endotracheal intubation or tracheotomy and rely on mechanical ventilation for respiratory support <sup>[9]</sup>. As the duration of ventilation increases, so does the frequency of airway opening, elevating the risk of infection. Prolonged mechanical ventilation can lead to the formation of a biofilm in the respiratory tract, making bacteria more resistant to treatment. This may be attributed to invasive procedures disrupting the body's natural defense mechanisms, thereby increasing the vulnerability to pathogenic infections, particularly in the lungs <sup>[10-12]</sup>. Additionally, inadequate sterilization of equipment, non-standardized procedures, and insufficient aseptic techniques can all contribute to an increased

risk of lung infections caused by drug-resistant bacteria. The use of suction catheters can damage the respiratory mucosal barrier, providing an entry point for pathogenic bacteria and further heightening the risk of drug-resistant bacterial lung infections. ICU patients, due to their severe conditions, often experience a decline in digestive system function, weakened digestive capacity, and compromised immune function. The use of anti-infective drugs frequently leads to gastrointestinal disorders and imbalances in intestinal flora, putting them at a higher risk of malnutrition <sup>[13]</sup>. Furthermore, infections can result in the depletion of albumin, and there is a positive correlation between hypoalbuminemia and the occurrence and severity of viral, bacterial, and fungal infections <sup>[14]</sup>. As ICU patients' length of stay increases, their immunity progressively weakens. Being exposed to a persistent environment of colonized bacteria makes them more susceptible to various pathogenic microorganisms, thereby increasing their infection risk <sup>[15]</sup>. Patients with malignant tumors, particularly those who have undergone radiotherapy and chemotherapy, have even lower immunity compared to general patients, further elevating their risk of infection <sup>[16]</sup>.

### 4. Conclusion

In conclusion, the situation of multidrug-resistant bacterial infections in ICU wards is extremely severe. The distribution and drug resistance of these bacteria exhibit distinct characteristics and are influenced by a variety of factors. Patients with the aforementioned high-risk factors should undergo targeted screening and intervention. For those who have already developed infections, it is imperative to conduct proper isolation and identification of pathogenic bacteria, as well as drug resistance analysis. Antibiotics should be used rationally based on drug sensitivity results to prevent further increases in bacterial resistance. Healthcare workers must strictly adhere to disinfection measures before and after contact with patients, avoid unnecessary invasive procedures, strictly follow sterile practices during operations, and ensure timely disinfection of medical equipment. These efforts will create a favorable hospital environment for patients. Additionally, measures should be taken to reduce the duration of mechanical ventilation, improve



patients' nutritional status, supplement protein to maintain metabolic balance and enhance patients' immunity.

These steps are aimed at achieving the goal of controlling multidrug-resistant hospital infections in the ICU.

### Disclosure statement

The authors declare no conflict of interest.

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# Exploring the Pathogenesis of Chronic Ischemic Brain Injury Based on the Theories of Ying-nutrients and Wei-defence and Blood Vessels

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## Abstract:

Chronic brain injury refers to a clinical syndrome caused by various factors, which is characterized by chronic progressive organic damage to the brain and ultimately leads to impairment of higher nervous functions. Chronic brain injury encompasses a wide range of conditions, among which ischemic brain injury is the most common type. Kidney essence deficiency, along with vessel and collateral impediment and brain marrow depletion, is an important pathogenesis in chronic ischemic brain injury, closely related to Ying-nutrients, Wei-defence and blood vessels. Kidney deficiency vessels and collateral impediments influence each other. Kidney deficiency can affect the circulation of Qi, blood, Ying-nutrients, and Wei-defence, leading to blood stasis vessels and collateral impediments. Internally accumulated static blood and obstructed vessels and collaterals can impede the circulation of Ying-nutrients and Wei-defence, exacerbating kidney deficiency. A self-formulated kidney-tonifying and collateral-unblocking formula aims primarily to tonify the kidneys, replenish essence, and nourish Ying-nutrients and Wei-defence, with the regulation and harmonization of Ying-nutrients and Wei-defence, and ensuring smooth circulation of blood vessels being the key goals. Ultimately, this formula can nourish the brain and unblock the vessels and collaterals, allowing the spirit to function properly.

## Keywords:

Theories of Ying-nutrients and Wei-defence and blood vessels

Chronic ischemic brain injury

Pathogenesis

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## 1. Introduction

Chronic brain injury refers to a clinical syndrome caused by various factors, which is characterized by chronic progressive organic damage to the brain, and ultimately leads to impairment of higher nervous functions <sup>[1]</sup>. Chronic brain injury encompasses a wide range of conditions, among which ischemic brain injury is the most common type. Long-term cerebral ischemia can lead to many chronic brain diseases. Besides the most common chronic cerebral ischemia, they can also manifest as headache, dementia, depression, tremor, insomnia, etc.

A large number of studies have indicated that kidney deficiency and vessel and collateral impediments are important pathogenesis in chronic ischemic brain injury <sup>[2-10]</sup>. Patients with chronic ischemic brain injury are mostly middle-aged and elderly individuals, and kidney essence deficiency is a prominent feature for them. Kidney essence deficiency leads to brain marrow depletion, which, at this stage, is often accompanied by a decline in the function of the organs and a deficiency of Qi and blood. The function of the vessel, one of the extraordinary organs, also begins to decline, and damage to vessels and collaterals, such as atherosclerosis, is a common symptom. Moreover, middle-aged and elderly individuals often exhibit hypercoagulability and blood hyper-viscosity, with multiple hemorheological parameters being abnormal, especially increased blood viscosity and whole blood viscosity. Vessels and collaterals function best when they are unobstructed. This hypercoagulable and hyper-viscous state can easily cause vessel and collateral impediment, preventing the smooth flow of qi and blood, and making it difficult to nourish the brain marrow.

Natural aging of the brain and long-term chronic ischemia can affect its various functions, such as mind, consciousness, memory, movement, sleep, etc., leading to symptoms of chronic ischemic brain injury, including dizziness, headache, dementia, depression, tremor, and insomnia. It is evident that kidney essence deficiency, along with vessel and collateral impediment and brain marrow depletion, is an important pathogenesis in chronic ischemic brain injury. Tonifying the kidneys and replenishing essence, as well as unblocking vessels and collaterals and nourishing the brain, is a key therapeutic approach. An explanation using theories of Ying-nutrients

and Wei-defence and blood vessels is provided below.

## 2. Essentials of theories of Ying-nutrients and Wei-defence and blood vessels

### 2.1. Theory of Ying-nutrients and Wei-defence

The theory of Ying-nutrients and Wei-defence originates from the “Yellow Emperor’s Inner Canon.” Ying-nutrients and Wei-defence are generated in the middle jiao and are rooted in the spleen and stomach, with the liver and kidneys serving as their foundation. The “Chapter on Ying Wei Sheng Hui of Lingshu in Yellow Emperor’s Inner Canon” states: “Ying-nutrients arise from the middle Jiao, and Wei-defence arises from the lower Jiao.” The “Chapter on Xie Ke of Lingshu in Yellow Emperor’s Inner Canon” states: “Wei-defensive Qi... often originates from foot-Shaoyin, circulating everywhere in the organs,” indicating that Wei-defensive Qi is rooted in the lower Jiao. The kidneys are the congenital foundation, and Wei-defensive Qi carries the Yang Qi of the lower Jiao to spread throughout the body, allowing kidney Qi to reach the entire body <sup>[11]</sup>.

Ying-nutrients and Wei-defence are refined substances that are essential for the human body and form the basis of life activities. The “Chapter on Tiannian of Lingshu in Yellow Emperor’s Inner Canon” states: “The Yellow Emperor asked: What is referred to as spirit? Qibo replied: When blood and Qi are harmonized, and Ying-nutrients and Wei-defence are unobstructed, the organs are formed, spirit resides in the heart, and the ethereal soul (Hun) and the corporeal soul (Po) are both complete, then one becomes a human being.” Ying-nutrients and Wei-defence permeate the organs, and torso, traveling through the pathways, orifices and collaterals used by the spirit. They participate in multiple physiological processes, including body temperature regulation, body fluid production, water and fluids regulation, consolidation and protection of the immune system, growth and movement, sleep and wake cycles, and spiritual and mental activities <sup>[11]</sup>.

### 2.2. Theory of blood vessels

Vessels arise from the congenital kidney essence and serve as the house of blood, with Qi as its promoter and unobstructed flow as its function. The “Chapter on Mai

Yao Jing Wei Lun of Suwen in Yellow Emperor's Inner Canon" states: "The vessels are the house of blood." Containing blood is the basic function of the vessels. The Qi circulates throughout the body, and Ying-nutrients and blood follow the vessels to spread throughout the body, with Qi acting as the leader. As stated in the "Chapter on Essential Techniques and Methods for Gynecology in Golden Mirror of Medicine": "The movement and cessation, along with the forward and backward circulation, of blood are all directed by Qi."

Bright spirit is rooted in the organs and is generated in Qi and blood. Since Qi and blood circulate through the vessels, the blood and vessels can convey the functions of the spirit. Hence, the "Chapter on Xie Qi Zang Fu Bing Xing of Lingshu in Yellow Emperor's Inner Canon" points out: "The 12 meridians and 365 collaterals all send their blood and qi upward to the head, reaching the orifices." Connecting the organs as well as the limbs and the torso, circulating Qi and blood, and conveying the functions of the spirit are the basic functions of the blood and vessels <sup>[12]</sup>.

### **2.3. Ying-nutrients and Wei-defence are closely related to the blood and vessels**

Ying-nutrients and wei-defence are forms of Qi that circulate continuously. The blood vessels are pathways shared by them. Ying-nutrients and blood use the same pathway, while Wei-defence travels outside and along the blood vessels. Among these, Wei-defence mainly causes movement, promoting and invigorating Qi transformation, maintaining smooth pathways, and conveying the functions of the spirit. Ying-nutrients, with their functions focusing on stillness, enter the vessels and transform into blood. The "Chapter on Ba Zheng Shen Ming Lun of Suwen in Yellow Emperor's Inner Canon" states: "Blood and Qi are the spirits of man." Ying-nutrients and Wei-defence originate from water and grain and are ultimately transformed into blood and Qi, which circulate through the blood vessels and spread throughout the body, generating spiritual and mental activities to allow the bright spirit to function properly <sup>[13]</sup>.

## **3. Kidney essence deficiency, along with vessel and collateral impediment and brain marrow depletion, is an important pathogenesis in chronic ischemic brain injury**

### **3.1. The generation of brain marrow depends on the kidneys, and the brain marrow relies on unobstructed blood vessels to supply it with blood**

#### **3.1.1. Kidney essence generates marrow**

The kidneys govern the storage of essence, which generates marrow, and the marrow accumulates to form the brain. Therefore, the "Chapter on Jing Mai of Lingshu in Yellow Emperor's Inner Canon" states: "At the beginning of human life, the essence is first formed, and when the essence is formed, brain marrow is generated." During the formation of brain marrow, continuous support from kidney essence is required. After its formation, brain marrow still needs continuous nourishment from kidney essence to maintain its normal structure and function.

#### **3.1.2. The blood vessels connect to the brain**

The blood and vessels are closely related to the brain marrow. Once brain marrow is formed, it requires the warming and promoting of Qi and the nourishment of blood to function normally. The brain weighs about 1/50 of the body weight, but cerebral blood flow accounts for approximately 1/5 of the cardiac output per beat. Blood governs nourishing and moistening, and is the foundation for nourishing the spirit. Blood circulates through the meridians upward to the head and face, moisturizing the orifices and nourishing the brain marrow. Only when brain marrow is properly nourished, can the mind be energetic. Therefore, the blood and vessels must not be separated from the brain marrow, essence and Qi for even a moment.

### **3.2. Chronic ischemic brain injury is attributed to kidney essence deficiency, as well as vessel and collateral impediment and brain marrow depletion**

The functions of spirit encompass mind, will, thought, memory, perception, movement, sleep, and the governance of life processes in the body. The functions of the spirit are the summary of various specific functional

activities of the brain marrow, and their external manifestation is the bright spirit. Bright spirit is the outward expression of life, observable and perceivable at all times <sup>[1]</sup>. The brain is the house of the original spirit. Brain marrow is the substrate that supports the functions of spirits. The functions of brain marrow are manifested as the functions of spirit. Therefore, mind, will, thought, memory, perception, movement, sleep, and the life processes in the body are all governed by brain marrow and are specific manifestations of its functions.

When the functions of spirits become disordered, it can lead to various diseases affecting mind, will, thought, memory, perception, movement, sleep, etc. Clinically, these can manifest as chronic cerebral ischemia, headache, dementia, depression, tremor, and insomnia, among other conditions. Long-term cerebral ischemia and damage to the blood and vessels can lead to chronic ischemic brain injury, affecting the brain marrow and causing disorders in the functions of spirits. The site of chronic ischemic brain injury is in the brain, and kidney essence deficiency, along with vessel and collateral impediment and brain marrow depletion, is an important pathogenesis for chronic ischemic brain injury.

## **4. Chronic ischemic brain injury is closely related to Ying-nutrients and Wei-defence, as well as the blood and vessels**

### **4.1. Kidney essence deficiency and undernourishment of Ying-nutrients and Wei-defence result in undernourishment of brain marrow**

#### **4.1.1. Kidney deficiency and insufficient Ying-nutrients and Wei-defence result in brain marrow depletion**

The formation of and the maintenance of functions of brain marrow require sufficient kidney essence. Ying-nutrients and Wei-defence are rooted in the liver and kidneys. Kidney deficiency leads to inadequate innate Qi, insufficient nourishment of Ying-nutrients and Wei-defence, a lack of source for Qi and blood. These cause brain marrow to be unhealthy and depleted, affecting its functions. The reduction in cerebral parenchyma, decreased brain weight, and reduced number of brain

cells in patients with age-related brain atrophy are typical manifestations of this condition.

#### **4.1.2. Kidney essence deficiency and the decline of organs result in undernourishment of brain marrow**

Ying-nutrients and Wei-defence originate from the Qi transformation of the organs, and rely on the Qi transformation of the organs to be promoted and distributed throughout the body, reaching everywhere. The kidneys are the congenital foundation, and kidney Qi circulates throughout the body to promote growth and development with the help of Ying-nutrients and Wei-defence. If kidney essence is deficient, then kidney Qi is insufficient, and the sources of Ying-nutrients and Wei-defence are also inadequate. These lead to functional decline of the organs, making it difficult to nourish brain marrow. When brain marrow is malnourished, various brain diseases may occur.

### **4.2. Vessel and collateral impediment and obstruction of Ying-nutrients and Wei-defence result in dysfunction of the spirit**

Vessel and collateral impediments prevent the normal circulation of Qi and blood. The vessels are the house of blood and function best when unobstructed, they facilitate the circulation of Ying-nutrients, Wei-defence, Qi and blood, and connect the organs and the torso. When blood flow is impeded and stagnates in the vessels, Ying-nutrients, Wei-defence, Qi and blood cannot circulate properly and cannot ascend to the brain. This affects the brain marrow, leading to disorders in the functions of spirits.

### **4.3. Kidney deficiency and vessel and collateral impediments influence each other**

#### **4.3.1. Kidney deficiency can easily lead to vessel and collateral impediments**

##### **4.3.1.1. The vessels originate from the kidneys**

As the congenital foundation, the kidneys promote the growth and development of the body. The prosperity or decline of the organs and the torso is governed by the kidneys. The vessels are considered extraordinary organs, and their processes of birth, growth, maturity, aging, and decline are closely related to the abundance or depletion of kidney essence. When the kidneys are deficient, the

vessels also become weak, and the vessels being weak makes them prone to stagnation of phlegm and blood stasis, leading to the entanglement of stagnant phlegm and static blood in the vessels, resulting in blood stasis, which is often referred to as pathogens lingering in the deficient areas.

#### **4.3.1.2. Kidney Qi deficiency leads to impaired circulation of Ying-nutrients and blood**

The kidneys are the congenital foundation. Kidney Qi, as the innate Yuan-primordial Qi, is the source of the body's Qi. Blood depends on Qi for circulation. When kidney Qi is insufficient, the body's Yuan-primordial Qi is not adequately supplied, leading to uncontrolled Qi movement, disharmony between Ying-nutrients and Wei-defence, and vessel and collateral impediment.

#### **4.3.1.3. Kidney yang deficiency can easily lead to blood stasis**

Kidney Yang, as the foundation of the body's Wei-defence, plays a role in promoting and warming the limbs and the torso<sup>[14]</sup>. Ying-nutrients depend on Qi for circulation and flow more readily when warm, but tends to congeal when cold. If kidney Yang is deficient, the Wei-defensive Yang becomes weak, and the warming function is impaired. Cold arises internally and attacks the vessels, leading to poor blood circulation. Additionally, kidney yang cannot perform Qi transformation normally, and cannot transport blood properly.

#### **4.3.1.4. Kidney Yin deficiency can lead to obstruction of blood circulation**

Kidney Yin, as the foundation of the body's Ying-nutrient Yin, plays a role in nourishing and moisturizing various organs and tissues<sup>[14]</sup>. Kidney Yin deficiency can lead to vessel and collateral impediment in three main ways: (1) Ying-nutrient Yin deficiency results in inadequate blood volume, causing slow blood movement and stagnation of blood in the vessels, which gradually leads to blood stasis; (2) insufficient body fluids result in dryness of the vessels, impairing smooth blood flow and causing obstruction; (3) Yin deficiency causes internal heat, which can scorch the blood and cause blood stasis. Once blood stasis occurs, the circulation of Ying-nutrients, Wei-defence, Qi and blood through the vessels and collaterals

is impaired, leading to vessel and collateral impediment.

#### **4.3.1.5. Kidney essence deficiency can lead to slow blood flow**

The kidneys store the essence received from organs. When kidney essence is deficient, the primary driving force that stimulates and promotes the Qi transformation of the organs weakens, slowing down the circulation of Qi, blood, and body fluids. This forms the basis for blood stasis. Additionally, when kidney essence is insufficient, kidneys fail to nourish the liver, leading to undernourishment of the meridians<sup>[15]</sup>, making them stiff and fragile, causing vascular hardening and convulsion in the vessels and collaterals, which can also slow down blood flow.

#### **4.3.2. Vessel and collateral impediment can exacerbate kidney deficiency**

##### **4.3.2.1. Stasis and congealing can damage the kidneys**

When stasis accumulates internally, the vessels become obstructed, and the circulation of Qi, blood, Ying-nutrients, and Wei-defence is impeded. As a result, the kidneys cannot receive adequate nourishment, leading to kidney deficiency. Over time, prolonged stasis can generate stagnant heat, and the combination of stasis and heat can easily injure kidney Yin. If the stasis is not dissipated, it can obstruct the circulation of Qi and blood, and may easily entangle with phlegm dampness. When phlegm dampness and blood stasis are entangled, the circulation of Qi and blood is more severely impeded.

##### **4.3.2.2. Healthy Qi deficiency affects the kidneys**

Prolonged obstruction by pathogenic factors such as blood stasis, phlegm dampness, and fire heat can eventually cause diseases in the collaterals, leading to the depletion of the body's healthy Qi. The nature of the pathology shifts from tip pathogen to healthy Qi deficiency, causing Qi, blood, Ying-nutrients, and Wei-defence to be insufficient, leading to the decline of the organs. As the saying goes, "when essence and Qi are depleted, there is a deficiency." When the organs are damaged, the kidneys will ultimately be affected, resulting in kidney deficiency.

In summary, kidney deficiency and collateral impediment influence each other. Kidney deficiency can affect the circulation of qi, blood, Ying-nutrients



and Wei-defence, leading to blood stasis and collateral impediment. Internal accumulation of static blood can cause vessel obstruction and impair the circulation of Ying-nutrients and Wei-defence, thereby exacerbating kidney deficiency.

## 5. Analysis of main symptoms of chronic ischemic brain injury in traditional Chinese medicine

### 5.1. Dizziness

Dizziness is primarily seen in chronic cerebral ischemia. In elderly individuals, kidney essence deficiency can lead to insufficient nourishment of the brain marrow. Alternatively, long-term illness can weaken the body, damaging Ying-nutrients, Wei-defence, Qi and blood, as well as kidney essence and Qi, leading to deficiency in the sea of marrow. Both conditions can result in dizziness. As stated in the “Chapter on Hai of Lingshu in Yellow Emperor’s Inner Canon”: “When the sea of marrow is insufficient, there may be dizziness, tinnitus, soreness in the crus, vertigo, visual disturbances, and fatigue with a tendency to lie down.” Blood stasis can also obstruct the brain vessels, cause disharmony between Ying-nutrients and Wei-defence, impair Qi movement, and impede the functions of spirits, leading to dizziness.

### 5.2. Headache

Headache is a common symptom of chronic ischemic brain injury. When kidney essence is insufficient, the brain marrow becomes empty; or when static blood obstructs the collaterals, Qi, blood, Ying-nutrients and Wei-defence cannot reach the brain, leading to undernourishment of the brain marrow. In both cases, the primary manifestation is a hollow pain throughout the head. Headaches caused by blood stasis obstructing the collaterals are often characterized by sharp, stabbing pain in the head.

### 5.3. Forgetfulness

Forgetfulness is primarily manifested as vascular dementia. Vascular dementia refers to cognitive decline caused by cerebral ischemia and hypoxia, which can result from ischemic stroke, hemorrhagic stroke, and other conditions. Some scholars think that the site of

vascular dementia is in the brain, with kidney essence and Qi deficiency being the root pathogenesis, and blood stasis and phlegm dampness obstructing the brain collaterals being the tip pathogenesis <sup>[16]</sup>. Treatment should focus on tonifying the kidneys, circulating the blood, and transforming phlegm. The kidneys govern storage, and postnatal learning and memory depend on this function. When kidney essence is insufficient, the brain marrow becomes empty, the function of storage is impaired, Ying-nutrients and Wei-defence cannot function properly, and the functions of spirits are impeded, leading to forgetfulness. Static blood, as one of the most common pathological factors, can obstruct the vessels and collaterals and result in forgetfulness as well.

### 5.4. Decline of spirit

Ding Yuanqing believes that the core pathogenesis of depression is “Yang stagnation and spirit decline,” with the key of pathogenesis being yang stagnation, disharmony between ying-nutrients and Wei-defence, and dysregulation of the functions of spirits <sup>[17]</sup>. Kidney Qi, as the innate Yuan-primordial Qi, is the source of the body’s Qi. The Wei-defensive Yang of the body is rooted in kidney Yang. When kidney yang is deficient, Yang Qi becomes stagnated and unable to spread, leading to depressed functions of spirit, decline of spirit and mind, and diminished will, resulting in depression. Vessel and collateral impediments can obstruct the circulation of Qi and blood, and impair the function of Qi movement, which can also hinder the uplifting and warming functions of Yang Qi, thus affecting the functions of spirit and leading to this condition.

### 5.5. Tremor

Tremor is most commonly seen in vascular Parkinsonism, which refers to a disease characterized by clinical symptoms similar to those of Parkinson’s disease, and caused by ischemic cerebrovascular disease or cerebral arteriosclerosis. According to Huang *et al.* (2019), kidney essence deficiency is the root cause of the disease, while internal blood stasis is the key factor in its development <sup>[18]</sup>. Movement is one of the functions of brain marrow. When kidney deficiency and vessel and collateral impediment occur, brain marrow’s functions are impaired, leading to motor symptoms such as tremor.

## 6. Treatment of chronic ischemic brain injury with kidney-tonifying and collateral-unblocking formula

For kidney essence deficiency, along with vessel and collateral impediment and brain marrow depletion, which is the important pathogenesis of chronic ischemic brain injury, the study proposes that the pathogenesis lies in kidney essence deficiency, vessel and collateral impediment, undernourishment of the brain marrow, damage to the original spirit and dysfunction of the spirit. Treatment should focus on tonifying the kidneys and replenishing essence, unblocking vessels and collaterals, and nourishing the brain. We recommend using a self-formulated kidney-tonifying and collateral-unblocking formula. The composition of the formula includes *Rehmannia glutinosa*, *Angelica sinensis*, *Lycium barbarum*, *Dendrobium officinale*, *Polygonatum odoratum*, *Testudinis carapax*, *Salvia miltiorrhiza*, *Gastrodia elata*, *Cistanche deserticola*, *Polygala tenuifolia*, *Platycodon grandiflorus*, and *Achyranthes bidentata*.

*Rehmannia glutinosa* has a sweet taste and is slightly warm in property, entering the liver and kidney meridians. It excels at tonifying blood, nourishing Yin, replenishing essence, and enriching the marrow, making it the monarch medicine. “Compendium of Materia Medica” states that it can “replenish bone marrow, increase muscle mass, generate essence and blood, tonify the five insufficient organs, promote blood circulation, benefit hearing and vision, and darken hair...” It enters the liver and kidney meridians and specializes in nourishing blood and Yin, replenishing essence, and enriching the marrow. Therefore, it is often used for conditions involving essence and marrow deficiency. *Angelica sinensis* has a sweet and pungent taste and is warm in property. It excels at tonifying and nourishing blood as well as harmonizing and circulating blood, making it a minister medicine. Not only does it circulate blood and transform stasis, promoting circulation in the brain vessels and collaterals, but also it has nourishing functions, making it an excellent herb for tonifying blood, as it can tonify and harmonize blood. As essence and blood share the same source, it is particularly suitable for blood stasis obstructing the collaterals due to kidney deficiency and blood stasis.

When used together, *Rehmannia glutinosa* and

*Angelica sinensis* follow the formula of Zhen Yuan Yin, which means tonifying Yuan-primordial Qi, from “Complete Works of Jingyue,” jointly exerting the effects of tonifying the liver and kidneys. *Lycium barbarum* has a sweet taste and is neutral in property. Acting on the liver, kidney, and lung meridians, it can nourish the liver, tonify the kidneys, and moisten the lungs. “Treatise on the Nature of Medicinal Substances” states that it “can tonify and replenish essence of various deficiencies.” This indicates that it can tonify the essence and blood of the liver and kidneys, thereby strengthening and nourishing the brain. Therefore, “Treasury of Words on the Materia Medica” states: “It is commonly said that *Lycium barbarum* excels at treating eye disorders, but it does not treat the eyes directly; instead, it strengthens the essence and invigorates the spirit. When the spirit is full and the essence is sufficient, eye disorders can be treated effectively.” *Dendrobium officinale* has a sweet taste and is slightly cold in property, acting on the stomach and kidney meridians. It functions to tonify the stomach and generate body fluids, nourish Yin and clear heat. By nourishing stomach Yin, it ensures a sufficient source of Qi and blood generated in the middle Jiao, allowing the brain marrow to be nourished. It can also tonify kidney yin and reduce deficiency fire, making it adept at tonifying kidney Yin deficiency. *Polygonatum odoratum* has a sweet taste and is slightly cold in property, acting on the lung and stomach meridians. It can nourish the Yin of the lungs and stomach and also clear heat from the lungs and stomach, nourishing Yin without hindering the elimination of pathogens. “Materia Medica of South Yunnan” states that it can “supplement Qi and blood, and tonify middle Jiao and spleen.” As previously mentioned, the lungs and the middle Jiao have a close relationship with the brain. Therefore, “A Supplement to Materia Medica” states that it “governs intelligence, regulates blood and Qi, and strengthens the body.” Together, *Lycium barbarum*, *Dendrobium officinale*, and *Polygonatum odoratum* can tonify liver and kidney with Yin and essence deficiencies, enhancing the effects of the monarch medicine.

*Salvia miltiorrhiza* has a bitter taste and is slightly cold in property, acting on the heart, Pericardium, and liver meridians. It excels at circulating blood and regulating menstruation, eliminating stasis and alleviating



pain, cooling blood and resolving abscesses, and alleviating vexation and calming the mind. “Ri Hua Zi’s Summary of Materia Medica” states that it can “nourish the spirit, stabilize the will, and promote the Guan pulsation.” Only by circulating blood and eliminating stasis, as well as regulating and clearing blood and vessels, can adequate blood supply to the brain marrow be guaranteed and the functions of spirit be benefited. *Gastrodia elata* soothes the liver and submerges Yang, removes wind and unblocks the collaterals, making it an important medicine for treating dizziness and headache. These two medicines can treat Yang hyperactivity and disorder of Qi movement caused by Yin deficiency of liver and kidneys respectively.

*Testudinis carapax* has a sweet taste and is cold in property, acting on the kidney, liver, and heart meridians. It excels at nourishing the kidneys and liver and is commonly used to tonify Yin, submerge Yang, and tonify blood and nourish the heart. *Polygala tenuifolia* has a bitter and pungent taste and is warm in property. It functions to calm the mind and enhance intelligence, and to eliminate phlegm and relieve stagnation. “Compendium of Materia Medica” states that “*Polygala tenuifolia* enters the kidney meridian of foot-Shaoyin and is not a medicine for the heart meridian. Its primary function is to strengthen intelligence and tonify essence, treating forgetfulness. The reason is that essence is stored in the kidney meridian, and intelligence is a function of the kidney meridian. When the kidney meridian is insufficient, intelligence declines and the heart’s governance of bright spirit is also impaired, leading to confusion and forgetfulness.” When used together, these two medicines ensure that kidney Qi is sufficient and reaches its intended destination, thus the cerebral parenchyma is sufficient and the brain functions strongly and healthily.

Yin and Yang are the source of each other, and they support each other, nourish each other and rely on each other. When tonifying yin, it is important not to neglect nourishing yang, hence the use of *Cistanche deserticola* in the formula. “Correct Interpretation of Materia Medica” states: “When ‘Shennong’s Classic of Materia Medica’ discusses the effects of *Cistanche deserticola*, it describes how this medicine stores Yin... *Cistanche*

*deserticola* is heavy and descending, directly entering the kidneys. It is warm and moistening, without causing damage by harsh, dry heat. It can warm and nourish the essence and blood, thereby circulating Yang Qi, hence it is said to benefit essence and Qi. When treating masses and nodules, its salty taste can soften hardness and enter the blood phase, while also tonifying Yin essence and warming and nourishing Yang Qi, thus promoting smooth circulation of Qi and blood and resolving obstructions.” This shows that *Cistanche deserticola* can tonify kidney Qi, replenish essence and blood, warm Yang Qi, and assist blood circulation.

*Achyranthes bidentata* circulates blood and eliminates stasis, and tonifies the liver and kidneys. “Orthodox Materia Medica” states that it can “tonify bone marrow, replenish essence, tonify Yin and circulate blood.” *Platycodon grandiflorus* has a light and clear smell, entering the lung and stomach meridians. Essays from “Chongqing Hall” states that “*Platycodon grandiflorus* opens and clears the stagnation of lung Qi and heart Qi, it is a medicine for the upper Jiao.” The lungs govern Qi, and when lung Qi is opened, the Qi of the entire body circulates freely, with clear Qi ascending and turbid Qi descending, ensuring continuous Qi transformation by the organs, allowing the brain marrow to be healthy and sufficient and the functions of spirit to reach the entire body. The two medicines both serve as assistant and guide medicines, capable not only of tonifying the kidneys and soothing the spirits, but also of regulating and harmonizing Qi and blood, thereby promoting Qi and blood to ascend to nourish the brain marrow.

## 7. Conclusion

In summary, this formula has the following three main effects: tonifying the kidneys, replenishing essence, and nourishing Ying-nutrients and Wei-defence; regulating and harmonizing Ying-nutrients and Wei-defence to promote smooth circulation of blood and vessels; nourishing the brain and unblocking vessels and collaterals to allow the spirit to function properly.

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# Exploring the Main Patterns of Evidence and Medication Patterns and Target Prediction of Yang Xiaocui's Treatment of CKD Stage 3-4 Based on Data Mining

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## Abstract:

Taking the Chinese medicine prescriptions of famous Chinese medicine practitioner Yang Xiaocui of Zunyi Hospital of Traditional Chinese Medicine for treating CKD stage 3–4 in the past 1 year as the source of data, the Chinese medicine prescriptions were analyzed for evidence type, frequency, association rules, and clustering by using Chinese medicine inheritance computation platform to obtain the main evidence type and core prescriptions, and on this basis, the research method of network pharmacology was used to screen the core targets and analyze them by KEGG pathway and GO function enrichment. The potential targets of HF drugs and diseases were studied to elucidate their mechanisms of action. A total of 158 outpatient medical records were collected, in which 153 Chinese herbal medicines were involved, including Huangqi, Shengdihuang, Chuanxiong, etc., which were mainly used to tonify deficiency, clear away heat and pacify the liver to calm the wind, and were mainly cold and sweet, and were mainly used in the liver meridian, spleen meridian and lung meridian, etc. Further, the frequency statistics and correlation analyzes were performed to obtain 10 high-frequency and 10 core drugs. By applying the research method of network pharmacology, the study explored the mechanism of action of the core group of Huangqi-Chuanxiong-Shengdihuang-Liuyuexue-Heichou (Qianniuzi), and found that its main active ingredients, such as quercetin, isorhamnetin and kaempferol, acted on the key targets of CA2, MAPT, ESR1, CYP19A1 and ESR2, and might be related to P53 signaling, insulin resistance,  $\alpha$ -linolenic acid metabolism, inflammatory mediator regulation of TRP channels, longevity regulation pathway, and signaling pathway regulating stem cell pluripotency. Chinese herbal tonics are often used to treat CKD stage 3–4 by treating both the symptoms and the root cause, benefiting the kidney and draining the turbidity, with considerable clinical efficacy, and the HF drugs may play a therapeutic role through multiple signaling pathways, such as P53 signaling pathway, insulin resistance, and so on.

## Keywords:

CKD  
Data mining  
Chinese medicine heritage  
computing platform  
Network pharmacology  
Medication patterns  
Target prediction

## 1. Introduction

Chronic kidney disease (CKD) is a chronic (duration of not less than 3 months) disease caused by primary or secondary glomerular disease, tubulopathy and renal vascular injury, which leads to structural damage and functional damage of the kidneys, accompanied by acid-base imbalance and metabolite retention <sup>[1]</sup>. Among them, chronic nephritis, hypertension and diabetes mellitus are the common causes of CKD, and the main clinical manifestations of this disease are proteinuria, haematuria, hypertension, and elevated blood creatinine <sup>[2]</sup>. Studies have shown that the prevalence of CKD among adults in China is 10.8%, involving about 119 million people <sup>[3]</sup>, so CKD has now become a public health problem in China and even worldwide <sup>[4]</sup>. Compared with Western medical treatment, traditional Chinese medicine in China has better advantages in improving clinical symptoms, protecting residual renal function, and delaying complications in patients with CKD <sup>[5-7]</sup>. CKD stage 3–4 is an important transition period in the pathogenesis, and if properly treated, it can slow down the time to enter end-stage renal disease, reduce the drawbacks and economic pressures brought by renal replacement therapy, and improve the quality of patient's survival. Dr Yang Xiaocui has been practicing medicine for more than 30 years. Yang Xiaocui has been practicing medicine for more than 30 years and has unique experience in the treatment of chronic kidney disease. By recording the cases of CKD stage 3–4 patients in Yang Xiaocui's outpatient medical records into the Chinese medicine inheritance computation platform, common Chinese medicine patterns and medication characteristics, prescription rules are mined and analyzed, commonly used medication groups and effective formulas are screened out, and then potential drug targets are predicted by using web-based pharmacology, further confirming Yang Xiaocui's clinical diagnosis and treatment. This will further confirm the scientific validity and effectiveness of Yang Xiaocui's clinical prescriptions and lay the theoretical foundation for possible animal experiments or clinical observations. Based on the effective prescription, the study can improve the clinical efficacy of treating CKD stage 3–4 patients, slow down the progression of patients to end-stage renal disease, prolong the survival period of patients, and improve the quality of life of

patients with chronic kidney disease.

## 2. Information and methodology

### 2.1. Sources of prescription

The outpatient medical records of Yang Xiaocui, a famous Chinese medicine practitioner of Zunyi Hospital of Traditional Chinese Medicine, who treated CKD stage 3–4 from December 2022 to December 2023 were selected as the data source.

### 2.2. Prescription screening and data standardization

Inclusion criteria: (1) Meet the diagnostic criteria of CKD stage 3–4 in Western medicine; (2) Patients who meet the above TCM patterns according to the symptoms and signs; (3) Patients who are taking TCM decoctions or granules orally; (4) Patients who have complete clinical history, including at least the basic information of the patient, clinical manifestations, tongue and pulse, prescription and medicine, and the number of visits to the clinic is two or more; (5) Patients who have obvious clinical efficacy, such as the symptoms of the patient get better or the experimental examination improves after the follow-up visit.

Exclusion criteria: (1) Those who took replacement therapy or had renal replacement therapy at the data collection stage; (2) Those who combined with serious primary diseases of the liver, kidney, cerebrovascular, hematopoietic system and other organs; (3) Female patients who were pregnant or breastfeeding. The evidence type and formula composition in the prescriptions that met the criteria of screening were entered into Excel, and the names of evidence types and drugs were standardized according to the 2002 "Guidelines for Clinical Research of New Drugs in Traditional Chinese Medicine," the 2021 "Clinical Pathway of Chinese Medicine in Chronic Renal Failure" and the "Pharmacopoeia of the People's Republic of China."

### 2.3. Data analysis

The main types of evidence, drug frequency, efficacy, sexual flavour and categorization of drugs in TCM prescriptions were statistically analyzed, and the commonly used drug combinations and core formulas



were systematically analyzed.

#### 2.4. Screening of core drug combinations for active ingredients and potential targets

The drug components were screened in the HERB database according to the Lipinski principle, and then the corresponding targets of each component were searched in turn, and the target gene names were standardized in the Uniprot database. The GeneCards database was searched with “chronic kidney disease” as the keyword to obtain CKD-related target genes. A Venn diagram was drawn with the online mapping tool Venny 2.0 to obtain the common targets of active ingredients and diseases, i.e., the potential targets of the core drugs to improve CKD, and the common targets were analyzed by the STRING 11.0 online database (the highest confidence level parameter value was  $> 0.7$ ).

#### 2.5. Constructing a network diagram of disease-drug-target relationships

Drug compounds with the same target as the disease were screened and the network diagram of the relationship between the disease target and drug compounds was made using Cytoscape 3.9.1 software. The degree value of the compounds was calculated using the network analyzer tool, and the compounds with higher degree values were the main components that played a role in the core of Chinese medicine.

#### 2.6. Extraction of key targets and construction of protein-protein interaction (PPI) network maps

The common targets were imported into the String database and the highest iso-confidence level of 0.700 was selected to obtain protein-protein interaction files for analysis. Potential target values were calculated using Cytoscape 3.9.1, and core target genes were assigned according to the degree of value.

#### 2.7. GO function, KEGG pathway enrichment analysis

The GO function (Gene Ontology, GO) and KEGG pathway (Kyoto Encyclopedia of Genes and Genomes, KEGG) enrichment analysis of the obtained common targets were performed using the DAVID database, and the corresponding enrichment analyses were obtained, respectively ( $P < 0.05$ ).

### 3. Results

#### 3.1. Frequency analysis of certificate type

After the standardization of the evidence type names, the frequency analysis of the evidence types using the Chinese medicine inheritance computing platform yielded that among the 158 outpatient medical records with CKD stage 3–4 evidence types, the essential deficiency was dominated by spleen-kidney deficiency (57 times, 36.1%) and spleen-kidney yang deficiency (52 times, 32.9%), and the standardized solid evidence was dominated by blood stasis (75 times, 47.5%). See **Table 1** for details.

**Table 1.** Frequency and frequency of distribution of major evidence types in CKD stages 3–4

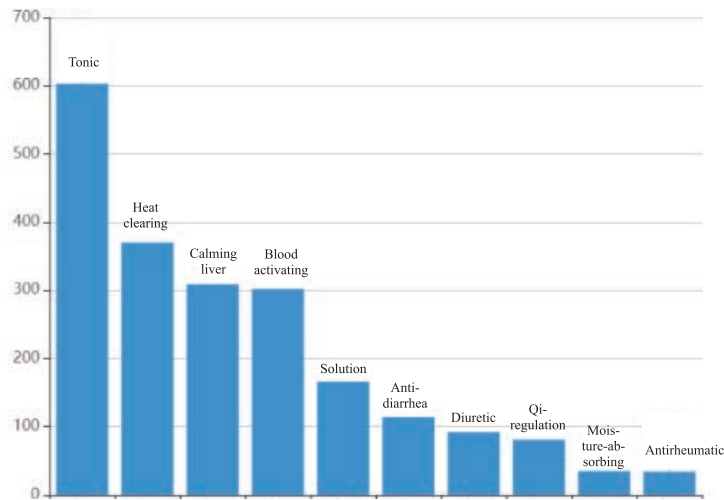
	Type of certificate (e.g. medical certificate)	Frequency	Frequency
Deficiency in essence	Deficiency of the spleen and kidney (TCM)	57	36.1%
	Deficiency of yang in the spleen and kidney (TCM)	52	32.9%
	Deficiency of both Qi and Yin (TCM)	21	13.3%
	Deficiency of Yin in the liver and kidney (TCM)	11	7%
	Deficiency of both Yin and Yang (TCM)	17	11%
Evidence-based	Water-dampness syndrome (TCM)	23	14.6%
	Damp-heat syndrome (TCM)	49	31%
	Evidence of blood stasis (TCM)	75	47.5%
	Evidence of intoxication by drowning (TCM)	11	7%

**3.2. Analysis of the frequency and efficacy of Chinese herbal medicines and the 4 Qi's, five flavours and the attributed meridians**

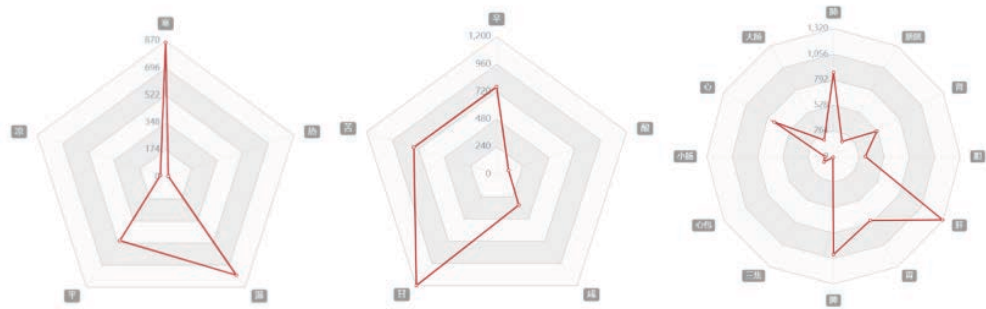
Statistical analyses of the prescribed Chinese medicines yielded 158 prescriptions involving a total of 153 Chinese medicines. The frequency of Chinese herbal medicines was mainly based on Huangqi (150), Shengdihuang (143), Chuanxiong (143), Jiangchan (139), Liuyuexue (138), etc. The efficacy of Chinese herbal medicines was mainly based on tonifying the deficiency (603), clearing heat (370), calming the liver and extinguishing the wind (309), (Figure 1). The flavour of the medicines was mainly based on coldness (861) and sweetness (1198), and the meridians were mainly based on the liver meridian, the spleen meridian and the lung meridian. The liver, spleen and lung meridians are the main meridians (Figure 2).

**Table 2.** The top 20 herbal medicines in terms of frequency in prescriptions for treating CKD stages 3–4

	Veterinary drug	Frequency
1	Huangqi	150
2	Shengdihuang	143
3	Jiangchan	143
4	Heichou	139
5	Dilong	138
6	Baichou	137
7	Chaihu	130
8	Longgu	122
9	Danggui	114
10	Taizishen	82
11	Danzhuye	54
12	Qianniuzi	52
13	Zhiqiao	50
14	Baishao	43
15	Cheqianzi	42
16	Yinyanghuo	37
17	Jinyinhua	34
18	Shigao	33
19	Sanleng	33
20	Weilingxian	31



**Figure 1.** Histogram of the efficacy of Chinese herbal medicines for treating CKD stages 3–4.



**Figure 2.** Radar chart of the frequency distribution of the four Qi, five flavours and attributed meridians of traditional Chinese medicine for treating CKD stages 3–4.

3.3. Analysis of the association rules of Chinese herbal formulas

The platform was set to have a support level of 50 and a confidence level of 0.7, and the top 10 drug combinations were obtained (Table 3). The association analysis of the obtained drug combinations resulted in the top 10 rules with the highest confidence level (Table 4), among which “Huangqi-Chuanxiong-Shengdihuang-Liuyuexue-Heichou-Dilong-Jiangchan” had the highest support, which indicated that this drug combination had the highest association in Chinese herbal formulae. Checking on “Network display” to get the network display of association rules (Figure 3).

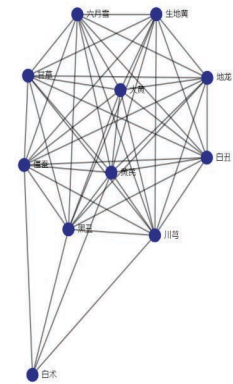


Figure 3. Display of the network of association rules of traditional Chinese medicines for treating CKD stage 3–4.

Table 3. Top 10 drug combinations in terms of frequency of herbal medicines for treating CKD stage 3–4 (times)

Serial number	Drug combinations	Frequency
1	Chuanxiong, Liuyuexue, Heichou, Dilong	99
2	Huangqi, Chuanxiong, Shengdihuang, Gancao	99
3	Shengdihuang, Jiangchan, Gancao	99
4	Jiangchan, Liuyuexue, Heichou, Gancao	99
5	Chuanxiong, Jiangchan, Liuyuexue, Heichou, Dilong	99
6	Huangqi, Liuyuexue, Heichou, Gancao	99
7	Huangqi, Shengdihuang, Dahuang	98
8	Huangqi, Chuanxiong, Jiangchan, Heichou, Gancao	98
9	Huangqi, Jiangchan, Heichou, Dahuang	98
10	Jiangchan, Liuyuexue, Heichou, Dahuang	98

Table 4. Top 10 drug combinations with herbal association rules for treating CKD stage 3–4

Serial number	Rules and regulations	Confidence level (math.)
1	Huangqi, Chuanxiong, Shengdihuang, Liuyuexue, Heichou, Dilong → Jiangchan	1
2	Liuyuexue, Heichou, Gancao, Dilong → Huangqi	0.99
3	Chuanxiong, Liuyuexue, Baichou → Jiangchan	0.99
4	Liuyuexue, Heichou, Baichou → Jiangchan	0.99
5	Chuanxiong, Liuyuexue, Heichou, Dahuang → Jiangchan	0.98
6	Chuanxiong, Shengdihuang, Liuyuexue, Baichou → Huangqi	0.97
7	Jiangchan, Dilong, Baichou → Liuyuexue	0.97
8	Shengdihuang, Liuyuexue, Heichou → Huangqi	0.97
9	Huangqi, Heichou, Baichou → Liuyuexue	0.96
10	Huangqi, Liuyuexue, Dilong → Heichou	0.96

### 3.4. Target prediction

#### 3.4.1. Screening of core drugs and disease-related targets

Sixty-one active ingredients of Huangqi, Chuanxiong, Shengdihuang, Liuyuexue, Heichou (Qianniuzi) were screened (no active ingredients were retrieved for Dilong and Jiangchan), and a total of 953 targets were obtained after normalization and de-duplication processes, which were entered into the Cytoscape 3.9.1 software for numerical calculations and screened for degree ranking of the top 10 active ingredients (Table 5). After screening the target genes related to chronic kidney disease, the intersection of drug and disease targets were taken, and there were 141 targets (Figure 4). Disease targets overlapped with the targets of “Huangqi-Chuanxiong-Shengdihuang-Liuyuexue-Heichou (Qianniuzi),” which represented that the five core drugs could work on the disease through the relevant targets.

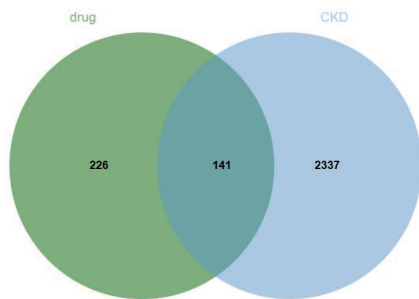


Figure 4. Wayne diagram of drug, CKD intersection targets.

#### 3.4.2. Core drug-disease target networked presentation

By constructing a disease-drug target relationship network diagram, the relationship between drug compounds and disease targets can be shown more intuitively, and the compounds that play a major role can be predicted (Figure 5). In the diagram, the potential targets of drug action are represented by blue prismatic nodes, and the “Huangqi-Chuanxiong-Shengdihuang-Liuyuexue-Heichou (Qianniuzi).” Compound components were green, yellow, blue-green, pink and purple octagonal respectively represented by nodes, the higher the degree value of each node, the larger the node, the more important the node.

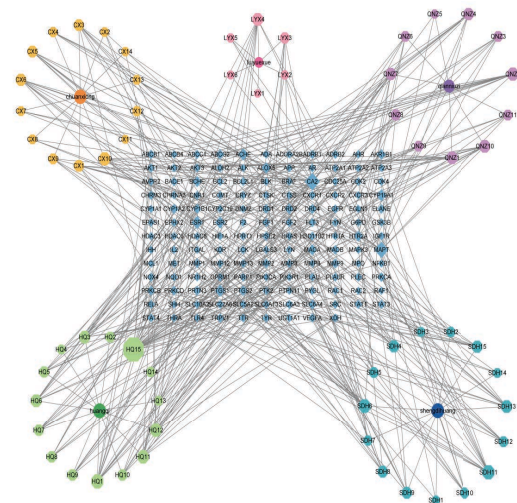


Figure 5. Core drug-disease target network map.

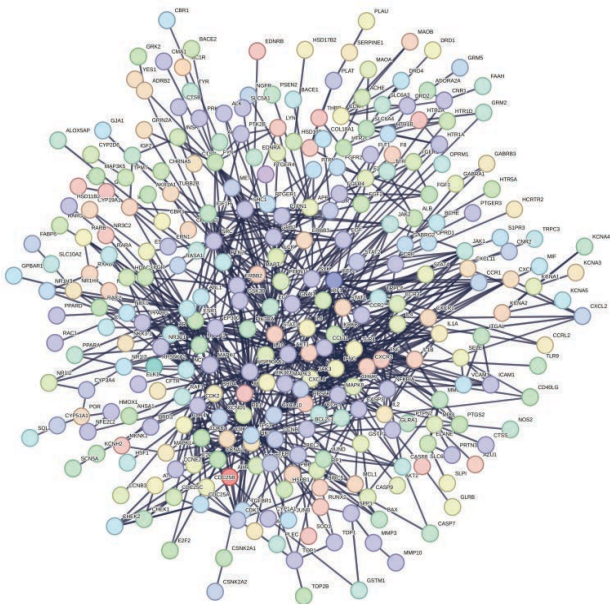
Table 5. Top 10 active ingredients by degree

Serial number	Herb ID	Ingredient name	Degree	Chinese medicine
1	HBIN041495	Quercetin	34	Huangqi
2	HBIN007657	3,5-Dimethoxystilbene	13	Huangqi
3	HBIN024020	Diincarvilone A	12	Shengdihuang
4	HBIN031114	Isorhamnetin	11	Huangqi
5	HBIN031753	Kaempferol	11	Huangqi
6	HBIN016163	Icaritin	11	Qianniuzi
7	HBIN038585	paederosidic acid	10	Liuyuexue
8	HBIN019690	Capsaicin	10	Huangqi
9	HBIN023828	Dihydrocapsaicin	10	Huangqi
10	HBIN013798	8-Prenylkaempferol	10	Qianniuzi



### 3.4.3. Prediction of relevant targets for core drug improvement before CKD

The common targets were imported into the String database to construct a protein-protein interaction (PPI) network graph (**Figure 6**). The values of potential targets were calculated using Cytoscape 3.9.1, resulting in an average degree value of 2.70. 50 targets exceeded the average degree value, and the larger the degree value, the larger the scope of action of the target. The larger the blue prismatic node in **Figure 5**, the greater the degree value of the node and the greater the impact on the disease. The information of the top 5 targets from high to low degree value (**Table 6**), among which CA2, MAPT, ESR1, CYP19A1, ESR2 and other target genes occupy a major position, which can be regarded as the key targets for the treatment of CKD.



**Figure 6.** PPI network interoperability diagram.

**Table 6.** Top 5 key targets in terms of degree value

Serial number	Target name	Gene name	Degree
1	Carbonic Anhydrase 2	CA2	21
2	Microtubule Associated Protein Tau	MAPT	18
3	Estrogen Receptor 1	ESR1	11
4	Cytochrome P450 Family 19 Subfamily A Member 1	CYP19A1	9
5	Estrogen Receptor 2	ESR2	9

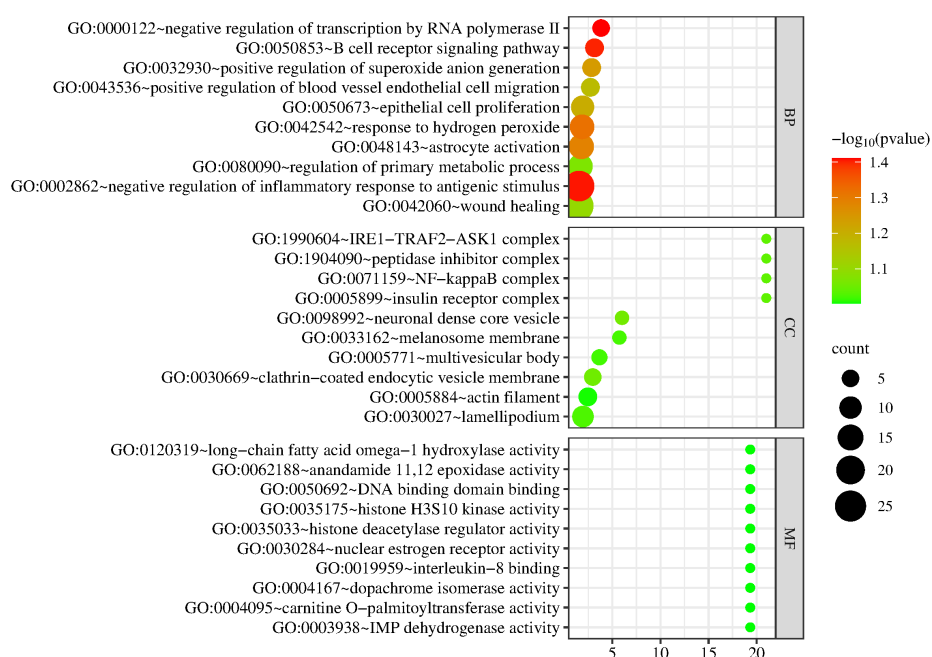
### 3.4.4. GO function and KEGG pathway enrichment analysis

The top 10 biological processes that were more significantly enriched in GO functional analysis included regulation of negative regulation of transcription by RNA polymerase II, B cell receptor signaling pathway, positive regulation of superoxide anion generation, positive regulation of blood vessel endothelial cell migration, epithelial cell proliferation, response to hydrogen peroxide, astrocyte activation, regulation of primary metabolic process, negative regulation of inflammatory response to antigenic stimulus, wound healing. The top 10 cell groups include IRE1-TRAF-ASK1 complex, peptidase inhibitor complex, NF-kappa B complex, insulin receptor complex, neuronal dense core vesicle, melanosome membrane, multivesicula body, clathrin-coated endocytic vesicle membrane, actin filament, lamellipodium. The top 10 molecular functions include long-chain fatty acid omega-1 hydroxylase activity, anandamide 11, 12 epoxidase activity, DNA binding domain binding, histone H3S 10 kinase activity, histone deacetylase regulator activity, nuclear estrogen receptor activity, interleukin-8 binding, dopachrome isomerase activity, carnitine 0-palmitoyltransferase activity, IMP dehydrogenase activity, and the bubble diagram of the GO enrichment analyses (**Figure 7**). The top 10 pathways in KEGG enrichment analysis (**Figure 8**), including p53 signaling pathway, insulin resistance, alpha-linolenic acid metabolism, inflammatory mediator regulation of TRP channels, longevity regulating pathway-multiple species, signaling pathways regulating pluripotency of stem cells, mTOR signaling pathway, apelin signaling pathway and Wnt signaling pathway.

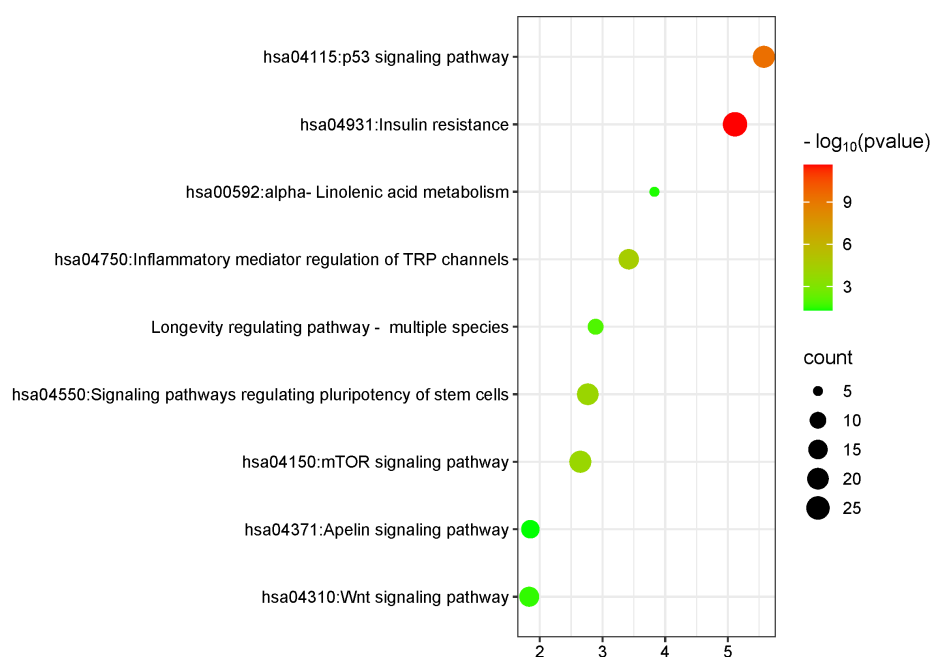
## 4. Discussion

Chronic kidney disease has many causes and complex pathological mechanisms, and the main treatment measures mainly focus on delaying renal failure and relieving clinical symptoms, in which stages 3–4 are an important turning period of the disease, if not actively treated, GFR will significantly decline, renal function will accelerate the deterioration, and rapidly enter the end-stage renal disease. After entering into end-stage renal disease, the main means of treatment is renal replacement





**Figure 7.** Bubble diagram of GO function analysis.



**Figure 8.** Bubble diagram of KEGG enrichment analysis.

therapy, but there are still many disadvantages of renal replacement therapy. Chinese medicine emphasizes evidence-based treatment and holistic treatment, which is not only simple, inexpensive, and easy to take for a long time, but also has an irreplaceable role in slowing down the process of renal failure and improving clinical symptoms.

As stated in “The Treatise on Typhoid Fever,” “Guan

is not allowed to urinate, and Ge is vomiting,” therefore, chronic kidney disease is attributed to the category of “Guan Ge” in Chinese medicine, and clinically, according to the different clinical manifestations, such as oedema, lumbar pain, inability to urinate, and ammonia taste in the mouth, etc., chronic kidney disease should be attributed to the categories of “Shenfeng,” “Shenlao,” “Nidu,” and “Longbi.” According to Chinese medicine, the etiology

of CKD is complex, mainly due to internal and external causes, with external causes being external evils, drug damage, dietary strain and other factors, and internal causes being attributed to the deficiency of internal organs, with spleen and kidney deficiencies being the key<sup>[8]</sup>.

Yang Xiaocui has been practicing medicine for more than 30 years and has unique experience in treating chronic kidney disease. As an inherited disciple of Zhang Daning, she inherited Zhang Daning's "Theory of Kidney Deficiency and Blood Stasis," "Theory of Heart-Kidney Axis System," and "Method of Tonifying the Kidneys and Activating Blood," and combined them with her experience in treating chronic kidney disease. In addition to the experience of "the theory of kidney deficiency and blood stasis," "the theory of heart-kidney axis system," "the method of tonifying the kidney and activating blood," and combining with the special geographic conditions of Guizhou, Yang Xiaocui put forward the rule of treatment for CKD, i.e., "benefiting the kidneys and draining the turbid." Chinese medicine believes that CKD stage 3–4 disease mechanism is mainly spleen and kidney deficiency, Yin and Yang, Qi and blood insufficiency, Qi and elevation dysfunction, so that the turbid evil diffuse congestion, is the basic deficiency standard solid. Yang Xiaocui believes that the main deficiency can be summarized as spleen and kidney deficiency, kidney deficiency and blood stasis, and the underlying reality can be manifested as internal dampness and turbidity, and stasis in the veins and channels, and proposes the treatment of "benefiting the kidneys and draining the turbid," and "dredging the liver, clearing the heart, and nourishing the blood" based on the identification of the viscera and organs. The present study is based on data mining. In the present study, data mining was used to collect statistics on Chinese herbal prescriptions for treating CKD stages 3–4, and it was found that in the treatment of CKD stages 3–4, Yang Xiaocui's treatments were dominated by spleen-kidney deficiency and spleen-kidney yang deficiency, and blood stasis was dominated by blood stasis. A total of 153 flavours of Chinese medicines were obtained, which were mainly tonic, heat-clearing, liver-relieving and wind-relieving, mostly cold, warm and flat, sweet, pungent and bitter and belonging to the liver meridian, the spleen meridian and the lung meridian. Cold and warm, and

reconcile Yin and Yang, and use sweet and flat products to tonic, prevent and control warm, dry, greasy, and then with the method of XinKaiBitterDown to regulate the Qi, the overall to replenish the deficiency for the key. Yang Xiao Cui believes that "benefiting the kidneys" mainly includes replenishing Qi, warming Yang, nourishing Yin, so the evidence of the use of Huangqi, Taizishen, Baizhu, Fupenzi, Nvzhenzi, Mohanlian, and so on. In the aspect of "draining the turbid," it mainly includes inducing Qianniuzi, Chaihu, Danzhuye, Zhiqiao, Cheqianzi, Jiangchan, Dilong are often used in the diagnosis. An analysis of the association rules of 153 Chinese medicines shows that the core combination is "Huangqi-Chuanxiong-Shengdihuang-Liuyuexue-Heichou (Qianniuzi)," which embodies the method of "benefiting the kidneys and draining the turbid," achieving both symptomatic and fundamental effects.

It was found through network pharmacology that the core drug combination may improve CKD mainly through active ingredients such as quercetin, isorhamnetin, and kaempferol, which mainly act on the targets of CA2, MAPT, ESR1, CYP19A1, and ESR2. Among them, quercetin can play a protective role in the kidney through anti-oxidative stress and anti-inflammatory effects<sup>[9]</sup>. Isorhamnetin inhibits epithelial-mesenchymal transition formation and reduces extracellular matrix deposition, so it has a protective effect against renal fibrosis<sup>[10]</sup>. Kaempferol can inhibit the inflammatory response by mediating the inflammatory pathway, and it has been demonstrated that kaempferol also has an indirect protective effect against LPS and high glucose-induced podocyte damage by regulating the macrophage M1/M2 phenotypic transition<sup>[11]</sup>. Among the key targets, CA2 belongs to the zinc-containing enzyme family of lytic enzymes, which is mainly responsible for catalyzing the reversible hydration of carbon dioxide to form bicarbonate ( $\text{HCO}_3^-$ ) and hydrogen ( $\text{H}^+$ ) ions, and the deletion of this gene can lead to insufficient secretion of hydrogen ions in the distal renal tubules or insufficient reabsorption of bicarbonate ions from the proximal renal tubules, resulting in renal tubular acidosis<sup>[12]</sup>, and CA2 can also hydrolyze cyanamide into urea<sup>[13]</sup>, which is a major factor in acid-base metabolism and urea synthesis. It plays a great role in acid-base metabolism and urea synthesis. MAPT is a protein-coding gene that maintains

microtubule stability in cells and is mainly expressed in neuronal cells, lymphocytes and epithelial cells. Some studies have shown that abnormal expression of MAPT in renal clear cell carcinoma may be correlated with prognosis<sup>[14]</sup>. ESR1 and ESR2 are estrogen receptor and ligand-activated transcription factors, and they belong to the nuclear receptor superfamily and perform biological functions in a variety of ways<sup>[15]</sup>. CYP19A1 is a member of the cytochrome P450 enzyme superfamily. Cytochrome P450 proteins are monooxygenases that catalyze many reactions involved in drug metabolism and the synthesis of cholesterol, steroids and other lipids<sup>[16]</sup>. Some studies have shown that there is a correlation between ESR1, ESR2, and CYP19A expression and endometriosis, and there is a lack of research in the kidney, and the specific mechanisms are still being explored<sup>[17]</sup>. In conclusion, the above key targets are closely related to immune-inflammatory responses, acid-base metabolic processes and other processes. From the results of GO function analysis, it can be seen that the core drug combination “Huangqi-Chuanxiong-Shengdihuang-Liuyuexue-Heichou (Qianniuzi)” mainly regulates primary metabolic processes, vascular endothelial cell migration, epithelial cell proliferation, superoxide CKD can be improved by regulating the activity of histone deacetylase regulator, histone H3S10 kinase activity, DNA binding domain binding and other molecular activities. CKD has a complex pathological mechanism, and the development of inflammation, glomerular atrophy, and changes in interstitial fibrosis play an important role in its development, which can effectively slow down the progression of CKD by regulating the balance of acid-base metabolism *in vivo*, and regulating the transport and metabolism of intracellular substances<sup>[18]</sup>. Transport and metabolism can effectively delay glomerular atrophy and interstitial fibrosis, reduce the clinical symptoms of CKD and improve the quality of life of patients. From

the results of KEGG enrichment analysis, it can be seen that the core drug combinations may mainly improve CKD by acting on the relevant pathways such as p53, which, as a nuclear transcription factor, can participate in the mitochondrial apoptosis pathway through the up-regulation of the expression of the target genes, and it has been demonstrated that p53 to activate the transcription of a variety of pro-apoptotic genes involved in mitochondrial apoptosis pathway<sup>[19]</sup>, and the traditional Chinese medicines can improve the quality of life of the patients through the modulation of p53 and mitochondrial apoptosis pathway by regulating p53 and the mitochondrial apoptosis pathway<sup>[20]</sup>. Therefore, it can be hypothesized that “Huangqi-Chuanxiong-Shengdihuang-Liuyuexue-Heichou (Qianniuzi)” can improve CKD by regulating the balance of acid-base metabolism and slowing down renal fibrotic changes.

However, due to the limited number of medical records collected in this study, and the sources of cases were all outpatient clinics, the observation indexes were limited, which led to the possible bias of the experimental results, and there may be database aging, target collection errors or omissions in the part of the network pharmacological research, so it can only be used as a reference for preliminary prediction. The study found that ESR1, ESR2, CYP19A and other targets are the key targets of CKD, but the current research on this aspect is incomplete, this study also found that insulin resistance, alpha-linolenic acid metabolism, inflammatory mediator regulation of TRP channels, longevity regulating pathway-multiple species and other related pathways are related to the development of CKD, for these key targets and pathways that have not yet been clarified, the later can be achieved through the clinical. Randomized controlled trials and animal experiments will be conducted to further validate the findings of this study.

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Based on Data Mining to Explore the Main Syndrome Types, Medication Rules and Target Prediction of Yang Xiaocui in Treating CKD Stages 3-4 (Project No.: Zunshi Kehe HZ Zi (2022) No. 448)

**Disclosure statement**

The authors declare no conflict of interest.

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# Research Progress on Acupuncture's Immune Regulation and Treatment Strategies for Autoimmune Diseases

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## Abstract:

This paper systematically reviews the research progress of acupuncture in immune function regulation and its application strategies in treating autoimmune diseases. Studies have shown that acupuncture can function through regulating immune molecules, immune cells, and immune responses. At the molecular level, it regulates cytokines and immunoglobulins while at the cellular level, it affects the function of NK cells, T cells, and B cells. On the other hand, at the immune response level, it regulates phagocytic cell activity and the neuroendocrine system. Acupuncture has demonstrated significant therapeutic effects in treating autoimmune diseases such as rheumatoid arthritis, systemic lupus erythematosus, and chronic fatigue syndrome, and can work synergistically with other treatment methods to provide more comprehensive therapeutic solutions.

## Keywords:

Acupuncture therapy  
Immune regulation  
Autoimmune diseases  
Cytokines  
Immune cells

**Online publication:** February 27, 2025

## 1. Introduction

Acupuncture, an essential component of Traditional Chinese Medicine, has a history spanning thousands of years. In recent years, with the advancement of modern medical research, the role of acupuncture in treating immune system diseases has gradually been revealed <sup>[1]</sup>. This paper aims to explore how acupuncture regulates the immune system and its application strategies in treating autoimmune diseases.

## 2. Research progress on acupuncture's immune regulation

### 2.1. Regulatory effects of acupuncture on immune molecules

Acupuncture's regulation of immune molecules is manifested in multiple aspects through stimulating specific acupoints, directly affecting the molecular level of the immune system. In inflammatory responses, tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) and interleukin-1 $\beta$  (IL-

1 $\beta$ ), as important pro-inflammatory cytokines, can lead to tissue damage and various disease developments when excessively expressed [2]. Research has shown that acupuncture can effectively reduce the levels of these pro-inflammatory cytokines, and decrease the release of inflammatory mediators, thereby achieving anti-inflammatory effects. This mechanism may be related to the activation of local nerve endings after acupuncture stimulation, which can trigger a series of biochemical reactions, ultimately inhibiting the activation of inflammation-related signaling pathways [3]. Moreover, acupuncture can promote the production of anti-inflammatory cytokines such as interleukin-10 (IL-10). IL-10 is an important anti-inflammatory cytokine that can inhibit pro-inflammatory cytokine synthesis, effectively regulate immune responses, and prevent excessive inflammatory responses from causing damage to the body. By increasing IL-10 levels, acupuncture not only helps balance the pro-inflammatory and anti-inflammatory states of the immune system but also protects organs from inflammatory damage to some extent, which is significant for maintaining body homeostasis. Besides affecting cytokines, acupuncture can also regulate immunoglobulin and complement system functions. Immunoglobulins are the main components of antibodies, crucial for recognizing and eliminating pathogens; while the complement system is part of innate immunity, helping to eliminate pathogens and clear damaged cells [4]. Acupuncture helps enhance the body's ability to resist external invasion while reducing tissue damage caused by autoimmune responses by regulating the levels or activity of these two components.

## 2.2. Regulatory effects of acupuncture on immune cells

Acupuncture's regulation of immune cells primarily manifests in its influence on the quantity and function of key immune cells such as natural killer (NK) cells, T cells, and B cells [5]. NK cells, as an important component of the body's non-specific immunity, can directly kill tumor cells and virus-infected cells. Research indicates that acupuncture can significantly enhance NK cell activity, suggesting that acupuncture can improve the body's anti-tumor capacity and ability to resist viral infections by enhancing NK cell function, which is important

for preventing and treating certain types of cancers and viral infectious diseases. Regarding the regulation of T cells and B cells, acupuncture demonstrates its potential in maintaining immune balance [6]. T cells are responsible for cellular immunity, participating in immune responses against intracellular pathogens such as viruses and tumors. B cells are responsible for producing antibodies and participating in humoral immune responses. Acupuncture can optimize cellular immune responses by adjusting the ratio of T cell subsets, such as balancing helper T cells (Th) and regulatory T cells (Treg). Meanwhile, acupuncture can promote B cell maturation and differentiation, increasing antibody production, and thereby strengthening humoral immunity. This regulation of T cell and B cell balance helps improve overall immune function, reduces the risk of autoimmune responses, and has positive implications for preventing and treating autoimmune diseases. Additionally, acupuncture can promote the release of neurotransmitters such as endorphins [7]. Endorphins are natural analgesic substances, and their release not only effectively relieves pain but can also regulate immune system function by affecting the hypothalamic-pituitary-adrenal (HPA) axis. Activation of the HPA axis can suppress inflammatory responses and reduce the production of inflammatory mediators, thereby alleviating inflammatory symptoms. Through this mechanism, acupuncture can not only relieve inflammation-induced pain but also further influence immune system activity, promoting the body's return to a healthy state.

## 2.3. Regulatory effects of acupuncture on immune responses

Acupuncture's regulation of immune responses is reflected in multiple aspects, including immune cell quantities, functions, and cytokine synthesis and secretion. Through stimulation of specific acupoints, acupuncture can significantly increase the number and function of phagocytic cells [8]. Phagocytic cells are the first line of defense in the immune system, responsible for clearing invading pathogens and dead cells, and maintaining the body's internal environment clean. Research shows that acupuncture can enhance the phagocytic ability and reactive oxygen species production capacity of macrophages and other phagocytic cells, improving

the body's efficiency in clearing bacterial, viral, and other pathogenic microorganisms, thereby effectively preventing infections. In terms of cytokine regulation, acupuncture also shows excellence. Cytokines are important messengers between immune cells, participating in the initiation, amplification, and termination processes of immune responses<sup>[9]</sup>. Acupuncture can regulate cytokine synthesis and secretion, such as by reducing levels of pro-inflammatory cytokines (like TNF- $\alpha$ , IL-1 $\beta$ ) while increasing concentrations of anti-inflammatory cytokines (like IL-10), achieving effective control of inflammatory responses. Furthermore, acupuncture can promote the production of growth factors and chemokines, which are crucial for immune cell proliferation, differentiation, and migration, helping accelerate wound healing and tissue repair. More importantly, acupuncture can indirectly influence immune responses by regulating the neuroendocrine system<sup>[10]</sup>. There exists a close connection between the nervous system and the immune system, where neurotransmitters and hormones can directly act on receptors on immune cells, affecting their activation state and migration ability. Through activating or inhibiting specific neural pathways, acupuncture can influence the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous system, thereby regulating the secretion of hormones such as cortisol. Cortisol has powerful anti-inflammatory effects, and appropriate cortisol levels can help control excessive immune responses, preventing the occurrence and development of autoimmune diseases. Meanwhile, acupuncture can promote the release of neurotransmitters such as endorphins, which not only relieve pain but can also indirectly support normal immune system function by improving emotional state<sup>[11]</sup>.

### 3. Acupuncture treatment strategies in autoimmune diseases

#### 3.1. Acupuncture treatment for rheumatoid arthritis

The effectiveness of acupuncture in treating rheumatoid arthritis has been widely recognized. Rheumatoid arthritis is a chronic autoimmune disease primarily characterized by joint pain, swelling, and limited mobility, severely affecting patients' quality of life. Research shows that

acupuncture can effectively relieve these symptoms, providing a new treatment option for rheumatoid arthritis patients. Through stimulating specific acupoints, acupuncture can reduce levels of inflammatory cytokines in the serum of rheumatoid arthritis patients<sup>[12]</sup>. Inflammatory cytokines, such as tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) and interleukin-1 $\beta$  (IL-1 $\beta$ ), play key roles in the pathogenesis of rheumatoid arthritis, and their excessive production leads to increased joint inflammation. Acupuncture treatment can significantly reduce the levels of these pro-inflammatory cytokines, thereby reducing inflammatory responses, decreasing joint pain and swelling, and improving patients' daily activity ability<sup>[13]</sup>. Besides direct anti-inflammatory effects, acupuncture can also exert therapeutic effects by regulating immune system function. Acupuncture can promote the production of anti-inflammatory cytokines, such as interleukin-10 (IL-10), helping balance immune responses and reducing autoimmune attacks on joint tissues.

#### 3.2. Acupuncture treatment for systemic lupus erythematosus

Systemic lupus erythematosus (SLE) is a complex autoimmune disease involving multiple system damage, with common symptoms including fatigue, joint pain, and skin damage<sup>[14]</sup>. As a traditional therapy, acupuncture has shown significant effects in improving SLE patients' symptoms, providing a new treatment option for patients. Research indicates that acupuncture can reduce disease activity by regulating cellular immune function in SLE patients, thereby effectively alleviating patients' suffering. The pathogenesis of SLE is closely related to immune system abnormalities, especially T cell and B cell dysfunction, leading to the body producing large amounts of autoantibodies that attack normal tissues and organs. Acupuncture treatment, through stimulating specific acupoints, can regulate T cell and B cell balance, reduce autoantibody production, and decrease immune system hyperactivity. In terms of improving specific symptoms, acupuncture has obvious effects on relieving fatigue<sup>[15]</sup>. Fatigue is one of the most common complaints among SLE patients, severely affecting daily life and workability. Acupuncture can promote blood circulation, improve microcirculation, and increase tissue oxygen and nutrient supply, thereby reducing fatigue. Meanwhile, acupuncture

can also promote the release of pain-relieving substances such as endorphins, effectively relieving joint pain, improving joint function, and increasing patients' mobility. Regarding skin damage, acupuncture also shows good therapeutic effects. SLE patients' skin damage manifests as butterfly rash, photosensitivity, etc., and acupuncture can reduce skin rash and itching symptoms by regulating the immune system and reducing inflammatory responses.

### 3.3. Acupuncture treatment for chronic fatigue syndrome

Chronic fatigue syndrome (CFS) is a complex disease primarily characterized by long-term fatigue, often accompanied by sleep disorders, cognitive dysfunction, and various other symptoms<sup>[16]</sup>. As a traditional treatment method, acupuncture has shown significant effects in improving CFS patients' symptoms, bringing new hope to patients. Research shows that acupuncture can increase natural killer (NK) cell activity in CFS patients, enhancing body immune function. NK cells are an important component of the immune system, with the ability to directly kill virus-infected cells and tumor cells. CFS patients often have immune dysfunction and weakened NK cell activity, which may be one of the reasons for persistent fatigue and other symptoms<sup>[17]</sup>. Through stimulating specific acupoints, acupuncture can activate the immune system, and increase NK cell activity, thereby enhancing the body's disease resistance and reducing fatigue. In terms of improving sleep disorders, acupuncture also shows excellence. CFS patients often suffer from insomnia or poor sleep quality, and acupuncture can help improve sleep quality by regulating neurotransmitter levels in the brain, such as increasing endorphin and serotonin secretion. Endorphins have sedative and sleep-promoting effects, while serotonin participates in regulating sleep cycles<sup>[18]</sup>. Acupuncture can effectively relieve sleep disorders and improve patients' sleep quality by promoting the release of these neurotransmitters. For cognitive dysfunction, acupuncture can also provide help. CFS patients' cognitive dysfunction manifests as poor concentration, memory decline, and other symptoms. Acupuncture can help improve patients' cognitive abilities by regulating central nervous system function and improving brain blood flow and metabolism.

### 3.4. Combination of acupuncture with other treatment methods

As an adjunctive treatment method, acupuncture, when combined with drug therapy, nutritional support, psychological intervention, and other treatment methods, can significantly improve therapeutic effects, providing more comprehensive support for the management of various diseases. Through multi-faceted and multi-angle combined treatment approaches, it can better address the challenges of complex diseases and improve patients' overall health status. In combination with drug therapy, acupuncture can enhance drug effects while reducing side effects. For example, in treating chronic pain, acupuncture can be used in conjunction with non-steroidal anti-inflammatory drugs (NSAIDs), reducing drug dosage through acupuncture's analgesic effects, thereby decreasing gastrointestinal discomfort and other side effects. In treating depression, combining acupuncture with antidepressant medications can more quickly improve mood and quality of life<sup>[19]</sup>. Acupuncture regulates the nervous system and promotes the release of natural analgesic substances like endorphins, complementing drug therapy to achieve better therapeutic effects. Combined with nutritional support, acupuncture can promote the body's absorption and utilization of nutrients, enhancing immunity. Malnutrition or absorption disorders are common problems faced by chronic disease patients, and acupuncture can help improve nutrition absorption efficiency by enhancing digestive system function, increasing appetite, and promoting gastrointestinal motility<sup>[20]</sup>. Additionally, acupuncture can regulate the endocrine system, improve metabolic function, providing more comprehensive rehabilitation support for patients. In terms of psychological intervention, acupuncture can be combined with cognitive behavioral therapy, psychological counseling, and other methods to jointly improve patients' psychological state. Chronic disease patients often experience psychological issues such as anxiety and depression, and acupuncture can help alleviate negative emotions and improve psychological resilience by regulating neurotransmitter levels in the brain, such as increasing serotonin and dopamine secretion. Combined with psychological intervention, acupuncture can work on both physiological and psychological levels, providing more comprehensive



support for patients.

## 4. Conclusion

Acupuncture regulates the immune system through multi-level, multi-target mechanisms, demonstrating its unique advantages in immune regulation. At the molecular level, acupuncture can regulate the balance between pro-inflammatory and anti-inflammatory cytokines and influence immunoglobulin function. At the cellular level, it can optimize the quantity and functional status of

NK cells, T cells, and B cells. At the immune response level, it can achieve comprehensive immune function regulation through modulating the neuro-endocrine-immune network. These mechanisms enable acupuncture to play an important role in treating autoimmune diseases, particularly showing significant clinical effects in treating rheumatoid arthritis, systemic lupus erythematosus, and chronic fatigue syndrome. The combined application of acupuncture with other treatment methods further highlights its value in the comprehensive treatment of immune system diseases.

### Disclosure statement

The authors declare no conflict of interest.

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# Treatment of Chronic Ischemic Brain Injury from the Perspective of Kidney Deficiency and Vessel and Collateral Impediment

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## Abstract:

Chronic brain injury refers to a clinical syndrome that is characterized by chronic progressive organic damage to the brain caused by various factors and ultimately leads to dysfunction of higher nervous functions. Chronic brain injury encompasses a wide range of conditions, among which ischemic brain injury is the most common type. Kidney essence deficiency, along with vessel and collateral impediment and brain marrow depletion, is an important pathogenesis in chronic ischemic brain injury. Tonifying the kidneys and replenishing essence, as well as unblocking vessels and collaterals and nourishing the brain, is a key therapeutic approach.

## Keywords:

Kidney deficiency  
Vessel and collateral impediment  
Chronic ischemic brain injury

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## 1. Introduction

Chronic brain injury refers to a clinical syndrome that is characterized by chronic progressive organic damage to the brain caused by various factors and ultimately leads to dysfunction of higher nervous functions<sup>[1]</sup>. Chronic brain injury encompasses a wide range of conditions, among which ischemic brain injury is the most common type. Long-term cerebral ischemia can lead to many chronic brain diseases. In addition to the most common chronic cerebral ischemia, it can cause headache, dementia,

depression, tremor, insomnia, etc.

A large number of studies suggest that kidney deficiency and vessel and collateral impediments are important pathogenesis of chronic ischemic brain injury<sup>[2-10]</sup>. Patients with chronic ischemic brain injury are mostly middle-aged and elderly individuals, for whom kidney essence insufficiency is a significant characteristic. When kidney essence is insufficient, the brain marrow becomes empty. This condition is often accompanied by organ decline and Qi-blood deficiency. The function of

the vessel, one of the extraordinary fu organs, also begins to decline, for which damage to vessels and collaterals, like atherosclerosis, is a common symptom. Moreover, middle-aged and elderly individuals often exhibit hypercoagulability and blood hyper-viscosity, with multiple hemorheological parameters being abnormal, especially increased blood viscosity. Vessels and collaterals function best when they are unobstructed. This hypercoagulable and hyper-viscous state can easily cause vessel and collateral impediment, preventing the smooth flow of Qi and blood, and making it difficult to nourish the brain marrow.

Natural aging of the brain and long-term chronic ischemia can affect its various functions, such as mind, consciousness, memory, movement, sleep, etc., leading to symptoms of chronic ischemic brain injury, including dizziness, headache, dementia, depression, tremor, and insomnia. It is evident that kidney essence deficiency, along with vessel and collateral impediment and brain marrow depletion, is an important pathogenesis in chronic ischemic brain injury. Tonifying the kidneys and replenishing essence, as well as unblocking vessels and collaterals and nourishing the brain, is a key therapeutic approach. The following discussion elaborates on these points.

## **2. A brief overview of the physiology and pathology of brain marrow**

### **2.1. Brain marrow generation**

The kidneys are responsible for storing essence, which generates marrow, and this marrow accumulates to form the brain. Therefore, the “Chapter on Jing Mai of Lingshu in Yellow Emperor’s Inner Canon” states: “When a person is born, the essence is formed first, and once the essence is formed, brain marrow is generated.” During the formation of brain marrow, it continuously requires the support of kidney essence. After its formation, brain marrow still needs the continuous nourishment of kidney essence to maintain its normal structure and function.

The relationship between the heart and brain marrow is very close. The heart governs the blood vessels and promotes the upward flow of Qi and blood to nourish the brain marrow. Additionally, the heart governs the bright spirit, and the brain is the house of the original spirit. Both are crucial for the spirit of the body, hence

there is a debate about whether the heart or the brain governs the bright spirit. Therefore, the heart, the blood, and the vessel must not be separated from the essence and qi of the brain marrow for even a moment.

### **2.2. The relationship between brain marrow and qi, blood, essence, and body fluids**

The innate essence is the most fundamental and refined substance for the generation of brain marrow. After brain marrow is formed, it requires continuous nourishment from essence to maintain its structure and function. “Anthology of Chinese Medicine” states: “When essence is sufficient, marrow is sufficient; when marrow is sufficient, the brain is full, and skills and dexterity arise thereby. Therefore, the kidneys are the organs of strenuous work.”

After brain marrow is generated, it requires the warming and propulsion of Qi, and the nourishment of blood and body fluids to function normally. The brain weighs approximately 1/50 of the body weight, but cerebral blood flow accounts for about 1/5 of each heartbeat’s cardiac output. As stated in the “Chapter on Xie Qi Zang Fu Bing Xing of Lingshu in Yellow Emperor’s Inner Canon”: “The 12 meridians and 365 collaterals all send their blood and Qi upward to the head, reaching the orifices.” Blood governs nourishing and moistening and is the foundation for nourishing the spirit. Blood circulates through the meridians upward to the head and face, moisturizing the orifices and nourishing the brain marrow. Only when brain marrow is properly nourished, can the mind be energetic. As stated in the “Chapter on Ba Zheng Shen Ming Lun of Suwen in Yellow Emperor’s Inner Canon”: “Blood and Qi are the essence of human beings and should be carefully nurtured.” Furthermore, the “Chapter on Jue Qi of Lingshu in Yellow Emperor’s Inner Canon” points out: “When grains enter the body and Qi is full, the bone marrow flows into the bones, allowing the latter to bend and stretch normally. Extra bone marrow supplements and benefits the brain marrow, and moisturizes the skin, and such is called body fluid.” This highlights the importance of body fluids for the brain marrow.

### **2.3. Functions of brain marrow**

The functions of spirit encompass mind, will, thought,

memory, perception, movement, sleep, and the governance of life processes in the body. The functions of the spirit are the summary of various specific functional activities of the brain marrow, and their external manifestation is bright spirit. Bright Spirit is the outward expression of life, observable and perceivable at all times <sup>[1]</sup>. The brain is the house of the original spirit. Brain marrow is the substrate that supports the functions of spirits. The functions of brain marrow are manifested as the functions of spirit. Therefore, mind, will, thought, memory, perception, movement, sleep, and the life processes in the body are all governed by brain marrow and are specific manifestations of its functions.

## **2.4. Diseases of brain marrow**

When the functions of spirit become disordered, it can lead to various diseases affecting mind, will, thought, memory, perception, movement, sleep, etc. Clinically, these can manifest as chronic cerebral ischemia, headache, dementia, depression, tremor, and insomnia, among other conditions.

## **3. Kidney essence deficiency**

Kidney essence deficiency along with vessel and collateral impediment and brain marrow depletion, is an important pathogenesis in chronic ischemic brain injury. Long-term cerebral ischemia and damage to the blood and vessels can lead to chronic ischemic brain injury, affecting the brain marrow and causing disorders in the functions of spirits. The site of chronic ischemic brain injury is in the brain, and kidney essence deficiency, along with vessel and collateral impediment and brain marrow depletion, is an important pathogenesis for chronic ischemic brain injury.

### **3.1. Kidney deficiency and chronic ischemic brain injury**

#### **3.1.1. Kidney essence deficiency, brain marrow emptiness**

The generation of brain marrow and the maintenance of its functions require adequate kidney essence. If kidney essence is deficient, it would be difficult for brain marrow to be healthy and full, and its functions would be affected. The reduction in cerebral parenchyma, decreased brain

weight, and reduced number of brain cells in patients with age-related brain atrophy are typical manifestations of this condition.

#### **3.1.2. Kidney essence deficiency, organ decline, and brain marrow undernourishment**

The kidneys are the congenital foundation, and kidney essence promotes growth and development. If kidney essence is insufficient, the growth and development of the body will be affected, leading to organ decline and difficulty in nourishing the brain marrow. When brain marrow is malnourished, various brain diseases can occur.

### **3.2. Vessel and collateral impediment and chronic ischemic brain injury**

#### **3.2.1. Static blood cannot ascend to nourish the brain**

Vessel and collateral impediments lead to blood stasis and obstruction, transforming normal blood into stagnant blood. As a pathological product formed during the disease process, static blood loses its nourishing function and thus cannot nourish the brain marrow. Undernourishment of the brain marrow leads to ischemic brain injury.

#### **3.2.2. Vessel and collateral impediment prevents the normal circulation of Qi and blood**

The vessels are the house of blood and function best when unobstructed. They facilitate the circulation of Ying-nutrients, Wei-defence, Qi and blood, and connect the organs and the torso. When blood flow is impeded and stagnates in the vessels, Ying-nutrients, Wei-defence, Qi and blood cannot circulate properly and cannot ascend to the brain. This affects the brain marrow, leading to disorders in the functions of the spirit.

### **3.3. Kidney deficiency and vessel and collateral impediments influence each other**

#### **3.3.1. Kidney deficiency can easily lead to vessel and collateral impediments**

##### **3.3.1.1. Kidney Qi deficiency leads to poor blood circulation**

The kidneys are the congenital foundation. Kidney Qi, as the innate Yuan-primordial Qi, is the source of the body's Qi. Blood depends on Qi for circulation. When kidney Qi is insufficient, the body's Yuan-primordial Qi

is not adequately supplied, leading to uncontrolled Qi movement and vessel and collateral impediment.

Kidney Qi deficiency can also affect the heart, liver, and spleen, thereby disrupting blood circulation. Blood is generated by the heart, stored in the liver, and controlled by the spleen, and the kidneys have a close relationship with the heart, liver, and spleen. The heart governs the blood and vessels, serving two main functions: generating blood, and circulating blood through the vessels to nourish the entire body, in which case the heart is the basic driving force for blood circulation. The heart belongs to Yang and is associated with fire in the Five Elements, the kidneys belong to Yin and are associated with water in the Five Elements. The heart and kidneys are interdependent, mutually restraining, and inseparable. The liver is an important organ for storing blood and works together with the heart to maintain blood circulation. The liver generates blood, the kidneys store essence, and essence and blood share the same source. The liver and kidneys mutually supplement Yin fluids, and they both can storage and clear. The spleen is the postnatal foundation and the source of Qi and blood generation. The spleen also regulates the blood of the organs. The kidneys are the congenital foundation, and the spleen and kidneys have a close relationship in mutual nourishment between congenital and postnatal foundation.

### **3.3.1.2. Kidney yang deficiency can easily lead to blood stasis**

Kidney yang, also known as primordial Yang or genuine Yang, is the foundation of the body's Yang Qi, playing a role in promoting and warming various organs and tissues <sup>[11]</sup>. Blood depends on Qi for circulation and flows more readily when warm, but tends to congeal when cold. If kidney Yang is deficient, the warming function is impaired, and cold arises internally and attacks the vessels, leading to poor blood circulation. Additionally, kidney yang cannot perform Qi transformation normally, and cannot transport blood properly.

### **3.3.1.3. Kidney Yin deficiency can lead to obstruction of blood circulation**

Kidney Yin, also known as primordial Yin or genuine Yin, is the foundation of the body's Yin fluids, playing a role in nourishing and moisturizing various organs and

tissues <sup>[11]</sup>. Kidney Yin deficiency can lead to vessel and collateral impediment in three main ways: (1) Yin and blood deficiency results in inadequate blood volume, causing slow blood movement and stagnation of blood in the vessels, which gradually leads to blood stasis; (2) Insufficient body fluids result in dryness of the vessels, impairing smooth blood flow and causing obstruction; (3) Yin deficiency causes internal heat, which can scorch the blood and cause blood stasis. Once blood stasis occurs, the circulation of Qi and blood through the vessels and collaterals is impaired, leading to vessel and collateral impediment.

### **3.3.1.4. Kidney essence deficiency can lead to slow blood flow**

The kidneys store the essence received from the organs. When kidney essence is deficient, the primary driving force that stimulates and promotes the Qi transformation of the organs weakens, slowing down the circulation of Qi, blood, and body fluids. This forms the basis for blood stasis. Additionally, when kidney essence is insufficient, kidneys fail to nourish liver, leading to undernourishment of the meridians <sup>[12]</sup>, making them stiff and fragile, causing vascular hardening and convulsion in the vessels and collaterals, which can also slow down blood flow.

### **3.3.1.5. The vessels originate from the kidneys**

As the congenital foundation, the kidneys promote the growth and development of the body. The prosperity or decline of the organs and the torso is governed by the kidneys. The vessels are considered extraordinary organs, and their processes of birth, growth, maturity, aging, and decline are closely related to the abundance or depletion of kidney essence. When the kidneys are deficient, the vessels also become weak, and the vessels being weak makes them prone to stagnation of phlegm and blood stasis, leading to the entanglement of stagnant phlegm and static blood in the vessels, which is often referred to as pathogens lingering in the deficient areas.

### **3.3.2. Vessel and collateral impediment can exacerbate kidney deficiency**

#### **3.3.2.1. Stasis and congealing can damage the kidneys**

When stasis accumulates internally, the vessels become obstructed, and the circulation of Qi, blood, Ying-



nutrients, and Wei-defence is impeded. As a result, the kidneys cannot receive adequate nourishment, leading to kidney deficiency. Over time, prolonged stasis can generate stagnant heat, and the combination of stasis and heat can easily injure kidney Yin. If the stasis is not dissipated, it can obstruct the circulation of Qi and blood, and may easily entangle with phlegm dampness. When phlegm dampness and stasis are entangled, the circulation of Qi and blood is more severely impeded.

### 3.3.2.2. Healthy Qi deficiency affects the kidneys

Prolonged obstruction by pathogenic factors such as blood stasis, phlegm dampness, and fire heat can eventually cause diseases in the collaterals, leading to the depletion of the body's healthy Qi. The nature of the pathology shifts from tip pathogen to healthy Qi deficiency, causing Qi, blood, Yin, and Yang to be insufficient, leading to the decline of the organs. As the saying goes, "when essence and Qi are depleted, there is a deficiency." When the organs are damaged, the kidneys will ultimately be affected, resulting in kidney deficiency.

In summary, kidney deficiency and vessel and collateral impediments influence each other. Kidney deficiency can affect blood circulation, leading to blood stasis and vessel and collateral impediment. Internal accumulation of static blood can cause vessel obstruction and impair the circulation of Ying-nutrients and Wei-defence, thereby exacerbating kidney deficiency.

## 4. Analysis of main symptoms of chronic ischemic brain injury in traditional Chinese medicine

### 4.1. Dizziness

Dizziness is primarily seen in chronic cerebral ischemia. In elderly individuals, kidney essence deficiency can lead to insufficient nourishment of the brain marrow. Alternatively, long-term illness can weaken the body, damaging kidney essence and Qi, leading to deficiency in the sea of marrow. Both conditions can result in dizziness. As stated in the "Chapter on Hai of Lingshu in Yellow Emperor's Inner Canon": "When the sea of marrow is insufficient, there may be dizziness, tinnitus, soreness in the crus, vertigo, visual disturbances, and fatigue with a tendency to lie down." Blood stasis can also obstruct

the brain vessels, impair Qi movement, and disrupt the functions of spirit, leading to dizziness.

### 4.2. Headache

Headache is a common symptom of chronic ischemic brain injury. When kidney essence is insufficient, the brain marrow becomes empty. When static blood obstructs the collaterals, Qi and blood cannot reach the brain, leading to undernourishment of the brain marrow. In both cases, the primary manifestation is a hollow pain throughout the head. Headaches caused by blood stasis obstructing the collaterals are often characterized by sharp, stabbing pain in the head.

### 4.3. Forgetfulness

Forgetfulness is primarily manifested as vascular dementia. Vascular dementia refers to cognitive decline caused by cerebral ischemia and hypoxia, which can result from ischemic stroke, hemorrhagic stroke, and other conditions. Some scholars think that the site of vascular dementia is in the brain, with kidney essence and Qi deficiency being the root pathogenesis, and blood stasis and phlegm dampness obstructing the brain collaterals being the tip pathogenesis<sup>[13]</sup>. Treatment should focus on tonifying the kidneys, circulating the blood, and transforming phlegm. The kidneys govern storage, and postnatal learning and memory depend on this function. When kidney essence is insufficient, the brain marrow becomes empty, the function of storage is impaired, and the functions of spirit are impeded, leading to forgetfulness. Static blood, as one of the most common pathological factors, can obstruct the vessels and collaterals and also result in forgetfulness.

### 4.4. Decline of spirit

Ding (2019) believes that the core pathogenesis of depression is "Yang stagnation and spirit decline," with the key to pathogenesis being Yang stagnation, disharmony between Ying-nutrients and Wei-defence, and dysregulation of the functions of spirit<sup>[14]</sup>. Kidney Qi, as the innate Yuan-primordial Qi, is the source of the body's Qi. The Yang Qi of the body is rooted in kidney Yang. When kidney Yang is deficient, Yang Qi becomes stagnated and unable to spread, leading to depressed functions of spirit, decline of spirit and mind,

and diminished will, resulting in depression. Vessel and collateral impediments can obstruct the circulation of Qi and blood, and impair the function of Qi movement, which can also hinder the uplifting and warming functions of Yang Qi, thus affecting the functions of the spirit and leading to this condition.

#### 4.5. Tremor

Tremor is most commonly seen in vascular Parkinsonism, which refers to a disease characterized by clinical symptoms similar to those of Parkinson's disease, and caused by ischemic cerebrovascular disease or cerebral arteriosclerosis. According to Huang *et al.* (2019), kidney essence deficiency is the root cause of the disease, while internal blood stasis is the key factor in its development<sup>[10]</sup>. Movement is one of the functions of brain marrow. When kidney deficiency and vessel and collateral impediment occur, brain marrow's functions are impaired, leading to motor symptoms such as tremors.

### 5. Treatment of chronic ischemic brain injury with kidney-tonifying and collateral-unblocking formula

For kidney essence deficiency, along with vessel and collateral impediment and brain marrow depletion, which is the important pathogenesis of chronic ischemic brain injury, the study proposes that the pathogenesis lies in kidney essence deficiency, vessel and collateral impediment, undernourishment of the brain marrow, damage to the original spirit and dysfunction of the spirit. Treatment should focus on tonifying the kidneys and replenishing essence, unblocking vessels and collaterals, and nourishing the brain. This study recommends using a self-formulated kidney-tonifying and collateral-unblocking formula. The composition of the formula includes *Rehmannia glutinosa*, *Angelica sinensis*, *Lycium barbarum*, *Dendrobium officinale*, *Polygonatum odoratum*, *Testudinis carapax*, *Salvia miltiorrhiza*, *Gastrodia elata*, *Cistanche deserticola*, *Polygala tenuifolia*, *Platycodon grandiflorus*, and *Achyranthes bidentata*.

*Rehmannia glutinosa* has a sweet taste and is slightly warm in property, entering the liver and kidney meridians. It excels at tonifying blood, nourishing Yin, replenishing

essence, and enriching the marrow, making it the monarch medicine. "Compendium of Materia Medica" states that it can "replenish bone marrow, increase muscle mass, generate essence and blood, tonify the organs, promote blood circulation, benefit hearing and vision, and darken hair..." It enters the liver and kidney meridians and specializes in nourishing blood and Yin, replenishing essence, and enriching the marrow. Therefore, it is often used for conditions involving essence and marrow deficiency.

*Angelica sinensis* has a sweet and pungent taste and is warm in property. It excels at tonifying and nourishing blood as well as harmonizing and circulating blood, making it a minister medicine. Not only does it circulate blood and transform stasis, promoting circulation in the brain vessels and collaterals, but also it has nourishing functions, making it an excellent herb for tonifying blood, as it can tonify and harmonize blood. As essence and blood share the same source, it is particularly suitable for blood stasis obstructing the collaterals due to kidney deficiency and blood stasis. When used together, *Rehmannia glutinosa* and *Angelica sinensis* follow the formula of Zhen Yuan Yin, which means tonifying yuan-primordial Qi, from "Complete Works of Jingyue", jointly exerting the effects of tonifying the liver and kidneys.

*Lycium barbarum* has a sweet taste and is neutral in property. Acting on the liver, kidney, and lung meridians, it can nourish the liver, tonify the kidneys, and moisten the lungs. "Treatise on the Nature of Medicinal Substances" states that it "can tonify and replenish essence of various deficiencies." This indicates that it can tonify the essence and blood of the liver and kidneys, thereby strengthening and nourishing the brain. Therefore, "Treasury of Words on the Materia Medica" states: "It is commonly said that *Lycium barbarum* excels at treating eye disorders, but it does not treat the eyes directly; instead, it strengthens the essence and invigorates the spirit. When the spirit is full and the essence is sufficient, eye disorders can be treated effectively." *Dendrobium officinale* has a sweet taste and is slightly cold in property, acting on the stomach and kidney meridians. It functions to tonify the stomach and generate body fluids, nourish Yin and clear heat. By nourishing stomach Yin, it ensures a sufficient source of Qi and blood generated in the middle Jiao, allowing the brain marrow to be nourished. It can also tonify

kidney Yin and reduce deficiency heat, making it adept at tonifying kidney Yin deficiency. *Polygonatum odoratum* has a sweet taste and is slightly cold in property, acting on the lung and stomach meridians. It can nourish the Yin of the lungs and stomach and also clear heat from the lungs and stomach, nourishing Yin without hindering the elimination of pathogens. “Materia Medica of South Yunnan” states that it can “supplement Qi and blood, and tonify middle Jiao and spleen.” As previously mentioned, the lungs and the middle Jiao have a close relationship with the brain. Therefore, “A Supplement to Materia Medica” states that it “governs intelligence, regulates blood and Qi, and strengthens the body.” Together, *Lycium barbarum*, *Dendrobium officinale*, and *Polygonatum odoratum* can tonify liver and kidney with yin and essence deficiencies, enhancing the effects of the monarch medicine.

*Salvia miltiorrhiza* has a bitter taste and is slightly cold in property, acting on the heart, Pericardium, and liver meridians. It excels at circulating blood and regulating menstruation, eliminating stasis and alleviating pain, cooling blood and resolving abscesses, and alleviating vexation and calming the mind. “Ri Hua Zi’s Summary of Materia Medica” states that it can “nourish the spirit, stabilize the will, and promote the Guan pulsation.” Only by circulating blood and eliminating stasis, as well as regulating and clearing blood and vessels, can adequate blood supply to the brain marrow be guaranteed and the functions of the spirit be benefited. *Gastrodia elata* soothes the liver and submerges Yang, removes wind and unblocks the collaterals, making it an important medicine for treating dizziness and headache. These two medicines can treat yang hyperactivity and the disorder of Qi movement caused by Yin deficiency of the liver and kidneys respectively.

*Testudinis carapax* has a sweet taste and is cold in property, acting on the kidney, liver, and heart meridians. It excels at nourishing the kidneys and liver and is commonly used to tonify Yin, submerge Yang, and tonify blood and nourish the heart. *Polygala tenuifolia* has a bitter and pungent taste and is warm in property. It functions to calm the mind and enhance intelligence, and to eliminate phlegm and relieve stagnation. “Compendium of Materia Medica” states that “*Polygala tenuifolia* enters the kidney meridian of foot-Shaoyin and is not a medicine

for the heart meridian. Its primary function is to strengthen intelligence and tonify essence, treating forgetfulness. The reason is that essence is stored in the kidney meridian, and intelligence is a function of the kidney meridian. When the kidney meridian is insufficient, intelligence declines, and the heart’s governance of bright spirit is also impaired, leading to confusion and forgetfulness.” When used together, these two medicines ensure that kidney Qi is sufficient and reaches its intended destinations, and thus the cerebral parenchyma is sufficient and the brain functions strongly and healthily.

Yin and Yang are the source of each other, and they support each other, nourish each other and rely on each other. When tonifying Yin, it is important not to neglect nourishing yang, hence the use of *Cistanche deserticola* in the formula. “Correct Interpretation of Materia Medica” states: “When ‘Shennong’s Classic of Materia Medica’ discusses the effects of *Cistanche deserticola*, it describes how this medicine stores Yin... *Cistanche deserticola* is heavy and descending, directly entering the kidneys. It is warm and moistening, without causing damage by harsh, dry heat. It can warm and nourish the essence and blood, thereby circulating Yang Qi, hence it is said to benefit essence and Qi. When treating masses and nodules, its salty taste can soften hardness and enter the blood phase, while also tonifying Yin essence and warming and nourishing Yang Qi, thus promoting smooth circulation of Qi and blood and resolving obstructions.” This shows that *Cistanche deserticola* can tonify kidney Qi, replenish essence and blood, warm Yang Qi, and assist blood circulation.

*Achyranthes bidentata* circulates blood and eliminates stasis, and tonifies the liver and kidneys. “Orthodox Materia Medica” states that it can “tonify bone marrow, replenish essence, tonify yin and circulate blood.” *Platycodon grandiflorus* has a light and clear smell, entering the lung and stomach meridians. “Essays from Chongqing Hall” states that “*Platycodon grandiflorus* opens and clears the stagnation of lung Qi and heart Qi; it is a medicine for the upper Jiao.” The lungs govern Qi, and when lung Qi is opened, the Qi of the entire body circulates freely, with clear Qi ascending and turbid Qi descending, ensuring continuous Qi transformation by the organs, allowing the brain marrow to be healthy and sufficient and the functions of spirit to reach the entire



body. The two medicines both serve as assistant and guide medicines, capable not only of tonifying the kidneys and soothing the spirit, but also of regulating and harmonizing qi and blood, thereby promoting Qi and blood to ascend to nourish the brain marrow.

## 6. A typical case

Patient Li, male, 85 years old, came for consultation due to “episodic dizziness for over three years” on October 16, 2019. The patient experiences intermittent dizziness and unsteady gait, with episodes occurring at irregular intervals. Symptoms improve with rest. He has experienced a decline in hearing and memory and persistent tinnitus. His energy and physical strength are generally average. He walks slowly due to skelalgia from osteoarthritis in his knees. He has a normal appetite and normal food intake and falls asleep normally with occasional snoring and good sleep quality. He has one bowel movement per day, with the stool well-formed and not sticking to the toilet bowl. He experiences frequent urination with dribbling after voiding and needs to urinate 2–3 times at night. His mouth is dry, but he does not experience bitterness and prefers to drink water. His tongue is purple and dark, with a thin and scanty tongue coating. He has a wiry and hard pulse. The patient has a history of hypertension for over 30 years and osteoarthritis in both knees for over 20 years. On physical examination, the Romberg sign was positive, and no significant abnormalities were detected in the examination of the rest of the nervous system.

Ancillary tests: Cranial MRI showed multiple ischemic and degenerative lesions in the brain. Diagnosis: chronic ischemic brain injury, with a pattern identification of Yin deficiency and blood stasis, as well as vessel and collateral impediment, and brain marrow depletion.

Treatment Principle: Tonifying the kidneys and replenishing essence, along with unblocking vessels and collaterals and nourishing the brain.

Prescription: *Rehmannia glutinosa* 24 g, *Ophiopogon japonicus* 30 g, *Angelica sinensis* 15 g, *Cornus officinalis* 24 g, *Astragalus complanatus* 24 g, *Testudinis carapax*

30 g, *Dendrobium officinale* 24 g, *Lycium barbarum* 24 g, *Schisandra chinensis* 12 g, *Gastrodia elata* 18 g, *Salvia miltiorrhiza* 20 g, *Cistanche deserticola* 20 g, *Platycodon grandiflorus* 12 g, *Achyranthes bidentata* 15 g. Decoct in water and take one dose daily. Follow-up on October 23: the patient’s dizziness intensity and frequency have significantly decreased, and urinary frequency and dribbling have also improved. The above prescription was formulated into water pills, with 10 g taken in the morning and evening each day. Follow-up after 3 months: the patient’s dizziness has been largely relieved, and urination at night has not exceeded twice per night.

The patient is in his eighties, with kidney essence deficiency. His symptoms of hearing loss, memory decline, tinnitus, dribbling urination, and dry mouth are all manifestations of kidney deficiency. Kidney deficiency and brain marrow depletion lead to episodic dizziness. Kidney deficiency results in a lack of source of Qi, blood, Yin, and Yang, causing blood stasis that results in a purple, dark tongue. Yin deficiency leads to dryness in the blood vessels, resulting in a wiry and hard pulse. Therefore, the modified kidney-tonifying and collateral-unblocking formula is used. In this formula, *Rehmannia glutinosa*, *Cornus officinalis*, *Testudinis carapax*, *Dendrobium officinale*, *Lycium barbarum*, and *Cistanche deserticola* tonify the liver and kidneys. Since the patient’s symptoms of kidney yin deficiency are particularly prominent, *Ophiopogon japonicus* is added to enhance the Yin-nourishing effect. Additionally, *Astragalus complanatus* and *Schisandra chinensis* are included to warm and tonify the liver and kidneys, and to secure essence and astringe urine. *Gastrodia elata* soothes the liver, submerges Yang, removes wind and relieves dizziness. *Angelica sinensis*, *Salvia miltiorrhiza*, *Platycodon grandiflorus*, and *Achyranthes bidentata* circulate blood, transform stasis, regulate Qi, and unblock collaterals. During the second visit, the patient’s main symptoms were significantly alleviated. However, given his advanced age and the difficulty in regenerating kidney essence, the formula was changed to water pills, and he was advised to take them long-term.

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The authors declare no conflict of interest.

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# Clinical Experience of Combining Qihuang Acupuncture with Extracorporeal Shock Wave Therapy for the Treatment of Knee Osteoarthritis

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## Abstract:

Knee osteoarthritis (KOA) is a chronic degenerative disease characterized by articular cartilage degeneration and bone hyperplasia, which severely affects patients' quality of life. Qihuang acupuncture therapy can regulate meridian Qi and blood circulation, improve local microcirculation, and has the effects of relieving pain and eliminating inflammation. As a noninvasive physical therapy technique, extracorporeal shock wave therapy (ESWT) promotes tissue repair and delays cartilage degeneration through mechanical stimulation. Combining clinical research and literature reports, this article summarizes the clinical experience of Qihuang acupuncture combined with extracorporeal shock wave therapy in the treatment of knee osteoarthritis. Studies have shown that the combined application of the two can significantly improve patients' pain symptoms, enhance joint function, delay disease progression, and have good safety with no significant adverse reactions. This comprehensive treatment plan has important clinical value in the non-surgical treatment of knee osteoarthritis and deserves further promotion and in-depth research.

## Keywords:

Knee osteoarthritis  
Qihuang acupuncture therapy  
Pain management  
Extracorporeal shock wave therapy  
Comprehensive treatment

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## 1. Introduction

Osteoarthritis (OA) is a chronic multi-factorial disease primarily characterized by the degeneration of articular cartilage. Its pathological features include cartilage

destruction, abnormal changes in subchondral bone, and synovial inflammation<sup>[1]</sup>. Clinically, knee osteoarthritis (KOA) is the most common type of osteoarthritis, with primary symptoms including knee pain, stiffness,

and limited range of motion <sup>[2]</sup>. Epidemiological investigations have shown that the incidence of KOA increases significantly with age, making it one of the top ten diseases affecting human health globally and posing a significant burden on healthcare resources and economic development <sup>[3]</sup>.

Currently, the treatment of KOA mainly focuses on symptom relief. While commonly used nonsteroidal anti-inflammatory drugs (NSAIDs) can provide pain relief, they cannot reverse the disease progression and may cause adverse effects on the gastrointestinal and cardiovascular systems with long-term use <sup>[4]</sup>. Among non-surgical treatments, extracorporeal shock wave therapy (ESWT) has gained attention due to its non-invasive nature. ESWT generates low to medium-energy shock waves through pneumatic ballistic principles, which can loosen tissue adhesions, improve local blood circulation, promote tissue repair, and show potential in cartilage protection and inflammation relief <sup>[5]</sup>.

Additionally, Chen Zhenhu has established and developed the Qihuang acupuncture therapy based on the meridian sinews theory from the “Yellow Emperor’s Inner Canon” and traditional acupuncture. This therapy is characterized by precise acupuncture point selection, delicate techniques, and remarkable efficacy. It can rapidly alleviate pain, improve joint function, and optimize the shortcomings of traditional acupuncture, such as the need for multiple acupuncture points and long needle retention times <sup>[6]</sup>. In recent years, the combination of Qihuang acupuncture therapy and ESWT has achieved promising clinical results in treating knee osteoarthritis. This study aims to summarize the clinical experience of combining Qihuang acupuncture therapy with extracorporeal shock wave therapy for the treatment of knee osteoarthritis, providing a reference for the comprehensive management of this disease.

## 2. Etiology and pathogenesis

### 2.1. Etiology and pathogenesis in Traditional Chinese Medicine (TCM)

In the theory of Traditional Chinese Medicine, knee osteoarthritis falls under the categories of “Bi Syndrome” and “Jingjin Disease.” As mentioned in the ancient medical text “Su Wen - Mai Yao Jing Wei Lun,” “The

knee is the house of the tendons; when one cannot bend or stretch, and walks with a hunch, it is a sign that the tendons are exhausted.” Therefore, Jingjin disease is a pathological condition of the knee joint, where the disease evil initially invades the tendons and gradually penetrates the muscles, and in severe cases, even affects the bones. Hence, the disease location involves muscles, tendons, and bones. “Su Wen - Bi Lun” points out that “when wind, cold, and dampness combine, they form Bi Syndrome.” This indicates that the invasion of wind, cold, and dampness evil into the human body disrupts the meridian operation, leading to Qi and blood stagnation, thus forming a “Bi Syndrome”. The ancient medical text “Za Bing Yuan Liu Xi Zhu” also records that “the tendons converge at the knees.” The knee joint belongs to the “gathering of tendons” and is susceptible to invasion by wind, cold, and dampness. Over time, this can cause symptoms such as joint swelling, pain, and difficulty in bending or stretching. “Ling Shu - Zhong Shi” proposes that “if the disease is in the bones, treat the bones; if it is in the tendons, treat the tendons.” Since “the liver controls the tendons, and the kidneys control the bones,” a deficiency in the liver and kidneys can lead to malnutrition of the tendons and bones, degeneration of joint function, and symptoms such as knee weakness, limited movement, especially among middle-aged and elderly people. According to Wang <sup>[7]</sup>, the root cause of knee osteoarthritis (KOA) lies in kidney yang deficiency and malnutrition of tendons and vessels. This deficiency leads to a decline in yang energy and insufficient vital qi, making it difficult to resist the invasion of external pathogens. Consequently, the tendons and vessels become blocked, Qi and blood circulation is impeded, resulting in local pain. Additionally, factors such as aging, excessive strain, or chronic illnesses affecting the kidneys can contribute to insufficiency of the liver and kidneys, further exacerbating the condition. If there is a deficiency in Qi and blood, it can result in malnutrition of the meridians and poor circulation in the joint area. This can lead to the formation of blood stasis, obstructing the meridians and manifesting as joint stiffness, persistent pain that is fixed in location, and increased severity during the night. Prolonged illness penetrating the meridians and blood stasis can worsen the condition, potentially leading to joint deformity and dysfunction. Weakness

of the spleen and stomach can cause dysregulation of digestion and transportation, leading to the endogenous production of damp-heat. This damp-heat pathogen then invades the knee joints, resulting in symptoms such as redness, swelling, burning pain, and restricted movement. Prolonged retention of damp heat can also damage tendons and bones, accelerating the degeneration of articular cartilage. In summary, ancient medical practitioners believed that the etiology and pathogenesis of this disease arise from a combination of liver and kidney deficiency and invasion by external pathogens. This condition is considered to be one of deficiency in origin and excess in manifestation.

## 2.2. Modern medical etiology and pathogenesis

The modern medical etiology and pathogenesis of knee osteoarthritis (KOA) involve a combination of multiple factors. Firstly, the occurrence of KOA is closely related to biomechanical factors. Long-term mechanical loading or improper joint use are important contributors to cartilage degeneration. Studies have found that obesity significantly increases the burden on the knee joint, and the pressure on the knee joint during walking or running can reach multiple times the body weight. Long-term high loads can accelerate cartilage wear and tear<sup>[8]</sup>. Overexercise or high-intensity activities can lead to the accumulation of micro-injuries in the cartilage, ultimately triggering degeneration<sup>[9]</sup>. Additionally, joint deformities (such as knee varus or valgus) can cause uneven distribution of load in the knee joint, and excessive local pressure can lead to excessive wear and tear of the cartilage<sup>[10]</sup>. Poor posture (such as incorrect standing, walking, or sitting) can also increase local joint pressure and accelerate cartilage damage, while joint instability due to ligament injury, muscle weakness, or soft tissue laxity can lead to abnormal sliding or rotation of the joint, further aggravating cartilage wear and degeneration. These biomechanical factors directly affect the cartilage by increasing joint load and local pressure, ultimately triggering the occurrence and development of knee osteoarthritis<sup>[10,11]</sup>. The occurrence of knee osteoarthritis (KOA) is not only related to biomechanical factors but also significantly influenced by biochemical factors, particularly the role of inflammatory mediators and matrix metalloproteinases (MMPs). Inflammatory mediators are

crucial triggers for the inflammatory response in knee joints<sup>[12]</sup>, with cytokines such as interleukin-1 $\beta$  (IL-1 $\beta$ ) and tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) playing a key role in their overexpression within the joint cavity. These inflammatory factors induce persistent inflammatory responses by activating synovial cells and chondrocytes in the joints, thereby disrupting the normal metabolic balance of cartilage<sup>[13]</sup>. Additionally, these inflammatory factors activate MMPs, including MMP-1 and MMP-13, leading to an accelerated degradation rate of type II collagen and proteoglycans in the cartilage matrix. Specifically, MMP-13 exhibits a strong degradation ability towards type II collagen, making it a significant factor in cartilage destruction. The synergistic effects of these inflammatory factors and MMPs create a vicious cycle, further aggravating cartilage damage and joint degeneration, ultimately leading to the development and progression of knee osteoarthritis<sup>[14]</sup>. Furthermore, family history is also an important risk factor for KOA. Research has revealed that genetic variations related to cartilage metabolism, inflammatory responses, and bone development may increase the susceptibility of cartilage to degeneration or sensitivity to inflammatory responses. Among them, long non-coding RNAs (lncRNAs) and microRNAs (miRNAs) play crucial roles in the regulation of osteoarthritis (OA) mechanisms<sup>[15]</sup>. These genetic variations can increase individual susceptibility to knee osteoarthritis (KOA) by affecting the function of chondrocytes, the integrity of joint structures, and the reactivity of the immune system. Metabolic abnormalities such as obesity, diabetes, hypertension, and hyperlipidemia not only affect overall health but may also promote the release of inflammatory mediators, accelerate cartilage degradation, and further exacerbate cartilage degeneration and joint damage. With increasing age, aging factors play a critical role in the occurrence and development of KOA. As the only active cells in cartilage tissue, chondrocytes gradually degenerate in function with age. On the one hand, the proliferation and regeneration ability of chondrocytes is significantly weakened, and synthetic metabolic activities decrease, leading to reduced production of key components in the cartilage matrix, such as proteoglycans and type II collagen<sup>[16]</sup>. On the other hand, aging also causes significant changes in the composition of the cartilage

matrix, including reduced water content and decreased proteoglycan content <sup>[17]</sup>. These changes weaken the elasticity, pressure resistance, and lubricating function of the cartilage, making it more susceptible to mechanical stimuli and inflammatory factors. Furthermore, increased levels of oxidative stress during aging can further damage chondrocytes, accelerating the process of cartilage degeneration and joint destruction. Therefore, aging is not only an important risk factor for KOA but also drives the occurrence and progression of the disease through multiple mechanisms.

### 3. Clinical thinking

#### 3.1. Knee osteoarthritis (KOA) and Qihuang needle therapy from the perspective of modern medicine

The core pathogenesis of knee osteoarthritis (KOA) lies in the disharmony of the “muscle, tendon, and bone” in the knee. According to the “Huangdi Neijing” (Yellow Emperor’s Inner Canon), “tendons are rigid, bones are the mainstay, and muscles are the walls.” These three elements are interdependent and jointly maintain the normal function of the knee joint. Tendons have the function of restraining bones, bones provide support, and muscles are the source of strength. However, with the degeneration of the body, the balance between these three elements is broken, forming a pathological state where “muscle, tendon, and bone” are equally important. The knee joint is where meridians such as the Stomach Meridian of Foot-Yangming, Gallbladder Meridian of Foot-Shaoyang, Spleen Meridian of Foot-Taiyin, and Bladder Meridian of Foot-Taiyang pass through. Based on the principles of syndrome differentiation and treatment, acupoints should be reasonably selected to harmonize Yin and Yang, promote blood circulation and remove blood stasis, and dredge meridians. Chen Zhenhu believes that the fundamental cause of KOA lies in the damage to the knee’s meridians and tendons, which subsequently affects the muscles, tendons, and bones, ultimately leading to the occurrence and development of the disease <sup>[6]</sup>. In clinical treatment, he focuses on meridian and tendon syndrome differentiation, emphasizing the simultaneous regulation of muscles, tendons, and bones. Through acupuncture, he aims to reduce patient pain and restore normal knee joint

function. This concept of syndrome differentiation based on meridians and tendons has become a key approach in the treatment of KOA using Qihuang needle therapy.

#### 3.2. Characteristics of Qihuang needle therapy

Qihuang Needle Therapy is an innovative acupuncture technique proposed by Chen Zhenhu, based on the inheritance of traditional acupuncture techniques. It integrates the meridian differentiation theory and the five-needle method from the “Yellow Emperor’s Inner Canon of Medicine.” This therapy is characterized by precise acupoint selection, rapid efficacy, short treatment duration, high reproducibility, and a wide range of applications. It is suitable for various medical conditions in internal medicine, surgery, gynecology, pediatrics, and more. The core tool of this therapy, the Qihuang Needle, is a novel hollow acupuncture needle designed based on the ancient nine needles (round needle, pointed round needle, long needle) and modern craftsmanship. The needle tip is both round and sharp, allowing it to channel Qi between muscles without damaging them. As stated in the “Leijing: Jiuzhen,” “The needle is shaped like an egg, facilitating guidance between muscles to avoid excessive damage, which could deplete spleen qi; therefore, sharpness is not the main focus.” The rounded needle tip can expand, compress, and clear deep tissues at acupoints during insertion, enhancing safety by avoiding damage to blood vessels and adjacent tissues <sup>[18]</sup>. The needle shaft adopts a hollow design, which reinforces the hardness of the needle body. This design enables more precise transmission of acupuncture techniques to the affected area, achieving the effect of “Qi reaching the diseased location.” Additionally, the transparent needle handle allows for observation of any blood return, preventing injury to blood vessels.

#### 3.3. Treating KOA with Qihuang needle combined with Jingjin syndrome differentiation

The treatment of KOA with Qihuang needle has formed a complete system of “theory-method-formula (acupoint)-technique.” Based on Jingjin syndrome differentiation, it focuses on the coordinated regulation of muscles, tendons, and bones, and proposes a combined treatment method of “point-line-surface.”



### 3.3.1. Identifying Jingjin: Clarifying the diseased Jingjin

Identifying Jingjin is the first step in treating KOA with Qihuang needle<sup>[19]</sup>. Jingjin refers to the system where the Qi of the twelve meridians gathers in muscular and joint areas. It complements the twelve meridians and jointly maintains the motor function of the human body. The knee is known as the “house of tendons” and is a convergence point for multiple Jingjin. For example, the Foot Taiyang Jingjin has “evil Qi ascending and converging at the knee,” the Foot Yangming Jingjin “ascends along the path, bypassing the knee and converging here,” while the Foot Taiyin Jingjin “converges at the medial auxiliary bone of the knee.” Clinical studies have shown that there are more than twenty positive reaction points of Jingjin near the knee joint, and the highest occurrence of pain points is at the starting and ending points of the patellar ligament<sup>[20]</sup>. Therefore, the imbalance or blockage of Qi and blood in the knee Jingjin is the root cause of KOA.

In clinical practice, Chen Zhenhu identifies the diseased Jingjin through a combination of four diagnostic methods: observation, auscultation and olfaction, inquiry, and palpation. For instance, observation is used to check for swelling or joint deformity in the knee area; inquiry helps understand the location and characteristics of the patient’s pain; and palpation is used to feel for abnormalities such as nodules, cords, or masses in the knee Jingjin. The integration of these four diagnostic methods not only aids in precise localization of the lesion but also guides acupuncture treatment.

### 3.3.2. Precise acupoint selection: From “Line” to “Point”

After identifying the diseased muscular meridians, Chen Zhenhu emphasizes precise acupoint selection, usually choosing 2 to 3 acupoints to minimize the damage to defensive Qi. Acupoint selection is divided into two methods: local treatment and remote regulation.

#### (1) Local Treatment at the Site of Illness, Facilitating the Flow of Muscular Meridians

Acupoints are selected based on the convergence points of the muscular meridians. For example, for lateral knee lesions, one can choose the Xiyangguan acupoint; for anterior knee lesions, the Dubi acupoint; for medial knee lesions, the

Ququan acupoint; and for popliteal lesions, the Weizhong acupoint. Acupuncture at these points can dredge the qi and blood of the muscular meridians, achieving the effect of “untying knots.”

#### (2) Remote Regulation of Qi and Blood, Strengthening the Body and Eliminating Pathogenic Factors

Acupoints are also selected based on the regulation of Qi and blood in the organs. For instance, Fengshi acupoint is mainly used for treating lower limb wind-dampness; Qihaiyu acupoint has the function of regulating and tonifying the liver and kidneys, relaxing tendons, and strengthening bones; and Xuanzhong acupoint, known as the “convergence of marrow,” can tonify the liver and kidneys, nourish marrow, and is used to relieve knee pain and movement disorders.

### 3.3.3. Skilled use of five types of acupuncture: Directing Qi to the disease site

Qi Huang acupuncture therapy emphasizes the hierarchical approach of acupuncture, selecting different techniques based on the depth of pathogenic factors. As stated in the “Plain Questions: On the Essentials of Acupuncture,” “Diseases manifest differently on the surface or internally, and acupuncture techniques vary in depth, each reaching its respective level without exceeding its limits.” The human body structure is divided into five layers from the outside to the inside: skin, vessels, tendons, internals, and bones. The acupuncture method needs to match the level of the lesion. For example, He-Gu needling is a superficial technique often used to treat lesions in the superficial muscles (muscle numbness). Techniques like Guan needling and Shu needling are deeper acupuncture methods used to treat tendon and bone lesions (tendon numbness, bone numbness). The lesions of knee osteoarthritis (KOA) often involve muscles, tendons, and bones. Chen Zhenhu frequently adopts a combined acupuncture approach. In the early stages, when the lesion primarily affects muscles and tendons, Guan needling can be used to relax tendons and promote blood circulation, supplemented by He-Gu needling to disperse pathogenic qi in the muscles. In later

stages, when bone lesions predominate, Shu needling is primarily used to reach the bone surface and disperse deep-seated pathogenic qi between the bone joints, supplemented by He-Gu needling to regulate Qi and blood and relieve pain.

### 3.4. Comprehensive advantages of Qihuang acupuncture

Qihuang acupuncture therapy emphasizes holistic regulation in the treatment of KOA. Through the identification of meridians and muscles, precise selection of acupuncture points, and the integration of the five needling techniques, it achieves the effect of Qi reaching the diseased location and dredging the meridians and muscles. The acupuncture technique employed is gentle and swift, not only alleviating patients' pain but also effectively relieving their fear of acupuncture, thus enhancing the acceptability of the treatment. As stated in the "Yi Zong Jin Jian": "The application of the method should make the patient unaware of their suffering." With its unique efficacy and safety, Qihuang acupuncture therapy has emerged as a significant approach for the treatment of KOA.

## 4. Extracorporeal ShockWave Therapy (ESWT) and knee osteoarthritis

In the field of non-surgical treatment, Extracorporeal ShockWave Therapy (ESWT), as an emerging physical therapy method, has gradually attracted widespread attention for its application in the treatment of knee osteoarthritis. Studies have shown that extracorporeal shock wave therapy can effectively improve pain symptoms and joint function in patients with knee osteoarthritis. Additionally, as a non-invasive and minimally invasive treatment, extracorporeal shock wave therapy has relatively high safety and patient acceptance. Research has found that the combination of extracorporeal shock wave therapy and sodium hyaluronate injection can effectively improve pain and function scores in patients with knee osteoarthritis<sup>[21]</sup>. Furthermore, the combination of extracorporeal shock wave therapy and traditional Chinese medicine fumigation has demonstrated better clinical effects in promoting symptom relief and improving quality of life. Meanwhile, comparative studies

on the combination of extracorporeal shock wave therapy with other physical therapy methods, such as ozone therapy and acupotomy, are continuously being conducted to find the best treatment combination regimen<sup>[22]</sup>.

## 5. Case study

Patient Jiang XX, a 67-year-old female, presented for the first time on June 27, 2024. The patient complained of recurrent bilateral knee pain for 9 years, with symptoms intensifying in the past week. Since 9 years ago, the patient has experienced dull pain in both knees, especially during walking and climbing stairs, accompanied by limited flexion activity of the knee joints. The patient prefers massage and kneading to relieve discomfort. X-ray examination revealed degenerative changes in bilateral knee joints, confirming the diagnosis of knee osteoarthritis. Although the patient's pain was reduced after taking celecoxib capsules, the symptoms still occur repeatedly. In the past week, the pain in both knees has worsened, affecting daily activities.

### 5.1. Initial diagnosis

- (1) Current medical history: The patient's bilateral knee pain is mainly concentrated on the lateral and posterior sides of the knees, which intensifies during prolonged walking and climbing stairs. It is accompanied by limited flexion and extension, making squatting difficult. No significant discomfort was reported in other parts.
- (2) Tongue and pulse: The tongue is pale with a thin white coating, and the pulse is deep and thin.
- (3) Physical examination: The skin temperature of the bilateral knee joints is elevated, but the skin color is normal. Pressure pain is positive on the medial and lateral sides of the knee joints. The floating patella test is positive, the drawer test is negative, and the bone friction sound is positive.
- (4) Scores:
  - (a) KOOS scores: Symptoms 64.3, Pain 63.9, Daily Activities 66.2, Sports and Recreational Functions 45, Knee-related Quality of Life 50.
  - (b) Knee LYSHOLM pain rating scale: 48 points
  - (c) WOMAC score: 48 points

(d) Patient's knee range of motion: 110°

## 5.2. Diagnosis and syndrome differentiation

- (1) Western medicine diagnosis: Knee osteoarthritis
- (2) Traditional Chinese Medicine diagnosis: Knee Bi Syndrome (a condition marked by pain and stiffness in the knee)
- (3) Syndrome differentiation: Liver and kidney deficiency syndrome (characterized by symptoms indicating a deficiency in the functions of the liver and kidney, often manifesting as weakness or pain in the joints)
- (4) Therapeutic method: Tonifying Qi to dredge the meridians, promoting blood circulation, and relieving pain. (This approach aims to strengthen the body's vital energy, improve the flow of energy through the meridians, enhance blood flow, and alleviate discomfort.)

## 5.3. Treatment process

Based on the patient's pain primarily focused on the lateral and posterior aspects of the knee, which is associated with the foot Shaoyang meridian sinews and foot Taiyang bladder meridian sinews, Yanglingquan, Ququan, and Weizhongshu (bilateral) acupoints were selected for acupuncture treatment. Extracorporeal shock wave therapy was administered on the second day after acupuncture treatment.

## 5.4. Acupuncture procedure

- (1) The patient was positioned appropriately to fully expose the affected area.
- (2) The physician chose a 1.5-inch Qihuang needle (specification: 0.3 mm × 55 mm) and inserted it quickly using a flying needle technique.
  - (a) First, Shu-style acupuncture was performed, with the needle tip reaching the bone surface at a depth of approximately 50 mm.
  - (b) Subsequently, He-style acupuncture was applied along the meridian sinew's pathway.
  - (c) The needle was immediately removed after the acupuncture procedure, and the needle hole was pressed with a cotton ball for a moment.

## 5.5. Treatment effect

- (1) After acupuncture, the patient reported significant pain relief in the knee, and squatting and standing movements became easier.
- (2) The patient was advised to avoid climbing stairs and heavy physical labor, and to perform appropriate knee function exercises.

## 5.6. Treatment plan

- (1) Acupuncture was administered once every other day, with 3 sessions constituting one course of treatment. Extracorporeal shock wave therapy (ESWT) was also applied, with an ESW energy of  $2.5 \times 10^5$  Pa and 2000 shockwaves per session, twice a week. - After one course of treatment, the patient reported a reduction in knee pain and significant improvement in knee joint function:
- (2) KOOS (Knee injury and Osteoarthritis Outcome Score) ratings were as follows: Symptoms 78.6, Pain 72.2, Activities of Daily Living (ADL) 73.5, Sport and Recreation Function 60, and Knee-related Quality of Life 62.5.
- (3) The LYSHOLM Knee Scoring Scale for pain rated at 68.
- (4) The WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index) score decreased to 34.
- (5) The patient's knee range of motion improved to 120°.

## 5.7. Follow-up results

Four weeks after the completion of treatment, a telephone follow-up was conducted. The patient's knee function recovered well, showing no signs of recurrence. In traditional Chinese medicine, the knee is considered the "house of tendons." Knee disorders are often caused by overstrain or weakness, coupled with external pathogenic factors invading and damaging the channels and tendons, leading to pain, stiffness, and difficulty in bending and stretching. In the treatment of traditional Chinese medicine, syndrome differentiation and treatment should be based on the theory of channels and tendons. The Qi Huang acupuncture therapy is based on the theory of channels and tendons, and adopts the five-needle method

according to the depth of the lesion, which has strong pertinence. The patient was elderly and frail, with liver and kidney deficiency. Overwork depleted qi and blood, leading to tendon dystrophy and pathogenesis. The disease course was protracted, and the pathogenic factors penetrated deep into the bones, resulting in loss of bone support and muscle weakness. The patient experienced pain on the inside and outside of the knee joint. Combined with palpation, it was found that the lesion involved the tendons of the Foot Shaoyang Channel and the Foot Taiyang Channel.

Based on the principle of “where the meridians pass, there lies the scope of treatment,” after identifying the location of the lesion, the method of selecting acupoints near the tendon and muscle accumulation points around the knee joint is adopted to dredge meridians and tendons, promote blood circulation and remove blood stasis, strengthen the body’s resistance, and eliminate pathogenic factors. The Xiyangguan acupoint belongs to the Foot Shaoyang Gallbladder Meridian and is located near the tendon and muscle accumulation points on the lateral side of the knee. It has the functions of dredging meridians, relaxing muscles, dispelling cold, and warming yang. The Ququan acupoint belongs to the Foot Jueyin Liver Meridian and is the He-Sea acupoint of the liver meridian, which can dredge meridians and tendons, promote blood circulation, and relieve pain. The Weizhong acupoint is the He-Sea acupoint of the Foot Taiyang Bladder Meridian, which can stimulate meridian qi and nourish meridians and tendons. For patients with long-term knee osteoarthritis, as the pathogenic factors penetrate deeply into the bones and damage the muscles, the treatment mainly focuses on shu-style needling, combined with hegu-style needling to enhance the therapeutic effect. The key to acupuncture treatment lies in regulating the qi and

blood of the meridians and tendons. When Qi and blood are smooth, pain can be relieved. The Qihuang needle therapy fully embodies the advantages of traditional acupuncture and moxibustion in the treatment of knee osteoarthritis due to its precise acupoint selection based on syndrome differentiation, simple operation, significant efficacy, and high reproducibility. For diseases manifesting as limb pain and limited mobility in clinical practice, treatment can also be based on syndrome differentiation and treatment from the perspective of meridians and tendons, which often achieves good therapeutic effects.

## 6. Conclusion

The combined therapy of Qi Huang acupuncture and extracorporeal shock wave therapy has demonstrated remarkable efficacy in the clinical application of knee osteoarthritis. It can not only effectively alleviate knee pain and stiffness but also significantly improve patients’ daily activities. Qi Huang acupuncture, characterized by precise acupoint selection, simple operation, rapid efficacy, and high reproducibility, inherits the advantages of traditional acupuncture and further enhances the therapeutic effect through the combination with modern physical therapy techniques. Clinical practice has proven that the combined application of Qi Huang acupuncture and Extracorporeal ShockWave Therapy has important clinical significance in the non-surgical treatment of knee osteoarthritis, providing patients with a safe, effective, and side-effect-free comprehensive treatment option. Looking ahead, with the advancement of more high-quality evidence-based medical research, this therapy is expected to provide a more scientific basis for the treatment of knee osteoarthritis and gain wider clinical promotion and application.

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# Treatment of Menopausal Syndrome Insomnia Based on the Theory of the Five Elements Theory

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## Abstract:

Menopausal syndrome insomnia is a common and quality-of-life-affecting issue for women during the menopausal phase. Chronic insomnia can cause numerous harms to the physical and mental health of patients, such as lethargy and decreased immunity, making effective treatment crucial. However, there are certain difficulties in treatment, such as the condition being influenced by various complex factors, making it hard to control the direction of treatment accurately. Traditional Chinese medicine (TCM) has unique advantages in dealing with such conditions. Based on the Five Elements theory, there are interrelationships of mutual restraint and promotion between the five viscera, such as the nourishing relationship of heart fire to spleen earth, and the promoting relationship of liver wood to heart fire. When these relationships are out of balance, they are closely related to the occurrence of menopausal syndrome insomnia. In light of this, TCM treatment methods such as nourishing blood and calming the spirit, nourishing Yin and reducing heat, nourishing Yin and subduing Yang, clearing liver and purging heat, benefiting Qi and lifting Yang, and strengthening the spleen and harmonizing the liver can be skillfully applied. By adjusting the balance of Qi and blood, Yin and Yang, and restoring the normal function of the viscera, a comprehensive treatment strategy can be effectively implemented to achieve the effect of treating both the root and the symptoms, providing a good approach to improving the condition of menopausal syndrome insomnia.

## Keywords:

Insomnia  
Menopausal syndrome  
Five Elements Theory  
Etiology and pathogenesis  
Relationships of the five viscera

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## 1. Introduction

Menopause is a significant stage in women's lives, during which many experience a range of physical and mental symptoms due to fluctuations or decreases in sex hormone levels. Insomnia is one of these common symptoms that severely affects quality of life <sup>[1,2]</sup>. This symptom cluster primarily affects women aged 45 to 60, with indications suggesting that this age range is gradually decreasing <sup>[3]</sup>. As reproductive hormone levels decline during the perimenopausal period, most women undergo physiological and psychological changes. With increasing age, insomnia becomes one of the primary complaints among postmenopausal women. Insomnia is a sleep disorder characterized by difficulty falling asleep <sup>[4]</sup>. In an international women's health study involving over 12,000 women, nearly 40% reported sleep difficulties during the menopausal transition <sup>[5]</sup>. Sleep difficulties can lead to fatigue, lethargy, emotional disturbances, impaired memory, decreased concentration, and even accidents, resulting in behavioral, occupational, and social issues <sup>[6]</sup>. Additionally, menopausal women often experience other typical symptoms of menopause, including hot flashes, night sweats, palpitations, emotional changes, anxiety, and depression, which also increase the risk of developing sleep disorders <sup>[7]</sup>. Long-term insomnia significantly impacts patients' health, utilization of medical resources, quality of life, and work performance <sup>[8]</sup>. Recent studies have also revealed that insomnia is associated with major health issues, such as increased risks of cardiovascular disease, diabetes, and even death <sup>[9]</sup>. Proserpio and colleagues reviewed the mechanisms and treatments of insomnia in postmenopausal women, with content similar to this overview <sup>[10]</sup>. Hormone Replacement Therapy (HRT) has been a conventional and effective strategy for managing perimenopausal symptoms <sup>[11]</sup>. However, some women may choose not to use HRT due to concerns about potential risks of breast cancer, endometrial cancer, and ovarian cancer. Recently, advancements in traditional Chinese medicine techniques have demonstrated increasing advantages in treating sleep disorders caused by female menopause. Many traditional Chinese medicine preparations have been proven to improve insomnia caused by menopause syndrome <sup>[12]</sup>. The five-element theory, relying on the concept of "holistic view," employs analogy and dialectic means to understand and address

human diseases, providing a macro and systematic thinking framework for medicine <sup>[13]</sup>. This article connects insomnia during menopause syndrome with the five organ systems in the five-element theory, analyzes its pathological mechanism, and offers new ideas for the treatment of insomnia during menopause syndrome in traditional Chinese medicine.

## 2. Understanding of insomnia in climacteric syndrome from Traditional Chinese Medicine

Insomnia related to climacteric syndrome falls into the categories of "insomnia," "lily disease," "visceral dryness," and "various symptoms before and after menopause" in Traditional Chinese Medicine. According to Chinese medicine theory, the main pathogenesis of insomnia in climacteric syndrome is attributed to the decline of kidney Qi, deficiency of Chong and Ren meridians, depletion of Tiangui (a substance essential for reproductive function in women), insufficiency of menstrual blood, imbalance of Yin and Yang, and disharmony of organs and Qi-blood <sup>[14]</sup>. As women enter menopause, their kidney Qi gradually declines, leading to kidney Yin deficiency and essence blood depletion. This results in Yin-Yang imbalance, preventing Yang from entering Yin, thus causing insomnia. As recorded in the "Plain Questions: On the Naive and the Natural," "When a woman reaches the age of 49, her Ren meridian becomes deficient, her Tai Chong meridian declines, her Tiangui is depleted, and her menstrual cycle ceases, thus her body deteriorates and she becomes unable to bear children." The five elements theory in Chinese medicine utilizes the characteristics of the five elements to analyze the physiological functions and pathological changes of the five organs <sup>[15]</sup>. Among the five elements, fire is warm and hot, with an upward tendency. The heart belongs to fire in the five elements, and heart Yang has the function of promoting and warming, ensuring continuous vitality, smooth flow of the heart meridian, and clarity of mind, maintaining the normal functions of the heart governing blood vessels and storing the mind. Adequate heart yang nourishes the mind, ensuring normal mental activities, helping to maintain Yin-Yang balance, enabling the normal functioning and orderly operation of

the five organs, and promoting stable sleep. If heart Yang is insufficient, it may lead to restlessness of the mind. When Yang cannot enter Yin, or Yin cannot exit Yang, insomnia occurs. The liver belongs to wood in the five elements, responsible for regulating and smoothing Qi. If liver Qi becomes stagnant or liver yang rises excessively, it may affect the mind, leading to insomnia. The spleen belongs to earth in the five elements, responsible for transportation and transformation, and is the source of Qi and blood generation. If spleen Qi is weak and Qi and blood generation is insufficient, the mind loses nourishment, which may also cause insomnia. The lungs belong to metal in the five elements, responsible for Qi and breathing. If lung Qi is weak or lung function is impaired, it may affect Qi and blood circulation, further affecting the mind and leading to insomnia. The kidneys belong to water in the five elements, are responsible for storing essence and are considered the foundation of “先天之本 (innate constitution).” If kidney essence is insufficient and cannot nourish the heart, leading to excessive heart fire, it may also cause insomnia. Therefore, treatment should start from the relationship of generation, restriction, overaction, and counter-restriction among the five elements, comprehensively regulating the functions of the five organs to restore the normal relationship among the five elements<sup>[16]</sup>.

### **3. The relationship between generation, restraint, overaction, and insult among the five elements is closely related to insomnia in menopause syndrome.**

“Treatise on Various Diseases and Their Treatments: Insomnia” states, “When Yang Qi naturally transitions from activity to stillness, sleep occurs. When Yin Qi naturally transitions from stillness to activity, wakefulness occurs. Insomnia arises when yang fails to intersect with Yin.” The five elements - wood, fire, earth, metal, and water - exhibit relationships of generation, restraint, overaction, and insult, which coordinate the interactions among the internal organs. Insomnia during menopause syndrome may be caused by an imbalance in these relationships, leading to dysfunction of the internal organs, imbalance of Yin and Yang, and disharmony of Qi and blood, thereby affecting sleep. The following are common imbalances.

#### **3.1. Relationships between the generation and restraint among the five elements and insomnia in menopause syndrome**

##### **(1) Fire generates earth**

As stated in the “Huangdi Neijing” (Yellow Emperor’s Inner Canon of Medicine), “The liver, represented by wood, stores blood to nourish the heart fire, and the warmth of the heart fire warms the spleen earth.” The heart belongs to fire and governs the mind, while the spleen belongs to earth and is responsible for transformation and transportation. Heart fire is the mother and spleen earth is the child. The Yang Qi of the heart can warm the spleen Yang, and when the spleen Yang is healthy and vigorous, it can transform and generate Qi and blood, nourishing the heart blood. Sufficient heart blood requires the transformation of water and grain essence<sup>[17]</sup>. The “Huangdi Neijing” mentions, “Human growth is first rooted in the essence of the kidneys, giving birth to wood, metal, and earth from water and fire. These are the innate five elements. Human aging progresses from liver wood to fire, earth, metal, and water, representing the acquired five elements.” If the spleen loses its healthy function, Qi and blood cannot be generated, and the heart’s blood supply becomes inadequate, possibly leading to heart dysfunction. This, in turn, can cause adverse effects on the parent organ, manifesting as pathological influences of the child organ on the parent organ. Insufficient heart Qi leads to fire not generating earth, blood circulation without Qi, spleen Qi deficiency, Qi and blood deficiency, resulting in symptoms of insomnia due to lack of nourishment and a restless mind. For example, menopausal women often experience emotional fluctuations, anxiety, and irritability, causing liver Qi to stagnate and attack the spleen. Alternatively, irregular eating habits and excessive consumption of cold and greasy foods can damage the spleen and stomach yang, leading to spleen dysfunction. As a result, Qi and blood cannot be generated, and the heart blood is not adequately nourished, easily triggering insomnia symptoms<sup>[18]</sup>.

##### **(2) Wood generates fire**

As stated in the “Su Wen: Yin Yang Ying Xiang Da Lun” (Basic Questions of Yellow Emperor’s Inner Canon of Medicine: Correspondence Between Yin and Yang), “The east gives birth to wind, wind gives birth to wood, wood gives birth to sourness, sourness gives

birth to the liver, the liver gives birth to tendons, tendons give birth to the heart, and the liver gives birth to the eyes.” Between the heart and liver, the liver belongs to wood, and the heart belongs to fire, forming a mother-child relationship. Sufficient liver blood can nourish the heart’s blood and ensure normal heart function. The heart’s blood circulation function is closely related to the liver’s Qi regulation, and its filling degree also depends on the liver’s blood storage and regulation function. If the relationship between the liver and heart in the five-element theory is unbalanced, such as long-term stress or accumulation of negative emotions leading to insufficient liver blood, they may mutually affect each other. That is, diseases of the parent organ can spread to the child organ, and vice versa. The “Huangdi Neijing: Su Wen: Wu Zang Sheng Cheng” (Yellow Emperor’s Inner Canon of Medicine: Basic Questions: Formation of the Five Zang Organs) states, “When a person sleep, the blood returns to the liver. The liver receives blood and can see, the feet receive blood and can walk, the palms receive blood and can grasp, and the fingers receive blood and can pick up things.” The liver can store blood and distribute it according to the body’s activity status. When a person is sleeping, the blood returns to the liver. If the liver’s blood storage function is dysfunctional, such as insufficient liver blood, it will cause heart blood deficiency. Insufficient heart blood cannot nourish the mind well, leading to a lack of nourishment and insomnia, nightmares, and easy startling<sup>[19]</sup>. Due to dramatic changes in hormone levels in menopausal women, emotions are extremely unstable, prone to liver Qi stagnation or liver yang hyperactivity. This not only affects the normal generation and storage of liver blood but also interferes with the generation of heart blood and the tranquility of the mind, leading to frequent insomnia<sup>[20]</sup>.

### (3) Water generates wood

As stated in the “Chun Qiu Fan Lu: Wu Xing Da Yi” (Luxuriant Gems of the Spring and Autumn Annals: The Great Meaning of the Five Elements), “Water generates wood because water nourishes and gives birth to wood.” In the five-element theory of Chinese medicine, the kidney and liver have a mother-child relationship. The liver is responsible for blood storage, while the kidney is responsible for sealing essence. The two complement each other. The liver’s blood requires the nourishment

of kidney essence, while kidney essence also needs the replenishment of liver blood, forming a dynamic balance of mutual support and transformation. This mutual generation relationship between essence and blood is crucial for physiological functions and sleep. If liver yin is deficient, it can easily affect kidney Yin, leading to kidney Yin deficiency and inability to nourish the liver, thereby causing insomnia<sup>[21]</sup>. Additionally, the liver is responsible for dispersion, and human wakefulness and sleep are regulated by the entry and exit of Ying and Wei Qi, influenced by the liver’s dispersing function. Normal dispersion of liver Qi allows Qi, blood, and body fluids to circulate regularly, with Wei Qi emerging from yang during the day and entering Yin at night, maintaining a normal sleep state<sup>[22]</sup>. If kidney water cannot nourish liver wood, leading to liver dispersion dysfunction and Qi stagnation. Liver Qi stagnation can transform into fire, consuming the yin of the liver and kidney over time, and deficiency fire disturbs the heart and forces the fluid to leak, which can also cause insomnia. For example, menopausal women who are chronically overworked may consume the essence of the liver and kidney, or if they are chronically tense and anxious, liver Qi stagnation may break the balance between the liver and kidney, triggering insomnia<sup>[23]</sup>.

### (4) Wood restricts earth

The liver belongs to wood, while the spleen belongs to earth. As mentioned in “Wu Jutong’s Medical Cases: Single Abdominal Distension,” “The disease originates from liver stagnation. When wood stagnates, it restricts the earth. Restricting Yang Earth leads to insomnia while restricting Yin earth causes distension. Self-stagnation results in hypochondriac pain. The liver is responsible for dispersion and drainage, but liver diseases hinder this function, leading to poor excretion... Liver stagnation necessarily restricts Earth. Yin earth stagnation causes distension, while Yang earth stagnation leads to reduced appetite.” Emotional distress, such as long-term depression and anger, accumulates internally and harms the liver, disrupting its smooth functioning. This leads to liver Qi stagnation, improper dispersion and drainage, and dysfunctional Qi movement, which further affects the spleen and stomach’s ascending and descending movements. This can be described as “wood stagnation restricting earth”<sup>[24]</sup>. Excessive wood Qi easily overcomes the spleen earth, leading to spleen and stomach



dysfunction. This dysfunction affects food digestion and absorption, resulting in a lack of Qi and blood generation. Pathological products like phlegm dampness caused by spleen and stomach disharmony obstruct the middle Jiao, preventing clear Qi from ascending and turbid Qi from descending. This disrupts the mind and causes insomnia. Due to physiological and psychological changes during menopause, women experience more intense emotional fluctuations, making them prone to liver stagnation affecting the spleen, leading to insomnia symptoms <sup>[21]</sup>.

### **3.2. The relationship of five elements' mutual overcoming and insulting with menopausal syndrome and insomnia**

In the theory of the five elements, the relationship between water and fire is particularly important. The heart belongs to fire, while the kidney belongs to water. Heart fire must descend to the kidneys and warm kidney Yin together with kidney Yang, keeping kidney water from being cold. Kidney water, in turn, needs to rise and nourish the heart, nourishing the heart Yang together with heart Yin and preventing heart fire from being excessive <sup>[25]</sup>. This mutual restraint relationship ensures harmony between water and fire, forming a balanced system of Yin and Yang ascent and descent. As stated in "Essential Prescriptions Worth a Thousand Gold for Emergencies," "The heart is fire, the kidney is water and water and fire complement each other." This relationship indicates the crucial dynamic balance of Yin and Yang ascent and descent between the heart and kidneys. If kidney water is deficient due to aging, chronic illnesses harming the kidneys, or excessive fatigue, the kidneys lose their nourishing Yin fluids. Alternatively, overexertion can harm the kidneys, preventing them from nourishing heart fire. This leads to excessive heart fire, causing restlessness and insomnia. Additionally, there is a mutual generation of essence and blood and mutual utilization of spirit between the two. If the water-fire relationship is disrupted and kidney essence is insufficient, it cannot nourish heart blood, leading to heart spirit malnutrition and insomnia. For example, as menopausal women age, their kidney Yin gradually declines. Combined with factors like life stress and unhealthy habits, they are prone to develop a condition where kidney water cannot nourish heart fire, exacerbating insomnia symptoms and severely

affecting their quality of life <sup>[26]</sup>.

Metal humiliates fire, and the lung belongs to metal, which means metal can, in turn, restrain fire <sup>[27]</sup>. Normally, fire should restrain metal, and the clear and serene Qi of lung metal should descend to generate kidney water, maintaining the balance of the five elements. However, when the metal Qi is excessively strong or the fire Qi is too weak, this reverse restraint can occur. If the Qi of lung metal is too strong, it may cause the Qi of the lungs to rise upward, which leads to a lack of heart fire and restlessness of the mind. In such cases, patients may not only exhibit symptoms related to the lung system, such as cough and asthma but may also accompany symptoms of the heart meridian, such as upset and insomnia, leading to sleep disorders. For example, after suffering from exogenous diseases, if the lung Qi of women in menopause is not relieved in a timely manner, it may cause the metal of the lungs to humiliate the fire, which can further lead to insomnia. Additionally, some women in menopause who have a long history of smoking or live in an environmentally polluted area are prone to experience an imbalance in their lung Qi, affecting their state of mind and causing insomnia <sup>[28]</sup>.

## **4. Treating insomnia due to menopausal syndrome based on the five elements theory**

Illustrating the various connections between the internal organs through the relationship of generation and restraint, multiplication, and humiliation among the five elements can explain the physiological and pathological connections between the five internal organs. It can also be used to resolve pathological conflicts between related organs. For the dialectical treatment of insomnia due to menopausal syndrome, the five elements theory can provide a macro and systematic thinking mode, clarifying the relationship between the organs and deducing the corresponding treatment methods <sup>[17]</sup>.

### **4.1. The transformation of heart fire and spleen earth: Nourishing the heart and spleen, nourishing blood, and calming the nerves**

There is a mutual generation relationship between the heart and fire, and both participate in the generation

of Qi and blood. The heart governs blood vessels and stores the mind, while the spleen governs transportation and transformation and controls blood. When the heart loses nourishment and the spleen's function of transportation and transformation is imbalanced, it can lead to a deficiency of both heart and spleen. Insufficient heart blood and failure of blood to nourish the heart can cause restlessness and difficulty falling asleep, as well as frequent dreaming and easy waking, accompanied by palpitations and forgetfulness. On the other hand, weakness of spleen Qi can hinder the effective transformation of water and grain essence, resulting in a lack of Qi and blood generation, further aggravating the insufficiency of heart blood and forming a vicious cycle, ultimately leading to insomnia. The method of nourishing earth to generate fire can be applied, and representative prescriptions include Gui Pi Tang, Gan Mai Da Zao Tang from Jin Gui Yao Lue, and Yang Xin Tang. Medications such as ginseng, astragalus, atractylodes, moxibustion licorice, and *poria cocos* can be used to tonify Qi and strengthen the spleen; longan meat, angelica, *zizyphus jujube*, and polygala can be used to nourish blood and calm the mind; ginger and jujube can harmonize the spleen and stomach to enhance Qi and blood generation, thereby improving symptoms such as insomnia and forgetfulness. Pan *et al.* used Gan Mai Da Zao Tang combined with Gui Shen Wan to treat sleep disorders during perimenopause, achieving a curative effect of 95.0%<sup>[29]</sup>. Studies by Jin *et al.* have shown that Tiaoshen Yangxin Tang has significant efficacy in treating perimenopausal insomnia and can also improve patients' symptoms of hot flashes and night sweats<sup>[30]</sup>.

#### **4.2. Changes in kidney water and heart fire: Nourishing Yin and reducing fire, harmonizing heart and kidney**

Water and fire have a mutual-restricting relationship. When the balance between water and fire is disrupted, heart fire cannot descend to the kidneys, and kidney water becomes cold due to the lack of heart fire. This leads to depletion of kidney essence, and lack of nourishment for the marrow sea, resulting in symptoms such as dizziness, tinnitus, soreness and weakness of the waist and legs. On the other hand, when kidney water cannot ascend to nourish heart fire, heart fire becomes hyperactive

due to the lack of nourishment from kidney water. This hyperactivity of heart fire leads to symptoms such as restlessness, insomnia, palpitations, dream-disturbed sleep, feverish sensation in the palms and soles, and nocturnal sweats, resulting in a state of "heat above and cold below," which causes insomnia. During treatment, the method of reducing the south and reinforcing the north can be applied. By nourishing kidney Yin to suppress the hyperactivity of heart fire, kidney Yang can be nourished, and heart fire can be calmed to restore the balance between the heart and kidneys. Prescriptions such as Liuwei Dihuang Pill, Tianwang Buxin Pill, and Huanglian Ejiao Decoction can be selected to nourish kidney essence, supplement kidney Yin, and help kidney water ascend to nourish heart fire. At the same time, herbs that clear heart fire, such as Dengxin Cao, Zhizi, and Lianzixin, can be used in combination to harmonize the heart and kidneys and restore their normal interaction. Zhu Xiaohong<sup>[31]</sup> selected 40 patients with insomnia due to climacteric syndrome from a gynecological clinic. They were treated with modified Huanglian Ejiao Decoction, taken once a day, and decocted in water, twice a day, with 14 days as one course of treatment. After continuous treatment for 2–3 courses, patients were able to sleep for more than 6 hours every night, and symptoms of restlessness, irritability, and facial flushing were reduced. Dong Xueshan<sup>[32]</sup> used Chaihu Guizhi Ganjiang Decoction combined with Liuwei Dihuang Pill to effectively improve patients' mental symptoms, thereby relieving insomnia and improving patients' quality of life, which is worthy of clinical promotion.

#### **3.3 Changes in liver wood and heart fire: Clearing liver fire, calming the heart and tranquilizing the mind**

Wood and fire have a mutual generation relationship. When the liver fire is too strong, it disrupts the normal function of the liver, which can affect heart fire and lead to its hyperactivity. This can disturb the mind and cause insomnia. Given the mother-child relationship between liver fire and heart fire, methods such as soothing the liver and reducing fire, calming the mind, and stabilizing the will can be adopted to assist the liver in its dispersing function and promote blood circulation in the heart. This can alleviate emotional fluctuations caused by

hormonal changes in menopausal women, which may lead to liver Qi stagnation. Prolonged stagnation can turn into fire, causing evil fire to disturb the mind and lead to symptoms such as insomnia and dream-disturbed sleep. Prescriptions such as Longdan Xiegan Decoction, Chaihu Jia Longgu Muli Decoction, and Jiawei Xiaoyao Pill can be selected. Herbs such as Longdancao, Huangqin, and Zhizi can be used to clear liver fire; Mutong and Cheqianzi can be used to promote urination and clear heat; Chaihu can enter the liver meridian and soothe the liver to relieve qi stagnation; Danggui and Shengdi can enter the liver and heart meridians, nourish the blood, nourish Yin, and soften the liver. Assisted by Gancao to harmonize the middle, or combined with Longgu and Muli to calm the heart and tranquilize the mind, the balance of Yin and Yang can be adjusted, allowing the mind to be calmed and improving insomnia symptoms. Wang Quanhui *et al.* <sup>[33]</sup> conducted a randomized controlled trial and concluded that Chaihu Jia Longgu Muli Decoction has a significant effect on treating menopausal insomnia, improving sleep quality, and reducing disease symptoms. Pan Xue *et al.* <sup>[34]</sup> studied 130 patients with menopausal insomnia of liver qi stagnation type. The application of Chaihu Jia Longgu Muli Decoction subtraction effectively improved patients' hormone levels and sleep quality, achieving significant results.

#### **4.4. Transformation of heart-fire and lung-metal: Reinforcing Qi and elevating Yang, tonifying and regulating the heart and lungs**

There is a mutually inhibitory relationship between Fire and Metal. The heart governs blood vessels, while the lungs govern Qi. However, in pathological states, when Lung-Metal becomes excessively strong, it can inversely restrain Heart-Fire, preventing it from warming the Lung-Metal. This can lead to insufficient lung Qi, poor circulation of Qi and blood, and malnutrition of the mind, manifesting as symptoms of cardiopulmonary Qi deficiency such as palpitations, shortness of breath, insomnia, and fatigue. Since the heart and lungs are adjacent to each other and functionally interrelated, with the lungs aiding the heart in circulating blood, it is necessary to treat both organs simultaneously. Remedies such as modified Bufe Decoction combined with

Baoyuan Decoction, Sancai Decoction, and Renshen Yangrong Decoction can be used, possibly complemented with nourishing Yin herbs like *Ophiopogon japonicus* and *Schisandra chinensis*. By nourishing the Qi and Yang of the heart, lungs, and kidneys, the goal is to treat injuries to both Yuan Qi and Yin fluids. According to Lv Yingying's <sup>[35]</sup> randomized controlled study on 68 patients with insomnia due to deficiency of both Qi and blood, Renshen Yangrong Decoction significantly improves insomnia symptoms, enhances quality of life, and is safe, painless, and has minimal side effects, making it worthy of clinical promotion and application.

#### **4.5. Transformation of kidney-water and liver-wood: Nourishing the kidneys and liver, cultivating Yin and subduing Yang**

There is a generative relationship between Water and Wood. The kidneys are the foundation of prenatal constitution, containing true yin and accommodating true Yang. The kidneys store essence and generate the body's vitality, while kidney essence gives rise to Yin and Yang. The Yin and Yang of the five organs cannot be nourished without the support of kidney Yin and Yang. The liver is responsible for dispersion and storing blood, and it is crucial for the abundant Qi and blood in the Chong and Ren meridians. Women naturally prioritize the liver due to the depletion of essence and blood caused by menstruation, pregnancy, childbirth, lactation, and other factors, leaving an excess of Qi. Women's bodies are based on blood, and their functions rely on Qi. Their constitution is Yin, but their functions are Yang. Therefore, menstrual syndrome-related insomnia is often associated with imbalances in the harmonization of Qi and blood in the liver. When kidney water fails to nourish liver wood, the generation of Yin and Yang in the liver and kidneys becomes deficient. If one aspect of Yin and Yang becomes excessively dominant, deficiency of defensive Yang and dysregulation of the skin's pores can manifest as "spontaneous sweating" or "night sweats." Women tend to be more contemplative and emotionally affected. Disharmony of Qi due to liver dysfunction can lead to liver Qi stagnation and transformation into fire. Over time, this consumes the Yin of the liver and kidneys, and deficient fire disturbs the heart, forcing fluids to leak out, manifesting as symptoms of menopause



such as hot flashes, irritability, insomnia, and excessive sweating. Treatment should focus on nourishing Yin and subduing Yang, enhancing kidney water nourishment to restrain liver wood hyperactivity. On the basis of nourishing kidney Yin, it is also necessary to tonify liver blood, nourish the heart, and calm the mind to harmonize the Yin and Yang in the kidneys, bringing the body into a state of Yin-Yang balance. Remedies such as Qiju Dihuang Pill, Zuogui Pill, and Yiguan Jian can be used, possibly complemented with herbs like *Anemarrhena asphodeloides* to nourish Yin and reduce fire, *Phellodendron amurense* to clear heat and purge fire, *Albizia julibrissin* to soothe the liver and dispel stagnation, and *Lycium barbarum* to nourish the kidneys and liver. These treatments address both the liver and kidneys, clear heat, nourish Yin, tonify the kidneys, and fill essence, simultaneously treating symptoms like hot flashes, night sweats, soreness and weakness of waist and knees, and fundamentally relieving insomnia. Guo Qun's <sup>[36]</sup> study applied a combination of Suanzaoren Decoction and Zuogui Pill to treat female patients with insomnia during menopause, demonstrating improvement in associated symptoms and enhanced treatment effectiveness. Fan Mingsheng's <sup>[37]</sup> randomized controlled trial found that the combination of Qiju Dihuang Pill and Losartan Potassium Tablets had significant effects in treating patients with insomnia and hypertension during menopause, effectively improving their sleep quality, making it worthy of promotion.

#### **4.6. The interaction between liver (wood) and spleen (earth): Soothing the liver and regulating Qi, strengthening spleen and harmonizing the stomach**

In traditional Chinese medicine theory, there is a restraining relationship between wood and earth elements. When the Qi of the liver (represented by wood) becomes excessive, the liver's dispersing function becomes abnormal, excessively restricting the spleen (represented by earth). This can lead to disorders of the spleen and stomach, further affecting the biochemical process of Qi and blood, and causing insomnia. Methods such as soothing the liver, strengthening the spleen, calming the mind, and stabilizing the will can be adopted. By promoting the liver's dispersing function to assist the

spleen's transportation and transformation, it helps alleviate emotional fluctuations caused by hormonal changes in menopausal women. In this process, if liver Qi stagnation persists, it will restrict the spleen, causing spleen dysfunction and leading to insufficient biochemical generation of Qi and blood. This deprives the mind of nourishment, resulting in insomnia and vivid dreams. In such cases, the treatment principle should be to soothe the liver, strengthen the spleen, and harmonize the liver and spleen. Therapeutic prescriptions such as Jieyu Anshen Tang (Decoction for Relieving Depression and Calming the Mind), modified Xiao Chai Hu Tang (Minor Bupleurum Decoction), and modified Si Jun Zi Tang (Four Gentlemen Decoction) can be used for treatment. In terms of medication selection, Chai Hu (Bupleurum) can exert the effect of soothing the liver and relieving depression, restoring the liver's dispersing function and preventing excessive restriction on the spleen. Bai Zhu (Atractylodes) and Fu Ling (Poria) can strengthen the spleen and benefit Qi, ensuring a source of Qi and blood generation to nourish the mind. Dang Gui (Angelica) and Bai Shao (Paeoniae) have the function of nourishing blood and softening the liver, supplemented by Gan Cao (Glycyrrhiza) to harmonize various medications. Additionally, acid jackfruit seed and Yuan Zhi (Polygala) can be combined to calm the mind and stabilize the will. Through such medication combinations, the goal is to achieve a balanced liver and spleen, ensuring sufficient Qi and blood and a peaceful mind, thereby improving insomnia symptoms. Sun Yuanyuan *et al.* <sup>[38]</sup> conducted a randomized controlled trial on 90 patients with liver depression and spleen deficiency type perimenopausal insomnia. They found that Jieyu Anshen Tang can effectively improve sleep quality, perimenopausal symptoms, and TCM syndromes, regulate sex hormone levels, and have no serious adverse reactions. Zhu Huiyan <sup>[39]</sup> used the modified Xiao Chai Hu Tang to treat 42 perimenopausal women with liver depression and spleen deficiency-type insomnia. The clinical efficacy was significant, improving patients' subjective sleep quality, reducing sleep latency, and alleviating symptoms of liver depression and spleen deficiency. This treatment is worthy of clinical promotion and application.

## 5. Summary

In the five-element theory, the physiological and pathological connections between various organs are closely linked. By analyzing the law of mutual generation and restraint among the five elements, we can deeply understand the impact on the functions of various organs and mental states, especially when diagnosing and treating insomnia issues related to climacteric syndrome. For example, the liver belongs to wood while the heart belongs to fire, and the liver (wood) promotes the heart (fire). Therefore, it is necessary to be vigilant about the pathological state of the liver affecting the heart, and emphasis should be placed on soothing the liver to assist the heart's blood circulation during treatment. Similarly, the heart (fire) promotes the spleen (earth), so it is necessary to prevent heart problems from affecting the spleen, which is known as "child disease affecting the mother." Thus, treatment should focus on soothing the liver to assist the heart in blood circulation, strengthening the spleen and benefiting Qi to achieve harmony between the heart and spleen. The kidney (water) generates the

liver (wood), so it is essential to nourish Yin and subdue Yang to soothe the liver and relieve depression. The kidney belongs to water, the heart belongs to fire, and water can control fire. Therefore, attention should be paid to the mutual influence of heart and kidney functions, and the Yin-Yang balance between the two should be adjusted. The lung belongs to metal, the heart belongs to fire, and metal can control fire. Hence, it is important to pay attention to the coordination of cardiopulmonary function and the smooth flow of Qi and blood. The liver belongs to wood, and the spleen belongs to earth. Wood can restrain earth, during treatment, attention should be given to strengthening the spleen and harmonizing the liver to prevent damage to the spleen and stomach, which affects the biochemical generation of qi and blood. Applying the five-element theory to the diagnosis and treatment of insomnia related to climacteric syndrome demonstrates the application of the holistic view and macro thinking of traditional Chinese medicine in the treatment of specific diseases. This highlights the uniqueness and advantages of clinical thinking in traditional Chinese medicine.

### Disclosure statement

The author declares no conflict of interest.

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