

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

Yujie Ding¹, Zhe Zhao¹, Xiao Sun¹, Zhe Chen¹, Lili Zhao¹, Xinlei Huang¹, Yuanqing Ding^{2*}

¹Rizhao Traditional Chinese Medicine Hospital, Rizhao 276800, Shangdong Province, China

²The Affiliated Hospital of Shandong University of Traditional Chinese Medicine, Jinan 250011, Shandong Province, China

*Corresponding author: Yuanqing Ding, dingtcm@126.com

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

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

Online publication: February 27, 2025

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 ^[1]. 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 ^[2-10]. 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 ^[11].

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 ^[11].

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^[12].

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^[13].

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 ^[1]. 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^[14]. 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^[14]. 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^[15], 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^[16]. 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^[17]. 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^[18]. 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.

Funding

Second round of construction project of the National Traditional Chinese Medicine Academic School Inheritance Studio [Guohan Medical People's Education Letter (2019) No. 62]; 2018 Shandong Province Famous Traditional Chinese Medicine Experts Inheritance Studio Construction Project [Lu Weizhong Fazi (2018) No. 1]; Shandong Provincial Natural Science Foundation Joint Fund Project (Project No.: ZR2022LZY024); Rizhao Natural Science Foundation Project (Project No.: RZ2021ZR50); Rizhao Traditional Chinese Medicine Science and Technology Project (Project No.: RZY2022C09)

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Ding YQ, 2019, Discussion on the Disease Name, Syndromes, and Treatments of Chronic Brain Injury in Traditional Chinese Medicine. *Shandong Journal of Traditional Chinese Medicine*, 38(7): 613–617.
- [2] Zhou S, Yang LY, Liang H, 2017, Clinical Study on the Treatment of Chronic Cerebral Insufficiency in the Elderly with Bushen Huoxue Formula. *Chinese Journal of Information on Traditional Chinese Medicine*, 24(10): 27–30.
- [3] Bu XH, Liu G, Zhang XX, et al., 2019, Study on the Effect of Bushen Huoxue Method on Hemorheology in Elderly Patients with Vertigo of Kidney Deficiency and Blood Stasis Type. *Liaoning University of Traditional Chinese Medicine*, 21(5): 175–178.
- [4] Wang HY, 2015, Treatment of Tension-Type Headache from the Perspective of Blood Stasis. *Journal of Practical Traditional Chinese Internal Medicine*, 29(7): 75–76.
- [5] Shang Y, Hu GH, 2019, Clinical Observation on the Treatment of Kidney Deficiency and Blood Stasis Syndrome of Senile Tension Headache with Shennaofuyuan Decoction. *Asia-Pacific Traditional Medicine*, 15(3): 154–156.
- [6] Zhou SS, Shi H, 2018, Experience in Treating Vascular Dementia from the Perspective of Kidney Deficiency, Phlegm, and Blood Stasis. *Hunan Journal of Traditional Chinese Medicine*, 34(4): 18–20.
- [7] Si JX, Wang TT, 2018, Study on the Efficacy of Bushen Huoxue Formula in the Treatment of Alzheimer's Disease. *Shaanxi Journal of Traditional Chinese Medicine*, 39(6): 723–725.
- [8] Zheng YL, 2017, Exploration and Analysis of National Medical Master Zhang Xuewen's Experience in Differentiating and Treating Depression with Kidney Deficiency and Blood Stasis Syndrome. *China Journal of Traditional Chinese Medicine and Pharmacology*, 32(9): 4023–4025.
- [9] Que WB, 2019, Clinical Efficacy Analysis of Bushen Huoxue Decoction Combined with Traditional Chinese Medicine Emotional Therapy in the Treatment of Senile Depression with Kidney Deficiency and Liver Stagnation Type. *Qiqihar Medical University Journal*, 40(6): 719–720.
- [10] Huang SD, Liang JF, Chen YQ, et al., 2019, Treatment of Vascular Parkinson's Syndrome from the Perspective of Kidney Deficiency and Blood Stasis. *Journal of Zhejiang Chinese Medical University*, 43(4): 328–330.
- [11] Ding YQ, 2017, Understanding and Reflections on the Substance of Ying and Wei. *Journal of Shandong University of Traditional Chinese Medicine*, 41(2): 99–101 + 114.
- [12] Ding YQ, 2015, Discussion on Several Issues Related to Blood Vessel Theory. *Shandong Journal of Traditional Chinese Medicine*, 34(4): 245–247.

- [13] Ding YQ, 2017, A Review of the Ying and Wei Theory in the “Nei Jing”. *Journal of Shandong University of Traditional Chinese Medicine*, 41(1): 3–7.
- [14] Sun GR, 2007, *Fundamentals of Traditional Chinese Medicine*. China Press of Traditional Chinese Medicine, 2007: 125.
- [15] Duo XY, Zhang DN, 2005, A Preliminary Understanding of Kidney Deficiency and Blood Stasis as the Pathological Basis of Geriatric Diseases. *Journal of Traditional Chinese Medical Sciences*, 2005(3): 524–533.
- [16] Zhou SS, Shi H, 2018, Experience in Treating Vascular Dementia from the Perspective of Kidney Deficiency, Phlegm Turbidity, and Blood Stasis. *Hunan Journal of Traditional Chinese Medicine* 2018, 34(4): 18–20.
- [17] Wu JL, 2012, Ding Yuanqing’s Experience in Treating Depression. *Journal of Traditional Chinese Medicine*, 53(23): 2044–2046.
- [18] Huang SD, Liang JF, Chen YQ, et al., 2019, Treatment of Vascular Parkinson’s Syndrome Based on Kidney Deficiency and Blood Stasis. *Journal of Zhejiang Chinese Medical University*, 43(4): 328–330.

Publisher’s note

Whoice Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.