

Review

Exploration on the Modern Application and Value of Traditional Chinese Medicine Theories for Cerebrovascular Disease Prevention and Treatment Based on the Doctrine "All Wind, Tremor and Vertigo Are Associated with the Liver"

Yanli Liu^{1,*} and Ziyang Liu¹

¹ Shaanxi University of Chinese Medicine, Xianyang, China

* Correspondence: Yanli Liu, Shaanxi University of Chinese Medicine, Xianyang, China

Abstract: Objective To unpack the core connotation of the classical pathogenetic doctrine "All wind, tremor and vertigo are associated with the liver" recorded in Huangdi Neijing (Huangdi's Internal Classic), and systematically explore the clinical value of this Traditional Chinese Medicine (TCM) theory across the full spectrum of cerebrovascular disease prevention, intervention and rehabilitation, as well as its theoretical intersections with integrative Chinese and Western medicine. Methods This study adopted literature retrieval, tracing of theoretical origins, and comparative analysis of TCM and biomedical theories. We systematically summarized the original pathogenesis, syndrome categorization, and diagnostic-treatment logic of the liver-wind doctrine, and interpreted its intrinsic links with cerebrovascular disorders combined with clinical guidelines and global research evidence. Results This doctrine identifies internal stirring of liver wind as the core pathogenesis of cerebrovascular diseases, and clarifies liver yin-yang and qi-blood imbalance as the root cause of cerebral vascular injury. Derived therapeutic strategies align closely with mainstream biomedical interventions including blood pressure regulation, neuroprotection and neural remodeling, and compensate for biomedicine's deficiency in holistic regulation. Conclusion Validated by millennia of clinical practice, this doctrine has high practical value in modern cerebrovascular care. Its integration with modern research can optimize staged prevention and treatment systems and elevate the overall rehabilitation level of cerebrovascular patients.

Keywords: Huangdi Neijing; internal stirring of liver wind; cerebrovascular diseases; integrative medicine; liver-yin deficiency

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1. Introduction

Cerebrovascular diseases occupy a distinctive position in China's neurological disorder spectrum, marked by high prevalence, disability, mortality, and recurrence-features typified in both ischemic and hemorrhagic stroke. Acute ischemic stroke, with its abrupt onset, rapid deficit progression, and unpredictable functional recovery, remains one of the most formidable neurological emergencies. Converging demographic and lifestyle shifts-accelerated aging, dietary Westernization, reduced physical activity, mounting psychosocial stress, and the high prevalence of hypertension, diabetes, and dyslipidemia-have jointly sustained a rising cerebrovascular disease burden. This burden not only limits further gains in short-term survival but also imposes heavy strain on long-term care, household finances, and public health insurance sustainability, placing cerebrovascular prevention among the top priorities in China's chronic disease control strategy.

Biomedical advances over recent decades have provided increasingly potent therapeutic tools. Intravenous rt-PA thrombolysis and endovascular thrombectomy form the cornerstones of acute revascularization; antiplatelet agents (e.g., short-term dual

therapy with aspirin and clopidogrel), PCSK9 inhibitors, and ambulatory blood pressure-guided antihypertensive regimens have proven effective in reducing acute mortality and slowing atherosclerosis in large RCTs. Yet these lesion-targeted strategies exhibit clear limitations when facing the full clinical complexity of cerebrovascular diseases.

A primary concern is that diagnosis and treatment remain overly focused on imaging-defined vascular lesions and ischemic cores. Clinically, patients with successful recanalization and small infarcts may still show slow consciousness recovery, mood swings, and autonomic instability-indicating that vascular repair alone does not address the whole disease process. Constitutional predispositions, emotional disturbances (depression/anxiety), and visceral functional status are rarely incorporated into routine assessments. Indeed, post-stroke depression surveys suggest unrecognized affective disorders may lower 1-year functional independence by roughly 20%--30%, underscoring the need to implement the biopsychosocial model in cerebrovascular care.

Therapeutic gaps also vary across phases. Acute neuroprotectants like edaravone and citicoline remain controversial in evidence level. For malignant middle cerebral artery infarction with refractory edema, decompressive craniectomy reduces mortality but optimal timing and patient selection remain debated. In rehabilitation, over half of survivors experience spasticity, tremor, vertigo, numbness, or emotional disturbances, yet effective options are limited-botulinum toxin helps focal spasticity but not generalized dystonia, and repetitive transcranial magnetic stimulation requires further parameter standardization.

From a full-cycle perspective, current systems lack both forward and backward integration. For high-risk individuals, Framingham-based tools are poorly calibrated for Chinese populations, and domestic schemes incorporating genetic, gut microbiome, and blood pressure variability parameters are lacking. Meanwhile, mechanisms of post-stroke neural remodeling-synaptic plasticity windows and remote diaschisis effects-have not been translated into clinical targets, and long-term outcomes like cognition, social participation, and well-being are rarely assessed. This acute-centric pattern leaves a considerable gap in achieving closed-loop care from pre-hospital prevention to community rehabilitation.

The theoretical framework of traditional Chinese medicine (TCM), refined through millennia of clinical practice, addresses visceral pathogenesis, pattern-based differentiation and treatment, preventive intervention prior to disease onset, and post-illness rehabilitative care-areas in which TCM has long demonstrated particular competence, especially in chronic disease management, refractory sequelae, and individual constitution regulation. Within this classical system, the Huangdi Neijing (Huangdi's Internal Classic) stands as a foundational text; its nineteen pathogenetic statements, in particular, have guided diagnostic and therapeutic reasoning across generations of TCM practitioners. Among these, the assertion that "all wind, tremor and vertigo are associated with the liver" holds a central position. It not only provides the conceptual anchor for understanding wind-related pathologies and disorders presenting with dizziness or involuntary movement, but also explicitly establishes a causal linkage between hepatic functional perturbation and a spectrum of manifestations-including limb tremor, lightheadedness, rotational vertigo, and neuropsychological disturbances.

This ancient doctrine finds substantial support in clinical observations of cerebrovascular disorders. Throughout the disease trajectory-from acute onset to the chronic phase-symptoms consistent with "internal stirring of liver wind" are commonly identifiable. The acute stage frequently presents with abrupt severe vertigo, throbbing cephalalgia, limb convulsions, nuchal rigidity, syncopal episodes, and aphasic disturbances. In the recovery and sequela stages, persistent findings such as tremor, muscular spasticity, pedal or manual clonus, disequilibrium, and recurrent vertiginous episodes continue to conform to this same TCM pattern. These consistent clinical correlations warrant a thorough re-evaluation of the classical doctrine's relevance to contemporary cerebrovascular care.

The current study therefore undertakes a systematic examination of the statement "all wind, tremor and vertigo are associated with the liver" from multiple vantage points. We trace its theoretical provenance within the Huangdi Neijing and subsequent interpretive traditions, analyze its core pathogenic mechanisms and associated syndrome classifications, and extend the discussion to its potential intersections with several biomedical disciplines-neurology, angiology, endocrinology, and immunology. Furthermore, we apply this doctrinal framework across the entire continuum of cerebrovascular disease management, encompassing primary prevention, acute-phase therapy, rehabilitative recovery, and long-term maintenance. Our overarching objective is to establish a robust theoretical rationale and to offer clinically implementable reference points for the standardized integration of TCM and Western medicine in cerebrovascular practice [1].

2. Theoretical Origins and Interpretations of the Doctrine "All Wind, Tremor and Vertigo Are Associated with the Liver"

The proposition that "all wind, tremor and vertigo are associated with the liver" is first articulated in the Suwen · Zhizhen Yaoda Lun (Plain Questions · Treatise on the Essential Manifestations of the True Pathogens), where it occupies a central position among the nineteen pathogenetic statements pertaining to wind-induced and vertiginous disorders. In essence, this brief formulation encapsulates three interrelated dimensions-disease localization, pathogenic mechanism, and epidemiological tendency-by asserting that any involuntary limb shaking, dizziness, rotational vertigo, tremor, or convulsion attributable to endogenous wind pathogen originates, in its fundamental pathology, from hepatic dysfunction. On this premise, successive generations of TCM practitioners have erected a systematic framework for the pattern-based differentiation and treatment of conditions such as stroke, vertigo, and convulsive syndromes.

2.1. Core Pathological Manifestations and Clinical Features of Wind, Tremor and Vertigo

Within the TCM conceptual system, wind pathogen is conventionally divided into two broad categories: exogenous wind (one of the six climatic pathogenic factors) and endogenous wind. The "wind" specified in the present doctrine refers exclusively to the latter-specifically, wind generated by internal stirring of the liver-and is thus fundamentally distinct from its exogenous counterpart. Endogenous wind arises from a constellation of underlying disturbances: yin-yang imbalance of the liver, disharmony between liver qi and blood, and broader visceral dysfunction. Together, these perturbations constitute a major pathogenic mechanism underlying cerebrovascular events. The pathophysiological attributes of wind pathogen-propensity for motion, abruptness of onset, and erratic migratory behavior-find direct parallels in the clinical behavior of cerebrovascular disorders, which are notorious for their sudden presentation and highly volatile course. In ischemic stroke, for instance, acute hemiplegia, severe vertigo, and aphasia are commonly observed; in hemorrhagic stroke, instantaneous syncope and limb convulsions may ensue, with rapid clinical deterioration and highly variable manifestations. These observations vividly illustrate the hallmark property of wind pathogen as inherently mobile and changeable.

The clinical concept of "tremor" in this context encompasses involuntary shaking, tremulous movements, and convulsive episodes-specifically, uncoordinated and abnormal motor activities involving the head, limbs, and skeletal musculature. Typical signs include head oscillation, limb tremor, pedal or manual clonus, muscular fasciculation, nuchal rigidity, and spastic hypertonia, all of which are classified as pathological shaking phenomena. The mechanistic underpinning of these presentations is twofold: on the one hand, malnutrition of the sinews and vessels; on the other, perturbation by wind pathogen. Together, they constitute the classic clinical picture of internal liver wind stirring with consequent sinew spasm. In contemporary cerebrovascular practice, this conceptual framework finds broad applicability: acute-phase limb convulsion and hypertonia, spastic hemiplegia during recovery, involuntary

tremor and fasciculation in the post-stroke phase, and even parkinsonian or ataxic tremor encountered in long-term sequelae-all fall within the TCM rubric of "tremor."

"Vertigo" describes the subjective sensation of rotational dizziness, manifesting as perceived spinning of the self or surrounding objects, heavy-headedness, blurred vision, unsteady stance, and occasional nausea, vomiting and head fullness. TCM posits that vertigo is not merely an ocular disorder; its root cause lies in liver wind ascending to harass the clear orifices and deprive them of nourishment. Within cerebrovascular disease pathology, recurrent vertigo secondary to vertebrobasilar insufficiency, cerebellar and brainstem infarction, hypertensive encephalopathy, positional dizziness and gait instability constitute the primary clinical expressions of "vertigo", pathognomonic for ascending liver wind and obstruction of the clear orifices.

2.2. Core Pathogenesis Underpinning the Phrase "All Are Associated with the Liver"

The liver is classified in TCM as a rigid zang-fu organ, governing the free flow of qi and embodying yang activity while rooted in yin essence. Its principal physiological functions encompass regulating qi dispersion, storing blood, dominating the sinews, and modulating systemic qi dynamics. Hepatic yin serves as the material foundation for visceral functioning, whereas the liver's dispersing and ascending properties facilitate the smooth circulation of qi and blood. Under physiological conditions, sufficient hepatic yin counterbalances excessive liver yang, ensures unobstructed qi flow, and adequately nourishes the sinews. When the equilibrium between liver yin and yang, or between liver qi and blood, is disrupted, a state of discordance between functional activity and material substrate ensues. Consequently, liver yang surges upward, qi movement reverses its normal descending course, the sinews and vessels become deprived of nourishment, and endogenous wind pathogen is generated-clinically manifesting as vertigo, tremor, and syncopal episodes. When mapped onto the temporal profile and clinical characteristics of cerebrovascular diseases across the acute, recovery, and sequelae phases, the concept of internal stirring of liver wind can be further stratified into four principal syndrome patterns, each corresponding to distinct disease stages and graded severity. Together, these patterns constitute an integrated TCM framework for understanding pathogenesis and guiding syndrome-based differentiation.

Liver Yang Transforming into Wind: This pattern constitutes the most frequently encountered pathogenetic mechanism during the acute phase of cerebrovascular disorders. Its origins are multifactorial: protracted emotional irritability, sustained anger or anxiety, physical overexertion, or pre-existing liver-kidney yin deficiency with failure of water to nourish wood-each may serve as a precipitating factor. The common underlying derangement is insufficiency of liver-kidney yin, which renders it unable to restrain liver yang, permitting the latter to surge upward in an uncontrolled manner. As a result, qi and blood flow retrogradely toward the head and eyes; yang transforms into wind; and wind-yang ascends to disturb the upper orifices. The characteristic clinical picture includes pronounced vertigo, splitting headache, facial flushing and conjunctival injection, irritability, insomnia with vivid dreaming, slurred speech, unsteady gait, and numbness or tremor of the extremities. In severe instances, abrupt derangement of qi and blood may ensue, culminating in syncope, loss of consciousness, and hemiplegia. This pathogenetic constellation closely parallels the acute-onset mechanisms underlying hypertensive emergency, hypertensive encephalopathy, intracerebral hemorrhage, and large-artery cerebral infarction as understood in biomedical terms, and thus represents a critical trigger for acute cerebrovascular events.

3. Correlation between the Doctrine "All Wind, Tremor and Vertigo Are Associated with the Liver" and Modern Cerebrovascular Medicine

TCM visceral pathogenesis is not an abstract theoretical construct; its core connotation overlaps extensively with multiple human physiological systems described in biomedicine, including the nervous, endocrine, circulatory and immune systems. The liver governs free qi dispersion and emotional regulation, corresponding to the central

emotional regulatory network in humans. Chronic emotional suppression, anxiety, irritability and excessive stress trigger liver qi stagnation and impaired qi dispersion, equivalent to chronic psychological stress states defined in biomedicine. Interpreting the pathological implications of the TCM "liver", "liver wind", "liver yin" and "stored liver blood" through a biomedical lens clarifies the scientific basis of this classical doctrine, builds a theoretical bridge for integrative Chinese and Western cerebrovascular disease management, and supplies empirical evidence supporting the modernization of traditional TCM theories [2].

3.1. Correlation between TCM Liver Function and the Neuro-Endocrine-Immune Network

The core physiological functions of the TCM liver include governing qi dispersion, regulating emotion, smoothing systemic qi movement, and storing qi and blood. This functional complex does not equate solely to the anatomical liver; it encompasses an integrated regulatory system covering neural signaling, endocrine modulation, psychological emotion, immune inflammation and hemodynamics, matching the neuro-endocrine-immune network proposed in biomedicine.

Chronic stress activates the sympathetic nervous system and hypothalamic-pituitary-adrenal (HPA) axis, triggering a cascade of pathological changes: neurotransmitter dysregulation, vasoconstriction, blood pressure lability, proinflammatory factor release and lipid metabolic dysfunction. These alterations accelerate cerebral atherosclerosis, vascular endothelial injury, atherosclerotic plaque formation and rupture, representing major risk factors for hypertension, stroke and cerebral hypoperfusion. Meanwhile, impaired liver qi dispersion and disrupted ascending-descending qi movement induce systemic hemodynamic dysregulation and cerebral perfusion imbalance, directly precipitating cerebral ischemia-hypoxia and malnourishment of the clear orifices. This mechanistic model fully explains why emotional disturbance and liver qi stagnation function as critical risk factors for cerebrovascular disease development.

3.2. Parallels between Internal Stirring of Liver Wind and Brain Injury Pathophysiology in Cerebrovascular Diseases

Internal stirring of liver wind constitutes the core pathological state driving cerebrovascular disease onset. Conceptually, it describes systemic dysfunction of cerebral neurons, blood vessels and microcirculation, corresponding to a spectrum of pathophysiological injuries following stroke in biomedicine. After cerebrovascular insult, abrupt cerebral ischemia-hypoxia or hemorrhagic compression induces neuronal damage, excessive excitatory amino acid release, intracellular calcium overload, oxidative stress injury and inflammatory cascade activation. These events disrupt central neural network regulation and motor/balance pathway signaling, ultimately generating all clinical manifestations attributed to "wind agitation".

Within this clinical spectrum, the TCM symptom of "vertigo" corresponds, in biomedical terms, to ischemic insults affecting the cerebellum, brainstem, and vestibular pathways, as well as to gait instability and vestibular dysfunction arising from insufficient perfusion of the brainstem reticular formation. Meanwhile, the "tremor, convulsion and spasm" encompassed by the TCM designation of "tremor" are anatomically correlated with lesions involving the corticospinal tract, basal ganglia, and extrapyramidal pathways. The loss of inhibitory control exerted by upper motor neurons over lower motor neurons gives rise to a cascade of abnormalities: elevated muscle tone, spasticity, involuntary movements, and aberrant neuronal discharges. Viewed from this perspective, internal stirring of liver wind should not be understood as an isolated TCM pathogenetic construct; rather, it offers a high-level, integrative characterization of neural dysfunction and cerebral injury states in cerebrovascular disorders—one that finds concrete pathological substantiation at the biomedical level.

3.3. Links between Liver Yin/liver Blood and Cerebral Tissue Repair Plus Neural Functional Remodeling

According to TCM theory, "the liver stores blood and dominates the sinews." When liver blood is sufficient and liver yin is abundant, qi and blood are transported upward to nourish the head and sensory orifices, moisten the cerebral cavity, lubricate the sinews and vessels, and facilitate unrestricted movement of the limbs. Translating these concepts into biomedical language, liver blood may be understood as representing adequate cerebral perfusion, oxygen delivery, and energy metabolism, whereas liver yin corresponds to interstitial fluid, nutritive substrates, and a stable internal microenvironment for neurons. Following cerebrovascular occlusion or hemorrhage, interruption of cerebral oxygen and blood supply triggers a sequence of pathological events-oxidative stress injury, neuronal edema, apoptosis, and axonal degeneration-all of which closely parallel the TCM pathogenetic framework of yin fluid consumption, qi-blood deficiency, and malnutrition of the sinews and vessels.

Liver-kidney yin and blood deficiency forms the primary endogenous driver of delayed neural repair and persistent post-stroke sequelae. TCM therapeutic approaches that nourish liver yin and nourish blood to soften the liver improve systemic qi-blood circulation, modulate metabolism, suppress neuronal apoptosis, promote neurotrophic factor secretion and mitigate oxidative stress through multi-target mechanisms. Such interventions ameliorate cerebral microcirculation, protect surviving neurons, facilitate axonal regeneration and functional remodeling, and deliver essential material substrates and therapeutic targets to support neural rehabilitation and limb functional recovery after stroke. These interventions align closely with biomedical therapeutic priorities of neuroprotection and neural plasticity.

4. Specific Clinical Applications of the Doctrine "All Wind, Tremor and Vertigo Are Associated with the Liver" in Cerebrovascular Disease Prevention and Treatment

The diagnostic and therapeutic framework centered on regulating the liver to extinguish wind, nourishing yin and blood, clearing heat and subduing yang-derived from this classical doctrine-fully covers three tiers of cerebrovascular disease care: preventive intervention before disease onset, halting disease progression after onset, and preventing recurrence following recovery. Tailored to the pathogenetic features of the acute, recovery and sequela phases, this framework establishes distinct integrative Chinese and Western prevention and treatment protocols [3].

4.1. Guiding Acute-Phase Syndrome Differentiation and Treatment to Target Acute Neurological Injury

Excess pathogenic factors predominate in the pathogenesis of acute-phase cerebrovascular diseases, with the most frequently encountered patterns being liver yang hyperactivity with ascending wind-fire, extreme heat generating wind, and retrograde flow of qi and blood. Acute management adheres to the principle of "treating the manifestation in acute emergencies," with priority given to three interrelated therapeutic strategies: calming the liver to extinguish wind, clearing heat to open the orifices, and subduing yang while descending counterflow. This therapeutic approach serves to rapidly suppress wind-agitation syndromes and arrest disease progression.

The pattern of liver yang hyperactivity with ascending wind-fire represents the most common acute-phase syndrome, corresponding clinically to hypertensive intracerebral hemorrhage and acute ischemic stroke complicated by hypertensive crisis. Its cardinal features include sudden-onset vertigo and headache, facial flushing with conjunctival injection, irritability, hemiplegia, and dysarthria. The therapeutic strategy is directed toward calming the liver, subduing yang, extinguishing wind, and unblocking the collaterals, for which modified Tianma Gouteng Yin (Gastrodia and Uncaria Decoction) serves as the first-line formula. Within this formulation, Rhizoma Gastrodiae and Ramulus Uncariae cum Uncisa act to calm the liver and extinguish wind-addressing the primary pathological driver; Radix Achyranthis Bidentatae and Haematitum are included to guide blood downward, thereby counteracting the retrograde flow of qi and blood; Concha Halitoidis and Concha Margaritiferae subdue yang and soothe the liver; and

Radix Scutellariae together with Fructus Gardeniae clear and purge liver fire. Modern pharmacological investigations have corroborated the multiple actions of this formula, including dilation of cerebral vessels, improvement of cerebral microcirculation, stabilization of blood pressure, relief of vasospasm, and prevention of secondary injury resulting from abrupt blood pressure fluctuations.

The pattern of extreme heat generating wind, complicated by orifice blockage and loss of consciousness, predominates in severe stroke presentations, with characteristic manifestations including hyperthermia, coma, nuchal rigidity, limb convulsions, and elevated intracranial pressure. The therapeutic priority is to clear heat, extinguish wind, and resuscitate consciousness by opening the orifices. This is typically accomplished using a modified Lingjiao Gouteng decoction in combination with Angong Niu Huang pill, supplemented by Dachengqi decoction to unblock the fu-organs and purge heat. The combined effect of fu-organ unblocking and heat clearance is to rapidly reduce intracranial pressure, alleviate cerebral edema, suppress central inflammatory cascades, and relieve febrile convulsions—thereby effectively restoring consciousness and lowering acute-phase mortality in critically ill patients [4].

On the foundation of standardized biomedical care including thrombolysis, thrombectomy, blood pressure reduction, dehydration and cerebral protection, adjunctive TCM herbal medicine and acupuncture may be administered combinatorially. Acupoints Taichong (LR3), Xingjian (LR2), Fengchi (GB20), Baihui (GV20) and Hegu (LI4) are selected to calm the liver, extinguish wind, refresh the brain and unblock orifices. Combined therapy stabilizes vital signs, mitigates neuroinflammatory injury, improves cerebral perfusion, relieves acute wind-induced vertigo, convulsion and spasm, and reduces acute complication rates.

4.2. Integrating the TCM Concept of Preventive Treatment of Disease to Optimize Cerebrovascular Disease Prevention Systems

This classical doctrine establishes explicit links among three interconnected domains—hepatic function, constitutional predisposition, and emotional regulation—and their collective impact on cerebrovascular disease risk. On this basis, it furnishes individualized, holistic intervention strategies applicable to both primary and secondary prevention of cerebrovascular events. In doing so, it addresses a notable deficiency in contemporary preventive biomedicine, which tends to concentrate on the management of laboratory-based biomarkers while giving insufficient attention to the broader aspects of constitutional conditioning and systemic physiological regulation.

Primary prevention targets healthy individuals and high-risk cohorts, focusing intervention on two high-risk constitutional profiles: liver yang hyperactivity and liver qi stagnation. For patients with liver yang hyperactivity presenting with hypertension, irritability, flushing and dizziness, clinicians recommend low-salt, low-fat diets, regular rest cycles and emotional restraint; emotional regulation therapy soothes and stabilizes liver function. Daily intake of medicinal and edible homologous substances—Rhizoma Gastrodiae, Flos Chrysanthemi, Semen Cassiae and Fructus Lycii—suppresses liver yang and preempts wind generation. For populations with chronic anxiety, stress, emotional depression and impaired qi movement secondary to liver qi stagnation, moderate physical activity and mindfulness meditation regulate mood, smooth liver qi and correct neuroendocrine dysfunction. These measures prevent qi stagnation transforming to blood stasis, stagnation generating fire, and yang generating wind, eliminating cerebrovascular disease precipitants at the source [5].

Secondary prevention addresses stroke patients in the recovery phase, who predominantly exhibit root deficiency with superficial excess, mixed deficiency-excess pathology. Liver-kidney yin deficiency and insufficient liver blood constitute the underlying root, while wind, phlegm and blood stasis represent superficial manifestations. Alongside routine biomedical interventions including antiplatelet agents, lipid lowering for plaque stabilization, blood pressure and glycemic control, TCM syndrome differentiation and treatment are integrated. Patients with liver yang hyperactivity receive

therapy to calm the liver and extinguish wind; those with liver-kidney yin deficiency are prescribed modified Liuwei Dihuang pill (six-ingredient rehmannia pill) and Qiju Dihuang pill (lycium-chrysanthemum pill) to nourish yin, tonify the kidney, soften the liver and subdue yang; patients with qi stagnation and blood stasis receive adjunctive therapy to soothe the liver, activate blood, unblock collaterals and extinguish wind. Such regimens improve vascular endothelial function, stabilize atherosclerotic plaques, modulate metabolism, reduce cerebrovascular recurrence risk, and deliver dual root-manifestation secondary prevention [6].

4.3. Optimizing Recovery and Sequela-Phase Rehabilitation to Promote Neural Functional Remodeling

Recovery and sequela-phase cerebrovascular disease pathogenesis is dominated by root deficiency, primarily liver-kidney yin deficiency and liver blood insufficiency compounded by wind-phlegm-stasis blockage. Deficiency-driven internal wind stirring acts as the core pathogenetic mechanism underlying limb spasm, tremor, numbness and recurrent vertigo. Management at this stage abandons acute-phase manifestation-only intervention, adhering to the principle of treating root pathology in chronic disorders. Core therapeutic targets include nourishing yin to extinguish wind, nourishing blood to soften the liver and moisten tendons-vessels, paired with collateral-unblocking and stasis-eliminating therapy to concurrently regulate root and superficial pathology [7].

For involuntary limb movements, dizziness, tinnitus, limb lassitude and recurrent vertigo arising from yin deficiency stirring wind, modified Dadingfengzhu (major wind-suppressing pearl) and Sanjia Fumai decoction (three shells restoring pulse decoction) are administered. Carapax Trionycis, Concha Ostreae and Plastrum Testudinis nourish yin, subdue yang, extinguish wind and relieve spasm; Radix Rehmanniae, Radix Ophiopogonis and Colla Corii Asini replenish liver-kidney yin fluid to fundamentally moisten tendons-vessels and calm endogenous wind. For limb numbness, restricted joint flexion-extension and pale complexion secondary to blood deficiency generating wind, modified Siwu decoction (four substances decoction) combined with Shaoyao Gancan decoction (peony and licorice decoction) nourishes blood, softens the liver, relieves spasm and alleviates contracture. Replenishing liver blood and moistening tendons-vessels mitigates muscular spasm and improves limb motor dysfunction [8].

Integrative rehabilitation combines standard biomedical exercise therapy, occupational therapy and balance training with characteristic TCM rehabilitative modalities. Scalp acupuncture stimulates cerebral motor projection zones; body acupuncture unblocks meridian qi and blood circulation; external herbal fumigation relieves tendon spasm; moxibustion regulates liver and kidney qi and blood. The core therapeutic philosophy-soothing the liver, extinguishing wind, nourishing blood and softening the liver-permeates all stages of rehabilitation. Multimodal combined therapy alleviates pathological muscle tone, limb tremor and gait instability alongside other residual deficits, accelerates neural functional remodeling, substantially improves patients' limb mobility and activities of daily living, and reduces long-term disability rates.

5. Discussion and Future Perspectives

Among the nineteen pathogenetic statements recorded in the Huangdi Neijing (Huangdi's Internal Classic), the tenet that "all wind, tremor and vertigo are associated with the liver" stands as one of the most enduringly influential. It distills the essential wisdom of TCM's holistic worldview and its system of syndrome-based differentiation and treatment. What makes this principle particularly compelling is its capacity to bridge-in a single coherent framework-visceral functional status, emotional state, and the relative abundance or depletion of qi, blood, and body fluids, while simultaneously linking these systemic determinants to focal tissue pathology. In this regard, it directly confronts a prevailing shortcoming in contemporary cerebrovascular medicine: the excessive concentration on isolated neural and vascular lesions to the neglect of broader systemic influences. Modern biomedical approaches, for all their sophistication in detecting

microscopic pathology, biochemical markers, and vascular abnormalities, deliver protocol-driven symptomatic care but frequently fail to account for deeper etiological variables-among them, individual constitutional differences, affective dysregulation, and visceral functional disturbances. In contrast, this ancient TCM doctrine, rooted in the restoration of systemic equilibrium, seeks out the fundamental causes of disease and reorients clinical reasoning away from a narrow lesion-focused paradigm toward a truly holistic, patient-centered model. It thus offers essential theoretical underpinnings for the realization of individualized, full-spectrum, and humanistic cerebrovascular care [9].

This same doctrine informs a broad array of therapeutic strategies that extend across the entire trajectory of cerebrovascular disease management-from primary prevention and acute-phase intervention through rehabilitative recovery and long-term chronic disease monitoring. These strategies include, but are not limited to, calming the liver to extinguish wind, nourishing yin to subdue yang, and enriching blood to soften the liver. Acting through diverse yet complementary mechanisms, these interventions yield a constellation of beneficial effects: blood pressure stabilization, enhanced cerebral perfusion, neuroprotection, and both anti-inflammatory and antioxidant actions. Such a multifaceted therapeutic profile resonates strongly with the current international movement toward precision-oriented diagnosis and comprehensive, life-course management of cerebrovascular conditions. Viewed in this light, the doctrine furnishes a crucial theoretical foundation for the integrated application of traditional Chinese and Western medicine in the prevention and treatment of cerebrovascular diseases [10].

Despite the theoretical and clinical relevance outlined above, several critical gaps persist in contemporary translational research concerning the application of this doctrine. First, mechanistic investigations at the basic science level remain fragmented. The majority of published reports are confined to clinical efficacy observations; studies that systematically address the molecular targets, signaling cascades, or neuromodulatory mechanisms underlying liver-regulating and wind-extinguishing therapies-along with their constituent herbal formulas-are sparse and lack comprehensive mechanistic integration. Second, high-quality evidence-based clinical data are insufficient. Existing evidence is derived largely from small-sample, single-center observational cohorts, whereas large-scale, multicenter randomized controlled trials capable of furnishing high-level clinical evidence are notably scarce-a shortfall that considerably impedes the standardized dissemination of this therapeutic approach across clinical settings nationwide. Third, diagnostic and therapeutic protocols suffer from a lack of unified standardization. Considerable heterogeneity exists among practitioners with respect to syndrome differentiation logic, herbal compatibility, and acupuncture protocols; consensus-based clinical pathways or industry-wide guidelines for integrated Chinese and Western cerebrovascular care have yet to be established.

In light of these limitations, three priority directions merit focused investigation in future research. First, mechanistic basic research should be expanded and deepened. The application of multi-omics technologies-encompassing genomics, proteomics, and metabolomics-offers a promising avenue for precisely characterizing the molecular targets and signaling pathways modulated by liver-calming, wind-extinguishing, and yin-nourishing, liver-softening therapeutic strategies, thereby clarifying the scientific basis underlying the TCM principle of "regulating the liver to treat wind disorders." Second, rigorously designed evidence-based clinical trials are urgently needed. Multicenter, large-cohort studies with extended follow-up periods should be conducted to evaluate the efficacy and safety of TCM herbal formulas, acupuncture, and rehabilitative interventions, with the goal of accumulating high-grade clinical evidence. Third, efforts should be directed toward the development of standardized diagnostic and therapeutic systems. By integrating modern clinical big data with traditional syndrome differentiation expertise, researchers can establish unified guidelines and clinical pathways for integrated Chinese and Western medicine, stratified according to cerebrovascular disease stage and TCM syndrome pattern-thereby facilitating the standardized, nationwide translation of this theoretical framework into routine practice.

6. Conclusion

The classical doctrine "All wind, tremor and vertigo are associated with the liver" recorded in Huangdi Neijing (Huangdi's Internal Classic) accurately delineates the core TCM pathogenesis of cerebrovascular diseases: internal stirring of liver wind, visceral dysfunction and retrograde qi-blood flow. It establishes a complete syndrome differentiation and treatment system centered on regulating the liver to treat wind. This classical tenet effectively bridges TCM holistic theory and modern cerebrovascular pathophysiology and clinical management frameworks, possessing irreplaceable clinical utility across high-risk population prevention, acute neurological injury intervention, recovery functional rehabilitation and long-term recurrence control.

Deep integration and complementary synergy between this classical TCM doctrine and modern cerebrovascular biomedicine can resolve critical limitations of contemporary biomedical care, expand stratified, staged and individualized therapeutic options, and markedly reduce persistent neurological deficits while improving patients' long-term quality of life. This theoretical framework lays robust theoretical and practical groundwork for constructing a Chinese characteristic, holistic and patient-centered modern integrated Chinese and Western cerebrovascular prevention and treatment system, and exhibits broad translational prospects for clinical promotion and further scientific investigation.

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