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Healthcare Wisdom in
Traditional Chinese Medicine

中医文化 东方智慧

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Chinese Medicine and Culture

中医药文化（英文版）

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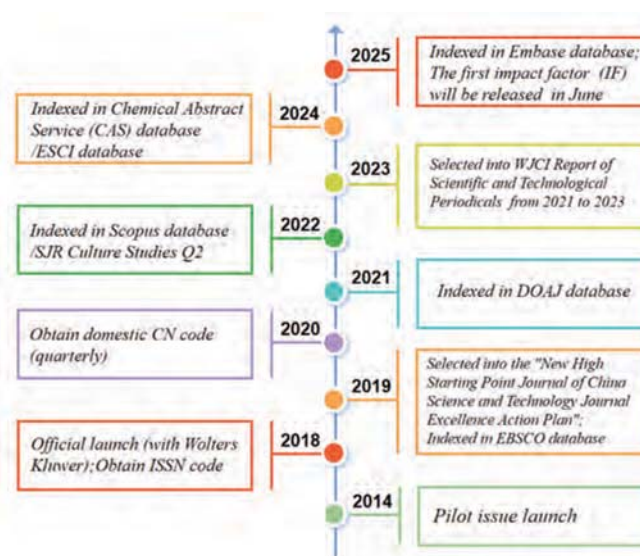
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Xu Jianguang (徐建光) M.D. is a professor of orthopedics, a chief physician, and a doctoral supervisor. He serves as vice president of Chinese Medical Doctor Association, chairman of International Influence Promotion Platform for English TCM Journals of China Association of Chinese Medicine, director of the TCM Intelligent Rehabilitation Engineering Research Center of the Ministry of Education, etc. He served as ex-president of Shanghai University of Traditional Chinese Medicine, etc.

We extend our heartfelt gratitude to our dedicated editorial board members, esteemed guest editors and reviewers, as well as valued authors for their contributions and support. Since its official launch in 2018, *Chinese Medicine and Culture* has achieved significant milestones, including being selected as a high-starting-point new journal in 2019, indexed in the Scopus database in 2022, and now included in the ESCI database in 2024. With this new recognition, we look forward to reaching a wider audience and continuing to promote dialogues and exchange in the fields of interdisciplinary research on medical science research, cultural exchange, and historical heritage conservation of TCM.



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中医药文化(英文版)

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AIMS AND SCOPE

Chinese Medicine and Culture is an interdisciplinary academic journal focusing on the study of Chinese medicine. It aims to promote communication and dialogue between researchers in the natural sciences and humanities of Chinese medicine. The objectives are to build an interactive platform for interdisciplinary research on Chinese medicine and to comprehensively reflect the high-level and latest research results of Chinese medicine in the fields of medical science research, cultural exchange and historical heritage conservation.

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Retraced Multi-dimensional Chinese Logic System behind Chinese Medicine

Edwin C. L. Yu^{1,2,3,*}

Abstract

The ancient tacit knowledge behind the logic system permeated the culture and promoted numerous impactful inventions throughout the history. Traditional Chinese medicine with its effectiveness should also have stemmed out from such logic system. This article aims to rearticulate the underlying lucid multi-dimensional logic system, which faded in obscurity only because of time-out loss of the mid-right concept. Retracing this past tacit but important concept could uncover a multi-dimensional system over a point relating to all matters while capturing the central core of the matter. The seemingly unmanageable multi-dimensional logic was strengthened by verification processes which affirmed its further extensions, and made up the language of the people, the concepts of yin-yang (阴阳), and the development of extensions of *Ba Gua* (八卦) derivatives, which furthered the interpretation of the space-time properties and Chinese medicine.

Keywords: Multi-dimensional logic system; Traditional Chinese medicine; Yin-yang

1 Introduction

The yin-yang (阴阳) theory applied in traditional Chinese medicine (TCM) has been widely described. The effectiveness of TCM is gaining a better rapport. Nonetheless, there is notably a lack of background expressed logic system, which is duly needed for TCM to be accepted in modern academic circles. The *Bian Zheng* (辨证 pattern differentiation) with the eight principles (八纲) of TCM, namely, yin-yang, exterior-interior, cold-heat, deficiency-excess (阴阳、表里、寒热、虚实), is often supposed to be a derivation of the basic logical system. Related to multiple steps, it is far from being a congruent simple extension of the *Ba Gua* (八卦) as a logical base. There must have been other logical elements for all these derivations.

2 The approach to TCM philosophy

The scope of mind to embrace the whole is limited. Medicine is better understood as a way of describing

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reality with order, and medicine is then reframed as practice through precision and predictive power with measurements and formulation of a unified conceptual framework. Thus, modern medicine has followed a rational approach, which focuses on learning facts and skills. Approaches that promote the discipline-based methods are honored.¹ Self-reflective, intentional, and appropriate coordination and use of genuine reasons are encouraged to generate practice and behavior. A preamble as an introductory and expressionary statement is necessary to justify beliefs.

It is here, to start with, that the fundamentally dichotomous approaches between Chinese medicine (CM) and Western medicine (WM) cross and produce subsequent contrasting and contradicting arguments. WM has gone past its philosophical and logical derivations in the last few centuries. Up to this point, CM would most likely be justified by its practice and effectiveness,^{2,3} somehow still rather controversial. Reference to the huge monumental ancient medical treatises of *Tai Ji* (太极) yin-yang theory is often done for more justification. Even so, modern healthcare workers often could not understand the clear logic behind TCM. The problem lies in how to address the philosophy behind CM in different languages properly.

3 Readdressing background logic and belief system behind TCM

3.1 Thinking of TCM cannot be manifested in a modern logical manner

In CM, the world as a single system in its movement gives rise to yin (阴) and yang (阳), the two main antithetic properties but relatively interconnected substantial

aspects. CM considers the human being at the center of the universe subsisting oneself by elements above and of the earth. As the elements have to be balanced, maintained, and circulated in the body in good formation, medicine systems in CM fundamentally aim to promote health, restore the body from diseases, and enhance the quality of life with medical care and therapeutic strategies in holistic consideration.

On these simple plain mechanisms, the modern world would appreciate it well. But for the initiated academics, they would find it difficult to comprehend it in modern terms, even after searching deeply into the basic logical derivations diligently. The problem lies in that while Western basic thinking can be written down precisely, Chinese basic thinking cannot be well addressed.

Thinking in modern times seeks “precision” and attaches great importance to “objectivity, specificity, logic and openness”. It is only on this basis that science has yielded fruitful results. However, it seems that “Chinese have no systematic logic or thinking”. Over this dilemma, many would refer to it as simple plain logic (朴素逻辑)⁴⁻⁶ or “simple dialectical materialism of original ideas, and natural expression of thought”. But simple logic is believed as often ineffective in the face of increasingly complex events. To note, naïve realism is based on the senses that provide direct awareness of objects as they really are, yet difficult to recognize that the environment or the world exists independently of our senses and our consciousness as our isolated selves. Some basic contextual workers may refer to Chinese thinking by the “heart-mind learning” as expounded by Wang Yangming (王阳明), wherein one cannot talk it out, alluding that one can only discover it by practice to cultivate its inner enlightenment.

As if desperate, the basis of Western logic system is sometimes rejected as not applicable for judging CM, even ascribing CM and WM as two separate paradigms of scientific systems.⁷ Generally, elaborations on this basic groundwork about Chinese approach were either vague and confusing, or inadequate for the lack of lucid convincing approaches. Some would refer the difference between CM and WM to unitary paradigms (一元化思维) or analogical classification derivations (取象比类思维).⁸⁻¹⁰ This is open to criticism for being over-simplistic. Some instead would revert all to qi transformation as basic to everything (气化) for an elementary explanation of all issues, but this in fact makes it further beyond rationality. Therefore, basic thinking and logics in TCM could not be clearly manifested in a logical manner.

3.2 The distinctive logic behind TCM

The context of basic ancient Chinese cogent system that foster development of CM can be articulated more cogently by enlarging the rational domain. In brief,

Chinese thinking is multi-dimensional around a core unitary concern (多维一元式思维或多维的二元对应).

CM is based on traditional Chinese philosophy, where concepts and ideas are generated in one as affirmed truth to both subjective and objective worlds. In this sense, raising the conviction that all things can be ascribed in one truth is the primordial searching ground for truth. This would be the object of knowledge, seeking a rational, timeless, and understandable comprehension of realities, for a unity of concepts of theory and practice. In other words, the unity of the concepts of life and the concepts of cognition for mind and nature, and subject and object, are under a united whole. It may also be appreciated to some extent from Hegel GWH in his *Science of Logic*.¹¹ This conceived for “original unity of thought and being” views that ultimately the structures of thought and being, subject and object, are identical. It is sometimes referred to as the Greater Logic to distinguish it from the Lesser Logic. For Hegel, the Concept is the ground of the existing world and the externality of space and time. The Idea, which is the self-relating, self-predicating, purposive, and conscious concept that emerges, becomes fully actual as the human mind as secondarily cognition, or self-conscious knowing. It is the purposive self-relation that renders intelligible the organic life. In creating the finite world, the logic thus returns to its beginning, to the abstract, to Being which has now however fallen into the sphere of Nature, into space and time. It is similarly emphasized currently for critical thinking, which is the ability to think clearly and rationally about what to do or what to believe. It includes the ability to engage in reflective and independent thinking.

There is indeed something distinctive about Chinese logic. Retrospectively, the use of analogies throughout ancient Chinese philosophy, and the ways in which they were accepted or rejected, involve forms of analysis and reasoning that were not systematically codified.¹² This article aims to reincorporate the missing mid-right concept (中正思维), which was historically present, back into the yin-yang framework to reinstate the ancient Chinese cogent logical system. It served as the background of thinking paradigms of both ancient Chinese culture and TCM, which could be implemented to manifest how TCM is applied to balance the system of humans, heaven, and earth.

4 Retracing the thinking paradigm of ancient Chinese

In looking for the thinking paradigms of ancient Chinese, while much can be traced through literature research, the presence of tacit knowledge often can deviate conclusions and block out exact understanding. As time goes on, just as in ancient culture, tacit knowledge is often obscured, being not described in the literature since the manifest behaviors are well understood as in

everybody's set of codes and assumptions for living. That is, proper forms of written knowledge can be covert and unexpressed. This, however, can be noted and retraced by observing the people's way and how they perform during interactions on work and non-work-related operations and transactions. Under this consideration, the all-along captivating elaborations of modern workup on the basic yin-yang theory and related principles up to development of CM may be faithfully precise, but open to re-evaluation.

Without digressing on the various tacit knowledge of the ancient Chinese that are possibly missed, the multi-dimensional Chinese logic system will be presented first. A more basic plain approach will be used as this should pertain more to primordial ancient thinking.

4.1 Primordial tripling coordinates for basic realities

Throughout the ages, the sun-moon and day-night realities are everyone's daily experience. As qi (气 vapor, gas, or air) is noticeably permeating the earth (Fig. 1, sunshine through trees), the word qi is used generally to depict such ethereal matters. Oracle bone inscriptions (甲骨文) of Qi 𠄎, with heaven line above and earth line below, used the middle stroke-line as a sign for something not definite but existed between heaven and earth.

These are depicted phenomenon of the sky above. Qi or gas is the evaporation of water. Figures in *Xiao Zhuan* (小篆) strengthen this concept of water evaporation into gas, adding [water] next to it as 𩇛. *Jin Wen* (金文) adds the word [fire] under the gas 𩇛, depicting that fire will burn water to form gas.¹³ Clouds are of course observed as something else but similar, and noted as water vapor condensation in the air. In oracle bone inscriptions 𩇛, 𩇛, 𩇛, though the fonts may be different, the expressions

similarly made two horizontal lines at the top to represent the sky. In explanations by *Shuo Wen Jie Zi* (《说文解字》 *Explaining Graphs and Analyzing Characters*), clouds are vapors among mountains and rivers, with the upper case as “rain”, while clouds below are like whirling vapor that changes in shapes around 𩇛, 𩇛. Qi would be vaporous while clouds more for condensations.

It is under this context that yin and yang took meaning. Yin and yang as qualifying words denote different meanings according to their application at the place or setting where it is used. The ancient words yang (易) and yin (𩇛) are comparable to modern characters 陰 as the traditional Chinese character, 阴 as its simplified Chinese character (Yin), and 陽 as the traditional Chinese character, 阳 as its simplified Chinese character (Yang) but without the left side radical of 阝. One way to interpret this word yang (易) is viewing it as clouds opened up with sun beams down.¹⁴ For this word yang (易), the 彡 strokes beneath 𩇛 is seen in *Jin Wen* as a symbol depicting the light rays under the morning sun (彡殆象初日之光线)¹⁵ just as in Figure 1. The crepuscular ray is also put here to illustrate this depiction even seeing the word yang (易) manifested (Fig. 2). In support of these concordant themes of qi and yang, the word 𩇛 as a variant of yang (易) is combining qi and yang.¹⁶ Thus, together with the sun-moon, day-night, morning vapor or foggy qi, the sun above shining down with rays all depict for the ancient Chinese this yang (易) phenomenon.

At this point, the primordial sky and earthly phenomena can be viewed as coded in ancient culture. Yin (𩇛) and yang (易) would be seen as a pair of opposite and complementary aspects, wherewith yang (易) denotes the volatilization of qi, while yin (𩇛) denotes condensation of qi.¹⁷ Actually, the yin in ancient form 𩇛 depicts similarly clouds and the radical below is actually written



Figure 1 Sunshine through trees, with qi noticeably permeating (source with permission from: picture made by the author)



Figure 2 Light rays under the morning sun, the crepuscular ray even allow seeing the word 易 manifested (source with permission from: picture made by the author)

as cloud 雲 also in *Shi Gu Wen* (石鼓文), Qin Bamboo-inscriptions (秦简), and *Xiao Zuan*. A yin weather would mean a sky under rainy clouds and yin in another ancient character 霽 means clouds covering the sun.¹⁸

Up here then, this yang (易) is not applied to define earthly configurations.¹⁹ After then, for denoting things on earth, the left side radical of 𠂔 is added for places, as this was meant 𠂔 for “mounts without rocks”.²⁰ Thus, yang is written as 陽 (as the traditional Chinese character, 阳 as its simplified Chinese character), and yin is written as 陰 (as the traditional Chinese character, 阴 as its simplified Chinese character). Thus, the author Duan Yucai (段玉裁) of *Commentary on Shuo Wen Jie Zi* remarked “The integralism of qi destined to yin [陰] and yang [陽] can barely be all appreciated by simulation. Therefore, 陰 over 𠂔 as yin, and 陽 over 易 as yang, are all just proxy translations through associating ‘cloud’, “sun,” “mount” word radicals to show up their meaning”.²¹

Thereby, with yang (易) and yin (陰) withstanding for sky (sun-moon, day-night), yang (陽) and yin (陰) was applied on earthly matters to depict functional formations (Yang qi, Yin clouds), and with civilized definitions to denote designations (mount South and river North more sunshine; mount North and river South more shadowy)²² (Table 1). In this way, the two antithetic aspects yin-yang as one coordinate is tripled in the sky-earth-man coordinates.

More being then appreciated, the properties of yin and yang became useful descriptions and interpretations over this tripling coordinates. The concept was applied on each entity or matter in terms of their characteristics: Yang is energetic and yin is compliant; yang being rigid and yin soft (阳: 乾, 健, 刚; 阴: 坤, 顺, 柔) (Table 2).

Table 1 Yin and yang in sky phenomena, earthly matters, and civilized definitions

Sky phenomena	Earthly matters	Civilized definitions
天	早; 夜	天地之本
Sky	Sun; moon Day; night	The base
地	阳...出气; 阴...出云	阳阴运化
Earthly	Yang... qi; Yin...clouds	Functional formations
人	山之南, 水之北; 山之北, 水之南	人释义定
Designations	Mount S/River N sunshine; Mount N/River S shadowy (S=South, N=North)	Human definitions

Similarly, people applied it in describing as in yang: sunny terrace (阳台); yin: shadowy below trees (树阴).

4.2 Concepts being consolidated before further generations

The previous section discusses the concepts of yin and yang as two vectors or a coordinate. It is here that modern academics are often ensnared or overzealous to jump to recite their well-studied and captivating elaborations on the basic yin-yang and related principles they are accustomed to. These elaborations started well later since the time of Confucius and were well expounded in Song dynasty by starting with the two elementary mode, *Liang Yi* (两仪), generating the four Forma or Emblematic Symbols, *Si Xiang* (四象). The elaborations were simple or appealing as a binary concept, even well

Table 2 Secondary application: yin and yang concept applied on each entity or matter

Sky phenomena	Earthly matters	Civilized definitions
天	乾; 坤	天地之本
Sky	(太阳)日; 月(太阴) Heaven; Earth (Taiyang) Sun; Moon (Taiyin)	The base
地	阳...健、刚; 阴...顺、柔	阳阴运化
Earthly	Yang: energetic; Yin: compliant Yang: rigid; Yin: soft	Functional formations
人	阳台; 树阴	人释义定
Designations	Yang: sunny terrace; Yin: shadowy below trees	Human definitions

versed and appealing in modern thinking at first sight. However, it is not the way *Ba Gua* started. These *Gua* (卦) generations are mainly explanatory and not necessarily the initial derivations when they were formed in the ancient times. These simple elaborations might have caused biased opinions on how to understand the logic system, as well as *Bian Zheng*, etc., in TCM.

In fact, before this, in ancient times, there could be tacit understanding not expressed that could well shape the thinking process influencing all these sophistications in theorization. There in the heart to seek unbiased truth were thinking processes emphasizing to capture the central core of the matter. This core-seeking stand posited Chinese philosophy and language with the need to use words embrative of many related meanings, and now understood as a very different track to English which is precise “scientific” language. Thus, Chinese words are simple and direct (like 平) but when put for exact translations become difficult (平: level; even; flat/ equal; fair/ to level; to make level/ calm; peaceful/ to calm down; to make peaceful; to quiet down) as if too widely diverse to understand as one word. In fact, while two-dimensional thinking has been the rational starting frame of modern thinking, the ancient Chinese central-core stand have worked in another way through Chinese culture all along.

4.3 The multi-dimensional coordinate system with a mid-right (squarely central) frame

Yin and yang were used in concepts and applications. However, yin and yang were not two individual concepts which are binary or two-dimensional. They depicted the reality in a multi-dimensional manner over a point relating to sky phenomena, earthly matters, and civilized definitions, which formed the yin and yang sky-earth-man coordinates. Yin and yang were only two examples in Chinese history and culture. This perspective stemmed from central-core seeking and thinking process, and made a great impact in the logic system

as other important Chinese wisdom like *Ba Gua* or the “Heart-mind Learning” of Wang Yangming developed subsequently. The central-core seeking and thinking process was deeply rooted in the culture of ancient Chinese, only being tacit knowledge in the culture and now obscured to understanding. While most current literature has dropped this off, the manifest behaviors could be well understood as in everybody’s set of codes and assumptions for living. There are two ideals notably being worded, *Zhong* (中 centrally) and *Zheng* (正 squarely), or being mid-right, which were well versed in ancient Chinese. [Again these words can carry multiple translations but some particularly pertinent. *Zhong* (中): mid, central, symmetry; and *Zheng* (正): right; proper; upright; regular; squarely.]

Though covert and unexpressed, these words are noted and retraceable in formalities and in people’s operations and interactions. *Zheng* means upright in proper position; right; proper; correct; upright; regular; standard; precisely; directly; balanced; without bias, and can simply be understood as the right proper frame. This has been a strong component in ancient culture with this word much used, such as 祭正 (officials in sacrifice), 军正 (officials in military), 射正 (officials in shooting), 弓正 (officials in archery), 车正 (officials in carts), 田正 (officials in fields), 农正 (officials in peasantry), only often replaced by other themes later, especially after the Tang dynasty when other words were used for official governing posts. Besides, the squarely framing of processes often was referred to four *Zheng* propers (四正) as rules and orders,^{23,24} also designated for four essential feudal orders: *Jun* (君 ruler), *Chen* (臣 subject), *Fu* (父 father) and *Zi* (子 son).^{25,26} Proper *Zheng* respect (朝正) in ancient times was for princes and vassals to ritually pay tribute to the emperor in his proper uprightness in the starting month of the year.^{27–29} The starting month is called the right month (正月), believing the year’s start would obtain the rights of heaven (得天之正).³⁰ Uphold right and proper (端正) is unbiased uprightness.^{31–33} All these quotes are from pre-Han eras, attributing their commonalities in ancient times.

Besides right and proper *Zheng*, there was the notion of central orientation *Zhong*, which means equal in distances from the ends, within a certain range. The ancient emperor covering miles of land marked the center as the country’s capital.³⁴ Here, the emperor’s palace and court is preferred.³⁵ Further application put it for the upright symmetry of clothing.³⁶ It denotes, in a way, virtuous beauty.³⁷ From the middle center to its applied meaning, the word was used³⁸ as getting to the point and be proper, *Zheng*.^{39–41} It also refers to harmony.⁴²

It is this cultural proper as rationale for being *Zhong Zheng* (中正 central, framed-right), predetermined within matters and individuals, that further grounded the coordinates. Starting with the yin and yang sky-earth-man tripling coordinates in depicting matters, *Ba Gua*



Figure 3 *Ba Gua* being right to the central core of the point and framed squarely (source with permission from: picture made by the author)

could follow this multi-dimensional logic with the whole eight trigrams being right to the point and framed squarely (Fig. 3).

It may be worth attention that while the binary development of *Ba Gua* with two elementary modes, *Liang Yi*, generating the four Forma or Emblematic Symbols, *Sì Xiàng* till the eight trigrams is logical through the Confucius discourse in *Yi Jing* (《易经》 *The Book of Changes*), the synthesis of the *Ba Gua* initially could have rather followed the multi-dimensional logic system. Notably, it was believed that Fu Xi (伏羲) began to draw *Ba Gua* with the enlightenment of *He Tu* (河图 the River Chart), which is not a bi-dimensional diagram. Despite its reliability, as the dating of *He Tu* relating to the synthesis of *Ba Gua* could be doubted⁴³ [*He Tu* being first attributed to Fu Xi only later by Shao Yong (邵雍) of 1011–1077 AD], the well versed starter quote of the *Ba Gua* as designed by the very ancient Fu Xi, describes:

*“Anciently, Bao-xi contemplating to the rule of all under heaven. He observed the brilliant forms up in the sky, and scrutinized the patterns down on the earth. He examined the fine details of birds and beasts, and he watched the properties conforming to grounds and localities. Set about bearing on whatsoever closely pertaining to (associated with) everyone, and along howsoever distantly relating (related) to everything, he started devising the eight trigrams, to show the full attributes of divine intelligence in operation, and to classify the scenarios and qualities of the myriads of things.”*⁴⁴

Simply it should have inspired Fu Xi not simply by a two-dimensional thinking, but a tripling, or multi-dimensional thinking with the former generation considerations and the requisition reasoned in the forthcoming presentation. How this did come about was confirmed by pre-Han workers with more objective thinking.

4.4 Documentation regularizing the dimensions

Now requisite of being central and framed squarely, the ancient founding fathers of the Zhou dynasty started to find where it should be best situated. The second generation of *Hou Tian* (后天 Late Heaven) *Ba Gua* was attributed to Wenwang (周文王), the first emperor of the Zhou dynasty. The duke of Zhou (周公), his son, went about the whole country to seek the *Zhong* central place. The way he did was using a type of sundial used in the Zhou dynasty, the gnomon (土圭), which is a standard to show time and season by the position of its sun shadow. He reached a place around luoyang (洛阳) and using the least shadow method for the gnomon, identified the place as the center (谓之地中),^{45,46} being central to four quadrants of the earth.⁴⁷ Later academics recognized it and remarked that the difference in the shadow length would show it by indicating any deviations of the central sky-framed qi.⁴⁸ Moreover, even when using divination in Zhou dynasty, *Bu* (卜), the same tried to see the lateralization of this central frame in the tortoise shell.⁴⁹ All these demonstrated how the mid-right or squarely central frame have been much emphasized. As mentioned earlier, all those earlier ancient dynasties, to start their era, had to determine which should be their starter month as right month of the year to secure the rights of heaven.⁵⁰ Thereby, the Xia, Shang, Zhou dynasties separately designated the right month in different times of their current year.

It must be understood further that the ancient Chinese would use two-dimensional elements in analysis, and conglomerate the whole as multi-dimensional when expressively discussing the theme. Thus, the *Ba Gua* later adjudged the *Kǎn* (坎), *Lí* (离), *Zhen* (震), *Dui* (兑) as the four *Zheng* regular *Gua* (四正卦) to refer to the noble right path,^{51,52} with *Li Qua* being central and proper (中正). Logic with two-dimensional binary system

is easier by its dichotomy as it is either A or B, induction or deduction, thereby delineating with dia arguments for a more precise answer. On the other hand, developing a logic system with multi-dimensional coordinate system is much more intellectually demanding. It is only now, after Newtonian coming to quantum physics, that multi-dimensional coordinate systems are more accepted generally. For ancient Chinese, it was developed further by verifying by measurement or experiment.

4.5 The difficulty of logic

This was the state with the use of multi-dimensional logic at a time when logic were not clearly defined as in nowadays. It was open and probably more followed the intuitive need to capture the true gist of the matter. Nowadays, logic may include philosophical logic, including various modal, temporal, epistemic, and deontic logic, constructive logics, relevance and other sub-classical logics, many-valued logics, logics of conditionals as well as quantum logic and other logic types.

To live well-off in a complicated world with myriad of things, man would wish his words carry. In two-dimensional semantic logic, in referring a term to possible worlds, expressions are associated with two different sorts of semantic values, one associated with reference up to ordinary truth-conditions, and the other associated with the way that reference and truth-conditions depend on the external world.⁵³ As these play different explanatory roles, the latter semantic value often plays a distinctive role in analyzing matters of cognitive significance and/or context-dependence.

On the whole, capturing the intuitive idea of a term is the goal, while approaches may differ. A formal system may represent a well-defined system of abstract thought. Such a system as the foundation for the knowledge has been proposed for mathematics.⁵⁴ Binary logic uses a set of rules for dealing with propositions that must be either true or false.

Essentially, a logical system lists all the logical truths of some part of logic by means of the application of recursive rules (rules for being repeatedly applied). By identifying certain axioms and certain purely formal rules of inference using purely formal criteria, theorems can be derived from axioms together with earlier theorems. Assuming axioms as logical truths, and the rules of inference preserve logical truth, then all the theorems in the system are logically true. If all the truths of the relevant part of logic can be captured in this way, the system is said to be “complete”.⁵⁵ Somehow there could be some logical possibilities that cannot be disproved, as any proposition will depend upon the system of logic being considered. In decision-making, as an integral aspect of our daily lives, it can be difficult to establish whether a certain statement (or state) is true or false in certain situations (non-A, non-B). In these situations, fuzzy logic system with nonlinear mapping of an input

data, as distinct from Boolean logic, uses the input’s degree of truth and linguistic variables to produce a certain output.

4.6 Extension through verification to establish further statements in each dimension

With the above discussion, multi-dimensional logic of the ancient Chinese culture would be intuitively capturing ordinary truth-conditions with their reference to the external world while analyzing matters of cognitive significance and/or context-dependence. While two-dimensionalism may seem able to make things precise after rows of binary delineation, gaps can be noticed in daily life and fuzzy logic is one example to cover for it. Apart from seeing things as A or B, the Chinese language allowed words and concepts that sometimes cannot be precisely put in to start with. Ancient Chinese tried to capture the whole gist, and adopted a multi-dimensional approach around each salient point. Somehow, without the current quantum multi-dimensional concepts, the ancient Chinese would have developed their ways to handle how to proceed further.

Without losing the gist of the core or the matter, the development of the multi-dimensions can be extended by further observations along the same initial path. Experimentation and measurements were among their methods. The extension of the yin-yang processes needs such documentation for them to ensure properly their logic.

Other realities are the time and space. This couple has been mapped in different ways throughout the ages, sometimes even in mystical perspectives. As the whole is to be mapped, and with a mid-right frame centrally (中) and squarely (正), there is the 6 directions of top, bottom, east, south, west, north. The top-bottom coordinate has been recognized. While the sun could hint the east, the full reality of directions was verified when the compass mechanism was applied at least since the south-pointing chariot of *Huang Di* (黄帝 the Yellow Emperor). In due course, since time and space are related sky and earth phenomena, they would be viewed together. Measurement with the length and direction of sun shadow of the gnomon showed a verifiable time of the day by measurements. The records of the standard gnomon and the sundial further documented knowledge to establish the “four seasons”.⁵⁶

Notably, both directions and time displayed concordant phenomena. Such understanding would direct the ancient Chinese to marshal further realities to be reckoned under the multi-dimensional logic for capturing the true core of the matter. Therefore, time-space designated in four directions was, by secondary application and extension, unto four time and localities as well.⁵⁷ Each direction is associated with time, and the four seasons are entangled with the four directional winds and conditions. This was documented by verification through

the gnomon, as “With the sun in the south, the gnomon shadow is short, and it is hot; with the sun in the north, the gnomon shadow is long, and it is cold; with the sun in the east, the gnomon shadow is evening, and it is windy; with the sun in the west, the gnomon shadow is in the morning, and it is shadowy yin”.⁵⁶

All these became important parameters in the dimensions, often simplified into eight dimensions for a whole totality. Their importance in the mind of the ancient may be seen as eight mastering divinities⁵⁸ as “Heaven, Earth, Force (military), Yin, Yang, Moon (month), Sun (day), Four seasons” that have been served in tribute in the shrine in the land of *Lang Xie* (琅邪) by many ancient kings and emperors.

It would be imposing that this multi-dimension way was plotted in extending the logic of truth wherein *Ba Gua* defined its eight tributes in eight directions. Starting with the four *Zheng* regular *Gua* of *Kǎn*, *Lí*, *Zhen*, *Dui*, each would be associated with the four seasons, *Kǎn* Winter (坎冬), *Lí* Summer (离夏), *Zhen* Spring (震春), *Dui* Autumn (兑秋) as these are associated with the directions, *Kǎn* North (坎北), *Lí* South (离南), *Zhen* East (震东), *Dui* West (兑西). They would, in the space-time totality, be associated with their properties. It goes further with the eight directions (Fig. 4), and *Ba Gua* would be associated with space-time phenomena,⁵⁹ which method of documentation their association was not clearly expressed though resultant associations were described in *Shuo Gua Zhuan* (《说卦传》Treatise of Commentaries on the Divinatory Symbols).⁶⁰

It is clear that the ancients used the method of observation and verification through looking up with astronomy,

looking down with geology, and looking at signs with space-timing knowledge. This multi-dimensional emphasis at the core of matter and at the center of individuals made up the language of the people, the concepts of yin-yang, and the development of extensions of *Ba Gua* derivatives, and furthered the interpretation of the twenty-four solar terms (节气) with the 64 hexagrams through examining the changes of yin and yang. This is the rationale how reasoning with analogical classification was critically examined to apply to CM. This is how the multi-dimensional Chinese logic could lead to the six-channel differentiation (六经辨证) (three yin and three yang) and *Bian Zheng* with the eight principles with a different sort of space-time body, the discussion being lengthy for another dissertation; same wise on how CM emphasizes unity of form and spirit. But suffice to see that this multi-dimensional Chinese logic was a powerful logic system, similar to abductive logic by nulling the dichotomously deducing and inducing process trying to tightly combine the two, but on a different path yet probably surpassing course by practical methods of realization, finally producing the magnificent system of CM.

5 From multi-dimensional logic system to Chinese medicine

5.1 Further extension to establish life dimension basics

It is reasonable, along with this multi-dimensional logic system and verification process that same wise CM developed to arrive at its firm basics. Reaching its



Figure 4 Each *Gua* associated with space-time phenomena (source with permission from: picture made by the author)

sophisticated theorization is of course much more complicated and take another discourse. The founding principles will be mainly discussed.

In the construction of the complex system of knowledge for life, ancient Chinese to base on realities would resort to further observations of man under the Chinese astronomical system. The multi-dimensional sky-earth attributes established above is further extended, as man was observed to vary in characteristics with wind and soil of each direction and locality. The winds of eight different directions were observed to affect the human body, the organs and viscera, the changes in qi and blood, and cause diseases.

A mode was formed by viewing the ground layout in “nine fields” as these correspond to the “nine sanctums” in the sky. Among the eight surrounding divisions, the person stays in the center field (along the previous mid-right emphasis). The astronomical divisions have been forever established with four regulars (四正) and four dimensions (四维) in eight octants (八方).⁶¹ Different sanctums in the related different spatial field locations will have corresponding qi (气象) and physical equivalents (物象) as sky, earth and physical phenomena on the ground, and thus related body effects.

As East, South, West, North and Southeast, Southwest, Northwest, Northeast winds stir up different body effects, the multi-dimensional system extends to describe how they bring about diseases. “The south wind affects the Heart and pulse with qi of heat. The wind of southwest affects the Spleen and muscles with qi mainly weakening. The west wind affects the Lungs and skin with qi of dryness. The wind of northwest affects the Small Intestine and the Taiyang meridian of the hand, wherein an exhausted circulation would bleed out while a closed-up circulation is blocked and vulnerable to sudden death. The north wind affects the kidneys and the bones and vertebral lumbar muscles with qi of cold. The wind of northeast affects the large intestine and the costal armpits and the limbs. The east wind affects the liver, and the tendons with qi of body dampness. The wind of southeast affect the stomach and muscle with qi of body heaviness”. While these wind effects were established by observations, they were again named as 大弱风, 谋风, 刚风, 折风, 大刚风, 凶风, 婴儿风, 弱风, similar to verified attributes in the multi-dimensional logic. Up the sky quadrants, the turning handle of the Polaris is referable to the eight chronicle seasons as two solstices (winter solstice and summer solstice), the two equinoxes (spring equinox and autumn equinox), and the four seasonal starts (start of spring, of winter, of autumn, and of summer).

With these sky and earth phenomena projected together, the climatology, phenology, and disease epidemiology became predictively relatable. They also constitute the healthy and pathogenic (正邪) concepts. The logic and verification process besides the eight chronicle seasons (八纪)⁶² and the eight directional winds (八

风)⁶¹ was extended to describe the eight regularities (八正)⁶³, eight earth-ends (八极),⁶⁴ eight movements (八动),⁶⁵ eight streams (八溪),⁶⁶ eight segments (八节),⁶⁷ and eight recessed folds (八虚)⁶⁸ as medical terminology in *Nei Jing* (《内经》 *The Inner Classic*). It is notable that throughout the chapters of *Nei Jing*, there is the singular diagram on “nine sanctums and eight winds”, which suggest its crucial importance in its derivations. Along with emphasis of an individual’s matching to the sky-earth phenomena, the multi-dimensional perspective should have been a resourceful base for development of CM.

5.2 A more sophisticated theorization with body more understood in dimensional unity

With all these, the body is further described for how it could achieve harmony. As an individual meets the sky-earth to match with the six folds (六合) (referring to up, down and east, south, west and north directions) and the seasons, balance is necessarily achieved as its qi among nine territories and nine orifices, five internal organs, and 12 joints, all connected to the qi of the sky...influence the foundations of life.⁶⁹ Over the body, each in-out pair of meridians constitutes a “matched couple”, so that the 12 meridians being three yin and three yang meridians, form a total of six pairs, which are called six matches (六合) (referring to meridian couples).⁷⁰ The sophisticated theorization of body and illnesses are developed further through its yin-yang attributes, even later categorized in the three yin three yang whole. Additional consideration of it along the five phases is another advance. Notably, the “nine sanctums” associated with the eight winds can be put in correspondence to *Luo Shu* (洛书) as its numbers from 1 to 9 were used to represent yin and yang symbols whence *Wu Xing* (五行 the five elements) and sky-earth equivalents could come into body theorization. After this it need more than just verification, but need even equating the numbers in allowing all fall into place (Fig. 5).

Under this system, CM excels on systemic integrality, embrative internal categories, and seeing the mind-body integrally under the influence of external environment. The way to seek and find reality has started with different emphasis since early times. With Chinese astronomy and earth studies as roots of ancient intelligence, simple logic cannot pass without an emphasis for formality so that, to direct clinical comprehension, the observation and logic and numeric math should come to a unity, embracing numeric math to rationing to phenomenal equivalents (象) with yin-yang and *Wu Xing* for a body perspective in form and function (Fig. 1). Even at its very beginning, the multi-dimensional logic system has required such unity in the many attributes for any formalized realities. It is under this formalized clinical comprehension applied, there are the 5 *Zang* organs and 6 *Fu* viscera, even when ancient Chinese started



Figure 5 The final experiential medicine between observation and theory of Chinese medicine emphasizes reality from knowing through abduction, with an analogical equivalating classification (取象比类) for a multi-dimensional perspective rather than simply logic. Clinical comprehension have to be processed before formalization through a unity embracing Numeric Math, Rationing, Phenomenal equivalents and Forms (数, 理, 象, 形) (source with permission from: picture made by the author)

with anatomical organ descriptions and measurements. It emphasizes reality from knowing through abduction, with an analogical equivalating classification (取象比类) rather than simply Western logic. Mastering reality rather than distracted by nitty-gritty details, CM was tuned to view the whole through the manifest down to the nano-microscopic details as a continuum without breaks,⁷¹ even when discrete measurements are definite items observable.

6 Conclusion

While most practitioners have been used to yin-yang, how exactly it can be articulated as being derived from a good logic systems has been unclear. When attributed to dichotomizing binary systems, the whole got lost, far different from Chinese thinking.

The start of classical CM is attributed to the monumental treatise of *Nei Jing*. Yin-yang is its core theory, but the logic system behind its earlier development needs to be retraced. Multi-dimensional thinking for getting right to the point in depicting matters since ancient times has established the roots of Chinese logic. Current logic systems from Hegel to modern forms do not suffice that much. In fact, the ancient Chinese logic system started with the yin-yang base following their constantly observable realities as coded from sky and earth, vapor, and clouds. More evidence mounted before further projections and redefinitions. The refinement of attributes under the "mid-right" emphasis put up a multi-dimensional logic system. In this system, space-time and other entities would be confirmed as definite when collected evidences all tallied in coincidence. The eight dimensions is one of such derived frame as it allows characteristic

properties and attributes in each space-time direction be logically accepted and verified.

This system should have facilitated *Nei Jing* as it emphasized a lot about the relatedness of the body to its surroundings. With valid space-time entities, such as winter for north and cold, evidences about winds from eight directions affecting the body established under the logic system on the core framework of nine sky sanctums and eight earthy winds, became an essential inspiring theme how body reacts in the surrounding environment.

After this framework, a lot more understanding can be described on subsequent CM development, nonetheless all derivatives of *Nei Jing* diagnosis which involves *Wu Yun Liu Qi* (五运六气 five movements and six qi). The sophisticated *Nei Jing* is basically an elaborate yin-yang theorization, wherein much theory and evidence is based upon each other by formalization through a unity embracing Numeric Math, Rationing, Phenomenal equivalents and Forms, finally producing the magnificent system of CM. The present paper describes this powerful multi-dimensional logic system.

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This study does not contain any studies with human or animal subjects performed by the author.

Author contributions

Edwin C. L. Yu did the research and wrote the paper.

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References

- [1] Mahlios M, Friedman-Nimz R, Rice S, Peyton V, O'Brien B. Measuring teachers' curricular beliefs: from Hong Kong to the United States. *Curriculum and Teaching*. 2010;25(2):81-100.
- [2] Shi Y. Culture and science: a sociological interpretation of traditional Chinese medicine (文化与科学: 中医的知识社会学解读). Available from: https://epaper.gmw.cn/gmrb/html/2020-05/08/nw.D110000gmrb_20200508_3-11.htm. [Accessed on June 28 2022]. Chinese.
- [3] World Health Organization. WHO expert meeting on evaluation of traditional Chinese medicine in the treatment of COVID-19. Available from: <https://www.who.int/publications/m/item/who-expert-meeting-on-evaluation-of-traditional-chinese-medicine-in-the-treatment-of-covid-19>. [Accessed on March 2022].
- [4] Yang YG. *Chinese Medicine Theory of Dialectical Thinking Features* (中医理论的辩证唯物主义思维特点) [dissertation]. Changchun: Northeast Normal University; 2008. Chinese.
- [5] Li MK. *Research on the Basis and Internal Rules of the Holistic Epistemology of Traditional Chinese Medicine* (中医学整体认识论的基础及其内在规律研究) [dissertation]. Wuhan: Hubei University of Traditional Chinese Medicine; 2007. Chinese.
- [6] Li J. *Discussion on Several Basic Viewpoints of Syndrome Differentiation Thinking in Traditional Chinese Medicine* (试论中医辨证思维的几个基本观点) [dissertation]. Wuhan: Hubei University of Traditional Chinese Medicine; 2005. Chinese.
- [7] Shi Y. Culture and Science: a sociological interpretation of traditional Chinese medicine (文化与科学: 中医的知识社会学解读). Available from: http://www.jsthinktank.com/wap/zhihuji-angsu/shehui/202005/t20200508_6634579.shtml. [Accessed on June 28 2022]. Chinese.
- [8] Dou P, Huang L, Chen XM. Simple discussion on the analogy thought of traditional Chinese medicine (浅谈中医学的取象比类思维). *Journal of Sichuan of Traditional Chinese Medicine*. 2013;31(3):12-14. Chinese.
- [9] Huang ZJ. Talking about the application of analogical equivalat-ing classification in traditional Chinese medicine (浅谈比类取象法在中医学的应用). *Hubei Journal of Traditional Chinese Medicine*. 2008;(8):7-8. Chinese.
- [10] Wang HL, Liu GX. Talking about the logic of the concept of analogical equivalat-ing classification in traditional Chinese medicine (中医取象比类思维的逻辑浅探). *Inner Mongolia Journal of Traditional Chinese Medicine*. 2012;(18):18-19. Chinese.
- [11] Hegel GWF. *Science of Logic*. di Giovanni G, translated. Cambridge: Cambridge University Press; 2010.
- [12] Beaney M. XIV—swimming happily in Chinese logic. *Proceedings of the Aristotelian Society*. 2021;121(3):355-379.
- [13] Zhang YS, Chen TJ, Ling SX, et al. Kangxi Dictionary (康熙字典). Available from: <https://kangxizidian.com/v2/index.php?page=2861&dpy=2>. [Accessed on June 28 2022]. Chinese.
- [14] Zhang PF. Interpretation of "Yang" and "Yi" (释"易"和"易"). *Journal of Hubei Normal University (Philosophy and Social Science)*. 2015;(4):42-45. Chinese.
- [15] Xu ZS, ed. *Oracle Dictionary* (甲骨文字典). Chengdu: Sichuan Dictionary Publishing House; 1989. Chinese.
- [16] Zhang YS, Chen TJ, Ling SX, et al. Kangxi Dictionary (康熙字典). Radical Search – "Chi" (氐) on Tongwen Publishing Original Edition. Available from: <https://kangxizidian.com/v1/index.php?page=599>. [Accessed on June 28 2022]. Chinese.
- [17] Anonymous. Chinese characters – "Yin" (阴). Available from: <https://baike.baidu.com/item/%E4%BE%8C/8559672>. [Accessed on June 28 2022]. Chinese.
- [18] Xu S. Explaining graphs and analyzing characters (说文解字). Volume 12. Available from: <https://ctext.org/dictionary.pl?if=gb&id=34122>. [Accessed on June 28 2022]. Chinese.
- [19] Duan YC. Commentary on explaining graphs and analyzing characters (说文解字注). Volume 14. Available from: <https://www.cidianwang.com/shuowenjiezi/yang4719.htm>. [Accessed on June 28 2022]. Chinese.
- [20] Xu S. Explaining graphs and analyzing characters (说文解字). Radical Search – "Fu" (阜). Available from: <https://ctext.org/dictionary.pl?if=gb&char=%F0%A8%B8%8E>. [Accessed on June 28 2022]. Chinese.
- [21] Duan YC. Commentary on explaining graphs and analyzing characters (说文解字注). Volume 14. Available from: <https://www.cidianwang.com/shuowenjiezi/yin4708.htm>. [Accessed on June 28 2022]. Chinese.
- [22] Wang NS. Ancient time: exploring the concept of yin and yang (远古时代: 阴阳观念探秘). Available from: <http://www.china10k.com/trad/history/1/11/11z/11z20/11z2001.htm>. [Accessed on June 28 2022]. Chinese.
- [23] Dai S. Book of rites: leisure life of Confucius (礼记·孔子闲居). Available from: <https://www.zaoci.top/yisi/67254.html>. [Accessed on June 28 2022]. Chinese.
- [24] Wang YL. Book helping memory for children, volume 3 (小学紺珠卷三). Available from: <https://ctext.org/library.pl?if=gb&file=7637&page=102>. [Accessed on June 28 2022]. Chinese.
- [25] Guan Z. Guan Zi: monarch and ministers: volume 2 (管子·君臣下). Available from: <https://ctext.org/guanzi/jun-chen-ii/zh?searchu=%E5%9B%9B%E8%82%A2%E5%85%AD%E9%81%93%E5%BC%8C%E8%BA%AB%E4%B9%8B%E9%AB%94%E4%B9%9F%E3%80%82>. [Accessed on June 28 2022]. Chinese.
- [26] Yin ZZ. Guan Zi: monarch and ministers: volume 2 (管子·君臣下). Available from: https://www.baike.com/wiki-id/3522883278612722828?from=wiki_content&prd=inner-link&view_id=5akvsdq2ds8000. [Accessed on June 28 2022]. Chinese.
- [27] Zuo QM. Zuo Qiuming's commentary on spring and autumn annals: Xianggong: the 29th year of Xianggong (春秋左传·襄公·襄公二十九年). Available from: <https://ctext.org/dictionary.pl?if=gb&id=19779>. [Accessed on June 28 2022]. Chinese.
- [28] Zuo QM. Zuo Qiuming's commentary on spring and autumn annals: Wengong: the 6th year of Wengong (春秋左传·文公·文公六年). Available from: <https://ctext.org/chun-qiu-zuo-zhuan/wengong-liu-nian/zh>. [Accessed on June 28 2022]. Chinese.
- [29] Xing B. Commentaries on the analects: the dancing squad of the emperor with 64 people (论语注疏·八佾). Available from: <https://ctext.org/lunyu-zhushu/ba-yi/zh#n92333>. [Accessed on June 28 2022]. Chinese.
- [30] Xing YL. Re-examination of ancient and modern law: volume 9: re-examination of successive generations: chronicle of emperors (古今律历考·卷九·历代考·皇帝纪). Available from: <https://ctext.org/wiki.pl?if=gb&chapter=894809>. [Accessed on June 28 2022]. Chinese.
- [31] Zhuang Z. Zhuang Zi: outer section: heaven and earth (庄子·外篇·天地). Available from: <https://ctext.org/zhuangzi/heaven-and-earth/zh#n2797>. [Accessed on June 28 2022]. Chinese.
- [32] Guo X. Annotations to pure classic of Nanhua, volume 3 (南华真经注疏卷三). Available from: <https://ctext.org/library.pl?if=gb&file=153107&page=238>. [Accessed on June 28 2022]. Chinese.
- [33] Ban G. Biography of Huo Guang and Jin Midi (霍光金日磾传). Available from: <https://ctext.org/dictionary.pl?if=gb&id=66755>. [Accessed on June 28 2022]. Chinese.
- [34] Jia Y. The renewed book by Jia Yi, volume 3: the distance (新书·卷三·属远). Available from: <https://ctext.org/dictionary.pl?if=gb&id=53450>. [Accessed on June 28 2022]. Chinese.
- [35] Sima Q. Biographic sketches of emperors: chronicles of Qin Shi Huang (本纪·秦始皇本纪). Available from: <https://ctext.org/shiji/qin-shi-huang-ben-ji/zh#n4789>. [Accessed on June 28 2022]. Chinese.
- [36] Liu X. The spring and autumn annals of Yanzi (晏子春秋). Available from: <https://ctext.org/library.pl?if=gb&file=77620&page=135#%E8%A1%A3%E5%86%A0%B9%84%B8%8D%E4%B8%AD>. [Accessed on June 28 2022]. Chinese.
- [37] Ban G. The history of the Han dynasty: the legend of Huns, volume 1 (汉书·匈奴传上). Available from: <https://ctext.org/han-shu/xiong-nu-zhuan-shang/zh?searchu=%E4%BB%A4%E5%85%B6%E9%87%8F%E4%B8%AD>. [Accessed on June 28 2022]. Chinese.
- [38] Xun Z. Encouraging learning (劝学). Available from: <https://ctext.org/text.pl?node=12247&if=gb&show=meta>. [Accessed on June 28 2022]. Chinese.
- [39] Sima Q. Records of the grand historian: family of Confucius (史记·孔子世家). Available from: <https://ctext.org/text.pl?node=6972&if=gb&show=parallel>. [Accessed on June 28 2022]. Chinese.

- [40] Zuo QM. The spring and autumn annals of Zuo Qiuming: Dinggong: the 1st year of Dinggong (春秋左传·定公·定公元年). Available from: <https://ctext.org/chun-qi-zuo-zhuan/ding-gong-yuan-nian/zh>. [Accessed on June 28 2022]. Chinese.
- [41] Liu X. Strategies of the Warring States: strategies of Western Zhou: Su Li persuades the emperor of Zhou (战国策·西周策·苏厉谓周君). Available from: <https://ctext.org/zhan-guo-ce/su-li-wei-zhou-jun/zh#n49534>. [Accessed on June 28 2022]. Chinese.
- [42] Xu S. Explaining graphs and analyzing characters (说文解字). Available from: <https://ctext.org/dictionary.pl?if=gb&id=28985>. [Accessed on June 28 2022]. Chinese.
- [43] Morales J. River diagrams and trigrams cycle of the *I Ching*. Available from: http://baharna.com/iching/articles/river_trigrams.html. [Accessed on June 28 2022].
- [44] Yu ECL. The great treatise II (系辞下). Personal translation. 2020.
- [45] Duke of Zhou. Rites of the Zhou dynasty: the governor who governs the land and the people: the grand governor (周礼·地官司徒·大司徒). Available from: <https://ctext.org/rites-of-zhou/di-guan-si-tu/zh>. [Accessed on June 28 2022]. Chinese.
- [46] Duke of Zhou. Rites of the Zhou dynasty: the governor who governs the land and the people: the grand governor (周礼·地官司徒·大司徒). Available from: <https://ctext.org/rites-of-zhou/di-guan-si-tu/zh#n36766>. [Accessed on June 28 2022]. Chinese.
- [47] Anonymous. Book of documents: documents of the Zhou dynasty: a submission to the emperor (尚书·周书·召诰). Available from: <https://ctext.org/shang-shu/announcement-of-the-duke-of-shao/zh?searchu=%E5%8F%AC%E8%AA%A5&searchmode=showall#result>. [Accessed on June 28 2022]. Chinese.
- [48] Shen K. Dream pool essays, volume 1: *Gua* and yin-yang (1st part) (梦溪笔谈·卷七·象数一). Available from: <https://ctext.org/wiki.pl?if=gb&chapter=117551&searchu=%E5%89%87%E7%9F%A5%E5%A4%A9%E6%AD%A3%E4%B9%8B%E6%B0%A3%E5%81%8F%E4%B9%9F>. [Accessed on June 28 2022]. Chinese.
- [49] Duke of Zhou. Rites of the Zhou dynasty: the governor who is responsible for rites, sacrifices, calendar, etc. (周礼·春官宗伯). Available from: <https://ctext.org/dictionary.pl?if=gb&id=36996>. [Accessed on June 28 2022]. Chinese.
- [50] Sima Q. Records of the grand historian: the book of times (史记·历书). Available from: <https://ctext.org/dictionary.pl?if=gb&id=5287>. [Accessed on June 28 2022]. Chinese.
- [51] Ji C. The book of changes: a collection of definitions of *Gua*: *Li* (周易·彖传·离). Available from: <https://ctext.org/dictionary.pl?if=gb&id=25536#s10127650>. [Accessed on June 28 2022]. Chinese.
- [52] Gao H. The book of changes: *Li* (易·离). Available from: <https://baike.baidu.com/item/%E4%B8%AD%E6%AD%A3/7146180>. [Accessed on June 28 2022]. Chinese.
- [53] Chalmers DJ. Epistemic two-dimensional semantics. *Philosophical Studies*. 2004;118:153–226.
- [54] Zach R. Hilbert's Program, Stanford Encyclopedia of Philosophy. Available from: <https://plato.stanford.edu/entries/hilbert-program/>. [Accessed on June 28 2022].
- [55] Encyclopedia Britannica. Logical system. Britannica. Available from: <https://www.britannica.com/topic/logical-system>. [Accessed on June 28 2022].
- [56] Duke of Zhou. Rites of the Zhou dynasty: the governor who governs the land and the people: the grand governor (周礼·地官司徒·大司徒). Available from: <https://ctext.org/rites-of-zhou/di-guan-si-tu/zh?searchu=%E4%BB%A5%E5%9C%9F%E5%9C%AD%E4%B9%8B%E6%B3%95%E6%B8%AC%E5%9C%9F%E6%B7%B1&searchmode=showall#result>. [Accessed on June 28 2022]. Chinese.
- [57] Anonymous. Book of documents: documents of the Yu dynasty: records of Yao (尚书·虞书·尧典). Available from: <https://ctext.org/shang-shu/canon-of-yao/zh>. [Accessed on June 28 2022]. Chinese.
- [58] Sima Q. Records of the grand historian: books: book of sacrificial ceremony (史记·书·封禅书). Available from: <https://ctext.org/shiji/feng-chan-shu/zh>. [Accessed on June 28 2022]. Chinese.
- [59] Zheng KC. Labor and degree of *Qian Kun*: Volume 1-2 (易纬乾坤凿度·卷上至卷下). Available from: <https://ctext.org/wiki.pl?if=gb&chapter=461322&searchu=%E5%85%AB%E5%8D%A6%E6%88%90%E5%88%97%EF%BC%8C%E5%A4%A9%E5%9C%B0%E4%B9%8B%E9%81%93%E7%AB%8B>. [Accessed on June 28 2022]. Chinese.
- [60] Ji C. The book of changes: definitions of *Gua* (周易·说卦). Available from: <https://ctext.org/book-of-changes/shuo-gua/zh?searchu=%E8%90%AC%E7%89%A9%E5%87%BA%E4%B9%8E%99%9C%87%EF%BC%8C%E9%9C%87%EF%BC%8C%E6%9D%B1%E6%96%B9%E4%B9%9F&searchmode=showall#result>. [Accessed on June 28 2022]. Chinese.
- [61] Wang B. *The Yellow Emperor's Inner Classic: The Spiritual Pivot* (黄帝内经·灵枢). Volume 11, Chapter 77. Shanghai: Shanghai Ancient Book Publishing House; 1995. p.1035. Chinese.
- [62] Wang B. *The Yellow Emperor's Inner Classic: Basic Questions* (黄帝内经·素问). Volume 2, Chapter 5. Shanghai: Shanghai Ancient Book Publishing House; 1995. p.880–884. Chinese.
- [63] Wang B. *The Yellow Emperor's Inner Classic: Basic Questions* (黄帝内经·素问). Volume 8, Chapter 26. Shanghai: Shanghai Ancient Book Publishing House; 1995. p.906–907. Chinese.
- [64] Wang B. *The Yellow Emperor's Inner Classic: Basic Questions* (黄帝内经·素问). Volume 19, Chapter 67. Shanghai: Shanghai Ancient Book Publishing House; 1995. p.949–952. Chinese.
- [65] Wang B. *The Yellow Emperor's Inner Classic: Basic Questions* (黄帝内经·素问). Volume 8, Chapter 25. Shanghai: Shanghai Ancient Book Publishing House; 1995. p.905–906. Chinese.
- [66] Wang B. *The Yellow Emperor's Inner Classic: Basic Questions* (黄帝内经·素问). Volume 3, Chapter 10. Shanghai: Shanghai Ancient Book Publishing House; 1995. p.888–889. Chinese.
- [67] Wang B. *The Yellow Emperor's Inner Classic: The Spiritual Pivot* (黄帝内经·灵枢). Volume 12, Chapter 78. Shanghai: Shanghai Ancient Book Publishing House; 1995. p.1035–1036. Chinese.
- [68] Wang B. *The Yellow Emperor's Inner Classic: The Spiritual Pivot* (黄帝内经·灵枢). Volume 10, Chapter 71. Shanghai: Shanghai Ancient Book Publishing House; 1995. p.1030–1031. Chinese.
- [69] Wang B. *The Yellow Emperor's Inner Classic: Basic Questions* (黄帝内经·素问). Volume 1, Chapter 3. Shanghai: Shanghai Ancient Book Publishing House; 1995. p.875–876. Chinese.
- [70] Basic Theory of Traditional Chinese Medicine Compilation Committee. *Basic Theory of Traditional Chinese Medicine (Second Edition)* [中医基础理论(第2版)]. Beijing: People's Medical Publishing House; 2011:335. Chinese.
- [71] Anonymous. *The Book of Change* (易经). Taipei: the Commercial Press; 2013. Chinese.

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The Transmission of Herbal Medicine to China via the Silk Road in Medieval Ages

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Abstract

The Silk Road has long been recognized as a vital channel for cultural and intellectual exchange, profoundly influencing the cosmopolitan identity of Tang emperor's culture. Beyond the trade of goods like tea, silk, and carpets, this network also fostered the transfer of medical knowledge. Traditional Chinese medicine (TCM), with its extensive pharmacopoeia of over ten thousand herbal medicines, benefited significantly from exchanges with neighboring countries and regions. This review explores the intricate connections between TCM and other medical systems facilitated by the Silk Road, highlighting representative herbs introduced from regions along the route. It underscores the reciprocal influences that shaped medical practices in both Eastern and Western traditions, offering insights into the potential integration of traditional and modern biomedical approaches today.

Keywords: Silk Road; Foreign medicine; Traditional Chinese medicine

1 Introduction

The Silk Road had a significant impact on various aspects of Chinese society including politics, economics, religion, culture, and medicine. It was a network of trade routes that facilitated the exchange of goods, money, and knowledge between Asia, Europe, and Africa. The connection with neighboring countries along the Silk Road has always been crucial for China's involvement in wildlife trafficking.¹ However, previous research has focused primarily on political, economic, religious, and cultural exchanges, neglecting the transmission of medical culture.² Valuable information on medicine and healing practices flowed in both directions along these routes,

influencing cultures and civilizations along the way. Over time, traditional Chinese medicine (TCM) has evolved and transformed into its present form through numerous widespread interactions and the accumulation of knowledge. The exchanges between the Song dynasty and the Arab countries became closer. During that period, China was introduced to highly advanced pharmaceutical preparation technology from the leading Islamic countries. This included the introduction of Chinese patent medicines wrapped in flower lotion, gold foil, and silver foil.³

2 The role of the Silk Road in advancing medical knowledge

The Silk Road originated from Chang'an (长安), which is now known as Xi'an city in China, during the Western Han dynasty. It traversed the Longshan Mountains (龙山山脉) and the Hexi Corridor (河西走廊) before reaching Xinjiang through Yumenguan (玉门关) and Yangguan (阳关). From there, it extended through present-day Tajikistan, Turkmenistan, Iran, Iraq, and Turkey, eventually reaching Africa and Europe.⁴ The term "Silk Road" or "Seidenstrassen" was initially coined by Baron Ferdinand von Richthofen, a German geologist and explorer, in 1877 (Fig. 1). This term has since been used metaphorically to represent the cultural exchange between Europe and Asia. The Silk Road, a vast network of routes, spans land and sea, connecting Europe, Africa, and Asia.⁵ The trade of medicine along these routes has had significant effects on the people and customs they have encountered. In recent times, Chinese medicine historians have focused on manuscripts that document the exchange of medical knowledge through the Silk Road. Archaeological findings in

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Central Asian Bactria, specifically in the region around Balkh and Mazar-i-Sharif in Afghanistan, have provided proof of trade in ancient Chinese silk as early as 500 BCE.⁵ Throughout history, traditional herbs and remedies have played a crucial role in addressing various health issues. However, as trade flourished along the Silk Road, Chinese medicine embraced new medicines and expanded its influence beyond local communities.¹

3 The exchange of traditional medicine through the Silk Road

The Silk Road served as a vital route for the exchange of medicinal products and knowledge between Asia, Europe, and Africa, spanning from ancient times to the present day. Countless texts documenting formulas and treatments have been transmitted along this historic trade route. Dunhuang (敦煌) was a bustling hub where a wide range of texts, from renowned Chinese medical authors to unidentified Xizang compilations of remedies for contagious diseases, were meticulously transcribed and translated into numerous languages for the diverse communities along the Silk Road. This exchange of knowledge and information flowed in both directions along the trade routes, resulting in Chinese medicine leaving its mark on foreign medical practices throughout history and even today. Moreover, the incorporation of non-Chinese medicine and information has also played a crucial role in shaping Chinese medicine and the spread of TCM across Asia over the centuries. During the year 138 BC, a man named Zhang Qian (张骞) was assigned the task of being an envoy to welcome the Western territories.⁶ This

event marked the beginning of a new era for the exchange of goods and culture between ancient China and foreign lands. To summarize, there were three main channels of cultural exchange between China and the outside world during the Sui, Tang, and Five Dynasties (late 6th century to mid-10th century): the overland route in the northwest, the maritime route in the southeast, and the route through the grasslands in the north.⁷

The assimilation of foreign medicinal substances, such as saffron, pomegranate, and asafetida, into Chinese herbology, represents a tale of cultural interchange and medical evolution spanning centuries. Among them, Saffron, renowned for its vivid coloration and distinctive flavor profile, has a storied history that likely began its journey to China via the ancient Silk Road trade routes. Benzoin resin, Patchouli native to Southeast Asia, likely made its way into China through historic trade pathways, such as the maritime Silk Road and overland commercial networks, which facilitated the exchange of commodities, concepts, and medicinal expertise across different regions.⁸ The six selected medicines are likely chosen for their illustrative power, providing concrete examples of the broader themes of medical exchange and adaptation along the Silk Road. They act as case studies to represent the countless other substances that traveled these routes, giving readers an in-depth look at how some of the most significant intercultural interactions took place. Through these examples, the study can effectively show the complex interplay of trade, cultural exchange, and medical adaptation that shaped TCM. The chosen medicines may come from different regions (India, Persia, Central Asia, Mediterranean), showcasing the geographical diversity of the Silk Road's impact.

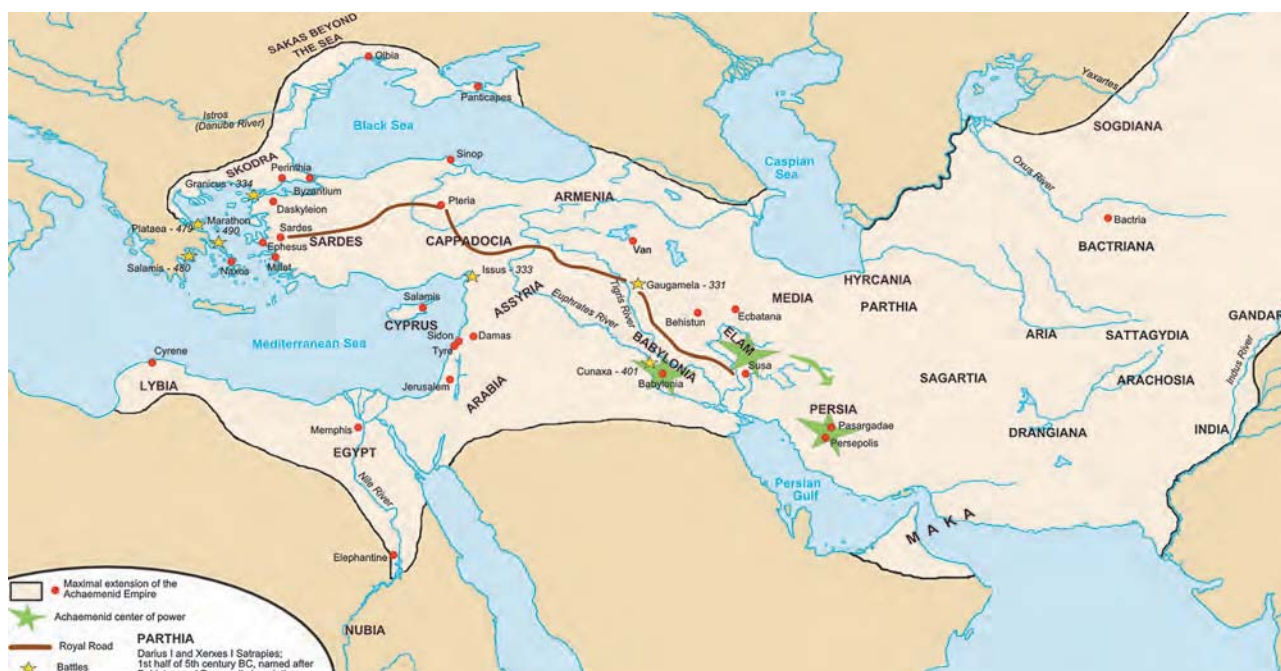


Figure 1 The part of Silk Road map illustration tracing Europe to China (source with permission from: www.worldhistory.org/image/5515/persian-royal-road/)

4 Comparison between TCM and different traditional medicines along the Silk Road

Research into the medical traditions and historical developments of countries along the Silk Road reveals notable overlaps and similarities with TCM. While systems like Persian medicine, Indian medicine (Ayurveda), and Greco-Roman medicine possess distinct theoretical frameworks, they share commonalities with TCM in key principles and therapeutic approaches.

4.1 Perspectives of traditional Chinese and Persian medicine

Persia played a crucial role in advancing a wide range of sciences during ancient times and the medieval ages. It served as a hub for scientific achievements, facilitating the exchange of knowledge between India and China in the East and between Rome and Greece in the West. Persian scientists have made significant contributions to various fields including alchemy, mathematics, architecture, astronomy, biology, anatomy, botany, cosmology, engineering, medicine, and pharmacy.³ Traditional Persian medicine (TPM) follows the principles of the four elements of fire, air, water, and earth. Each element has its own characteristics: fire is hot and dry, air is hot and moist, water is cold and moist, and earth is cold and dry. These elements make up the entire world, and their varying ratios in every object contribute to the diversity we see in our universe.³ Persia (present Iran) was an important territory along the ancient Silk Road. Iran and China have a long history of interaction dating back to ancient times, specifically during the Arsa dynasty of the Parthian Empire in Iran. This period corresponds to the time before Christ (BC). As the Silk Road flourished, the relationship between China and Persia grew stronger, resulting in closer ties.⁹ This connection also facilitated the introduction of various medicinal materials from Persia to China. *The Grand Compendium of Materia Medica*, also known as *Ben Cao Gang Mu* (《本草纲目》) in Chinese, is a comprehensive collection of medicinal products and agents. It was created by Li Shizhen (李时珍) during the Ming dynasty (1518–1593).³ Recently, Chinese medicine historians have focused on ancient texts that reveal how medical knowledge was shared along the Silk Roads. TPM and TCM not only play a significant role in sustainable agriculture and food systems but also provide a comprehensive approach to disease prevention, utilizing organic and herbal products, particularly those grown by small-scale family farmers. During the medieval period, Muslim medical scholars such as Tabari, Rhazes, Haly Abbas, Avicenna, and Jurjani extensively discussed Chinese herbal medicines.¹⁰ Avicenna, in particular, mentioned the term “al-sin” (Arabic for China) 46 times in his *Canon of Medicine*, referring to the importation of herbal medicines from China. Various

forms of traditional medicine incorporate theories and practices from different cultures, such as the Chinese, Persian, Graeco-Roman, and Ayurvedic traditions. The Iranian traditional medicine, similar to Graeco-Arabic medicine, is founded on the belief that the human body contains four essential substances, known as humors. These humors include phlegm (Balgham), blood (Dam), yellow bile (Safra), and black bile (Sauda).³ The physical and mental traits of individuals, also referred to as mizaj or temperaments, are determined by four substances. During this period, Chinese herbal medicines played a significant role in the exchange of goods and knowledge between China, the Islamic world, and later the Western world. Both TPM and TCM systems provide a comprehensive approach to health and disease, considering both spiritual and physical aspects. Additionally, these traditional medicines are affordable and accessible to everyone, with a greater emphasis on maintaining wellness rather than treating illnesses.¹¹

4.2 Perspectives of traditional Chinese and Indian medicine

Traditional medicines in China and India have a long history of sharing knowledge, referencing each other's practices, and evolving medical theories and treatments. The exchange of traditional medicine between the two countries started during the Qin and Han dynasties and reached its peak in the Tang dynasty. However, it gradually declined after the Song dynasty.¹² The connection between the rise and decline of Buddhism also influenced traditional Indian medicine. These include various systems such as Ayurveda, Yoga and Naturopathy, Unani, Siddha, Sowa Rigpa, and Homoeopathy. These systems have gained popularity not only in their respective countries but also worldwide. Given that India and China are neighboring countries, it is probable that there was an exchange of culture and customs between them, which may have also impacted their respective medical systems. The traditional Indian medicine (represented by Ayurveda) is a medical system that has its origins in the Indian subcontinent.¹³ It is recognized as one of the oldest healing systems worldwide, dating back to at least 5,000 years ago in India. Ayurveda, a term derived from Sanskrit, can be translated as “the wisdom of life” or “the knowledge of longevity”. This term is a combination of “ayus”, which means life or longevity, and “veda”, which means deep knowledge or wisdom. Both Indian medicine and TCM share several similarities. Both systems prioritize the patient's well-being rather than focusing solely on the disease.¹⁴

4.3 Perspectives of traditional Chinese and Arabic medicine

Traditional Arabic and Islamic Medicine (TAIM) is a system of healing practiced since antiquity in the Arab world

within the context of the religious influences of Islam and comprises medicinal herbs, dietary practices, mind-body therapy, spiritual healing, and applied therapy, many of these elements reflecting enduring interconnectivity between Islamic medical and prophetic influences as well as regional healing practices emerging from specific geographical and cultural origins.¹⁵ Traditional Arabic Medicine is the culmination of Greece-Roman, Chinese, Persian, and Ayurvedic theories and practices.¹⁶ Historical and current studies indicate that the Eastern region of the Mediterranean has been distinguished for long periods with a rich inventory of natural medicinal herbs. It is well documented that TAIM has contributed greatly to the development of modern medicine in Europe and remains one of the closest forms of original European medicine.¹⁷ The modern use of Arab botanical medicines has historical roots in ancient Arabic medicine. Arab herbalists, pharmacologists, chemists, and physicians in the Middle Ages adopted the ancient medicinal practices of Mesopotamia, Greece, Rome, Persia, and India.¹⁵

4.4 Perspectives of traditional Chinese and Egyptian medicine

Throughout history, scholars from various ancient civilizations, such as Egypt, China, India, Persia, and the Islamic civilization, have demonstrated exceptional expertise in the field of medicine. The remarkable advancements achieved by Egyptians in particular, such as the science of mummification and other medical practices, still leave many awes today. One notable discovery made by both the Indians and Egyptians is the use of the Moringa plant, which is used to treat numerous diseases. Although it was forgotten for some time, it has recently been rediscovered and shows promising potential in treating previously incurable illnesses. The ancient Egyptians believed in prayer as a solution to health problems, but they also had natural, or practical, remedies, such as herbs.¹⁸ Taken together, both systems emphasize the importance of balance, whether in bodily energies or the harmony between body, mind, and spirit. While TCM leans towards natural and empirical practices such as acupuncture and herbal medicine, Egyptian medicine integrated practical treatments with deeply rooted spiritual and religious elements.

In general, TCM and the traditional medicines of other Silk Road cultures each exhibit unique characteristics. However, the exchange of ideas and trade in medicinal substances along the Silk Road fostered significant interaction and integration of medical concepts. Traditional medicines in these regions share a common emphasis on natural therapies, employing methods such as herbal remedies, dietary adjustments, massage, and acupuncture, which closely align with TCM practices like *Bian Zheng* (辨证 pattern differentiation), herbal treatment, and acupuncture. Additionally, Persian

medicine, Ayurvedic medicine, and TCM adopt a holistic approach, treating the human body as an interconnected whole. Health is viewed not merely as the absence of symptoms but as the restoration of overall harmony and balance. These systems also prioritize individualized care, tailoring treatments to a person's constitution, environment, and lifestyle.

5 The transmission of herbal medicines via the Silk Road

China has a rich tradition of growing medicinal plants, which plays a significant role in TCM. Interestingly, not all of these herbs are native to China. In fact, some of them are exotic plants that were brought in from other countries. However, despite their foreign origins, these plants have been successfully integrated into the TCM systems and have become essential. Two unique and regional materia medica books focus on the impact of Arabic and Persian medicines. One is called *Hu Ben Cao* (《胡本草》 *Foreign Materia Medica*) and the other is *Hai Yao Ben Cao* (《海药本草》 *Materia Medica from the (Southern) Seaboard Area*).¹⁹ These foreign plants have successfully adapted to their new environment and are now widely recognized among the Chinese people. In the Islamic Golden Age, Persian doctors made significant contributions to the field of medicine in two stages. Philosophers such as Gerber, Al-kindi, Rhazes, Al-Farabi, Avicenna, and Averroes had a profound impact on Europe during the Dark Ages. The exchange of medicinal resources along the historical Silk Road has played a vital role in the advancement of TCM. Additionally, it has fostered cultural connections between China and other nations. Chinese medicine, as a unique and intricate healthcare system, has expanded steadily over time. It has evolved from a limited range of a few hundred medicines from a specific region to a diverse collection of thousands of medicines from around the globe. Most scholars of Asian medicine have tended to confine themselves to a single geographic region, focusing on China, Japan, Persia, India, or another location belonging to Islam and Arabic people.²⁰ As Chinese herbalists became familiar with new herbs, they would have classified them according to the principles of TCM theory, including *Si Qi* (四气 four qi or four thermal nature), *Wu Wei* (五味 five flavors), and *Gui Jing* (归经 channel tropism or meridian affinity). Chinese herbalists, known for their keen observational skills and empirical approach to medicine, carefully studied the physical characteristics and medicinal properties of newly encountered herbs. In this section, we highlight representative herbs from countries along the Silk Road to shed light on their therapeutic properties and their compatibility with other herbs in TCM formulations. The six selected herbs were chosen for their illustrative efficacy, serving as concrete examples of the broader themes of medical exchange and adaptation along the Silk Road. These case studies represent

the many substances that traversed these routes, offering readers a deeper understanding of some of the most significant intercultural exchanges in the history of medicine. The name and current distribution of these TCMs are included in Table 1 (Table 1).

5.1 Saffron (番红花)

Saffron, obtained from the *Crocus sativus* plant, has its roots in the Middle East, specifically the region spanning from Greece to Persia (Iran). Despite its historical significance and use in ancient civilizations such as Assyria, Sumeria, Persia, Greece, and Egypt, saffron is not commonly utilized by most people today, whether for medicinal or culinary purposes. This is primarily due to its exorbitant cost, which has earned it a justified reputation for being extremely expensive.²¹

Saffron is a compact and long-lasting plant that reaches a height of 10 to 30 cm. The plant produces 2 to 3 flowers at the end of its bulb, surrounded by a number of leaves. The color of the stigma, which has three branches, is determined by the number of carotenoids and lycopene present. The size of the stigma varies, while the size of the branches remains consistent. Saffron was historically traded along the Silk Road, passing through Mongolia, China, and eventually reaching Europe. Saffron has always been a highly valued and costly luxury due to its labor-intensive cultivation, separation of stigmas, and extraction of its valuable essence.³ The earliest mention of saffron in Chinese medical literature dates back to the Tang dynasty (618–907 CE), specifically in *Ben Cao Shi Yi* (《本草拾遗》 Supplement to “*The Grand Compendium of Materia Medica*”) by Chen Cangqi (陈藏器). This text, composed around 739 CE, serves as an important addition to earlier medical texts, introducing herbal knowledge that had previously gone unrecorded. Chen Cangqi’s reference marks the first formal acknowledgment of saffron in the context of Chinese pharmacology. Over time, saffron has been integrated into *Ben Cao Gang Mu*, alongside indigenous Chinese herbs, with its properties and indications recorded in classical texts such as *Shen Nong Ben Cao Jing* (《神农本草经》 *Shen Nong’s Classic of the Materia Medica*) and *Ben*

Cao Gang Mu. Central to this integration were concepts such as *Si Qi*, *Wu Wei* and channel tropism.⁸ Regarding *Si Qi*, saffron is classified as “warm” due to its warming properties. In terms of *Wu Wei*, its unique taste—characterized by a blend of bitterness and subtle sweetness—has been analyzed for its therapeutic effects and organ affinities. Additionally, saffron is associated with the heart, liver, and spleen meridians, reflecting its impact on mood, digestion, and circulation. Iran, known as the largest producer of saffron, has been researching for its potential medicinal benefits.⁸

Saffron demonstrates a broad spectrum of pharmacological effects, including potent antioxidant, anti-inflammatory, anti-atherogenic, anti-apoptotic, antihypertensive, and hypolipidemic properties. These effects help reduce oxidative stress and inflammation, both of which are key contributors to central nervous system (CNS) disorders. It is particularly used in treating depression. The tradition of using saffron as an antidepressant dates back to ancient times and continues to the present day. In preliminary studies, saffron was compared to the commonly prescribed antidepressant fluoxetine (also known as Prozac).²² When used topically, it can enhance the overall condition of the skin and effectively treat acne. In ancient Greek medicine, saffron was used to rejuvenate facial skin, alleviate liver-related issues, and heal acne, skin ailments, and wounds.²¹ Saffron has multiple benefits for the skin, including its ability to treat blemishes such as acne. By soaking saffron with a few basil leaves, facial skin can be refreshed, and liver issues caused by excess bile can be alleviated.²¹ Extended periods of sun exposure can be highly detrimental to the skin due to the harmful effects of ultraviolet rays, which are known to cause severe damage. Saffron, on the other hand, possesses anti-sun properties that can shield the skin from these harmful ultraviolet rays.²³ In the realm of traditional medicine, saffron has long been hailed for its aphrodisiac properties. In particular, TPM utilized saffron as both a diuretic and a cleanser for the kidneys and bladder. Additionally, it has been employed in the treatment of urinary obstruction.³ Numerous experimental and clinical studies have demonstrated that saffron, along with its active compound crocin, can have a positive impact on sexual factors. These include improving erectile function, increasing libido, enhancing semen quality, and reducing hesitation time. We conducted a study to assess the aphrodisiac effects of a water extract from the stigmas of *C. sativus*, as well as its safranal and crocin components.²⁴ Throughout history, saffron has been utilized in traditional medicine to aid in difficult deliveries and alleviate uterine pain. It is also known to regulate the menstrual cycle.²⁴

Additionally, research has shown that saffron possesses a range of pharmacological potential, including antimicrobial, antioxidant, cytotoxic, cardioprotective, neuroprotective, antidepressant, hypolipidemic, and

Table 1 Examples of medicinal plants transmitted to China via the Silk Road

Medicine name	Origin	Reference
番红花 Saffron	Iran, Greece, Spain	[21]
石榴 Pomegranate, <i>Punica granatum</i> L.	India, Iran, Afghanistan, and Georgia	[25]
安息香 Benzoin Resin	Vietnam, Thailand, Sumatra, Indonesia	[29]
广藿香 Patchouli	Indonesia, Philippines, Malaysia	[33]
阿魏 Asafetida	Iran, western Afghanistan, Kashmir region	[36]
没食子 <i>Mo Shi Zi</i>	Turkey, Syria, Iran, India	[41]

antihyperglycemic properties, as well as a being a protector of retinal lesions. Saffron has been found to be an effective natural food preservative because of its antioxidant and antimicrobial properties.³ Although saffron is cultivated in regions such as Chongming (崇明) in Shanghai, China continues to depend significantly on imports to meet its demand. Local production alone is insufficient to satisfy the needs of the Chinese market.

5.2 Pomegranate (石榴)

For centuries, the pomegranate, scientifically known as *Punica granatum* L., has been utilized in various traditional medicine practices across the globe. These include TCM, Ayurveda, TAIM, and TPM. It has been used to treat a range of health conditions such as atherosclerosis, diabetes, hypertension, hyperlipidemia, different types of cancer, peptic ulcers, and oral diseases. Pomegranate is a plant from the Punicaceae family.²⁵ It can be classified as a deciduous shrub or a small tree with a perennial rootstock or dunga-runga. The peels of the pomegranate fruits contain a total of twenty polyphenols, including nine previously unidentified polyphenols. These newly discovered polyphenols have been named punicagranins A-I (1–9), and they are accompanied by eleven other known compounds (10–20).²⁶ It contains 17 different amino acids and a variety of minerals, including high levels of vitamin C, calcium, iron, and phosphorus. Pomegranates also contain small amounts of retinol, riboflavin, folic acid, and other phenolic compounds, making them highly nutritious and beneficial for human health. This substance exhibits a diverse array of pharmacological effects, encompassing its ability to reduce inflammation, combat oxidative stress, fight against bacteria and viruses, regulate lipid levels, and modulate the immune system.²⁷

The pomegranate, originating from Persia and Central Asia, was introduced to China through trade and cultural exchanges during the Han dynasty (206 BCE–220 CE). This introduction is recorded in various material medica texts, such as *Ben Cao Gang Mu*, which emphasize the fruit's importance not only as a food source but also as a symbol and medicinal herb.²⁵ Early references in texts such as *Ming Yi Bie Lu* (《名医别录》 *Miscellaneous Records of Famous Physicians*) and *Tang Ben Cao* (《唐本草》 *Tang Materia Medica*) indicate its incorporation into Chinese pharmacological practices, while Li Shizhen's extensive work in *Ben Cao Gang Mu* further solidifies its esteemed position within the Chinese herbal tradition. Historical accounts attribute the introduction of pomegranate seeds to China to Zhang Qian, an envoy of the Han Emperor Wu (汉武帝), who is believed to have brought them back around 138 BCE during his diplomatic missions to Central Asia. This event represents one of the earliest documented instances of the pomegranate entering Chinese culture, highlighting a significant moment in

the exchange of botanical knowledge between regions. The narrative of the pomegranate reflects both its journey and evolution—from a foreign fruit to an integral component of Chinese medicine and cultural identity. This transformation underscores the dynamic nature of cultural exchange, illustrating how foreign elements can be assimilated and reinterpreted, thereby enriching local traditions and practices.²⁶

The identification of pomegranates' properties within the framework of TCM involves a systematic analysis based on core principles. In terms of *Si Qi*, the cooling properties of pomegranates may have been identified through empirical observation and theoretical analysis, resulting in its classification as a “cool” herb within TCM theory. In terms of *Wu Wei*, the fruit's unique taste—a combination of sweetness and astringency—was examined to understand its therapeutic effects and organ affinities. In TCM, sweetness is associated with the spleen and stomach, while astringency can influence the lung and large Intestine meridians. Regarding *Gui Jing*, pomegranates may have been associated with the heart, liver, and large intestine meridians based on its therapeutic effects, such as promoting digestion and supporting cardiovascular health.²⁵ Pomegranates can be divided into two categories: ornamental pomegranates, which have white flowers, small fruits, and hard seeds, and edible pomegranates, which have medicinal value, red flowers, large fruits, and soft seeds. Pomegranates are recognized for their medicinal properties and are included in the “homology of medicine and food (药食同源)” catalog in China.²⁶

In recent years, there have been numerous studies on the pharmacological properties, toxicity, side effects, clinical trials, and pharmaceutical applications of pomegranate. Pharmaceutical studies have recently emphasized various areas including antioxidant properties, antimicrobial effects, anticancer properties, lipid and glucose metabolism regulation, antihypertensive effects, atherosclerosis prevention, and protection against Alzheimer's disease.²⁷

5.3 Benzoin resin (安息香)

The assimilation of benzoin resin (安息香) into Chinese herbology reflects a fascinating chapter in the history of cultural exchange and medicinal exploration.²⁸ Benzoin resin, derived from the *Styrax* trees native to Southeast Asia, likely entered China through ancient trade routes, such as the maritime Silk Road and overland trade networks. The introduction of benzoin resin to China would have occurred during periods of extensive trade and cultural interaction between China and neighboring regions. Merchants traveling along the Silk Road would have brought benzoin resin along with other exotic goods to trade with Chinese traders.²⁹ The earliest documentation of benzoin resin within Chinese medicinal texts can be found in *Tang Ben Cao*, compiled during

the Tang dynasty in the 7th century CE. This herb was categorized as a significant imported commodity, valued mainly for its aromatic characteristics and its medicinal applications, including the treatment of respiratory ailments and its role as a fixative in incense. In the 16th century CE, during the Ming dynasty, Li Shizhen's *Ben Cao Gang Mu* provided a detailed account of benzoin resin, highlighting its medicinal qualities and confirming its historical importation by Central Asian traders along the Silk Road. This text serves as an important link between the historical use of benzoin in China and its origins in Southeast Asia and the Arabian Peninsula.²⁸ Over time, benzoin resin has been integrated into the framework of TCM.²⁹ Regarding *Si Qi*, benzoin resin, known for its warming and aromatic properties, would likely be classified as a “warm” herb.²⁸ In terms of *Wu Wei*, its taste—a blend of sweetness and bitterness—was analyzed to determine its therapeutic effects and organ affinities. Sweetness is traditionally associated with the spleen and stomach, while bitterness influences the heart and small intestine meridians.³⁰ For *Gui Jing*, the classification of benzoin resin would have been informed by observations of its effects on the body's meridian system. Its affinity for the heart, lung, and spleen meridians may have been identified based on its therapeutic actions, such as promoting circulation and resolving dampness.²⁸

Benzoin is a medicinal resin derived from the trunk of the benzoin plant. Research in pharmacology has indicated that benzoin, a type of phenolic resin, primarily consists of benzoic acid, cinnamic acid, and their derivatives as volatile compounds, as well as triterpenoids and lignans as nonvolatile compounds.²⁸ Various studies have indicated that crude extracts of benzoin or purified monomers derived from benzoin possess several pharmacological effects. These effects include antitumor, neuroprotective, cytotoxic, antimicrobial, anti-inflammatory, pesticidal, and estrogen-promoting effects. Benzoin also has benefits such as protecting against cerebral hypoxia and enhancing blood-brain barrier permeability. In addition to its medicinal properties, benzoin is used in various official and proprietary medicinal preparations. These include over-the-counter cough suppressants, cold and flu preventatives, lotions, mouthwashes, and antibacterial powder. Historical records from the Tang dynasty in ancient China mention benzoin as both a spice and a medicine in *Tang Ben Cao*.²⁸

5.4 Patchouli (广藿香)

Patchouli, also known as *Guang Huo Xiang* (广藿香), is a commonly used ingredient in various well-known Chinese patent medicines, such as Huoxiang Zhengqi Oral Liquid (藿香正气口服液).³¹ The integration of patchouli into Chinese herbology is a fascinating narrative of cultural exchange and medical exploration.

Pogostemon cablin (Blanco) Benth., a member of the Lamiaceae family commonly known as patchouli, is native to Southeast Asia and has been extensively cultivated in Indonesia, the Philippines, Malaysia, China, and Brazil. It is believed to have been introduced into China through ancient trade routes, particularly during periods of maritime trade and diplomatic exchanges between China and neighboring regions. *Tang Ben Cao*, compiled in 659 CE by Su Jing (苏敬) and his colleagues under imperial mandate, stands as one of the earliest official pharmacopoeias to document Patchouli and its introduction via trade routes. This foundational text records the plant under its Chinese nomenclature and outlines its medicinal uses and historical origins. In contrast, *Ben Cao Gang Mu*, offers a more extensive examination of patchouli, encompassing its characteristics, therapeutic applications, and geographical provenance. This compendium not only confirms the presence of patchouli in China but also recognizes its significance as both a medicinal and aromatic plant, while acknowledging its foreign roots.¹⁹ Currently, patchouli cultivation is widespread in southern China, including Guangdong and Hainan provinces.³² In terms of *Si Qi*, patchouli, with its warming and aromatic properties, would likely be categorized as a “warm” herb within TCM theory.³¹ Regarding *Wu Wei*, the taste profile of patchouli, characterized by its bitterness and pungency, would have been carefully analyzed to determine its therapeutic benefits and effects on various organs. Bitterness is traditionally associated with the heart and small intestine meridians, while pungency is believed to influence the lung and large intestine meridians.³³ As for *Gui Jing*, patchouli's affinity for the spleen, stomach, and lung meridians may have been established based on its therapeutic actions, including its ability to enhance digestion, alleviate nausea, and relieve respiratory congestion.³²

In TCM, Huoxiang Zhengqi Oral Liquid is effective at treating gastrointestinal disorders. With its warm nature, Patchouli helps restore a balanced yin-yang harmony in individuals who have an excess of cold in their body, such as those with yin excess or yang deficiency. It has a pungent taste that promotes the circulation of qi and body fluids, with a specific focus on the lungs, spleen, and stomach.³¹ Its effects can be classified into: (1) Patchouli is known for its ability to treat spleen dysfunction caused by dampness. This herb is effective in resolving obstructions in the Middle *Jiao* (中焦) caused by dampness.³¹ (2) Patchouli is commonly used to address vomiting of all types. Its effectiveness in stopping vomiting makes it a valuable herb. It is often combined with other herbs to treat specific types of vomiting.³⁴ (3) Patchouli can release the exterior and provide relief in the early stages of wind-cold exterior syndromes. By dispersing wind-cold, this herb can alleviate symptoms such as fever with chills, headache, and body aches caused by external wind-cold or the presence of cold and dampness in the body.³¹ (4) Furthermore,

patchouli, which has long been widely used in beauty products, promotes the renewal of skin cells, ensuring smooth and healthy complexion. Its powerful antibacterial properties make it effective in addressing various skin issues such as acne, skin infections, cracked skin, and oily skin. Additionally, this herb may help prevent hair loss.³⁴

The utilization of herbal Patchouli dates back to ancient times. Although the plant originates from Southeast Asia, the earliest documented evidence of its existence comes from ancient Egypt and Islamic countries. In TCM, Patchouli is a member of the Lamiaceae family of flowering plants and has been used to treat various ailments such as colds, nausea, fever, headache, and diarrhea. Patchouli also has a rich history in China, where it was first mentioned in *Ming Yi Bie Lu* during the years 420 to 589 AD. In addition to its medicinal uses, Chinese silk merchants discovered its insecticidal properties in the 18th century.³¹

5.5 Asafetida (阿魏)

Ferula asafoetida is a plant belonging to the Umbelliferae family. Olejun gum is a resin called oleo gum that is extracted from the roots and rhizomes of the plants. Asafoetida, also known as asafetida, is the dried latex or resin obtained from the taproots of various perennial herbs in the *Ferula* genus, which belongs to the Umbelliferae family.³⁵ These plants are perennial herbs and are mainly found in the Mediterranean region and Central Asia. *Ferula asafoetida* Linn is a plant from which prized gum resin is obtained and used as a condiment in India and Iran.³⁶ The Latin term *ferula*, which translates to “carrier” or “vehicle”, is the origin of the name *asa*. *Asa* is a Latinized version of the Farsi word “asa”, which means “resin”, while the Latin *foetidus* signifies “smelling” or “fetid”. The primary regions where *asafoetida* is produced are Eastern Iran and Western Afghanistan, although some species can also be found in the Punjab and Kashmir regions. The earliest documentation of *asafoetida* within Chinese materia medica can be traced to the Tang dynasty (618–907 CE). It is referenced in significant classical texts, including *Tang Materia Medica*, compiled under the imperial command of Tang Emperor Gaozong (唐高宗). This work detailed the medicinal characteristics and uses of *asafoetida*, reflecting its vital role in TCM during that historical period.³⁶ *Asafoetida* serves various purposes, including its use as a medicine and a condiment.³⁵ While the exact timeline of its introduction to China is not well-documented, it likely coincided with periods of extensive cultural and commercial exchange along the Silk Road. The unique properties of *asafoetida* have intrigued Chinese herbalists, leading to its integration into the comprehensive pharmacopeia of TCM.³⁶

In terms of *Si Qi*, *Asafoetida*, known for its strong aromatic and warming properties, would likely be

categorized as a “warm” herb within TCM theory. As for *Wu Wei*, taste profile of *asafoetida*, distinguished by its pungent and bitter qualities, would have been analyzed to determine its therapeutic benefits and effects on various organs. Pungency is traditionally associated with the lung and large intestine meridians, while bitterness is thought to influence the heart and small intestine meridians. Concerning *Gui Jing*, *Asafoetida*’s affinity for the lung, large intestine, and spleen meridians may have been established based on its observed therapeutic actions, including promoting digestion, relieving respiratory congestion, and expelling parasites.³⁷

Despite its numerous biological activities, the use of *asafoetida* resin is limited due to its strong smell and poor solubility in water. Gummer resin has beneficial properties such as relieving spasms, promoting digestion, and stimulating the respiratory system. It is commonly used to treat various conditions in infants, including diarrhea, dysentery, indigestion, and colic. The gum from *F. asafoetida* shows promise as a treatment option for obesity and fatty liver disease associated with diabetes. Despite its strong smell, *asafoetida* is widely used in Persian cuisine as a spice and is believed to have a stimulating effect on the brain. It is commonly used as a flavoring agent and in TPM. While India utilizes *asafoetida* for both culinary and medicinal purposes, China primarily uses it in certain medicinal preparations.³⁸ In Iran and Afghanistan, where most production occurs, *asafoetida* is incorporated into food and medicine to stimulate the intestinal and respiratory tracts, as well as the nervous system. It is particularly effective in managing asthma, whooping cough, and chronic bronchitis. In China, a decoction of the plant is consumed orally as a vermifuge.³⁸

From a pharmacological perspective, we compiled a list of the bioactive effects of *Ferula asafoetida*: (1) Gastrointestinal Tract: *Ferula asafoetida* has proven to be a potent remedy for various stomach ailments.³⁷ (2) Cancer: Studies conducted on animals and test tubes suggest that *asafoetida* may inhibit the growth and spread of certain cancer cells, including breast and liver cancer cells.³⁵ (3) Women’s Ailments: *Ferula asafoetida* is believed to be beneficial for treating women’s health issues such as sterility, unwanted abortion, premature labor, excessively painful and difficult menstruation, and leucorrhea.³⁷ (4) Antibacterial, Antifungal, and Antimicrobial Effects: *Asafoetida* possesses properties that protect against pathogens, including different strains of *Streptococcus* bacteria.³⁷ (5) Blood Pressure: Research indicates that *Ferula asafoetida* can significantly lower blood pressure, producing hypotensive effects and reducing mean arterial blood pressure.³⁷ (6) Antioxidant Activity: *Ferula asafoetida* significantly inhibits lipid peroxidation, as measured by thiobarbituric acid-reactive substances in the liver.³⁶

Historically, it has been relied upon for its medicinal properties, including the treatment of ailments such as

asthma, epilepsy, stomachaches, flatulence, intestinal parasites, weak digestion, and influenza.³⁶ Within the realm of TCM, asafoetida is renowned for its capacity to dispel coldness and alleviate phlegm-related issues. According to ancient Chinese medical texts, asafoetida is believed to affect the stomach, spleen, and liver.³⁸ It has a bitter and acrid taste and is considered to be warm. Recent studies, including those in pharmacology and biology, have also revealed that asafoetida has various properties such as antioxidant, antiviral, antifungal, cancer prevention, antidiabetic, antispasmodic, hypotensive, and mollusk effects.³⁷

5.6 Mo Shi Zi (没食子)

Mo Shi Zi (没食子), a well-known herb in TCM, was introduced to China during the Northern Wei dynasty from Persia.³⁹ It was given various names when translated from Persian to Chinese.³⁹ *Mo Shi Zi* are round knots that form on oak branches, leaves, or flower buds after being pierced by wasps and other insects to lay their eggs. It is important to note that *Mo Shi Zi*, also referred to as gallnuts or Chinese galls, should not be confused with *Trachyspermum ammi*. *Trachyspermum ammi*, commonly known as Ajwain or Carom seeds, is a flowering plant in the family Apiaceae, while *Mo Shi Zi* is a specific type of galls formed by insects on certain trees, particularly oak trees, and has been utilized in TCM for centuries.³⁹ Gallnut was first brought to China during the Tang dynasty.⁴⁰ It originated from Turkey, Syria, Iran, India, and other regions. These names are derived from the Persian term “māzū” which refers to this particular object. The historical references to *Mo Shi Zi* in Chinese materia medica can be traced back to the Tang dynasty (618–907 CE). This text is recognized as one of the earliest Chinese pharmacopoeias to document medicinal substances that were imported, illustrating the role of the Silk Road in the development of TCM. Later works, such as *Ben Cao Gang Mu*, further acknowledged *Mo Shi Zi*, signifying their persistent relevance in Chinese pharmacological practices.³⁹ China produces approximately 95% of the world's *Mo Shi Zi*, with Guizhou and Yunnan being the largest producing regions within the country.⁴⁰

In terms of *Si Qi*, gallnuts are generally recognized for their astringent properties and are often classified as having a cool nature in TCM.⁴¹ Regarding *Wu Wei*, gallnuts are primarily characterized by their sour and astringent taste, categorizing them mainly as sour and bitter flavors within TCM.⁴¹ For *Gui Jing*, gallnuts are primarily associated with the liver and large intestine meridians. This meridian affinity influences their therapeutic actions and indications in TCM practice.³⁹

The pharmacological function of Gallnut includes its effectiveness in treating various intestinal disorders such as diarrhea, dysentery, and intestinal parasites.³⁹

It is also beneficial for treating rectal prolapse, hemorrhoids, and bleeding issues such as functional bleeding, hematochezia, and bleeding hemorrhoids, as well as for topical use in treating bleeding wounds and ulcerations. Additionally, gallnuts can help with excessive discharge problems such as enuresis, frequent urination, leucorrhea, hyperhidrosis, and night sweating, as well as involuntary seminal emission.⁴²

Gallnuts are known for their strong astringent properties, due to their high tannin content. Tannins are natural compounds found in plants that are soluble in water. Moreover, Gallnuts have shown significant antibacterial activity against a wide range of bacteria, including clinical isolates.⁴²

6 Conclusion

The transmission of herbal medicine to China via the Silk Road during medieval times was a transformative process that significantly influenced the development of TCM. As merchants, scholars, and travelers from Central Asia, India, Persia, and the Mediterranean passed through the Silk Road, they brought not only goods but also valuable medical knowledge and therapeutic practices. This exchange introduced a diverse array of foreign herbs and medicinal substances, which were eventually incorporated into the extensive pharmacopeia of TCM. For centuries, the Silk Road served as a crucial conduit for the exchange of goods, ideas, and knowledge across regions. This ancient trade network connected China to the western parts of Asia, the Mediterranean, Northern Africa, and Southeast Asia. As it facilitated the movement of information, medical knowledge and remedies were introduced to China from various cultures. The medicinal practices of different civilizations were often influenced by the herbs, treatments, and knowledge encountered along this route. The historical exchange between Chinese Medicine and other traditions underscores the significance of international communication in shaping both fields. Key examples of foreign herbs that entered China through the Silk Road include saffron, benzoin resin, asafetida, and various spices and medicinal plants. These herbs introduced new therapeutic options to TCM, broadening its scope and enhancing its treatment modalities. As foreign herbs were incorporated into Chinese medicine, they underwent processes of standardization, with their thermal nature, taste, and meridian affinities carefully identified and recorded in major medical texts like *Shen Nong Ben Cao Jing* and *Ben Cao Gang Mu*.

In conclusion, the transmission of herbal medicine along the Silk Roads not only facilitated the exchange of goods but also initiated a fusion of medical knowledge between East and West. This cross-cultural exchange enriched Chinese herbal medicine, expanding its capacity to address a broader range of health issues.

The resulting synthesis of foreign and indigenous knowledge highlights the dynamic, evolving nature of TCM, which remains an integral part of global health-care today.

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This study does not contain any studies with human or animal subjects performed by the author.

Author contributions

Ali Mollahassani wrote and reviewed the manuscript. CHENG Aoyu collected the related papers. ZHANG Weidong and WU Ye reviewed and revised the manuscript.

Conflicts of interest

The authors declare no financial or other conflicts of interest.

References

- [1] Hansen V. *The Silk Road: A New History*. New York: Oxford University Press; 2012. p. 112–123.
- [2] Liu XR. *The Silk Road in World History*. New York: Oxford University Press; 2011. p. 54–61.
- [3] Shi JM, Yang YF, Zhou XX, et al. The current status of old traditional medicine introduced from Persia to China. *Frontiers in Pharmacology*. 2022;13:953352.
- [4] Foltz RC. *Religions of the Silk Road: Premodern Patterns of Globalization*. New York: Palgrave Macmillan; 2010. p. 29–36.
- [5] Chin T. The invention of the Silk Road, 1877. *Critical Inquiry*. 2013;40(1):194–219.
- [6] Zhang XB, Lyu DM, Huang LQ, Li M, Guo LP, Peng HS. Discussion on exploitation of foreign traditional Chinese medicine resources based on “the Belt and Road” (基于“一带一路”的外来中药资源开发探讨). *China Journal of Chinese Materia Medica*. 2018;43(7):1501–1506. Chinese.
- [7] Bradley S. The Silk Road and sources of Chinese medicine expansion: part 1-materia medica. *Chinese Medicine and Culture*. 2018;1(1):29–31.
- [8] Wenger T. History of saffron. *Longhua Chinese Medicine*. 2022;5:15.
- [9] Shahrajabian MH, Sun W, Cheng Q. The influence of traditional Iranian and Chinese medicine on Western and Islamic countries. *Asian Journal of Traditional Medicines*. 2019;5(2):94–99.
- [10] Bradley S. The Silk Road and sources of Chinese medicine expansion: part iii-histories. *Chinese Medicine and Culture*. 2019;2(1):29–31.
- [11] Bahramsoltani R, Rahimi R. An evaluation of traditional Persian medicine for the management of SARS-CoV-2. *Frontiers in Pharmacology*. 2020;11:571434.
- [12] Wu L, Chen WY, Wang Z. Traditional Indian medicine in China: the status quo of recognition, development and research. *Journal of Ethnopharmacology*. 2021;279:114317.
- [13] Patwardhan B, Warude D, Pushpangadan P, Bhatt N. Ayurveda and traditional Chinese medicine: a comparative overview. *Evidence-based Complementary and Alternative Medicine*. 2005;2(4):465–473.
- [14] Elahee SF, Mao H, Shen X. Traditional Indian medicine and traditional Chinese medicine: a comparative overview. *Chinese Medicine and Culture*. 2019;2(3):105–113.
- [15] Azaizeh H, Saad B, Cooper E, Said O. Traditional Arabic and Islamic medicine, a re-emerging health aid. *Evidence-based Complementary and Alternative Medicine*. 2010;7(4):419–424.
- [16] Buell PD, Anderson EN. *Arabic Medicine in China: Tradition, Innovation, and Change*. Leiden: Brill; 2021. p. 87–96.
- [17] AlRawi SN, Khidir A, Elnashar MS, et al. Traditional Arabic & Islamic medicine: validation and empirical assessment of a conceptual model in Qatar. *BMC Complementary and Alternative Medicine*. 2017;17(1):157.
- [18] Metwaly AM, Ghoneim MM, Eissa IH, et al. Traditional ancient Egyptian medicine: a review. *Saudi Journal of Biological Sciences*. 2021;28(10):5823–5832.
- [19] Ming C. The Transmission of foreign medicine via the Silk Roads in medieval China: a case study of *Haoyao Bencao*. *Asian Medicine*. 2007;3(2):241–264.
- [20] Albala K. Almonds along the Silk Road: the exchange and adaptation of ideas from west to east. *Petits Propos Culinaires*. 2009;88:19–34.
- [21] Mzabri I, Addi M, Berrichi A. Traditional and modern uses of saffron (*Crocus sativus*). *Cosmetics*. 2019;6(4):1–11.
- [22] Siddiqui MJ, Saleh MSM, Basharruddin SNBB, et al. Saffron (*Crocus sativus* L.): as an antidepressant. *Journal of Pharmacy and Bioallied Sciences*. 2018;10(4):173.
- [23] Golmohammadzadeh S, Jaafari MR, Hosseinzadeh H. Does saffron have antisolar and moisturizing effects? *Iranian Journal of Pharmaceutical Research*. 2010;9(2):133–140.
- [24] Mollazadeh H, Emami SA, Hosseinzadeh H. Razi's Al-hawi and saffron (*Crocus sativus*): a review. *Iranian Journal of Basic Medical Sciences*. 2015;18(12):1153–1166.
- [25] Ge SS, Duo L, Wang JQ, et al. A unique understanding of traditional medicine of pomegranate, *Punica granatum* L. and its current research status. *Journal of Ethnopharmacology*. 2021;271:113877.
- [26] Zarfeshany A, Asgary S, Javanmard SH. Potent health effects of pomegranate. *Advanced Biomedical Research*. 2014;3(1):100.
- [27] Sarkhosh A, Zamani Z, Fatahi R, Ghorbani H, Hadian J. A review on medicinal characteristics of pomegranate (*Punica granatum* L.). *Journal of Medicinal Plants*. 2007;6(22):13–24.
- [28] He Q, Sun Y, Chen X, Feng J, Liu Y. Benzoin resin: an overview on its production process, phytochemistry, traditional use and quality control. *Plants*. 2023;12(10):1976.
- [29] Feng J, He QQ, Xie AZ, Liu YY. Successful identification of the species of the semipetrified amber medicinal resin benzoin using molecular diagnostic technology. *Scientific Reports*. 2023;13(1):2943.
- [30] Zhang L, Wang FF, Zhang Q, et al. Traditional ancient Egyptian medicine: a review. Anti-inflammatory and anti-apoptotic effects of Stybenpropol A on human umbilical vein endothelial cells. *International Journal of Molecular Sciences*. 2019;20(21):5383.
- [31] Chen JR, Xie XF, Li MT, et al. Pharmacological activities and mechanisms of action of *Pogostemon Cablin* Benth: a review. *Chinese Medicine*. 2021;16(1):5.
- [32] Chen Y, Wu YG, Xu Y, et al. Dynamic accumulation of sesquiterpenes in essential oil of *Pogostemon cablin*. *Revista Brasileira de Farmacognosia*. 2014;24(6):626–634.
- [33] Swamy MK, Sinniah UR. A comprehensive review on the phytochemical constituents and pharmacological activities of *Pogostemon cablin* Benth: an aromatic medicinal plant of industrial importance. *Molecules*. 2015;20(5):8521–8547.
- [34] Zhang XR, Li TN, Ren YY, et al. The important role of volatile components from a traditional Chinese medicine *Dayuan-Yin* against the COVID-19 pandemic. *Frontiers in Pharmacology*. 2020;11:583651.
- [35] Peter KV. *Handbook of Herbs and Spices*. Sawston: Woodhead Publishing; 2012. p. 112–230.
- [36] Peter KV. *Handbook of Herbs and Spices*. Sawston: Woodhead Publishing; 2006. p. 71–102.
- [37] Mahendra P, Bisht S. Ferula asafoetida: traditional uses and pharmacological activity. *Pharmacological Review*. 2012;6(12):141–146.
- [38] Zhu WL, Zhang YN, Huang YJ, Lu L. Chinese herbal medicine for the treatment of drug addiction. *International Review of Neurobiology*. 2017;135:279–295.
- [39] Hu YX, Liang QY, Zhang XD, Ding J, Wang LH, Xu LL. Gallnut and its identification as a herb in traditional Chinese medicine

- (外来药物没食子考辨). *Chinese Journal of Medical History*. 2023;53(1):8–14. Chinese.
- [40] Ren YY, Zhang XR, Li TN, Zeng YJ, Wang J, Huang QW. Galla chinensis, a traditional Chinese medicine: comprehensive review of botany, traditional uses, chemical composition, pharmacology and toxicology. *Journal of Ethnopharmacology*. 2021;278: 114247.
- [41] Gao JY, Yang X, Yin WP, Li M. Gallnuts: a potential treasure in anticancer drug discovery. *Evidence-based Complementary and Alternative Medicine*. 2018;2018:4930371.
- [42] Sariozlu NY, Kivanc M. Gallnuts (quercus infectoria oliv. and rhus chinensis mill.) and their usage in health. *Nuts and Seeds in Health and Disease Prevention*. 2011;505–511.

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Using *Xiang* Thinking to Unravel the Mystery of *Wu Xing* in Traditional Chinese Medicine

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Abstract

From the perspective of *Xiang* thinking (象思维 imagery thinking), the application of *Wu Xing* (五行 five elements) in traditional Chinese medicine (TCM) provides a reasonable cognitive model. *Wu Xing* with the earth in the center (中土五行) helps TCM establish extensive connections between the human body and the universe, while *Wu Xing* in the generating and conquering cycles (生克五行) incorporates everything into a systematic thinking framework through complex dialectical relationships, becoming an ideal cognitive tool for TCM diagnosis and treatment. In essence, *Wu Xing* represents an upgrade of yin-yang dialectical thinking into a two-dimensional *Xiang* thinking diagram, possessing powerful explanatory capabilities. When faced with complex life systems, *Wu Xing* provides TCM with a theoretical framework, and TCM, in turn, offers a practical application for *Wu Xing*.

Keywords: Yin-yang; *Wu Xing* (五行); *Xiang* thinking (象思维); Two-dimensional yin-yang structure

1 Introduction

The term “*Xiang* thinking (象思维 imagery thinking)” is first proposed by Wang Shuren (王树人) in the 1980s, as a contrast to the conceptual and logical thinking characteristic of the Western culture. *Xiang* thinking represents a holistic, dialectic, dynamic and non-objectified mode of Chinese thinking. It is a crucial cross-cultural comparative category, with theoretical value and inclusivity surpassing other terms like “symbolic thinking” and “image thinking”.

The doctrine of *Wu Xing* (五行 five elements) is the cornerstone of the theory of *Zang Xiang* (藏象 visceral manifestation) in traditional Chinese medicine (TCM), and indeed the entire theoretical system of TCM. Whether it possesses scientific validity is one of the most common criticisms of TCM. Defending *Wu Xing* often falls into two pitfalls: either talking only in the context of traditional Chinese culture using culture-specific terms without persuasive power due to the incompatibility between Chinese and Western thinking, or force-fitting

it into Western scientific and philosophical frameworks, thereby deconstructing the TCM theory. This paper attempts to decipher the doctrine of *Wu Xing* from the perspective of “*Xiang* thinking” (Note 1).

Wu Xing forms a grand system based on the number of five, covering various aspects of nature and humanity. This unique phenomenon of Chinese culture and thinking has an irreplaceable application in understanding and solving problems, particularly in TCM theory. Therefore, Lou Yulie (楼宇烈) said: “Without understanding TCM, one cannot grasp the fundamental characteristics of Chinese philosophy, nor can one appreciate the core spirit of Chinese culture”.¹

Wu Xing in TCM is presented in two forms: *Wu Xing* with the earth in the center (中土五行) and *Wu Xing* in the generating and conquering cycles (生克五行). The primary function of *Wu Xing* with the earth in the center lies in analogy, establishing an ever-expanding *Wu Xing* system that aids in forming holistic and relational thinking. On the other hand, *Wu Xing* in the generating and conquering cycles fully embodies dialectical thinking by expressing complex relational systems. Both distinctly showcase the characteristics of TCM thinking, as well as those of Chinese thinking, or “*Xiang* thinking”.

2 *Wu Xing* with the earth in the center (中土五行)

In *Wu Xing* system, wood (木), fire (火), earth (土), metal (金), and water (水) are not merely concepts of five substances but an expandable analogy system formed through inductive reasoning of the properties of these substances. The symbol of this system is *Wu Xing* with

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the earth in the center (Note 2), corresponding to the four directions with the four phases of wood, fire, water and metal, and with earth in the center (Fig. 1). This is also why it is called “Wu Xing with the earth in the center”.

In this model, the earth holds a special position. *Bai Hu Tong Wu Xing* (《白虎通·五行》 *The Confucian Classics Discussions in Bai Hu Hall Meeting: The Five Elements*) stated, “reigning over the four seasons, occupying the center, not belonging to any of the four seasons (王四季, 居中央, 不名时)”. Similar expressions are also found in texts such as *Huai Nan Zi Tian Wen Xun* (《淮南子·天文训》 *The Huainanzi: Celestial Patterns*). This practical solution solves the problem of matching Wu Xing with the four directions and four seasons. Through analogy, a grand system linking Wu Xing with directions, seasons, colors, tastes, and more was gradually formed. Especially, the correspondence between Wu Xing and directions and seasons linked the five substances, which originally lacked profound philosophical significance, with space (four directions plus center) and time (changing seasons), creating an all-encompassing pattern with infinite inclusivity. As the system expanded, each element of Wu Xing also gained increasingly rich connotations.

Scholars generally agree that Wu Xing is not simply five elements or substances (Note 3). In reality, Wu Xing is not merely a classification based on five functions or properties. Unlike Western categorization based on conceptual and logical thinking, Wu Xing is based on intuition and association, establishing connections among different things through analogy, creating the basis for associative and analogical thinking.

In TCM, the introduction of Wu Xing system integrates Wu Zang (五脏 five Zang-organs) with the body's physical and mental phenomena, such as Wu Ti (五体 five corporeal structures), Wu Ye (五液 five body fluids), Wu Mai (五脉 five pulses), Wu Guan (五官 five sense organs), Wu Zhi (五志 five emotions), and Wu Luan (五乱 five disturbances/disorders), forming an organic whole. It also connects the individual with the natural and social worlds, such as five (four)

seasons, five (four) directions (Note 4), Wu Wei (五味 five flavors), Wu Se (五色 five colors), Wu Yin (五音 five musical tones), Wu Gu (五谷 five grains), Wu Guo (五果 five fruits), Wu Chong (五虫 five animals), Wu Lun (五伦 five cardinal relationships) and Wu Chang (五常 five eternal virtues) (Note 5), avoiding isolated thinking in both internal and external dimensions. This reflects the Chinese traditional view of life and the universe, adhering to the cognitive approach of Tian Ren He Yi (天人合一 unity between heaven and man). Its application in TCM's treatment based on pattern differentiation (辨证施治) emphasizes linking various internal and external factors for comprehensive evaluation.

However, it has been a long process to establish this relational model. Taking the alignment of Wu Xing with the five Zang-organs for example, historically, there were two systems based on the ancient text version of *Shang Shu* (《尚书》 *Book of Documents*) and the modern text version of it. The commonly accepted system, represented by *Huang Di Nei Jing* (《黄帝内经》 *The Yellow Emperor's Inner Classic*), assigns liver to wood, heart to fire, spleen to earth, lung to metal, and kidney to water, which is in accordance with the modern text version of *Shang Shu*. Conversely, *Lyu Shi Chun Qiu Shi Er Ji* (《吕氏春秋·十二纪》 *Spring and Autumn Annals of Lu Buwei: Twelve Chronicles*), *Li Ji Yue Ling* (《礼记·月令》 *Book of Rites: Monthly Ordinance*), *Huai Nan Zi Shi Ze Xun* (《淮南子·时则训》 *The Huainanzi: Seasonal Rules*) assign spleen to wood, lung to fire, heart to earth, liver to metal, and kidney to water, following the ancient text version of *Shang Shu* system. *Huai Nan Zi Di Xing Xun* (《淮南子·地形训》 *The Huainanzi: Terrestrial Forms*) adopts the modern text system but replaces spleen with stomach to align with earth. Another example is *Guan Zi Shui Di* (《管子·水地》 *Guanzi: Water and Earth*), which correlates five organs with five tastes, generating another combination: spleen to wood, liver to fire, heart to earth, kidney to metal, and lung to water.

The process of matching Wu Xing with the five organs illustrates the absence of an a priori necessity for these correspondences. It was a gradual process through long-term practice, continuous exploration, adjustment and summarization.

Borrowing terminology from Zhuangzi (庄子) and *Yi Jing* (《易经》 *The Book of Changes*), the observation and summarization of various things' properties in Wu Xing is a process of “taking Xiang (取象)”, while organizing and building the system involves a process of “establishing Xiang to fully express the meaning (立象以尽意)”. This demonstrates the characteristics of Xiang thinking. In the application of Wu Xing with the earth in the center in the Zang Xiang theory of TCM, for example, the phases of fire (summer/south) and water (winter/north), bear the significance of dispersing or Taiyang (太阳 Greater Yang) and contracting or Taiyin (太阴 Greater Yin); The elements of wood (spring/east) and metal (autumn/west), bear the significance of rising



Figure 1 Wu Xing system diagram (source with permission from: made by the author)

or Shaoyang (少阳 Lesser Yang) and falling or Shaoyin (少阴 Lesser Yin) respectively; the earth in the middle stands for a balanced state of yin-yang. However, in most cases, this form of *Wu Xing* mainly signifies analogy. While establishing infinite connections, it is just like five parallel lines (Fig. 2). Establishing and exploring the rich relationships among *Wu Xing* require another form, *Wu Xing* in the generating and conquering cycles.

3 *Wu Xing* in the generating and conquering cycles

Wu Xing in the generating and conquering cycles is fundamentally different from *Wu Xing* with the earth in the center. While the primary function of the latter lies in analogy, the main function of the former lies in establishing overall relationships, making it a perfect example of “establish *Xiang*”. *Wu Xing* in the generating and conquering cycles forms a “generating in sequence and conquering in alternation (比相生而间相胜)” pattern as specified in *Chun Qiu Fan Lu Wu Xing Xiang Sheng* (《春秋繁露·五行相生》 *Luxuriant Dew of the Spring and Autumn Annals: Five Elements Generating*), presented as a pentagon with an inscribed pentagram (Fig. 3). The outer pentagon forms the generating cycle, and the inner



Figure 2 *Wu Xing* analogy diagram (source with permission from: made by the author)

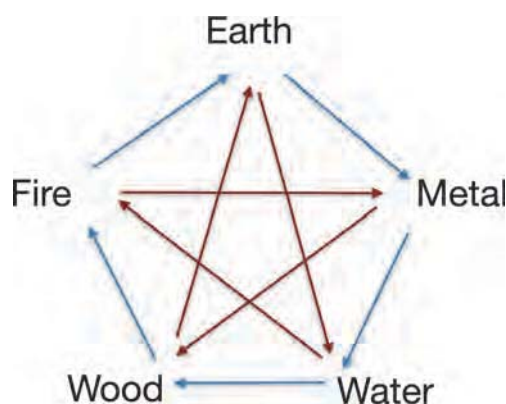


Figure 3 *Wu Xing* in the generating and conquering cycles form (source with permission from: made by the author)

pentagram forms the conquering cycle. In this diagram, the five elements are equal, eliminating the special status of earth and finding for it a corresponding position in the seasons through the concept of “later summer (季夏)” or “long summer (长夏)” (Note 6).

The generating and conquering cycles dilute the individual characteristics of *Wu Xing*. In fact, pentagons and pentagrams are rotationally symmetrical geometric shapes; starting from any corner, all relationship combinations are equivalent. This forms a cycle with endless relationships. In other words, the generating and conquering cycles can be abstracted into letters (Note 7) (Fig. 4), thus producing a more abstract, mathematical expression: starting from any point A, the relationships can be specified as: A generates B, conquers C, is conquered by D, and is generated by E, demonstrating a set of four relationships.

For any A, besides the aforementioned AB (generating), AC (conquering), DA (being conquered), and EA (being generated) relationships, several smaller cyclic relationships starting from it can also be established, such as three-step circles ABDA (generating, conquering, conquering), ACDA (conquering, generating, conquering), and ACEA (conquering, conquering, generating), four-step circles ABCDA (generating, generating, generating, conquering), ACDEA (conquering, generating, generating, generating), and of course, the largest cycles of five steps, ABCDEA (generating, generating, generating, generating, generating), and ACEBDA (conquering, conquering, conquering, conquering, conquering). Numerous rich relationship forms can be extracted accordingly, making it difficult to simplify the relationships between any two elements in *Wu Xing*.

Just as yin (阴) and yang (阳) are not simply binary oppositions, *Wu Xing* is not a system of one-way generating or conquering relationships. The ancients may not have consciously recognized the mathematical and systemic laws we have abstracted, but in practice, through expressions like generating (生), conquering (克), over-conquering (乘), and counter-conquering (侮) relationships, similar effects were achieved, just as in the case of its application in TCM. The goal is to avoid absolutizing generating and conquering relationships, and increasing the complexity, dialectical nature, and dynamism of *Wu Xing* model.

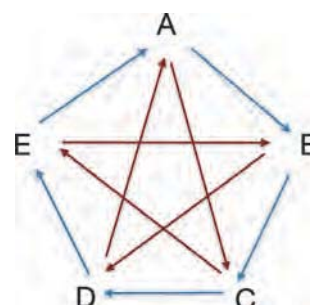


Figure 4 The generating and conquering cycles abstracted into letters (source with permission from: made by the author)

First, generating and conquering relationships are not simple unidirectional relationships. For example, in the relationship of “generating” (mother-child, AB, EA), *Huai Nan Zi Tian Wen Xun* suggests, “The child generates the mother means righteousness; the mother generates the child means protection; the child and mother mutually benefit each other means specialty; the mother conquers the child means dominance; the child conquers the mother means frustration (子生母曰义, 母生子曰保, 子母相得曰专, 母胜子曰制, 子胜母曰困)”. In the “conquering” (AC, DA) relationship, there is an issue of power comparison, as stated by Mozi (墨子), “*Wu Xing* have no constant victory (五行无常胜)” (《墨子·经下》*The Mozi: Concept: 2nd Volume*). Additionally, there are more refined relationships where the “conquering” party is too strong, leading to “over-control (相乘)” (倍克 conquering with double strength), and the “conquering” party is relatively too weak, leading to “counter-offending (相侮)” (反侮 reversed conquering). (Note 8)

In the *Zang Xiang* theory of TCM, concepts like “the mother’s illness affects the child (母病及子)” “the child’s illness affects the mother (子病及母)” “the child steals the mother’s *qi* (子盗母气)” and “supplement the mother for a deficiency pattern, and drain the child for an excess pattern (虚则补其母, 实则泄其子)”, adjust A through B or E. Meanwhile, expressions like “the conquered (财 wealth) generates the conquering (官 authority); the generating (印 seal) conquers the generated (食 food deity)” in fate theory, i.e., C generates D and E conquers B, and “the child can rescue the father in trouble, so metal conquers wood, and fire (the son of wood) returns its enmity” in *Wu Xing Da Yi* (《五行大义》*The General Principle of Wu Xing*) by Xiao Ji (萧吉) of the Sui dynasty, expound on the impact of B, C, D, and E as regards A. The factors of yin-yang and the waxing and waning cycle of “birth (生), growth (壮), aging (老), imprisonment (囚), and death (死)”, as stated in *Huai Nan Zi Di Xing Xun*, when combined with *Wu Xing*, also expand the explanatory dimension and enhance the explanatory power of the system.

Wu Xing Da Yi proposes the theory of “intermingling of *Wu Xing* (五行相杂)”, in which each element contains the other four elements. “*Wu Xing* are evenly distributed, omnipresent, and cannot be confined to a single path.... Each element inherently contains five meanings. For example, wood has the property of bending and straightening, which is wood; wood produces fire, which is fire; wood can be used as weapons, which is (the function of) metal; wood contains moisture, which is water; wood produces flowers, leaves, and fruits, which is (the function of) earth (凡五行均布, 遍在万有, 不可定守一途。.....一行当体即有五义。如木有曲直, 此是木也, 木中有火, 则是火也, 木堪为兵仗, 有击触之能, 即是金也, 木中有润即是水也, 木吐华叶子实, 即是土也)”. This explanation of *Wu Xing* each containing five meanings is similar to the symbolic expression of *Wu Xing*, both diluting the uniqueness of

each element while extending this systemic thinking to subsystems. The expressions by Zhang Jiebin (张介宾), a famous TCM doctor of the Ming dynasty, such as “each organ contains the wonder of *Wu Xing* (五脏各具五行之妙)” and “each organ also contains five *qi* (五脏各兼五气)”, the expression by Zhou Shenzhai (周慎斋) that “each *Zang*-organ has its spleen and stomach (各脏皆有脾胃)”, and that by He Mengyao (何梦瑶) of the Qing dynasty that “each organ contains *Wu Xing* (五脏各具五行)”, as summarized by Zhang Qicheng (张其成),² are specific applications of the theory of “intermingling of *Wu Xing*” in TCM.

Wu Xing Da Yi also summarizes the relationships of “harmony (合)” “assistance and suppression (扶抑)” “mutual overcoming (相克)” “incompatibility (刑)” “harm (害)” and “conflict and disruption (冲破)” among *Wu Xing*, undoubtedly increasing the complexity of their relationships and avoiding the simplification and absolutization of generating and conquering. The “Generating, Conquering, Controlling and Transforming of *Wu Xing* (五行生克制化)” chapter of Shao Yong’s (邵雍) *He Luo Zhen Shu Wu Xing Sheng Ke Zhi Hua* (《河洛真数·五行生克制化》*He-Luo Authentic Numerology: The Five Elements Give Rise to Restraint*) of Song dynasty also provides a detailed explanation of the dialectical relationships of *Wu Xing* in comparative strength, and excess or deficiency among them.

Therefore, in the *Zang Xiang* theory in TCM, the heart, lung, liver, spleen, and kidney, along with their related spiritual and physical phenomena [spirit (神), *qi* (气), blood (血), flesh (肉), willpower (志)], form a complex network of relationships without absolute hierarchy. As Lou Yulie said, “The whole includes the parts, the parts reflect the whole, and any changes in the parts within the whole directly affect the whole, while changes in the whole also affect the parts”.³ This aligns with modern systems thinking, where every element within the system is interconnected, with no isolated ones.

TCM is a discipline that studies life. Lou Yulie pointed out that, “The life view of TCM is a holistic one, considering life as an integrated whole. The fundamental point of TCM is to view the body with a holistic, dialectical approach”.³ *Wu Xing* theory views humans as a system within the larger system of the universe, which, at that time, was undoubtedly an advanced concept aligned with the reality of life.

To sum up, the dialectical relationships of *Wu Xing* in the generating and conquering cycles and the analogy of *Wu Xing* with the earth in the center together provide a practicable framework for TCM’s study of humans and the world, as well as a set of flexible tools.

4 Traditional Chinese medicine and Xiang thinking

The application of *Wu Xing* in TCM theory is a typical example of the Chinese “*Xiang* thinking”. *Xiang*

thinking differs from conceptual thinking by grasping the whole intuitively. To explain the paradigm of traditional Chinese science, Li Shuhua (李曙华) created the new concept of “*Xing'er Zhong* (形而中 in between the physical and the metaphysical)” in contrast to “*Xing'er Shang* (形而上 metaphysics)” and “*Xing'er Xia* (形而下 physical world), as it is neither the abstract, imageless “*Dao* (道 way)” nor the concrete, tangible “*Qi* (器 matter)”, but a middle state through which the Chinese people perceive the world.⁴

Chinese people do not objectify the external world but start from *Dao*, the shared origin of both human and nature. *Dao* is nameless and imageless, making it difficult to be a subject of thought and expression, yet its function is omnipresent. Therefore, through observing and “taking *Xiang*” to embody *Dao*, and in the savoring of *Xiang*, Chinese people creatively produce “meaningful images”, originating from physical images but encompassing human cognition. This process is “establishing *Xiang*”. In this, the ancients did not pursue further abstraction to explore the world with purely rational abstract concepts but fully recognized the limitations of concepts and even language itself, as “words cannot fully express the meaning (言不尽意)”. Instead, they step back from purely conceptual thinking and consciously adopted the approach of “establishing *Xiang* to fully express the meaning”, using *Xiang*, which is seemingly ambiguous but in reality rich in meaning and with strong inclusive power, as a medium to combine intuition and reason, to think, deduce, understand the world and solve problems, avoiding partiality, isolation, absolutism, and static nature of concepts abstracted from the holistic real world.

When talking about TCM, Lou Yulie insightfully pointed out that, “Is clarity closer to the holistic true nature of things or is vagueness closer to it? This is a serious question. Science increasingly recognizes that vagueness is closer to the true nature of things, while clarity may lead to a more partial understanding of things”.³ Human perception and understanding are limited; the clearer the expression, the more likely it is to reduce the infinite reality into limited human perception. The adherence to *Xiang* thinking by Chinese people is a refusal to separate from *Dao*, avoiding the trap of purely conceptual thinking. Similarly, early human writings are pictographic, but later, major scripts, except Chinese characters, evolved into phonetic scripts. Only Chinese characters remain ideographic, maintaining the “image” as a umbilical cord connecting to the world. If early image thinking was a natural result of human cognitive limitations, the later approach of “establishing *Xiang* to full express the meaning” by the Chinese people is a conscious choice to better understand the world. When Chinese characters were once considered backward in the face of Western cultural impact, some advocated for abandoning Chinese characters and Latinizing the language. Now, people recognize the unique value and

charm of Chinese characters, which are not backward but different from phonetic scripts. Similarly, *Xiang* thinking should not be viewed as a primitive thinking mode that has not reached the level of conceptual thinking.

Traditionally, this way of thinking from *Xiang* to *Xiang* in China has significant advantages in handling complex problems. Taking TCM for example, the information contained within *Wu Xing* is immense and hard to exhaust with language. It becomes a practical tool containing more correct choices in addressing life issues. Observing and establishing *Xiang*, and using *Xiang* to interpret and solve problems are the characteristics of TCM. Not only is *Wu Xing* being *Xiang*, but yin-yang, *Ba Gang Bian Zheng* (八纲辨证 the eight principles of diagnosis), *Wu Yun Liu Qi* (五运六气 the five movements and six qi), *Jing Qi* (精气 essence qi), *Zang Fu*-organs (脏腑), *Mai Xiang* (脉象 pulse manifestations), and *Si Qi Wu Wei* (四气五味 the four qi and five flavors) of the Chinese medicine are all *Xiang*, fitting Wang Shuren's description of *Xiang* thinking, “non-substantial” “non-objectified” and “non-ready-made”.⁵ TCM uses these *Xiang* for diagnosis and treatment. Among them, *Wu Xing* is undoubtedly an important general *Xiang* as a thinking tool. *Wu Xing* model itself is *Xiang*, and many variables substituted into the model are also *Xiang*. It encompasses almost all elements of both internal and external systems, ensuring the comprehensiveness and dialectical nature of TCM thinking.

The process of TCM aligning *Xiang* with *Xiang* and thinking from *Xiang* to *Xiang* avoids the limitations of abstract, definite conceptual thinking, which is also the secret of the successful application of *Wu Xing* in TCM. This thinking mode provides users with vast interpretive space with occasional compromising on consistency, where experience-based flexible application plays an important role. The traditional cultural characteristic of “the art of application lies in one's mind (运用之妙，存乎一心)” is fully revealed here. As long as it helps solve the problem and is reasonable, it can be established as a proper application through the expression of *Xiang* thinking. The explorations of various TCM schools are examples of this. Theories and practices in *Xiang* thinking can mutually select and promote each other. Although on the practical end, more defined concepts and rules are used, the upper-level theoretical framework of TCM remains as an all-embracing umbrella based on *Xiang* thinking.

During the Han dynasty, various systems of *Xiang* thinking, including yin-yang, *Wu Xing*, *Ba Gua* (八卦 the eight trigrams), and *Tian Gan Di Zhi* (天干地支 the heavenly stems and earthly branches) converged, developing into a synthesizing period that matured, systematized, and theorized traditional *Xiang* thinking, making it reach its application peak. The formation of TCM's core theory in this period, represented by the *Zang Xiang* theory in classics such as *Huang Di Nei Jing*, was no

coincidence. On the one hand, *Xiang* thinking, including *Wu Xing*, established TCM's theoretical framework; on the other hand, TCM practice enriched and perfected systems like yin-yang and *Wu Xing*. This was a result of long-term experiential accumulation, theoretical exploration, continuous validation, trial and error, and correction. The matching of *Wu Xing* with the five organs and the perfection of the meridian system (经脉) are good examples.

However, the development of systematization and theorization also brought about the problem of fixing and abstracting *Xiang* thinking. With the interpretations of the Confucian scholars in the Han dynasty and the elaborations of the Confucian scholars in the Song dynasty, the vibrant, integrated *Xiang* thinking system was gradually eroded by systematic and abstract theoretical reasoning. TCM might be the last remaining domain where *Xiang* thinking thrives. However, within TCM, *Xiang* thinking also faces the crisis of ossification and absolutization, especially needing to avoid the pitfalls of “being confined by names and stuck by sentences (囿于名相，死于句下)”, and to leave enough free space when doing necessary theoretical sorting, in order to let *Xiang* thinking exert its unique advantages and demonstrate its vitality.

5 Yin-yang, *Wu Xing*, and *Xiang* thinking

To fully understand the important role of *Wu Xing* in TCM applications, we need to reconsider the relationship between yin-yang and *Wu Xing* from the perspective of *Xiang* thinking.

The generating and conquering cycles of *Wu Xing* express the relationships of four categories: generating, being generated, conquering, and being conquered. The expression of these four relationships requires and only requires five elements (Note 9). In Western thinking, this concept might be expressed as a 2×2 four-quadrant matrix composing two sets of binary dimensions, positive/negative and active/passive (Fig. 5). Although highly clear and concise, it simplifies and fixes the generating and conquering relationships. The Chinese *Wu Xing* theory uses five symbolic elements in this pentagon/pentagram structure to vividly demonstrate the complete

five sets of relationships of the four categories and all the complicated interrelations among *Wu Xing*, encompassing rich cultural connotations of overall connection and dynamic balance, which is, in itself, a visual holographic image (*Xiang*) of a pentagon with an inscribed pentagram.

This reveals the biggest difference between *Xiang* thinking and conceptual thinking. Specifically, it uses the vivid imagery with the number “five” instead of the abstract and absolute concepts with the number “four”. Behind “five” is a perfect model (*Xiang*) of five elements containing and expressing the four categories of relationships and beyond. Applying *Wu Xing* model to different things and situations means incorporating these things and situations into an overall relational, dynamically balanced system thinking, grasping the most fundamental laws behind things, often leading to comprehensive, balanced, and appropriate choices. The fundamental difference between Western medicine and TCM also lies here.

As Li Zehou (李泽厚) said, yin-yang and *Wu Xing* “can effectively apply to practical life within a certain range and extent, thus being preserved and continuously refined and enriched”.⁶ This might be the real reason why *Wu Xing* system based on the number five stood out and flourished in Chinese history compared to other systems based on the numbers three, four, or six, etc.

We can further examine these two sets of binary dimensions. Active and positive belong to yang, passive and negative to yin. Therefore, they are actually two sets of yin-yang relationships. We can say that the essence of *Wu Xing* in the generating and conquering cycles is the development of the yin-yang system, an intuitive diagram of two sets of yin-yang overlays. The development of yin-yang into *Wu Xing* is the elevation of *Xiang* thinking from one dimension to two dimensions, to be more specific, from expressing a one-dimensional dialectical relationship with two elements (yin-yang) to a two-dimensional dialectical relationship with five elements (wood, fire, earth, metal, water). For *Wu Xing* in the generating and conquering cycles, the analogical structure of the five elements are just the surface phenomenon, forming the generating/conquering circles, just as the three elements in the rock-scissor-paper game; the four categories of relationships are its essence. We have been blinded by the number “five”, not seeing its logical relationship with the “two” of yin-yang. Examining “five” and “four”, we can clearly recognize that in *Xiang* thinking, the progression from “two” to “five”, or from yin-yang to *Wu Xing*, is a natural progression from one-dimensional to two-dimensional dialectical relationships. This differs entirely from the abstract mathematical progression from Taiji (太极) to “two phenomena (yin and yang)”, “Four Phases [*Shao Yang* (少阳 junior yang), *Lao Yang* (老阳 senior yang), *Shao Yin* (少阴 junior yin) and *Lao Yin* (老阴 senior yin)], *Ba Gua* and “Sixty-four Hexagrams” in mathematical logic.

		Yang	Yin
		Positive	Negative
Yang	Active	Generate	Conquer
Yin	Passive	Generated	Conquered

Figure 5 2×2 four-quadrant matrix (source with permission from: made by the author)

Chinese yin-yang thought already includes multiple relationships like opposition and unity (相反相成), mutual waxing and waning (此消彼长), mutual inclusion (相互包容), and mutual transformation (相互转化). Elevating it to the two-dimensional height of five elements generates stronger explanatory power through the interaction of two sets of yin-yang: positive/negative and active/passive. These two sets of binary concepts reveal the most basic qualitative relationships between things and therefore are widely applicable. The two-dimensional dialectical network of *Wu Xing* encompasses the complex relationships between things from an overall point of view, thus rightfully establishing its crucial position in TCM theory.

This paper explores the relationship between yin-yang and *Wu Xing* from an epistemological perspective, which echoes Li Shuhua's "generative" interpretation. Li Shuhua proposed that at least five variables are required to complete the "generating" and "conquering" cycles, and that yin-yang and *Wu Xing* model is "the simplest model for the generation and evolution of systems," a "super-cyclic generation model with fractal characteristics, i.e., multi-level self-similarity".⁷

Laozi's saying "*Dao* generates one, one generates two, two generates three, three generates all things (道生一, 一生二, 二生三, 三生万物)" is primarily a generative statement. From the perspective of human comprehension of *Dao*, "one" is the primordial state, named Taiji in *Yi Jing*, and is difficult to describe. "Two" is expressed through the image of yin-yang. The progression from yin-yang to *Wu Xing* can be interpreted as the process of "two generates three", the third step in the generative progression. This process establishes an open *Xiang* Thinking model that can be infinitely expanded based on the fundamental yin-yang binary dialectics. Positive and negative, active and passive summarize the most basic relationship types among things, forming a universal relatedness and embodying a dialectical dynamic balance, which is expressed in ancient saying as "everything embodies a Taiji (事事一太极)". This model is capable of addressing the myriad phenomena of the world, aligning with the statement "three generates all things".

At this point, we have made a new exploration of the relationship between yin-yang and *Wu Xing*. Perhaps this is a secret that "common people use it daily but do not know it (百姓日用而不知)" for over two thousand years.

6 Conclusion

Life is not the sum of anatomical organs and their functions, but an extremely complex integrated system. The use of *Xiang* thinking in TCM to address this complex system demonstrates the uniqueness of TCM and lays the foundation of its rationality. The application of *Wu*

Xing theory in TCM provides an excellent example of *Xiang* thinking.

There is only one *Wu Xing* theory; *Wu Xing* with the earth in the center and *Wu Xing* in the generating and conquering cycles are just two functional and illustrative forms for ease of application and expression. They complement each other, jointly fulfilling the purpose of *Wu Xing*. Without *Wu Xing* with the earth in the center, there can be no analogy; without *Wu Xing* in the generating and conquering cycles, its application will be greatly confined. The former is not simple classification but involves summarizing and applying commonalities. The latter is not absolute definition but suggestive diagrams of complex relationships. As an upgraded version of the yin-yang theory, *Wu Xing* theory, using the methods from observing to "taking *Xiang*" and from inductive reasoning to "establish *Xiang*", builds a dialectical, integrated, and holographic *Xiang* thinking framework with a "two-dimensional yin-yang structure", helping TCM complete the whole process from finding, interpreting to solving problems.

From the perspective of a cognitive tool, yin-yang and *Wu Xing* in TCM are not mysterious ideas but successful applications of the Chinese *Xiang* thinking in the field of TCM. The full philosophical significance of yin-yang and *Wu Xing* may still require long-term exploration and comprehension.

Notes

1. In this article, "*Xiang* thinking" (象思维 imagery thinking) refers to the idea proposed by Wang Shuren (王树人) in the 1980s. The author adopted this idea, however, mainly from an epistemological perspective rather than an ontological perspective as the original idea may suggest. And the author believes that the best demonstration of *Xiang* thinking lies in the created (artificial) *Xiang*, rather than natural *Xiang* (image).
2. Parts of the sections "*Wu Xing* with the earth in the center", "*Wu Xing* in the generating and conquering cycles", and "Yin-yang, *Wu Xing*, and *Xiang* thinking", are derived from the author's paper "*Wu Xing*, four elements, and 2×2 matrix: an exploration of the cultural value of *Wu Xing* through comparison of Chinese and Western ways of thinking (五行、四元素与2×2矩阵: 从中西思维模式的不同看五行的文化价值)", published in *Review of Natural Science Studies in Chinese Classics and Culture* (自然国学评论), Issue No. 5, pages 277–297.
3. This idea is mentioned by Feng Youlan (冯友兰), Li Zehou (李泽厚), Pang Pu (庞朴), Joseph Needham, Benjamin Schwartz, and John S. Major, among others.
4. See above explanations on matching *Wu Xing* with directions and seasons. Also refer to Note 6 for another way of matching with the seasons.
5. Such sets in "five" can be found in classical texts such as *Huang Di Nei Jing*.

6. References to the division of the year into five periods to align with *Wu Xing* can be found in texts such as “Late Summer” in *Lyu Shi Chun Qiu* and “*Wu Xing*” in *Chun Qiu Fan Lu*, though such alignment seems to be only for theoretical purpose and not in calendric practice.

7. Feng Qi (冯契) suggested that yin-yang and *Wu Xing* “serve as algebraic symbols to regulate phenomena”, as seen in “On the methodology of ancient Chinese philosophy (论中国古代哲学方法)”, *Philosophical Research*, 1984, Issue 2, page 62. Hu Huakai (胡化凯) also mentioned that *Wu Xing* could be replaced by alphabetic symbols. However, his discussion was limited to this point and did not delve into its significance and interpretation. See Hu Huakai’s *Gold, Wood, Water, Fire, and Earth: The Chinese Doctrine of Wu Xing* (金木水火土: 中国五行学说), Haitian Publishing House, 2012, pages 56–57.

8. Refer to *Su Wen Wu Yun Xing Da Lun* (《素问·五运行大论》Basic Questions: Comprehensive Discourse on the Progression of the Five Periods) of *Huang Di Nei Jing* and other TCM literature for more details.

9. The four relationships refer to those between element A and B (generating), C (conquering), D (being conquered), and E (being generated) as discussed previously.

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LIU Qian drafted and reviewed the manuscript.

Conflicts of interest

The author declares no financial or other conflicts of interest.

References

- [1] Lou YL. *Intuition: Lou Yulie's Philosophy Course at Peking University* (体悟力: 楼宇烈的北大哲学课). Beijing: Zhonghua Book Company; 2020. p. 72. Chinese.
- [2] Zhang QC. Rethinking the scientific value of philosophy from traditional Chinese medicine (中医生命模型的特征和意义). *Hebei Academic Journal*. 2007;27(3):31. Chinese.
- [3] Lou YL. The philosophical connotation of traditional Chinese medicine and its significance (中医的人文内涵及其意义). *Chinese Culture Research*. 2018;(2):1–9. Chinese.
- [4] Li SH. Preliminary exploration on the mode of Chinese traditional science (中国传统科学范式初探). *Journal of Taiyuan Normal University (Social Science Edition)*. 2003;(1):1–8. Chinese.
- [5] Wang SR. *Returning to the Original Thought: Chinese Wisdom from the Perspective of “Xiang Thinking”* (回归原创之思: “象思维”视野下的中国智慧). Nanjing: Jiangsu People's Publishing House; 2020. p. 3. Chinese.
- [6] Li ZH. *A Treatise on the History of Ancient Chinese Thought* (中国古代思想史论). Beijing: SDX Joint Publishing Company; 2008. p. 172. Chinese.
- [7] Li SH. System science and modern reconstruction of traditional Chinese medicine theory (系统科学与中医理论的现代重建). *Journal of System Dialectics*. 2005;13(1):21–25. Chinese.

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Chronic Disease Prevention Insights from Long-time Sitting Damaging Muscles: A Traditional and Modern View

LOU Lihong¹, WU Xiaqiu^{2,*}

Abstract

Thousands of years ago, the concept of *Jiu Zuo Shang Rou* (久坐伤肉 long-time sitting damages muscles) was introduced in traditional Chinese medicine (TCM). It was clearly recorded in ancient books, that prolonged sitting disrupts the circulation of qi and blood, damages muscles, impairs spleen function, and ultimately leads to diseases. Modern biomedical evidence shows that sedentary behavior, including prolonged sitting, affects endocrine, metabolic, and physiological functions, increasing the risk of chronic diseases. This article systematically reviews TCM records of the health impacts of long-time sitting and biomedical findings, to explore the pathophysiological mechanisms underlying the health risks of prolonged sitting. By integrating TCM's preventative philosophy, namely *Zhi Wei Bing* (治未病 preventing a disease before it arises), with modern preventive medicine, this study offers insights into strategies for mitigating the health risks associated with sedentary behavior.

Keywords: Chronic diseases; Long-time sitting; Sedentary behavior; Spleen governing muscles theory; Traditional Chinese medicine

1 Introduction

Sitting, a sedentary posture in human's daily life, however, has become a silent killer for human beings.¹ As the daily sitting time increases, the risk of chronic diseases may increase for people at all ages.¹⁻³ As reported by World Health Organization (WHO), approximately 27% of diabetes and 30% of ischemic heart disease might be attributed to insufficient physical activity and sedentary lifestyle.⁴ Western medicine has gradually realized the high risk brought by sedentary behaviors, including sitting, reclining and lying.

Back to thousands of years ago, traditional Chinese medicine (TCM) physicians have already noticed the chronic injuries to human body by *Jiu Zuo* (久坐

long-time sitting), and proposed the conception of *Jiu Zuo Shang Rou* (久坐伤肉 long-time sitting damaging muscles), which can be traced back to *Huang Di Nei Jing* (《黄帝内经》The Yellow Emperor's Inner Classic). As the original sentence goes, "Long-time observation damages blood, long-time lying damages qi, long-time sitting damages muscles, long-time standing damages bones, and long-time walking damages sinews. These are the so called five exhaustions (久视伤血, 久卧伤气, 久坐伤肉, 久立伤骨, 久行伤筋, 是谓五劳所伤)".⁵ Observation, lying, sitting, standing, and walking are five common postures, together keeping the static and dynamic balance of human's life. Too much observation, lying, sitting, standing or walking are called *Wu Lao* (五劳 five exhaustions) in TCM theory, that one should avoid, since these exhaustions can cause impairments on blood, qi, muscles, bones and sinews respectively. Throughout history, *Jiu Zuo* damages have been further studied and expanded by generations of TCM doctors. Avoiding *Jiu Zuo* has become a principle of disease prevention and life nourishing among Chinese.

Recent biomedical research has validated the health risks associated with sedentary behavior. Evidences showed that prolonged sitting disrupts endocrine and metabolic functions, induces chronic inflammation, and increases the risk of obesity, type 2 diabetes, cardiovascular diseases, and certain cancers.⁶ Studies from China also provide insights into the association between sedentary behavior and body constitutions described in TCM. A cross-sectional survey of 1,091 elderly individuals in community settings demonstrated

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that prolonged sitting significantly increases the risk of qi-deficiency, yang-deficiency, and idiosyncratic constitutions, while low-intensity physical activity exacerbates phlegm-dampness and qi-stagnation constitutions.⁷ These findings align with the TCM view that sedentary lifestyles weaken the spleen and disrupt the body's qi and blood circulation, resulting in various physical imbalances. This article aims to bridge traditional and modern perspectives by systematically reviewing ancient records of *Jiu Zuo Shang Rou* and contemporary biomedical research on diseases potentially caused by sedentary behavior. Through this exploration, it seeks to offer insights into the prevention of chronic diseases and the promotion of holistic health.

2 Jiu Zuo and Jiu Zuo Shang Rou in TCM

2.1 Understanding Jiu Zuo and its historical context

What is *Jiu Zuo*? According to *Shuo Wen Jie Zi* (《说文解字》 *Explaining Graphs and Analysing Characters*), *Jiu* (久), means “for a long time” or “of a certain duration of time”. *Zuo* (坐), means sitting.⁸ In ancient China, there are three main sitting postures before chairs were commonly used: *Qi Ju* (箕踞), *Ji Zuo* (踞坐) and *Fu Zuo* (趺坐) (Fig. 1). From the pre-Qin period to the Han dynasty, the *Qi Ju* and *Ji Zuo* postures were the core sitting positions in the Chinese culture. In the *Qi Ju* position, both legs are extended straight forward in front of the body, resembling a dustpan. The *Ji Zuo* posture involves sitting on one's knees with the buttocks resting on the lower legs and feet. When there were no guests present, people could sit casually in the *Qi Ju* position. However, when hosting guests, discussing important matters with respected elders, or dining at formal gatherings, the *Ji Zuo* posture was required. The *Ji Zuo* posture was regarded as the formal sitting manner, while the *Qi Ju* position was considered impolite due to the exposure of the body.⁹ During the Wei, Jin, and Southern and Northern Dynasties, Buddhist culture flourished,

and the *Fu Zuo* position sitting cross-legged, similar to the lotus position in Buddhism, became more common as a daily sitting posture. In the Eastern Han dynasty, the *Hu Chuang* (胡床 foreign beds) and *Hu Zuo* (胡坐 foreign sitting postures), as well as high-legged chairs, were introduced from Central Asia.¹⁰ However, for a long time, chairs were primarily used by the elderly, the sick and those with special needs, and were generally not used in formal settings. By the end of the Southern Song dynasty, the three sitting positions mentioned above—*Qi Ju*, *Ji Zuo*, and *Fu Zuo*—remained the mainstream.¹¹ These traditional sitting positions, which involve bending the legs, are not conducive to the smooth flow of qi and blood.

2.2 The role of Rou (肉) in TCM and its vulnerability to Jiu Zuo

What is *Rou* (肉)? According to *Shuo Wen Jie Zi*, *Rou* (肉) originally depicted ritually cut sacrificial meat as a pictograph.⁸ Through the lens of TCM, its meaning has expanded. In TCM, *Rou* refers to the soft tissue of the body that includes skin, muscle, and fat. Although it closely resembles the modern anatomical definition of muscles, TCM considers *Rou* to be the area where qi and blood flow. Zhang Sanxi (张三锡), a famous physician in the Ming dynasty, described the anatomical structure of *Rou* in his book *Jing Luo Kao* (《经络考》 *Research on Meridians*). He stated, “The interspace where *Rou* are sparse is called *Xi* (溪 stream), while the interspace where *Rou* are abundant is called *Gu* (谷 valley). Both *Xi* and *Gu* serve as channels for nutrients and defensive qi, merging into ancestral qi (肉之小为会为溪, 肉之大会为谷, 分肉之间、溪谷之会, 以行荣卫, 以会大气).¹² The terms *Xi* and *Gu* refer to the gap junctions or depressions between muscles, the smaller depression is termed a *Xi*, while the larger junction is referred to as a *Gu*. These are the locations where qi and blood converge in the body, and where the meridian qi is located. Yao Shaoyu (姚绍虞), a famous physician in Qing dynasty, described the physiological functions of muscles in his book *Su Wen Jing Zhu Jie Jie* (《素问经注



Figure 1 Three main sitting postures in ancient China (source with permission from: picture made by the authors)

节解》*Annotation and Explanation of Basic Questions*). He noted, “*Rou* protects the internal organs, supports the bones and tendons, and shapes the body. *Rou* is passive and static, providing form for the flow of qi and blood. *Rou* is nourished by the spleen and stomach (包藏脏腑, 拥护筋骨, 而丰满于一身者, 肉也。肉也者, 外静而内动, 气血流焉, 脾胃应焉)”.¹³ From this perspective, a strong body arises from the fullness of *Rou* and relies on the functions of the spleen and stomach.

How does *Jiu Zuo* damage *Rou*? Sitting is a behavior with a static and quiet nature, and too much sitting can disturb the circulation of qi and blood. Qi is energy, and blood is nutrient that both flow along the body, and play the role of promoting and nourishing skin, muscle, and tissues. If the flow of qi and blood is not regulated, illness will occur. In *Tai Chan Zhi Nan* (《胎产指南》*Guideline of Obstetric*), it was recorded clearly that “if a pregnant women sit or lie down for long time, it will cause blood stasis and qi stagnation, resulting in dystocia (盖妇人怀胎, 若久坐久卧, 血凝气滞则难产)”.¹⁴ Qi and blood stagnation can also cause the accumulation of pathological products, developing into diseases. As recorded in *Wai Ke Zheng Zong* (《外科正宗》*Treatise on Surgery*), “one who has hemorrhoids is because of accumulations of dampness and heat caused by overeating fried food, or blood stagnation resulted from prolonged sitting, ... so that the turbid qi and blood flow into the anus, which developed into hemorrhoids (夫痔者, 乃素积湿热, 过食炙爆, 或因久坐而血脉不行, ……以致浊气瘀血流注肛门, 俱能发痔)”.¹⁵ Eventually, long term qi or blood stagnation will result in deficiency and weakness of the whole body.

Another explanation for *Jiu Zuo Shang Rou* is that prolonged sitting may result in spleen disorders, leading to diseases. From the perspective of TCM, spleen is an important organ that governs transportation and transformation essential substances. Along with spleen qi flows, blood and nutrients will be sent to the whole body, nourishing the muscles and flesh. The condition of the flesh and muscles is closely related to the level of spleen qi, as the saying goes, “Muscles are nurtured by the spleen. If the spleen qi is strong, muscles will be nourished and plump (肌肉者, 脾土之所生也, 脾气盛则肌肉丰满而充实)”.¹⁶ Long-time sitting can block the circulation of qi in the body, thereby affecting the normal physiological functions of the spleen and weakening its qi. Furthermore, spleen qi deficiency will result in failure to digest and absorb nutrients from diet, thereby causing weight loss even emaciation.

2.3 Long-time sitting, spleen disorders, and chronic diseases

Li Dongyuan (李东垣), a renowned TCM physician in Ming dynasty, stated in his treatise *Pi Wei Lun* (《脾胃论》*Treatise on the Spleen and Stomach*) as, “All diseases arise from the decline of the spleen and stomach (百病皆

由脾胃衰而生)”.¹⁷ This concept has been supported by subsequent physicians, who observed that spleen deficiency plays a critical role in the development of various chronic diseases, including obesity, cardiovascular and cerebrovascular diseases, diabetes, etc. Spleen deficiency impairs the body’s ability to transport and transform nutrients, leading to an imbalance in qi, blood, and body fluids, which may contribute to disease progression.

According to the TCM perspective, *Jiu Zuo* is a pathological factor that affects multiple interconnected systems. First, prolonged sitting restricts local circulation in muscles and tendons, leading to *Rou Damage* (equivalent to musculoskeletal disorders in modern medicine). Second, TCM posits that “disharmony between qi and blood leads to disease” (气血不和, 百病乃变化而生)”.⁵ Reduced circulations due to prolonged sitting can result in qi stagnation, blood stasis or qi and blood deficiency, each of which is associated with various health conditions. Lastly, in alignment with Li Dongyuan’s theory, prolonged sitting weakens the spleen’s function of nutrient transformation and distribution. This dysfunction leads to an accumulation of dampness, phlegm, fat and blood stasis factors that are commonly implicated in the development of chronic disease according to TCM (Fig. 2).¹⁸ (See the left panel of Figure 2.)

From a biomedical perspective, prolonged sitting is classified as a sedentary behavior that impairs multiple physiological systems. It may cause musculoskeletal dysfunction, leading to chronic pain and injuries of the muscles and joints. Additionally, sedentary behavior is associated with increased systemic inflammation, which has been implicated in conditions such as chronic obstructive pulmonary disease (COPD). Moreover, prolonged sitting disrupts metabolic and vascular hemostasis, significantly increasing the risk of obesity, type 2 diabetes, cardiovascular diseases, and even certain types of cancer. These effects illustrate the complex interplay between sedentary lifestyles and chronic disease development, a topic that will be further explored in Part 3. (See the right panel of Figure 2.)

By integrating insights from both TCM and biomedical science, it becomes evident that prolonged sitting poses significant health risks through multiple mechanisms. While TCM attributes these effects to disruptions in qi, blood, and organ function, modern medicine highlights musculoskeletal injury, metabolic dysregulation, and systemic inflammation as key contributors to disease. Together, these perspectives emphasize the importance of reducing sedentary behavior to promote overall health and well-being.

2.4 TCM activities to prevent long-time sitting damaging muscles

To mitigate the negative impacts of prolonged sitting, TCM developed preventive and therapeutic practices such as Tai Chi (太极), *Ba Duan Jin* (八段锦), and *Tui*

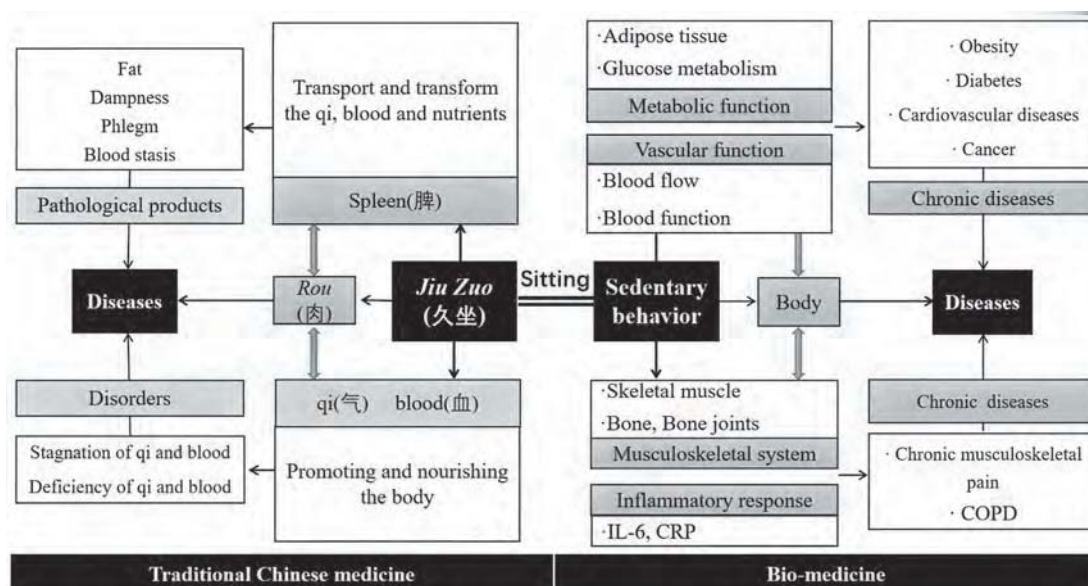


Figure 2 Illustration of *Jiu Zuo*, sedentary behavior, and diseases from TCM and biomedical views (source with permission from: picture made by the authors)

Na (推拿). These approaches integrate physical postures, breathing techniques, manual manipulation, relaxation, and mental focus, promoting qi flow and maintain overall well-being.

Tai Chi, often referred to as “meditation in motion”, has been shown to promote aerobic capacity, reduce chronic inflammation, and improve immune function. According to TCM theory, Tai Chi and *Ba Duan Jin* directly influence the body’s qi dynamics. If any area of the body is blocked, qi stagnation occurs, leading to muscle tension and poor local circulation. By stimulating qi flow through precise movements and breathing techniques, these exercises promote muscle relaxation, improve joint flexibility, and enhance energy circulation. Complementing these exercises, *Tui Na* (推拿), a form of therapeutic bodywork, is a TCM intervention for muscle health and postural correction. By utilizing kneading, pressing, rolling, and stretching techniques, *Tui Na* (推拿) message effectively releases muscle stiffness, improves blood circulation, and rebalances the body’s meridians.

Scientific research has confirmed the health benefits of these traditional exercises and therapeutic practices, including enhanced endothelial function, immune regulation, and metabolic balance. Both Tai Chi and *Ba Duan Jin* have been found to significantly improve aerobic capacity, help losing weight, reduce chronic inflammation, enhance immune regulation, and help prevent upper respiratory tract infections.^{19–21} *Tui Na* is shown to stimulate appetite by improving blood circulation in the digestive system. It also enhances psychological states and sleep quality by regulating neurotransmitter levels and alleviating anxiety and depression.^{22,23} Additionally, all these practices are accessible and beneficial for people

of all ages and physical conditions. Integrating Tai Chi, *Ba Duan Jin* exercises, or *Tui Na* therapy into daily routines can effectively counteract the negative effects of prolonged sitting, maintaining muscular health, joint mobility, and overall vitality in alignment with TCM principles.

3 Sedentary behavior and sitting diseases in the view of bio-medicine

Sedentary behavior is defined as any waking behavior characterized by energy expenditure ≤ 1.5 metabolic equivalents (METs).²⁴ As the use of screens (computer/TV/phone) and motorized transport (motorbike/metro/car) has increased commonly worldwide, people spend more time on sitting. It is estimated that from 2007 to 2016, the total sitting time among U.S. adolescents and adults has increased from 7.0 hours to 8.2 hours per day and 5.5 hours to 6.5 hours per day, respectively.²⁵ In another survey, the sedentary time of the older adults was up to 8.5 hours daily.²⁶ According to a recent study by the Chinese Center for Disease Control and Prevention, sedentary behaviors become more common among Chinese adults between 2022 and 2023.²⁷ About 25% of adults spend more than 6 hours a day sitting, with screen time becoming the dominant form of sedentary behavior. In addition, the accelerometer-based objective measurement study found that only 37.3% of adults met the recommendation of no more than 8 hours of sedentary time per day. In terms of physical activity, although 85.7% of adults meet the recommended 150 minutes of physical activity per week, there are still some people who do not meet the recommended standards. At the same time, only 2.7%

of adults met the dual recommendations for moderate-to-vigorous physical activity and sedentary time.

Long-time sitting impacts health from multifaceted aspects. Long-time sitting increases the hydrostatic pressure within lower limbs, which may reduce blood flow and shear stress, decrease the nitric oxide availability, increase the vasoconstrictors production, impair vascular function, eventually leading to cardiovascular diseases.²⁸ Long-time sitting causes less contraction of skeletal muscle. As basic regulator of glucose homeostasis, less contraction of skeletal muscles can cause insulin resistant and glucose metabolism disorders.²⁹ Long-time sitting also can trigger inflammatory responses. Increasing amount of sitting time can induce the increasing levels of chronic inflammatory factors, i.e., C-reactive protein and IL-6 in the plasma, eventually lead to chronic conditions.³⁰ Literature is reviewed as below, to illustrate the associations among sedentary behavior and obesity, diabetes, cardiovascular disease, and other chronic conditions.

3.1 Obesity

Evidence has shown that sitting behavior is significantly associated with the incidence of obesity among all ages. Result from a prospective study indicates, sitting time is closely correlated with higher body weight, hip circumference, BMI, fat mass (FM) and anthropometry, among adults aged 20-35.³¹ The same tendency can be found among children and elders. Results from two independent studies launched among children (aged 7-12 years, 58% girls) and elder women [mean age (66.6 ± 6.5) years] both showed that those who engaged in long-time sedentary sitting were also likely being higher in FM percentage or visceral adipose tissue.³² Conversely, MVPA (moderate-to-vigorous physical activity) could improve the adiposity status and control the childhood obesity.³³

3.2 Diabetes

Meta-analyses (10 studies) suggest that there is a greater relative risk associated with a large duration of sitting behavior for type 2 diabetes (T2DM).³⁴ Compared with those whose sedentary time was less than 3 hours per day, the risk of T2DM increased by 33% in those who sat for more than 6 hours per day.³⁵ Similar association was found among older women. Women in the highest quartile of sedentary time (≥ 10.3 hours/day) had higher odds of diabetes (OR = 2.18; 95% CI = 1.77–2.70) than women in the lowest quartile (≤ 8.3 hours/day). Beside high levels of sedentary time, accumulating it in prolonged pattern was either associated with increased odds of diabetes.³⁶

Insulin resistance is a key element in the development and progression of type 2 diabetes. A study of 801 apparently healthy participants, in which sedentary time was measured using accelerometry showed that sedentary time

was inversely associated with insulin sensitivity, measured using a hyper insulinemic-euglycemic clamp. There was about 4 hours of difference between the groups with the most and the least sedentary time and up to 40% range in insulin-stimulated glucose uptake.³⁷

It is shown that any level of physical activity can reduce the risk of diabetes. Each 30 minutes of sitting time replaced with MVPA was associated with 15% lower risk for diabetes, evidence based on the observation from 4,839 healthy older women.³⁶ Furthermore, a combination of increasing physical activity and avoiding sitting for long periods of time can make the effect even more remarkable.^{38,39}

3.3 Cardiovascular disease

Cardiovascular disease (CVD) was defined as the group of disorders of heart and blood vessels, including coronary heart diseases, cerebrovascular diseases, peripheral arterial diseases, rheumatic heart diseases, congenital heart diseases, deep vein thrombosis and pulmonary embolism. Current evidence showed that, sedentary behavior is significantly associated with all-cause cardiovascular morbidity and mortality.^{40,41} A large prospective cohort study followed 127,554 healthy adults for 21 years, indicated that adults who sat for more than 6 hours per day would have a 19% higher risk of CVD than those who sat for less than 3 hours a day.⁴² A meta-analysis including 34 prospective studies supports this view. In addition, it identified that there would be a sharp increase in the risk of cardiovascular death if people are accustomed to more than 8 hours of daily sedentary activities.⁴³

Current studies also provide strong evidence to support the link between CVD risk factors and sedentary behavior. Long-time sitting can induce alterations to glucose tolerance, blood pressure and lipid profile, lead to reduction in mean and antegrade blood flow and shear rate, causing inreactive oxygen species production, low-grade inflammation and metabolic impairment.⁴⁴ Alternating sitting by physical activities brings significant benefits, i.e., reduction in platelet reactivity and improvement on blood vessel function, that reduce the likelihood of arterial thrombosis and stroke.^{45,46}

It is worth noting that, standing suddenly after sitting for a long time is prone to postural hypotension, which causes insufficient blood supply to organs such as heart and brain, and is easy to induce myocardial ischemia, stroke, and other cardiovascular and cerebrovascular diseases.^{47,48}

3.4 Other chronic diseases

Physical inactivity has been examined as a primary cause initiating 35 chronic conditions.⁴⁹ Besides obesity, diabetes, and CVD, sedentary behavior might increase risk for multiple conditions, including constipation, CMP

(chronic musculoskeletal pain), COPD (chronic obstructive pulmonary disease) and cancers.

Constipation was identified in 15.6% of 33,692 adolescents from Hong Kong, 14.0% in those with sufficient exercise and 19.6% in those with inactive behaviors, i.e., insufficient exercises, insufficient non-exercise physical activities, and excessive sedentary behaviors. Increasing adjust odds ratios (AORs) of constipation were observed for having 1 (AOR 1.23), 2 (AOR 1.57) and 3 (AOR 1.88) inactive behaviors (p for trend <0.001).⁵⁰ In addition, long-time sitting may progress low back pain (LBP), while reduction of sitting time can reduce neck-shoulders and lower back pain.^{51,52} Individuals who remained sedentary for more than 7 hours/day were more likely to have COPD than those less than 3 hours/day.⁵³ Sedentary behavior was either associated with increased colorectal, endometrial, ovarian, and prostate cancer risk, cancer mortality in women, and weight gain in colorectal cancer survivors.⁵⁴

4 Discussion

The growing body of evidence from both TCM and modern biomedical research strongly underscores the detrimental effects of prolonged sitting on human health. WHO has explicitly recommended reducing sedentary behavior and replacing it with physical activities at any intensity level to mitigate health risks.⁵⁵ Studies show that individuals who meet the recommended physical activity (PA) guideline (150 minutes of moderate-intensity exercise per week) experience a 14% lower risk of cardiovascular disease and a 25%-35% lower risk of type 2 diabetes.⁵⁶ Strong and consistent evidence illustrates that higher levels of PA can further reduce the risk of obesity, CVD and six types of cancer,⁵⁵ reinforcing the health promotion principle: “More Physical Activities and Less Sedentary Behavior”.⁵⁷

While Western medicine has developed preventive health strategies since the 18th century, the philosophy of *Zhi Wei Bing* (治未病 preventing a disease before it arises)—which emphasizes preventing disease before it arises—has been an intrinsic part of TCM for millennia. The holistic approach of TCM offers critical perspectives into the balance of movement and stillness, reinforcing the importance of maintaining qi circulation and metabolic equilibrium to sustain overall health. In addition to *Jiu Zuo Shang Rou*, the broader theory of *Wu Lao* in TCM presents a comprehensive framework for understanding how postural habits influence chronic disease risk.

Ancient Chinese medical theories align with contemporary preventive medicine, advocating early intervention and lifestyle modifications to maintain health and prevent chronic illness. The classic TCM aphorism, “flowing water does not rot, nor a door-hinge rust (流水不腐, 户枢不蠹)” from *Lyu Shi Chun Qiu* (《吕氏春秋》 *The Spring and Autumn Annals of Lyu Buwei*),⁵⁸

reflected the fundamental belief that movement sustains vitality. According to TCM, prolonged sitting disrupts the flow of qi (vital energy) and blood, weakening the spleen, impairing digestion, and leading to conditions such as qi stagnation, dampness accumulation, and blood stasis, which are precursors to chronic disease.

Sedentary behavior of today's people, driven by work demands, commuting, and the pervasive use of digital tools, may pose significant challenges to modern public health due to the rise of chronic disease.⁵⁹ The transition from manual labor to desk-bound jobs, coupled with the increasing reliance on electronic devices, has led to a “default sedentary state”, where many people struggle to find opportunities for physical activities. However, reducing sedentary time is not merely a matter of personal choice but requires structural changes in how we live and work. Beyond individual behavior changes, there is a need for public strategies that reshape work environments, urban spaces, and schools to support a more active lifestyle.

The integration of TCM and modern medicine can offer a holistic approach to mitigating the health impacts of prolonged sitting as well as to reducing the burden of chronic disease.^{60,61} TCM practices such as Tai Chi and *Ba Duan Jin*, provide gentle, accessible forms of exercises that not only improve blood circulation and metabolic function but also support mental relaxation and harmony. Promoting these traditional activities as part of public health strategies could offer innovative solutions for reducing sedentary behavior, contributing to chronic disease prevention, and enhancing overall quality of life.^{62,63} By combining traditional wisdom with modern scientific approaches, effective and sustainable strategies can be built to address long-term sedentary-induced chronic disease, one of the most pressing public health challenges of urban population.

5 Conclusion

Jiu Zuo, one of *Wu Lao*, is considered as a pathogenic factor in TCM 2,000 years ago. Sedentary behavior has been identified to a leading risk factor for chronic disease in the past 20 years in modern biomedicine. From this aspect, TCM and biomedicine meet together, thereby providing chances for integrating. While modern preventive medicine has evolved over the past centuries, the philosophy of *Zhi Wei Bing* has long emphasized early intervention and maintaining balance in the body. Beyond *Jiu Zuo Shang Rou*, the broader *Wu Lao* theory offers valuable insights into chronic disease prevention.

However, this study primarily focuses on theoretical analysis and lacks empirical clinical trials to validate the effectiveness of TCM interventions in sedentary disease prevention. Future research should incorporate longitudinal studies and controlled trials to further substantiate these findings. Moving forward, it will be of great clinical guiding significance and value, to deeply explore the

theory and approaches of *Zhi Wei Bing*, to enlighten disease prevention and health promotion in the future.

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Ethical approval

This article does not contain any studies with human or animal subjects performed by either of the authors.

Author contributions

LOU Lihong and WU Xiaqiu contributed to drafting the manuscript. WU Xiaqiu contributed to design and revising the manuscript. All authors approved the final version to be published, agree to take responsibility for all aspects of the work.

Conflicts of interest

The authors declare no financial or other conflicts of interest.

References

- [1] Owen N, Bauman A, Brown W. Too much sitting: a novel and important predictor of chronic disease risk? *British Journal of Sports Medicine*. 2009;43(2):81–83.
- [2] Wu XY, Han LH, Zhang JH, Luo S, Hu JW, Sun K. The influence of physical activity, sedentary behavior on health-related quality of life among the general population of children and adolescents: a systematic review. *Public Library of Science ONE*. 2017;12(11):e0187668.
- [3] Alley S, van Uffelen JGZ, Duncan MJ, et al. Sitting time in adults 65 years and over: behavior, knowledge, and intentions to change. *Journal of Aging and Physical Activity*. 2018;26(2):276–283.
- [4] WHO. Global health risks: mortality and burden of disease attributable to selected major risks. Available from: <https://www.who.int/publications/i/item/9789240015128>. [Accessed on September 28 2021].
- [5] Anonymous. *The Yellow Emperor's Inner Classic* (黄帝内经). ca. 200 BCE–100 CE. Chinese.
- [6] Hermelink R, Leitzmann MF, Markozannes G, et al. Sedentary behavior and cancer—an umbrella review and meta-analysis. *European Journal of Epidemiology*. 2022;37(5):447–460.
- [7] Cui G, Yin Y, Chen L, et al. Relationship between sedentary behavior and the level of physical activity of the elderly in the community and the constitution of traditional Chinese medicine. *China Medical Herald*. 2021;18(9):60–63.
- [8] Xu S. *Explaining Graphs and Analysing Characters* (说文解字). Beijing: Zhonghua Book Company; 1963. Chinese.
- [9] Wang CX, Zhang XJ. Ancient sitting postures, furniture, and the evolution of social rituals: inspiration and application in modern design (古代坐姿坐具和社会礼俗演变对现代设计的启发与应用). *Screen Printing*. 2024;(5):14–19. Chinese.
- [10] Liu DF. The evolution of Han portrait Hu beds and human sitting postures from an iconographic perspective (从图像学视角看汉画像胡床及人体坐姿演变). *Fine Arts*. 2024;(6):98–101. Chinese.
- [11] Chen Z. Revisiting the evolution of medieval Han Chinese from kneeling to sitting with legs hanging (再谈中古汉人从跪坐到垂脚高坐的演变). *Clio at Beida*. 2000;(1):196–208,378–379. Chinese.
- [12] Zhang SX. *Research on Meridians* (经络考). 1609. Chinese.
- [13] Yao SY. *Annotation and Explanation of Basic Questions* (素问经注节解). Qing dynasty. Chinese.
- [14] Shan NS. *Guideline of Obstetric* (胎产指南). Qing dynasty. Chinese.
- [15] Chen SG. *Treatise on Surgery* (外科正宗). 1617. Chinese.
- [16] Huang YY. *The Heart Source of the Four Sages* (四圣心源). 1753. Chinese.
- [17] Li DY. *Treatise on the Spleen and Stomach* (脾胃论). Jin dynasty. Chinese.
- [18] Chao J, Liu Y, Zhong W, et al. Treatment of diabetes from the spleen based on the theory of “spleen and pancreas sharing the same origin” (基于“脾胰同源”理论从脾论治糖尿病). *Journal of Traditional Chinese Medicine*. 2017;58(17):1458–1461. Chinese.
- [19] Siu PM, Yu AP, Chin EC, et al. Effects of Tai Chi or conventional exercise on central obesity in middle-aged and older adults: a three-group randomized controlled trial. *Annals of Internal Medicine*. 2021;174(8):1050–1057.
- [20] Ma QJ, Li HZ, Gao YP, Zou YL. Effects of Baduanjin on glucose and lipid metabolism in diabetic patients: a protocol for systematic review and meta-analysis. *Medicine (Baltimore)*. 2021;100(4):e23532.
- [21] Zhou J, Yu YY, Cao BW, et al. Characteristic of clinical studies on Baduanjin during 2000–2019: a comprehensive review. *Evidence-based Complementary and Alternative Medicine*. 2020; 2020:4783915.
- [22] Rimbani AL, Maryatun M. The effect of massage on weight gain in children in Ngrandu village, Geyer district, Grobogan county (Pengaruh pijat tuina terhadap peningkatan berat badan balita di desa Ngrandu kecamatan Geyer kabupaten Grobogan). *Jurnal Kesehatan Bakti Tumas Husada: Jurnal Ilmu-ilmu Keperawatan, Analis Kesehatan dan Farmasi*. 2024. Indonesian.
- [23] Wang Z, Xu H, Wang Z, et al. Effect of tuina on sleep quality, psychological state and neurotransmitter level in patients with insomnia: a systematic review and meta-analysis. *Frontiers in Neurology*. 2024;15:1273194.
- [24] Tremblay MS, Aubert S, Barnes JD, et al. SBRN Terminology Consensus Project Participants. Sedentary Behavior Research Network (SBRN) - Terminology Consensus Project process and outcome. *International Journal of Behavioral Nutrition and Physical Activity*. 2017;14(1):75.
- [25] Yang L, Cao C, Kantor ED, et al. Trends in sedentary behavior among the US population, 2001–2016. *The Journal of the American Medical Association*. 2019;321(16):1587–1597.
- [26] Harvey JA, Chastin SF, Skelton DA. Prevalence of sedentary behavior in older adults: a systematic review. *International Journal of Environmental Research and Public Health*. 2013;10(12):6645–6661.
- [27] Ouyang YF, Wang HJ, He YN, et al. Physical activity and sedentary behavior among Chinese adults-10 PLADs, China, 2022–2023. *China CDC Weekly*. 2025;7(1):6–9.
- [28] Thosar SS, Johnson BD, Johnston JD, Wallace JP. Sitting and endothelial dysfunction: the role of shear stress. *Medical Science Monitor*. 2012;18(12):RA173–180.
- [29] Evans PL, McMillin SL, Weyrauch LA, Witczak CA. Regulation of skeletal muscle glucose transport and glucose metabolism by exercise training. *Nutrients*. 2019;11(10):2432.
- [30] Howard BJ, Balkau B, Thorp AA, et al. Associations of overall sitting time and TV viewing time with fibrinogen and C reactive protein: the AusDiab study. *British Journal of Sports Medicine*. 2015;49(4):255–258.
- [31] Staiano AE, Martin CK, Champagne CM, Rood JC, Katzmarzyk PT. Sedentary time, physical activity, and adiposity in a longitudinal cohort of nonobese young adults. *The American Journal of Clinical Nutrition*. 2018;108(5):946–952.
- [32] Pechová J, Pelclová J, Gába A, et al. Sedentary behavior and adiposity in community-dwelling women aged 55 and older. *Casopis Lekaru Ceskych*. 2019;158(3–4):112–117.
- [33] Gába A, Pedišić Ž, Štefelová N, et al. Sedentary behavior patterns and adiposity in children: a study based on compositional data analysis. *BMC Pediatrics*. 2020;20(1):147.

- [34] Hamilton MT, Hamilton DG, Zderic TW. Sedentary behavior as a mediator of type 2 diabetes. *Medicine and Sport Science*. 2014;60:11–26.
- [35] Cong XF, Liu SB, Xu TL, et al. Relationship between sedentary time and incidence of type 2 diabetes in adults in China: a prospective cohort study. *Chinese Journal of Epidemiology*. 2020;41(9):1465–1470.
- [36] Bellettiere J, Healy GN, LaMonte MJ, et al. Sedentary behavior and prevalent diabetes in 6,166 older women: the objective physical activity and cardiovascular health study. *The Journals of Gerontology Series A Biological Sciences and Medical Sciences*. 2019;74(3):387–395.
- [37] Balkau B, Mhamdi L, Oppert JM, et al. Physical activity and insulin sensitivity: the RISC study. *Diabetes*. 2008; 57(10):2613–2618.
- [38] Bellettiere J, LaMonte MJ, Healy GN, et al. Sedentary behavior and diabetes risk among women over the age of 65 years: the OPACH Study. *Diabetes Care*. 2021;44(2):563–570.
- [39] Llaverro-Valero M, Escalada San Martín J, Martínez-González MA, et al. Promoting exercise, reducing sedentarism or both for diabetes prevention: the “Seguimiento Universidad De Navarra” (SUN) cohort. *Nutrition, Metabolism, and Cardiovascular Diseases*. 2021;31(2):411–419.
- [40] Young DR, Hivert MF, Alhassan S, et al. Sedentary behavior and cardiovascular morbidity and mortality: a science advisory from the American Heart Association. *Circulation*. 2016;134(13):e262–279.
- [41] Pandey A, Salahuddin U, Garg S, et al. Continuous dose-response association between sedentary time and risk for cardiovascular disease: a meta-analysis. *JAMA Cardiology*. 2016;1(5):575–583.
- [42] Patel AV, Maliniak ML, Rees-Punia E, Matthews CE, Gapstur SM. Prolonged leisure time spent sitting in relation to cause specific mortality in a large US cohort. *American Journal of Epidemiology*. 2018;187(10):2151–2158.
- [43] Patterson R, McNamara E, Tainio M, et al. Sedentary behavior and risk of all-cause, cardiovascular and cancer mortality, and incident type 2 diabetes: a systematic review and dose response meta-analysis. *European Journal of Epidemiology*. 2018;33(9):811–829.
- [44] Carter S, Hartman Y, Holder S, Thijssen DH, Hopkins ND. Sedentary behavior and cardiovascular disease risk: mediating mechanisms. *Exercise and Sport Sciences Reviews*. 2017;45(2):80–86.
- [45] Lundberg Slingsby MH, Gliemann L, Thrane M, et al. Platelet responses to pharmacological and physiological interventions in middle-aged men with different habitual physical activity levels. *Acta Physiologica*. 2018;223(1):e13028.
- [46] Heber S, Fischer B, Sallaberger-Lehner M, et al. Effects of high-intensity interval training on platelet function in cardiac rehabilitation: a randomized controlled trial. *Heart*. 2020;106(1):69–79.
- [47] Peytz NC, Jabbari R, Bojesen SE, Nordestgaard B, Schnohr P, Prescott E. Physical activity and risk of instant and 28-day case-fatality in myocardial infarction. *Public Library of Science ONE*. 2019;14(5):e0217398.
- [48] Yu LL, Liang Q, Zhou W, et al. Sedentary behavior and the risk of cardiac-cerebral vascular diseases in southern China. *Medicine (Baltimore)*. 2018;97(44):e12838.
- [49] Booth FW, Roberts CK, Laye MJ. Lack of exercise is a major cause of chronic diseases. *Comprehensive Physiology*. 2012; 2(2):1143–1211.
- [50] Huang R, Ho SY, Lo WS, Lam TH. Physical activity and constipation in Hong Kong adolescents. *Public Library of Science ONE*. 2014;9(2):e90193.
- [51] De Carvalho DE, de Luca K, Funabashi M, et al. Association of exposures to seated postures with immediate increases in back pain: a systematic review of studies with objectively measured sitting time. *Journal of Manipulative and Physiological Therapeutics*. 2020;43(1):1–12.
- [52] Danquah IH, Kloster S, Holtermann A, Aadahl M, Tolstrup JS. Effects on musculoskeletal pain from “Take a Stand!”-a cluster-randomized controlled trial reducing sitting time among office workers. *Scandinavian Journal of Work, Environment & Health*. 2017;43(4):350–357.
- [53] Lei YL, Zou K, Xin JG, et al. Sedentary behavior is associated with chronic obstructive pulmonary disease: a generalized propensity score-weighted analysis. *Medicine (Baltimore)*. 2021; 100(18):e25336.
- [54] Lynch BM. Sedentary behavior and cancer: a systematic review of the literature and proposed biological mechanisms. *Cancer Epidemiology, Biomarkers & Prevention*. 2010;19(11):2691–2709.
- [55] Friedenreich CM, Ryder-Burbidge C, McNeil J. Physical activity, obesity and sedentary behavior in cancer etiology: epidemiologic evidence and biologic mechanisms. *Molecular Oncology*. 2021;15(3):790–800.
- [56] Physical Activity Guidelines Advisory Committee. 2018 *Physical Activity Guidelines Advisory Committee Scientific Report*. Washington: U.S. Department of Health and Human Services; 2018.
- [57] Warburton DER, Bredin SSD. Health benefits of physical activity: a systematic review of current systematic reviews. *Current Opinion in Cardiology*. 2017;32(5):541–556.
- [58] Lyu BW. *Spring and Autumn Annals of Lyu Buwei* (吕氏春秋). Warring States. Chinese.
- [59] Khan HTA, Addo KM, Findlay H. Public health challenges and responses to the growing ageing populations. *Public Health Challenges*. 2024;(3):e213.
- [60] Chan K, Hu XY, Razmovski-Naumovski V, Robinson N. Challenges and opportunities of integrating traditional Chinese medicine into mainstream medicine: a review of the current situation. *European Journal of Integrative Medicine*. 2015;7(1):67–75.
- [61] Qiu J. When the East meets the West: the future of traditional Chinese medicine in the 21st century. *National Science Review*. 2015;2(3):377–380.
- [62] Sparling PB, Owen N, Lambert EV, Haskell WL. Promoting physical activity: the new imperative for public health. *Health Education Research*. 2000;15(3):367–376.
- [63] Guo YC, Shi HY, Yu DH, Qiu PX. Health benefits of traditional Chinese sports and physical activity for older adults: a systematic review of evidence. *Journal of Sport and Health Science*. 2016;5(3):270–280.

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Comparison of “Exterior-interior Pairing of the Lung and Large Intestine” and “Gut-lung Crosstalk” Based on COVID-19

WANG Yunliang^{1,✉}, ZHANG Yan^{1,2}

Abstract

The infection of SARS-CoV-2 has triggered the COVID-19 pandemic. In addition to the fever and respiratory symptoms in the process of coronavirus infections, gastrointestinal symptoms, especially diarrhea, are prominent features of its acute infection and long COVID. The associations between the lung and large intestine have been demonstrated by Western medicine in aspects such as tissue origin, microflora homeostasis, mucosal immunity, renin-angiotensin system (RAS) and autonomic nervous system as well, which are considered as the evidence of material basis and potential regulatory mechanisms for “gut-lung crosstalk (肺肠串扰)” in COVID-19. We have noticed that probiotics and other preparations can regulate the intestines, and further treat COVID-19 with effective and gratifying results. In the system of traditional Chinese medicine (TCM), there's a term of “exterior-interior pairing of the lung and large intestine (肺与大肠相表里)”, showing an interconnection of the lung and the bowels. “Exterior-interior pairing of the lung and large intestine” is an important part of the theory of visceral activities proposed by ancient physicians through a long-term observation and practice. It's considered that “lung” and “large intestine” are interconnected and mutually exterior-interior in the normal physical activities and the disease development, providing a theoretical basis for treating lung diseases and bowel diseases from the perspective of overall concept. The study aims to compare the term of “exterior-interior pairing of the lung and large intestine” in TCM and “gut-lung crosstalk” in Western medicine regarding the development of COVID-19 and its intestinal symptoms, and provide more ideas for diagnosing and treating lung and bowel related diseases.

Keywords: Exterior-interior pairing of the lung and large intestine (肺与大肠相表里); Gut-lung crosstalk; Connotation; COVID-19; Traditional Chinese medicine

1 Introduction

Similar to Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS), a member of the β -coronavirus genus, SARS-CoV-2, has already led to Corona Virus Disease 2019 (COVID-19) pandemic.¹ Fever and respiratory symptoms are dominant feature in the process of coronavirus infections, however, gastrointestinal symptoms are also prominent features of COVID-19 infection.¹

The highly prevalent symptoms of digestive tract in COVID-19 patients are diarrhea and abdominal pain, lack of appetite, as well as nausea and vomiting.² Early studies from China demonstrated that gastrointestinal symptoms were with high incidence in severe cases in classical COVID-19 patients.³ In addition to anorexia (4.7%), as well as nausea and vomiting (4.3%), the dominated gastrointestinal symptom was diarrhea (8.1%).⁴ A research demonstrated that in addition to much more critical conditions, higher proportions of noninvasive ventilation application and intensive care unit admission as well as case fatality rate can be seen in COVID-19 patients with diarrhea compared with COVID-19 patients without diarrhea.⁵ In addition, 48.1% of patients had a positive virus RNA testing in fecal samples, even with negative respiratory symptoms.⁶ Relevant studies also found that 35% patients of COVID-19 in U.S. had gastrointestinal symptoms, mainly diarrhea or nausea/vomiting.⁷ What's more, one or more gastrointestinal symptoms can be seen in nearly 60% of COVID-19 patients in a multicenter study, with 37.9% of those having diarrhea.⁸

Except for the acute infection of COVID-19, the intestinal dysbiosis is also prominent symptoms of long COVID. Studies showed that a sustained SARS-CoV-2

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RNA positive in fecal can be seen 4 months after COVID-19 diagnosis in 12.7% of participants, as well as 7 months after diagnosis in 3.8% of participants.⁹ There can be seen higher levels of fungal translocation in plasma of long COVID patients from the gut and/or lung epithelium compared with patients tested negative with SARS-CoV-2 or without long COVID, indicating a possibility of intestinal barrier dysfunction and cytokine production.¹⁰

In the mentioned gastrointestinal symptoms, given the high occurrence proportion of diarrhea and the fact of virus RNA detected in stool,⁶ intestinal functions play a critical role in COVID-19 process, not only in the acute infection period, but also in long COVID.

2 The connotation of “exterior-interior pairing of the lung and large intestine” in traditional Chinese medicine

The term of “exterior-interior pairing of the lung and large intestine (肺与大肠相表里)” is an important part of the theory of visceral activities in traditional Chinese medicine (TCM), which was proposed by ancient physicians through long-term observation and practice. It's considered that “lung” and “large intestine” are interconnected and mutually exterior-interior in normal physical activities and disease development, providing a theoretical basis for the treatment of lung diseases and bowel diseases from the perspective of overall concept. This theory can be traced back to the period of *Huang Di Nei Jing* (《黄帝内经》 *The Yellow Emperor's Inner Classic*). “The lung and large intestine are exterior-interiorly connected (肺与大肠相表里)” and “The hand-Taiyin (太阴) meridian of the lung starts from the middle energizer,... the collaterals of the lung, and the lower diaphragm belongs to the large intestine (肺手太阴之脉, 起于中焦, 下络大肠)” proposed in *Ling Shu* (《灵枢》 *The Spiritual Pivot*) are the sprouts of the relevant theories of the lung and the bowels. Later in the Tang dynasty, the term of “lung and large intestine being exterior-interior” was stated for the first time by Sun Simiao (孙思邈) in his commentary on *Hua Tuo Shen Fang* (《华佗神方》 *Hua Tuo's Divine Prescription*). This was adopted and applied in clinic by later doctors. Clinical attention should be paid to the relativity between the lung and the large intestine, which is a vital embodiment of this academic term connotation.

Based on the theory of viscera and meridians in TCM, the hand-Taiyin meridian (lung) and the hand-Yangming (阳明) meridian (large intestine) form *Zang Fu* (脏腑 *Zang-Fu* organs) relationship and the exterior-interior relationship as well via the mutual collaterals of the meridians, which is one of the internal attributes to the correlation of the lung and the large intestine, and the bridge foundation to realize the connection from the interior to the exterior. The exterior-interior association

of the lung and the large intestine is also strengthened via meridians, collaterals, etc.

The lung is “*Hua Gai* (华盖)” in TCM, which locates in the *Shang Jiao* (上焦 upper energizer), controlling the qi (气) and the breath. It regulates the normal activity of qi through qi's promoting and descending, and helps the blood, as well as body fluid to distribute around the body. The large intestine, located in the *Xia Jiao* (下焦 lower energizer), has the function of transmission in TCM, dominating the body fluid with function of transmitting the dross. These two cooperate with each other, guaranteeing the qi's ascending and descending unobstructed in the lung and the bowels, which is further conducive to the normal circulation of qi and blood in a healthy body. The lung loses its transmission function and causes the imbalance of qi in the stomach and the bowels if the lung is attacked by exogenous pathogenic factors. Then the clear yang will not ascend, the turbid qi will not descend, causing diarrhea and loose stool, as *Su Wen Yin Yang Ying Xiang Da Lun* (《素问·阴阳应象大论》 *Basic Questions: Comprehensive Discourse on Phenomena Corresponding to Yin and Yang*) says: “Diarrhea will be caused when there is a descending clear qi (清气在下, 则生飧泄)”. On the one hand, the lung qi cannot reach the bowels if there's a lack of vitality, disabling the body to push the dross out, causing a difficult defecation. The body fluids cannot be dispersed in the large intestine if there's phlegm and heat blockade in the lung, resulting in dry bowels and stool. Besides, diarrhea may occur if the lung heat moves down to the large intestine. On the other hand, if the large intestine qi is blocked with a bad conduction, the pathogenic factors will stay in the large intestine, causing lung qi stagnation, which can finally generate asthma, cough, chest tightness, and even dyspnea. These symptoms are the embodiment of “exterior-interior pairing of the lung and large intestine” in the process of physiology and pathology (Fig. 1).

3 The evidence of gut-lung crosstalk

The intestinal epithelial cells are different from those in the respiratory tract not only in the aspect of existing environments, but also the functional purposes. However, the same embryonic origin is shared by the tracts of gastrointestinal tract and respiratory, and they have the similar structure consequently. They are both composed of columnar epithelial cells. Projections of microvilli could be observed in the intestinal tract, and cilia in respiratory tract. In addition to the function of secreting mucus via goblet cells, they have the secretory function of immunoglobulin A as well and hence are considered as physical barriers, and sentinels for the immune system.¹¹ The systemic immunity can be affected by lymphocytes circulating via the lymphatic system. Gut-derived bacteria can travel to and stay in the lung by ways of inhalation of gastroesophageal reflux or

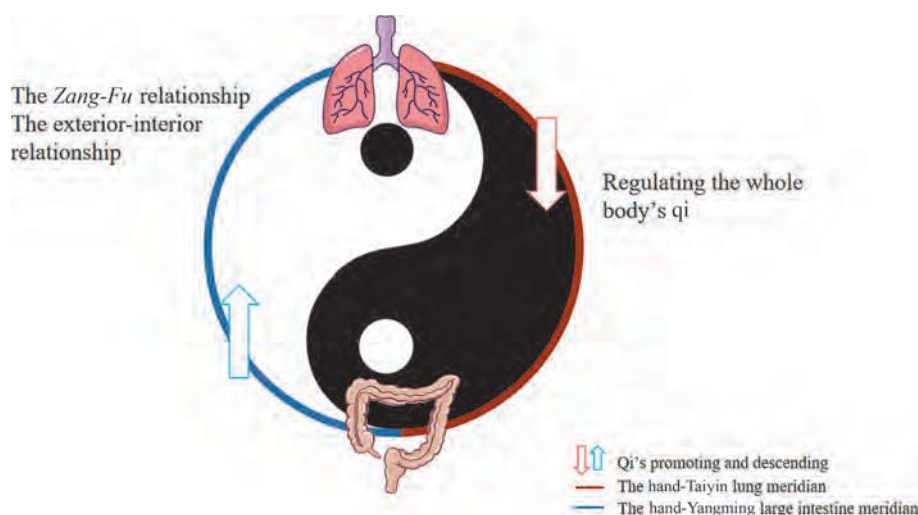


Figure 1 The connotation of “exterior-interior pairing of the lung and large intestine” in TCM (source with permission from: picture made by the authors)

vomit, leading to immune imbalance. Besides, the bacteria and their metabolites may enter the circulation system when the epithelial integrity is damaged in the period of intestinal dysbiosis, thus causing systemic inflammation.¹¹ Therefore, it is with no surprise that there are interactions between lung and gut in health and disease.

Because most of the immune cells can be seen in the intestines, the gut microbiome makes a great contribution to the immune response to initiating, adapting, as well as regulating.¹² The alterations of gut microbiome are closely related to an increasing trend of respiratory diseases susceptibility, together with the modifications of immune responses and lung homeostasis.¹¹ Many studies have demonstrated that a higher prevalence of lung diseases can be seen in patients with chronic digestive tract diseases such as inflammatory bowel disease (IBD).¹³ It's reported that pulmonary involvement, including inflammation or lung function impairments can be detected in up to 50% of adult IBD patients and 33% of irritable bowel syndrome (IBS) patients.^{14,15} Researchers also revealed that decreased levels of relative abundance in *Bifidobacterium*, *Akkermansia*, as well as *Faecalibacterium* can be detected in human neonatal gut, which are associated with an up-regulated risk rate of atopy and asthma in childhood.¹² Furthermore, several research studies suggested that there's an elevated risk of allergic respiratory disease like asthma because of the gut microbiome disturbances by the application of antibiotics in early life.^{16,17}

Besides, the lung microbiome has the same contributions to the immune response regulation as gut microbiome. An imbalance in immunological homeostasis can be introduced by a loss of diversity in pulmonary microbiome, which influences the occurrence and development of chronic inflammatory respiratory diseases.¹⁸ Chronic lung diseases, including asthma and chronic obstructive pulmonary disease (COPD), are investigated in the aspect of lung bacterial communities compared

with healthy subjects by many research studies.^{19,20} Evidences from studies on large children cohorts have shown that the impact of the environment, as well as the accumulated changes in lung microbiome composition may lead to a greater asthma developing risk.²¹ Studies also suggested that there's a much lower risk of asthma development when there's much obvious lung microbiota diversity.²² Additionally, differences in lung bacterial communities can be detected in COPD patients in comparison with healthy subjects.²³ In an observational study, the compositions of the microbiota in the lung biopsy samples from 20 fatal COVID-19 patients have been tested, and the results after analysis demonstrated that an *Enterobacteriaceae* family can be found in the lungs, as well as *Cryptococcus* dominated lung fungal in COVID-19 patients.²⁴

The effects of lung diseases on the intestinal microbiome are also very common. A mice study revealed that the influenza A virus can lead to intestinal dysbiosis and increase secondary bacterial infections, as well as emphasize the key role of short-chain fatty acids (SCFAs) on defending against bacterial infections in the pulmonary of host.²⁵ Additionally, researchers found that intestinal injury and gut microbiome alteration can be caused by the infection of respiratory influenza.²⁶ According to the report, there's a close relationship between chronic lung diseases and chronic digestive tract diseases. Asthma, as well as COPD, often occurs with IBD or IBS.^{27,28} It's shown that the functional and structural changes of intestinal mucosa can be seen in individuals with asthma, while COPD patients can represent typically increased levels of intestinal permeability,²⁹ who have a 2–3 times likelihood of being diagnosed as IBD.¹⁵

The autonomic nervous system (ANS) may also play a key role in gut-lung crosstalk. It has been reported that SARS-CoV2 infection is closely related to nervous system symptoms, and nervous system involvement is one of the causes of disease exacerbation.³⁰ Through animal

studies and clinical trials, coronavirus has been shown to have the ability to penetrate cerebrospinal fluid and disrupt the structure and function of the nervous system.³¹ The enteric nervous system (ENS) is a separate branch of the autonomic nervous system and the largest part of the peripheral nervous system (PNS). Esposito's team discovered that ENS may act as a route for SARS-CoV-2 to enter the brain, where the virus will enter the brain via the vagus or visceral nerves.³² By conducting histochemical studies on intestinal specimens, choroidal plexus and adjacent brain parenchyma of deceased COVID-19 patients, Deffner et al.³³ demonstrated the rationality of ENS as a potential pathway for SARS-CoV-2 entry at the anatomical level. The study by Buoite et al.³⁰ confirmed the hypothesis that ANS involvement occurs after COVID-19 and suggested further multi-system clinical and research evaluation, especially in the gastrointestinal tract. In addition to COVID-19 infection, the autonomic nervous system is also involved in the association of other lung diseases with intestinal diseases, for example, the correlation between IBS and asthma.³⁴

Mucosa-associated lymphoid tissue (MALT) also plays a role in gut-lung crosstalk. Bienenstock has proposed the common mucosal immune system (CMIS),³⁵ which posits that immune cells contained in mucosal tissues are universally connected throughout the body. In mice infected with the influenza virus,³⁶ immune damage occurred not only in the lungs, but also in the intestines, most likely due to crosstalk between the mucosal lymphatic tissue of the lungs and intestines. Shi's team found that *Houttuynia cordata* polysaccharides could treat lung infections by regulating the "gut-lung axis" involved in mucosal immunity.³⁷

Hence, there is actually an establishment of gut-lung crosstalk.¹¹ The alterations of gut microbiome in composition, diversity as well as function can affect the lung immunity.³⁸ In contrast, the microbiome in respiratory tract and lung inflammatory response can result in intestinal dysbiosis.³⁹ In addition, the autonomic nervous

system, and mucosa-associated lymphoid tissue are also involved in the progress of gut-lung crosstalk. Therefore, this bidirectional interaction connecting the respiratory tract with the gut is regarded as gut-lung crosstalk, which is supposed to be involved in physiological function in healthy individuals or the pathological process in SARS-CoV-2 infection (Fig. 2). However, the possible ways by which the gut affects the lung or vice versa still need to be fully elucidated.

4 The main mechanisms of "gut-lung crosstalk" in COVID-19

In addition to the delayed clearance of SARS-CoV-2 virus, diarrhea caused by the infection of SARS-CoV-2 may be related to the decreased richness and diversity of gut microbiome, the systemic inflammation, as well as the effects of pandemic stress on the alterations of gastrointestinal function (Fig. 2).⁴⁰

4.1 Effect on gut microbiome mediated immunity

Trillions of microorganisms participate in maintaining the complex ecosystem of intestinal microflora in human and play a role in the immune system regulation of intestinal epithelial barrier, as well as the whole physiology.⁴¹ The intestinal epithelial barrier plays a protective role in the invasion process of pathogenic microbes and contributes to maintaining the tolerance to food antigens. The pathogenic microorganisms can transfer and locate in the blood and the lung once there is a damage of intestinal epithelial barrier, which can then lead to septicemia, and even acute respiratory distress syndrome (ARDS).⁴² The intestinal microbiota can also influence the type I interferon receptors expression in epithelial cells in respiratory tract with the restricting function to viral replication after infections.⁴³ In addition, the status of host immunity is affected by gut microbiome,

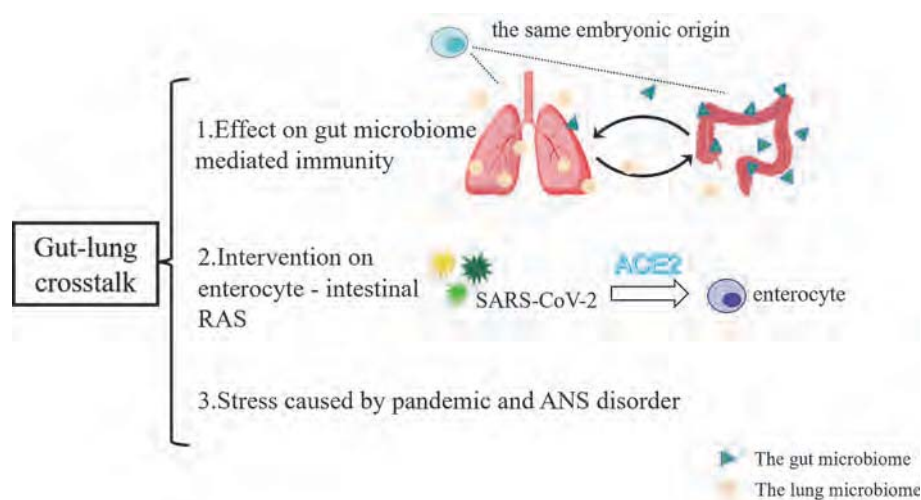


Figure 2 The evidences of gut-lung crosstalk (source with permission from: picture made by the authors)

which may cause the impact on the immune extent towards SARS-CoV-2 infections.⁴⁴

In a research conducted in China, the intestinal microbiota from patients of COVID-19 and H1N1, as well as healthy individuals were tested and analyzed by Gu et al.⁴⁵ and the results showed that a decreased intestinal microbiota diversity can be seen in the subjects with SARS-CoV-2 infection in contrast with controls, with opportunistic genera dominated. The COVID-19 patients in hospital also showed similar results. The intestinal flora disorder was sustained detected even after the SARS-CoV-2 disappearance and the symptoms improved in respiratory tract.⁴⁶ Additionally, Zuo et al.⁴⁷ reported that increased opportunistic fungi, including *Candida albicans*, *C. auris*, etc., were detected in fecal samples in COVID-19 patients.

Given the fact that gut microbiome makes a great contribution to the immune system maturation, it is reasonable to believe that the gut microbiome also has a critical role in the process of SARS-CoV-2 infection. Numerous pieces of evidence demonstrate that the host epithelia, together with immune cells, can obtain information from microorganisms and the local cytokine response, which further regulates the process of inflammatory response, as well as shapes the immunity at distal sites like the lung.¹¹ The various *Bacteroides* have the ability to expand Treg cell groups or bias the TH1/TH2 phenotype via SCFAs and epigenetic regulation of immune cells as well.⁴⁸ SCFAs orally administrated can also attenuate experimental allergic airway disease.³⁸ Immune changes in B lymphocytes are also important manifestations of COVID-19 and are closely related to the severity of the disease. Liu's team found that fecal microbiome transplantation (FMT) therapy not only improved gastrointestinal symptoms in patients recovering from COVID-19, but also the composition of peripheral lymphocyte subsets, especially B lymphocytes.⁴⁹ This suggests that FMT targeting the gut microbiota has a favorable effect on the immune system after SARS-CoV-2 infection. In addition to the intestinal mucosal barrier disruption aggravated by intestinal microbiota disorders, SARS-CoV-2 Infection can lead to the inflammatory factors release mediated by the intestinal endotoxin and intestinal flora translocation as well, which then contribute to the formation of inflammation storm,⁵⁰ resulting in exacerbated inflammatory responses in pulmonary and systematically. Meanwhile the structure and function of the lung can also be affected directly by these cytokines, resulting in serious disease development.⁵¹ Abundant evidence has shown that the cytokine storms greatly affect the COVID-19 progression, particularly in severely ill patients,⁵² which is a key reason for death in severe COVID-19 patients.

The application of antibiotics is related to diarrhea. In the treatment of COVID-19, there is also a possibility of using antibiotics,² causing alterations in intestinal flora compositions.⁵³ This provides another possibility for the reason for diarrhea symptoms in COVID-19 patients,

which also strengthens the correlation between SARS-CoV-2 and intestinal flora.

4.2 Intervention on enterocyte and intestinal renin angiotensin system (RAS)

The enterocytes can be infected directly by coronavirus, causing intestinal dysfunction or activation of the intestinal nervous system, and finally resulting in the important clinical symptoms of diseases.⁵⁴ The virus targets either enterocytes or colon organoids, making contributions to the increased viremia and spread of SARS-CoV-2 infection. Many reports have demonstrated that SARS-CoV-2 can be detected positively in the small and large intestine in infected patients with a high concentration of virus replication mainly concentrated in intestinal epithelial cells.⁵⁵ Besides, SARS-CoV-2 can be found in fecal samples as well in COVID-19 patients, showing that the digestive tract may be an active site for the virus replication.⁵⁶ A study carried out in Singapore showed that virus can be positively detected in the stool samples in 50% of COVID-19 patients, with half appearing digestive tract symptoms like diarrhea.⁵⁷ Researchers also evaluated the existence of SARS-CoV-2 in samples from throat swabs and stools. The data suggested that there was sustained positive results in stool samples for nearly 5 weeks in the cohort even after respiratory tract tests turned out to be negative.⁵⁸ Similarly, positive results of viral rectal swabs can be seen in 80% of infected children after respiratory sample tests turned out to be negative.⁵⁹ It is noteworthy that live SARS-CoV-2 virus can be detected in fecal samples in patients without diarrhea as well, suggesting a possibility of affecting the intestinal epithelium via virus directly.⁶⁰

The specific way of SARS-CoV-2 infection on digestive tract is still not fully clarified, however, latest studies suggest that possible pathways are involved in the virus-entering process into host, and angiotensin converting enzyme 2 (ACE2) is the key step.⁶¹ Like SARS-CoV,⁶² ACE2 is also a cellular receptor for SARS-CoV-2. The epithelial cells in the intestines can be infected directly by SARS-CoV-2. The virus can enter into the enterocyte abluminal side and translocate into the circulation after the process of replication and packaging.⁶³ In the digestive system, the ACE2 expression level is positively associated with immune signatures, explaining the possible gastrointestinal symptoms associated with COVID-19.⁶⁴ Recent studies suggest that SARS-CoV-2 can exist and replicate in the intestines over a long period of time, while a decreased ACE2 level after viral infection plays a vital role in the dysfunction in the digestive tract.⁶² A decreased luminal ACE2 can be seen during SARS-CoV-2 infection. The production level of Ang 1-7 would be reduced due to the reduction of enzymes cleaving Ang II, which further leads to a reduced Mas activation. Meanwhile, more Ang II with less Ang 1-7 can lead to the activation of luminal AT1R

(Angiotensin type I receptor) and enhance the intestinal permeability.⁶⁵ Besides, it's found previously that ACE2 also plays a role in regulating the expression of intestinal B0AT1.⁶⁶ As the substrates of B0AT1, tryptophan and glutamine contribute to the inflammatory cytokines regulation, tight junction improvement, the antimicrobial peptides secretion, as well as the mucosal cell autophagy modulation.^{65,67} All of the above can be affected and disturbed by the infection of SARS-CoV-2 and result in leaky gut. It is noteworthy that the gut barrier dysfunction disrupted by SARS-CoV-2 could generate bacterial lipopolysaccharide and peptidoglycan elevation, as well as inflammation enhancement, resulting in cytokines storm in critically ill COVID-19 patients.⁶³

The renin-angiotensin system (RAS), which is a complex cascade, consists of vasoactive peptides. ACE2, a main pathway of SARS-CoV-2 entry and infection, is not only the infection target of SARS-CoV-2 in intestine, but also in respiratory epithelium and vascular endothelium.⁶⁸ The entry of SARS-CoV-2 can generate a decreased level of ACE2, as well as the reduction of catalytic activity of ACE2 in the RAS system.⁶⁹ Besides, the interaction between local RAS (intestine RAS, lung RAS, etc.) and circulating RAS may also contribute to the progression of COVID-19 disease.

4.3 Effect of pandemic stress on gastrointestinal symptoms and autonomic nervous system disorder

Diarrhea and abdominal pain are also manifestations of functional bowel disorders and IBS, which belong to a kind of stress-sensitive mediated gut-brain disorder.⁷⁰ The outbreak of COVID-19 and several waves of pandemic have led to tremendous stress and obvious anxiety in public. In an online survey of gastrointestinal disease (FD, functional dyspepsia), as well as IBS, with a total number of 5,157 COVID-19 subjects finally enrolled, the researcher found that 8.5% of COVID-19 patients had FD, 16.6% with IBS, as well as 4.0% with FD-IBS overlapping, giving a suggestion of the negative public sentiment caused by the pandemic of COVID-19.⁷⁰ A study about whether the COVID-19 pandemic is correlated with the increased stress experiences in IBD patients as well as the aggravated disease activity showed that there were stress increments in the COVID-19 pandemic, especially in those with interpersonal tension and excessive interpersonal proximity, which relates to a deterioration of gastrointestinal symptoms. A study of post-COVID-19 autonomic disorders also showed that patients with neurological symptoms had higher scores on the Complex Autonomic Symptom Scale 31 (COMPASS-31), particularly in orthostatic intolerance, pitching movement, and gastrointestinal disorders.³⁰ All these indicate that the increase of pressure and the change of mood during the COVID-19 pandemic cannot be ignored, which also provides an opportunity to

aggravate the disorder of autonomic nervous system and symptoms of intestine. Clinical doctors should pay additional attention to and take extra care of patients with functional gastrointestinal symptoms not only during the acute infection of COVID-19 but also during the long COVID period.

5 The application of “simultaneous treatment of the lung and bowel” in the treatment of COVID-19

COVID-19 falls into the category of “dampness toxin epidemics” in TCM, which is characterized by rapid onset, high infectiousness, as well as easy spreading.⁵¹ It has been found that SARS-CoV-2 infection not only presented fever, dry cough and fatigue as clinical symptoms, but also presented the symptoms of digestive tract, such as diarrhea and abdominal pain, as well as nausea and vomiting. It has been a long time since TCM has been used as a therapy in treating epidemic diseases, which makes a great contribution to accumulating massive successful experience in epidemic disease prevention and treatment. Under the theoretical guidance of pattern differentiation and treatment, the TCM has the advantage of setting corresponding prescriptions according to the clinical symptoms, which plays a role in improving clinical symptoms, shortening the disease duration, as well as disease deterioration prevention.⁷¹

TCM not only has a direct therapeutic effect on lung symptoms, but also has an intervention effect on intestinal microbial environment and intestinal function. The lung and the large intestine are physiologically and pathologically connected in TCM, hence, the methods of simultaneous treatment of lung and bowel, the lung treating methods in bowel diseases, and the bowel treating methods in lung diseases can be applied to clinical use. *Shang Han Lun* (《伤寒论》 *Treatise on Cold Damage*) pointed out that if the stomach and bowel are dry and feces were accumulated inside, the defecation would be abnormal, and the lung system syndrome of wheezing could appear. In this situation, one can choose *Da Cheng Qi Tang* (大承气汤 Major Purgative Decoction) to clear the visceral qi and free the nasal orifices, so that the lung heat will be released with defecation, and wheezing will be improved. Ye Tianshi (叶天士), a master of epidemic febrile diseases, recorded many cases in *Li Zheng Zhi Nan Yi An* (《临证指南医案》 *Case Records as a Guide to Clinical Practice*). “*Xuan Fei Qi* (dispersing lung qi 宣肺气)” is used as the treatment method to adjust the intestinal fluid and expel the dross, finally improving intestinal obstruction, in which the selected medicines are all products to promote or improve lung qi. More and more modern scholars also treat lung and bowel related diseases based on this theory, and the curative effect is significant.

The fact that infection of influenza A virus in experimental mice can lead to intestine microbiota disorder and immune dysfunction has been demonstrated in a previous research. The TCM formula *Ma Xing Shi Gan Tang* (麻杏石甘汤 Ephedra, Apricot Kernel, Gypsum and Licorice Decoction) not only improved lung symptoms, but also played a role in regulating gut microbiota abundance with increasing Firmicutes, Lactobacillus, as well as Coprococcus and decreasing the Proteobacteria and Escherichia.⁵¹ Among the recommended traditional Chinese medicines for the prevention and treatment of COVID-19,^{72,73} they all have the functions of promoting lung qi, eliminating dampness, disintoxication and adjusting intestinal fluid, which aims to the simultaneous treatment of lung and bowel. Wu et al.⁷⁴ found that the use of *Qing Fei Pai Du Tang* (清肺排毒汤 Lung Cleansing and Toxin-removing Decoction) not only made a great contribution to the immune functional improvement and inflammation reduction in pneumonia model mice, but also the modulation of richness and diversity in intestine microbiota, indicating a correlation between clinical efficacy of *Qing Fei Pai Du Tang* and the regulation on gut microbiota. Studies also showed that the inflammatory storm mediated over-activation of immune response in the infection of COVID-19 can be inhibited by *Xuan Fei Bai Du Ke Li* (宣肺败毒颗粒 Lung-dispersing Toxin-resolving Granule). Meanwhile, *Xuan Fei Bai Du Ke Li* can also modulate the intestine microbiota composition, and further partially ameliorate the relative microbiota abundance in the intestinal bacterial imbalance induced by antibiotics in rats.⁷⁵ Additionally, *Lian Hua Qing Wen Tang* (连花清瘟汤 Weeping Forsythia and Honeysuckle Flower Epidemic-clearing Decoction) has been studied by the detailed network analysis, and the data indicated the process of inflammation can be regulated by *Lian Hua Qing Wen Tang*, which then makes a contribution to the antiviral effects, as well as lung injury repairs. Meanwhile, *Lian Hua Qing Wen Tang* also plays a role in alleviating symptoms induced by ACE2 expression disorder.⁷⁶ Xiao et al. found that LHQWD combined with *Huo Xiang Zheng Qi Di Wan* (藿香正气滴丸 Agastache Qi-correcting Dropping Pills) for 14 days could not only significantly improve respiratory symptoms such as cough and fever in COVID-19 patients, but also improve digestive system symptoms such as loss of appetite, diarrhea, nausea and vomiting by 100%.⁷⁷

Common medicines used in Western medicine to treat COVID-19 include Paxlovid,⁷⁸ molnupiravir,⁷⁹ and other antiviral medicines. However, about 3.1%–6% of patients would have diarrhea, vomiting, appetite loss and other gastrointestinal adverse reactions after taking the medicines. Considering the interaction between respiratory and gastrointestinal mucosa in the imbalance of microbiome and inflammatory response, it is reasonable to assume that the modulation and restoration of the intestinal microenvironment as an adjuvant treatment may

make a great contribution to the suppression of adverse outcomes of COVID-19. It's reported that the application of these Western medicine treatments can alleviate the immune response. Moreover, this may also improve the immune status against SARS-CoV-2 infection after vaccinations.⁸⁰ Meanwhile, the beneficial microbes can play a key role efficiently against respiratory viruses via the influence on mucosal immunity.⁸¹

The application of probiotics has played a positive role in the improvement of symptoms of intestinal diarrhea and the recovery of lung diseases as well. It is reported that probiotics can help treat not only diarrhea linked with SARS-CoV-2 infection, but also antibiotic-associated diarrhea related to secondary pulmonary infection.⁸² Moreover, the supplementation of probiotics can lower the incidence of pneumonia related to ventilator use in two meta-analyses of nearly 2,000 patients.⁸³ What's more, the incidence of respiratory tract infection can be inhibited by the use of Bifidobacterium, Lactobacillus paracasei, as well as L. rhamnosus through enhancing vaccine immunity.⁸⁴ In an animal experiment, Liu et al.⁸⁵ indicated that the recombinant Lactobacillus plantarum can play an antiviral role in coronavirus infection in the intestinal epithelial cells. D'Ettorre et al.⁸⁶ also evaluated the probiotics influences on decreasing the progression of COVID-19 disease. The results showed that patients in the group with 3 days of probiotic supplementation appeared to alleviate most of the symptoms and the conditions of diarrhea in 92.9% of patients have been improved, while the group with 7 days of probiotic supplementation showed a significantly lower risk level in respiratory failure, intensive care hospitalizations, as well as mortality, indicating that the intervention of gut-lung crosstalk can play a role in SARS-CoV-2 infection treatment.⁸⁶ Relevant registered clinical trials are available on ClinicalTrials.gov on the impact of probiotics and intestinal microbiota regulators on COVID-19.⁸⁴ What's more, given the fact that SARS-CoV-2 enters the host cells by binding its spike (S) protein to the cellular ACE2, it's worth noticing that the inhibitors of viral targeting either S protein or host ACE2 receptor are closely related to RAS.⁸⁷

It's highly recommended that the treatment related to intestinal microenvironment regulation should be included during acute COVID-19 infection and long COVID whether the SARS-CoV-2 RNA test result is positive or not, and whether there are intestinal symptoms. This is also applicable in the treatment of other lung diseases.

6 Conclusion

There has been a COVID-19 pandemic. Through the exploration of the pathogenesis and treatment of COVID-19, it has become more and more profound in understanding the relationship between the intestines and the lung. Both TCM and Western medicine

have extensive experience in treating diseases by connecting the lung and the intestines in medical practice. Although the system of TCM is different from that of Western medicine, a common understanding of the relationship between the lung and the intestines has been found by the studies of COVID-19. In addition to the same tissue origin, Western medicine has demonstrated some relationships between the lung and large intestine in aspects such as microflora homeostasis, mucosal immunity, RAS as well as the autonomic nervous system, which are considered as the evidence of material basis and potential regulatory mechanisms for “gut-lung crosstalk” in COVID-19. We have also noticed that the use of probiotics and other medicines can regulate the intestines, and further treat COVID-19 with effective and gratifying results. In the TCM system, the concept of “exterior-interior pairing of the lung and large intestine” also shows an interconnection between the lung and the intestines. It’s considered that there’s an interconnection with mutual exterior-interior between “lung” and “large intestine” either in normal physical activities or in the disease developments, providing a theoretical basis for the treatment of lung diseases and bowel diseases from the perspective of overall concept. The ultimate impact on the intestines is associated with its function, no matter whether it is intestinal flora imbalance, intestinal RAS disorder, stress, autonomic nervous system disorder, or immune imbalance. Hence, the regulations of intestinal symptoms in COVID-19 are aimed at the recovery and improvement of intestinal function. This coincides with the connotation of “exterior-interior pairing of the lung and large intestine” in TCM. By comparing the term of “exterior-interior pairing of the lung and large intestine” in TCM and “gut-lung crosstalk” in Western medicine in the development of COVID-19 disease, the cognitions of the same disease in the two medical systems have been revealed and have displayed a result of “all roads lead to Rome”, which can provide more ideas for the lung and bowel-related diseases diagnosis and treatment.

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Ethical approval

This study does not contain any studies with human or animal subjects performed by the author.

Author contributions

WANG Yunliang contributed to the topic selection, wrote the first draft, and revised the final version of the paper. ZHANG Yan participated in manuscript writing and illustration making.

Conflicts of interest

The authors declare no financial or other conflicts of interest.

Reference

- [1] Caio G, Lungaro L, Cultrera R, De Giorgio R, Volta U. Coronaviruses and gastrointestinal symptoms: an old liaison for the new SARS-CoV-2. *Gastroenterology and Hepatology from Bed to Bench*. 2020;13(4):341–350.
- [2] Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *New England Journal of Medicine*. 2020;382(18):1708–1720.
- [3] An P, Chen HB, Ren HX, et al. Gastrointestinal symptoms onset in COVID-19 patients in Wuhan, China. *Digestive Diseases and Sciences*. 2021;66(10):3578–3587.
- [4] Zheng T, Yang C, Wang HY, et al. Clinical characteristics and outcomes of COVID-19 patients with gastrointestinal symptoms admitted to Jiangnan Fangcang Shelter Hospital in Wuhan, China. *Journal of Medical Virology*. 2020;92(11):2735–2741.
- [5] Wan YL, Li J, Shen LH, et al. Enteric involvement in hospitalised patients with COVID-19 outside Wuhan. *Lancet Gastroenterology & Hepatol*. 2020;5(6):534–535.
- [6] Cheung KS, Hung IFN, Chan PPY, et al. Gastrointestinal manifestations of SARS-CoV-2 infection and virus load in fecal samples from a Hong Kong cohort: systematic review and meta-analysis. *Gastroenterology*. 2020;159(1):81–95.
- [7] Nobel YR, Phipps M, Zucker J, et al. Gastrointestinal symptoms and coronavirus disease 2019: a case-control study from the United States. *Gastroenterology*. 2020;159(1):373–375.e2.
- [8] Marasco G, Cremon C, Barbaro MR, et al. Prevalence of gastrointestinal symptoms in severe acute respiratory syndrome coronavirus 2 infection: results of the prospective controlled multinational GI-COVID-19 Study. *American Journal of Gastroenterology*. 2022;117(1):147–157.
- [9] Natarajan A, Zlitni S, Brooks EF, et al. Gastrointestinal symptoms and fecal shedding of SARS-CoV-2 RNA suggest prolonged gastrointestinal infection. *Medicine*. 2022;3(6):371–387.e9.
- [10] Giron LB, Peluso MJ, Ding J, et al. Markers of fungal translocation are elevated during post-acute sequelae of SARS-CoV-2 and induce NF-κB signaling. *JCI Insight*. 2022;7(15):e160989.
- [11] Budden KE, Gellatly SL, Wood DL, et al. Emerging pathogenic links between microbiota and the gut-lung axis. *Nature Reviews Microbiology*. 2017;15(1):55–63.
- [12] Fujimura KE, Sitarik AR, Havstad S, et al. Neonatal gut microbiota associates with childhood multisensitized atopy and T cell differentiation. *Nature Medicine*. 2016;22(10):1187–1191.
- [13] Lee J, Im JP, Han K, et al. Risk of inflammatory bowel disease in patients with chronic obstructive pulmonary disease: a nationwide, population-based study. *World Journal of Gastroenterology*. 2019;25(42):6354–6364.
- [14] Yazar A, Atis S, Konca K, et al. Respiratory symptoms and pulmonary functional changes in patients with irritable bowel syndrome. *American Journal of Gastroenterology*. 2001;96(5):1511–1516.
- [15] Keely S, Talley NJ, Hansbro PM. Pulmonary-intestinal crosstalk in mucosal inflammatory disease. *Mucosal Immunology*. 2012;5(1):7–18.
- [16] Russell SL, Gold MJ, Reynolds LA, et al. Perinatal antibiotic-induced shifts in gut microbiota have differential effects on inflammatory lung diseases. *Journal of Allergy and Clinical Immunology*. 2015;135(1):100–109.
- [17] Arrieta MC, Stiemsma LT, Dimitriu PA, et al. Early infancy microbial and metabolic alterations affect risk of childhood asthma. *Science Translational Medicine*. 2015;7(307):1–14.
- [18] Marsland BJ, Gollwitzer ES. Host-microorganism interactions in lung diseases. *Nature Reviews Immunology*. 2014;14(12):827–835.
- [19] Sze MA, Hogg JC, Sin DD. Bacterial microbiome of lungs in COPD. *International Journal of Chronic Obstructive Pulmonary Disease*. 2014;9:229–238.
- [20] Mathieu E, Escribano-Vazquez U, Descamps D, et al. Paradigms of lung microbiota functions in health and disease, particularly, in asthma. *Frontiers in Physiology*. 2018;9:1168.

- [21] Ege MJ, Mayer M, Normand AC, et al. Exposure to environmental microorganisms and childhood asthma. *New England Journal of Medicine*. 2011;364(8):701–709.
- [22] Bacharier LB, Cohen R, Schweiger T, et al. Determinants of asthma after severe respiratory syncytial virus bronchiolitis. *Journal of Allergy and Clinical Immunology*. 2012;130(1):91–100.e3.
- [23] Zakharkina T, Heinzel E, Koczulla RA, et al. Analysis of the airway microbiota of healthy individuals and patients with chronic obstructive pulmonary disease by T-RFLP and clone sequencing. *Public Library of Science ONE*. 2013;8(7):e68302.
- [24] Fan J, Li X, Gao Y, et al. The lung tissue microbiota features of 20 deceased patients with COVID-19. *The Journal of Infection*. 2020;81(3):e64–e67.
- [25] Sencio V, Barthelémy A, Tavares LP, et al. Gut dysbiosis during influenza contributes to pulmonary pneumococcal superinfection through altered short-chain fatty acid production. *Cell Reports*. 2020;30(9):2934–2947.e6.
- [26] Wang J, Li F, Wei H, Lian ZX, Sun R, Tian Z. Respiratory influenza virus infection induces intestinal immune injury via microbiota-mediated Th17 cell-dependent inflammation. *Journal of Experimental Medicine*. 2014;211(12):2397–2410.
- [27] Roussos A, Koursarakos P, Patsopoulos D, et al. Increased prevalence of irritable bowel syndrome in patients with bronchial asthma. *Respiratory Medicine*. 2003;97(1):75–79.
- [28] Rutten EPA, Lenaerts K, Buurman WA, Wouters EFM. Disturbed intestinal integrity in patients with COPD: effects of activities of daily living. *Chest*. 2014;145(2):245–252.
- [29] Vieira WA, Pretorius E. The impact of asthma on the gastrointestinal tract (GIT). *Journal of Asthma and Allergy*. 2010;3:123–130.
- [30] Buoite Stella A, Furlanis G, Frezza NA, Valentiniotti R, Ajcevic M, Manganotti P. Autonomic dysfunction in post-COVID patients with and without neurological symptoms: a prospective multidomain observational study. *Journal of Neurology*. 2022;269(2):587–596.
- [31] De Felice FG, Tovar-Moll F, Moll J, Munoz DP, Ferreira ST. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the central nervous system. *Trends in Neurosciences*. 2020;43(6):355–357.
- [32] Esposito G, Pesce M, Seguela L, Sanseverino W, Lu J, Sarnelli G. Can the enteric nervous system be an alternative entrance door in SARS-CoV2 neuroinvasion? *Brain Behavior and Immunity*. 2020;87:93–94.
- [33] Deffner F, Scharr M, Klingenstein S, et al. Histological evidence for the enteric nervous system and the choroid plexus as alternative routes of neuroinvasion by SARS-CoV2. *Frontiers in Neuroanatomy*. 2020;14:596439.
- [34] Bachani P, Kumar L, Kumar N, et al. Prevalence and symptom characteristics of irritable bowel syndrome among bronchial asthma patients in Pakistan. *Cureus Journal of Medical Science*. 2020;12(12):e12231.
- [35] Bienenstock J, Rudzik O, Clancy RL, Perey DY. Bronchial lymphoid tissue. *Advances in Experimental Medicine and Biology*. 1974;45(0):47–56.
- [36] Zhu HY, Lu XX, Ling LJ, et al. Houttuynia cordata polysaccharides ameliorate pneumonia severity and intestinal injury in mice with influenza virus infection. *Journal of Ethnopharmacology*. 2018;218:90–99.
- [37] Shi CC, Zhu HY, Li H, et al. Regulating the balance of Th17/Treg cells in gut-lung axis contributed to the therapeutic effect of Houttuynia cordata polysaccharides on H1N1-induced acute lung injury. *International Journal of Biological Macromolecules*. 2020;158:52–66.
- [38] Trompette A, Gollwitzer ES, Yadava K, et al. Gut microbiota metabolism of dietary fiber influences allergic airway disease and hematopoiesis. *Nature Medicine*. 2014;20(2):159–166.
- [39] Groves HT, Cuthbertson L, James P, Moffatt MF, Cox MJ, Tregoning JS. Respiratory disease following viral lung infection alters the murine gut microbiota. *Frontiers in Immunology*. 2018;9:182.
- [40] Freedberg DE, Chang L. Gastrointestinal symptoms in COVID-19: the long and the short of it. *Current Opinion in Gastroenterology*. 2022;38(6):555–561.
- [41] Donaldson GP, Lee SM, Mazmanian SK. Gut biogeography of the bacterial microbiota. *Nature Reviews Microbiology*. 2016;14(1):20–32.
- [42] Abrahamsson TR, Jakobsson HE, Andersson AF, Björkstén B, Engstrand L, Jenmalm MC. Low gut microbiota diversity in early infancy precedes asthma at school age. *Clinical and Experimental Allergy*. 2014;44(6):842–850.
- [43] Bradley KC, Finsterbusch K, Schnepf D, et al. Microbiota-driven tonic interferon signals in lung stromal cells protect from influenza virus infection. *Cell Reports*. 2019;28(1):245–256.e4.
- [44] Prompetchara E, Ketloy C, Palaga T. Immune responses in COVID-19 and potential vaccines: lessons learned from SARS and MERS epidemic. *Asian Pacific Journal of Allergy and Immunology*. 2020;38(1):1–9.
- [45] Gu SL, Chen YF, Wu ZJ, et al. Alterations of the gut microbiota in patients with coronavirus disease 2019 or H1N1 influenza. *Clinical Infectious Disease*. 2020;71(10):2669–2678.
- [46] Zuo T, Zhang F, Lui GCY, et al. Alterations in gut microbiota of patients with COVID-19 during time of hospitalization. *Gastroenterology*. 2020;159(3):944–955.e8.
- [47] Zuo T, Zhan H, Zhang F, et al. Alterations in fecal fungal microbiome of patients with COVID-19 during time of hospitalization until discharge. *Gastroenterology*. 2020;159(4):1302–1310.e5.
- [48] Samuelson DR, Welsh DA, Shellito JE. Regulation of lung immunity and host defense by the intestinal microbiota. *Frontiers in Microbiology*. 2015;6:1085.
- [49] Liu FQ, Ye SL, Zhu X, et al. Gastrointestinal disturbance and effect of fecal microbiota transplantation in discharged COVID-19 patients. *Journal of Medical Case Reports*. 2021;15(1):1–9.
- [50] Liu Q, Zhou YH, Yang ZQ. The cytokine storm of severe influenza and development of immunomodulatory therapy. *Cellular & Molecular Immunology*. 2016;13(1):3–10.
- [51] Yang ZH, Liu YX, Wang L, et al. Traditional Chinese medicine against COVID-19: role of the gut microbiota. *Biomedicine & Pharmacotherapy*. 2022;149:112787.
- [52] Jose RJ, Manuel A. COVID-19 cytokine storm: the interplay between inflammation and coagulation. *Lancet Respiratory Medicine*. 2020;8(6):e46–e47.
- [53] Willing BP, Russell SL, Finlay BB. Shifting the balance: antibiotic effects on host-microbiota mutualism. *Nature Reviews Microbiology*. 2011;9(4):233–243.
- [54] Lamers MM, Beumer J, van der Vaart J, et al. SARS-CoV-2 productively infects human gut enterocytes. *Science*. 2020;369(6499):50–54.
- [55] Xiao F, Tang MW, Zheng XB, Liu Y, Li XF, Shan H. Evidence for gastrointestinal infection of SARS-CoV-2. *Gastroenterology*. 2020;158(6):1831–1833.e3.
- [56] Chen YF, Chen LJ, Deng QL, et al. The presence of SARS-CoV-2 RNA in the feces of COVID-19 patients. *Journal of Medical Virology*. 2020;92(7):833–840.
- [57] Ong J, Young BE, Ong S. COVID-19 in gastroenterology: a clinical perspective. *Gut*. 2020;69(6):1144–1145.
- [58] Wu YJ, Guo C, Tang LT, et al. Prolonged presence of SARS-CoV-2 viral RNA in faecal samples. *Lancet Gastroenterology & Hepatology*. 2020;5(5):434–435.
- [59] Xu Y, Li XF, Zhu B, et al. Characteristics of pediatric SARS-CoV-2 infection and potential evidence for persistent fecal viral shedding. *Nature Medicine*. 2020;26(4):502–505.
- [60] Wang WL, Xu YL, Gao RQ, et al. Detection of SARS-CoV-2 in different types of clinical specimens. *Journal of the American Medical Association*. 2020;323(18):1843–1844.
- [61] Wan YS, Shang J, Graham R, et al. Receptor recognition by the novel coronavirus from Wuhan: an analysis based on decade-long structural studies of SARS coronavirus. *Journal of Virology*. 2020;94(7):e00127–20.
- [62] Wang W, Xu Y, Gao R, et al. Pathogenesis and mechanism of gastrointestinal infection with COVID-19. *Frontiers in Immunology*. 2021;12:674074.
- [63] Penninger JM, Grant MB, Sung JJY. The role of angiotensin converting enzyme 2 in modulating gut microbiota, intestinal inflammation, and coronavirus infection. *Gastroenterology*. 2021;160(1):39–46.
- [64] Li MY, Li L, Zhang Y, Wang XS. Expression of the SARS-CoV-2 cell receptor gene ACE2 in a wide variety of human tissues. *Infectious Diseases of Poverty*. 2020;9(2):23–29.
- [65] Perlot T, Penninger JM. ACE2—from the renin-angiotensin system to gut microbiota and malnutrition. *Microbes and Infection*. 2013;15(13):866–873.

- [66] Camargo SM, Singer D, Makrides V, et al. Tissue-specific amino acid transporter partners ACE2 and collectrin differentially interact with hartnup mutations. *Gastroenterology*. 2009;136(3):872–882.
- [67] Obukhov AG, Stevens BR, Prasad R, et al. SARS-CoV-2 infections and ACE2: Clinical outcomes linked with increased morbidity and mortality in individuals with diabetes. *Diabetes*. 2020;69(9):1875–1886.
- [68] Amraei R, Rahimi N. COVID-19, renin-angiotensin system and endothelial dysfunction. *Cells*. 2020;9(7):1652.
- [69] Verdecchia P, Cavallini C, Spanevello A, Angeli F. The pivotal link between ACE2 deficiency and SARS-CoV-2 infection. *European Journal of Internal Medicine*. 2020;76:14–20.
- [70] Oshima T, Siah KTH, Yoshimoto T, et al. Impacts of the COVID-19 pandemic on functional dyspepsia and irritable bowel syndrome: a population-based survey. *Journal of Gastroenterology and Hepatology*. 2021;36(7):1820–1827.
- [71] Yang ZH, Wang B, Ma Q, et al. Potential mechanisms of action of Chinese patent medicines for COVID-19: a review. *Frontiers in Pharmacology*. 2021;12:668407.
- [72] Wang JJ, Qi FH. Traditional Chinese medicine to treat COVID-19: the importance of evidence-based research. *Drug Discoveries & Therapeutics*. 2020;14(3):149–150.
- [73] Lyu M, Fan GW, Xiao GX, et al. Traditional Chinese medicine in COVID-19. *Acta Pharmaceutica Sinica B*. 2021;11(11):3337–3363.
- [74] Wu GS, Zhang WD, Zheng NN, et al. Integrated microbiome and metabolome analysis reveals the potential therapeutic mechanism of Qing-Fei-Pai-Du decoction in mice with coronavirus-induced pneumonia. *Frontiers in Cellular and Infection Microbiology*. 2022;12:950983.
- [75] He QY, Shi YM, Xing H, et al. Modulating effect of Xuanfei Baidu granule on host metabolism and gut microbiome in rats. *Frontiers in Pharmacology*. 2022;13:922642.
- [76] Zheng SC, Baak JP, Li S, et al. Network pharmacology analysis of the therapeutic mechanisms of the traditional Chinese herbal formula Lian Hua Qing Wen in corona virus disease 2019 (COVID-19), gives fundamental support to the clinical use of LHQW. *Phytomedicine*. 2020;79:153336.
- [77] Xiao MZ, Tian JX, Zhou Y, et al. Efficacy of huoxiang zhengqi dropping pills and lianhua qingwen granules in treatment of COVID-19: a randomized controlled trial. *Pharmacological Research*. 2020;161:105126.
- [78] Hammond J, Leister-Tebbe H, Gardner A, et al. Oral nirmatrelvir for high-risk, nonhospitalized adults with Covid-19. *New England Journal of Medicine*. 2022;386(15):1397–1408.
- [79] Jayk Bernal A, Gomes da Silva MM, Musungaie DB, et al. Molnupiravir for oral treatment of Covid-19 in nonhospitalized patients. *New England Journal of Medicine*. 2022;386(6):509–520.
- [80] He LH, Ren LF, Li JF, Wu YN, Li X, Zhang L. Intestinal flora as a potential strategy to fight SARS-CoV-2 infection. *Frontiers in Microbiology*. 2020;11:1388.
- [81] Villena J, Kitazawa H. The modulation of mucosal antiviral immunity by immunobiotics: could they offer any benefit in the SARS-CoV-2 pandemic? *Frontiers in Physiology*. 2020;11:699.
- [82] Szajewska H, Canani RB, Guarino A, et al. Probiotics for the prevention of antibiotic-associated diarrhea in children. *Journal of Pediatric Gastroenterology and Nutrition*. 2016;62(3):495–506.
- [83] Su MM, Jia Y, Li Y, Zhou DY, Jia JS. Probiotics for the prevention of ventilator-associated pneumonia: a meta-analysis of randomized controlled trials. *Respiratory Care*. 2020;65(5):673–685.
- [84] de Oliveira GLV, Oliveira CNS, Pinzan CF, de Salis LVV, Cardoso CRB. Microbiota modulation of the gut-lung axis in COVID-19. *Frontiers in Immunology*. 2021;12:635471.
- [85] Liu YS, Liu Q, Jiang YL, et al. Surface-displayed porcine IFN- λ 3 in lactobacillus plantarum inhibits porcine enteric coronavirus infection of porcine intestinal epithelial cells. *Journal of Microbiology and Biotechnology*. 2020;30(4):515–525.
- [86] d'Ettorre G, Ceccarelli G, Marazzato M, et al. Challenges in the management of SARS-CoV2 infection: the role of oral bacteriotherapy as complementary therapeutic strategy to avoid the progression of COVID-19. *Frontiers in Medicine*. 2020;7:389.
- [87] Şimşek-Yavuz S, Komsuoğlu Çelikyurt FI. An update of anti-viral treatment of COVID-19. *Turkish Journal of Medical Sciences*. 2021;51(Si-1):3372–3390.

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Distribution of Traditional Chinese Medicine Syndromes and Syndrome Elements of Chronic Heart Failure Based on Network Analysis and Hierarchical Cluster Analysis

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Abstract

Traditional Chinese medicine (TCM) has played a significant role in the prevention and treatment of chronic heart failure (CHF). To study TCM diagnosis of CHF, a total of 278 Chinese clinical research articles on the study of CHF syndromes in recent 40 years retrieved from Web of Science, Scopus, PubMed, Embase, CNKI, Wanfang Data, CqVIP, and SinoMed. According to cumulative frequency analysis, network analysis, and hierarchical cluster analysis, the study found the distribution of CHF syndromes was syndrome of qi deficiency with blood stasis, syndrome of qi and yin deficiency, syndrome of yang deficiency with water flooding, syndrome of heart blood stasis obstruction, syndrome of turbid phlegm, and syndrome of collapse due to primordial yang deficiency. The syndrome elements on location of illness were heart, kidney, lung, and spleen. The syndrome elements on nature of illness were qi deficiency, blood stasis, yang deficiency, yin deficiency, water retention, and turbid phlegm. These findings can provide reference to the research on diagnosis and treatment of CHF, and contribute to the study on syndrome standardization and objective research of TCM diagnosis.

Keywords: Chronic heart failure; Traditional Chinese medicine; Hierarchical cluster analysis; Network analysis; Syndrome; Syndrome differentiation; Syndrome element

1 Introduction

With the aging population increasing, the incidences of coronary artery disease, hypertension, diabetes, obesity, and other chronic diseases rising, and the medical care quality improving in China, the prevalence of chronic heart failure (CHF) in China has witnessed a continuous increase.¹ As the severe manifestations and/or the end phase of various cardiac diseases, CHF would lead to high mortality and

readmission rate, which has become the most important cardiovascular disease in the 21st century.²

Traditional Chinese medicine (TCM) can achieve significant therapeutic effects in preventing and treating CHF, as well as improving clinical symptoms and patients' quality of life. It has been widely used in the treatment of CHF.³ According to the views of TCM, CHF is a condition characterized by deficiency in root cause but excess in symptoms, i.e., a pattern of combined deficiency and excess.⁴ As it is usually seen in the terminal stage of multiple chronic diseases, so its cause, developing process, and syndromes are usually complicated.

The conditions, symptoms, body signs of CHF patients at different stages are inconsistent, not to mention different patient groups, different regions where patients living in, and professional and clinical experience differences in doctors, which all led to various views on the distribution of CHF syndromes. These have hindered the standardization and research of TCM diagnosis and treatment on the disease.⁵ Thus, it is of important clinical significance to study the distribution and standardization of CHF syndromes and syndrome elements.

2 Methods

This study was designed to analyze Chinese and English articles. The processing of articles, including literature retrieving, software screening and manual screening, as

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well as data extraction and standardization, were done separately according to writing language. The data of Chinese literature were then translated and merged with those of English literature for further analyses.

2.1 Literature retrieving

The Chinese articles were retrieved from four Chinese literature databases, i.e., Wanfang Data, CNKI, CqVIP, and SinoMed, from the time of the database foundation to December 31st, 2021, with the keywords of “congestive heart failure (充血性心力衰竭), chronic heart failure (慢性心衰、慢性心力衰竭、慢性心功能衰竭), chronic heart insufficiency (慢性心功能不全), syndrome/pattern (证、证候、证型), syndrome differentiation (辨证)” in Chinese. The English articles were retrieved from four English literature databases, i.e., Web of Science (Core Collection), Scopus, PubMed, and Embase, from the time of the database foundation (WOS: January 1st, 1900) to December 31, 2021, with the keywords of “congestive heart failure, chronic heart failure, chronic heart insufficiency, chronic heart myocardial failure, traditional Chinese medicine, Chung I Hsueh, *Zhong Yi Xue* (中医学), syndrome, *Zheng* (证), pattern”.

The database retrieving results were exported in the format of Refwork, which were then merged and de-duplicated by the software of COOC version 9.9.⁶ The result was screened manually by reading title, abstract, and key words. If there were any missing information or similar articles, the full texts of articles would be reviewed.

2.1.1 Inclusion criteria

The research original articles should be on the topic of “chronic heart failure” or “congestive heart failure” with definite TCM syndrome differentiation criterion and Western medicine diagnostic criterion for CHF. Each article should categorize CHF into two types of syndromes at least and have definite case number for each syndrome. The diagnostic criteria for CHF in the articles should be recognized by authoritative institutions. The TCM diagnostic criteria should be guidelines stipulated by governmental organs, criteria made by the specialty committees, the standards recommended by TCM textbooks or monographies recognized by the academic community, and so on. As for those criteria for CHF in Western medicine, all the criteria should reference the recognized standards, such as the Framingham Risk Score, and the guidelines of The American College of Cardiology (ACC)/American Heart Association (AHA) and European Society of Cardiology (ESC), etc.

2.1.2 Exclusion criteria

Literature review, case report, introduction on the clinical experience of eminent doctors, theoretical research on the concept or the nature of TCM syndromes only, animal experiment, study protocol, meta-analysis, or

duplicate publication would be excluded. During the manual screening, the duplicate publication in other language or using the same set of clinical data would be handled carefully, and the reviewers shall keep all the researches and/or clinical data sets are unique in this study.

2.2 Data extraction and pre-processing

The data, for example, the general information of publication, demographic data of patients, case numbers, diagnostic criteria, syndromes, and symptoms, were extracted from each article, and then standardized. In the case of inconsistency of data extraction and standardization, the original full text of the article would be reviewed and the questions would be referred to experts for final decision. A database was established with Excel 2021 to store the data.

The syndromes extracted from the articles were standardized according to *Zhong Yi Bing Zheng Fen Lei Yu Dai Ma* (《中医病证分类与代码》 *Classification and Codes of Diseases and Patterns of Traditional Chinese Medicine*) (GB/T 15657–2021)⁷ and *Zhong Yi Lin Chuang Zhen Liao Shu Yu: Di Er Bu Fen, Zheng Hou* (《中医临床诊疗术语: 第2部分, 证候》 *TCM Clinical Diagnosis and Treatment Terminology: Part 2: Syndromes/patterns*) (GB/T 16751.2–2021).⁸ For those complex ones, they were disassembled into standard syndromes before further studies.

The syndrome elements, reflecting location of disease and nature of disease, respectively, were extracted from the standardized syndromes, according to *Zheng Su Bian Zheng Xue* (《证素辨证学》 *Study on Syndrome Element Differentiation*).⁹

All the symptoms mentioned in the articles were also standardized according to *Zhong Yi Yao Xue Ming Ci* (《中医药学名词》 *Chinese Terms in Traditional Chinese Medicine and Pharmacy*).¹⁰ Some typical terms, although not within the term list, were included with the aim of reflecting the diversity and traditional features of TCM, such as “Incapability of supination” and “Gasping for breath”.

For the complicating disease, standard syndrome, syndrome element, and symptom, their frequencies were counted as “one” when they appeared in one article. For the complex syndromes, they were disassembled into standard syndromes first, and the frequency of each standard syndrome was counted as “one”. Then their cumulative frequencies and relative cumulative frequencies were calculated. In addition, based on the extracted case numbers, the cumulative frequencies and relative cumulative frequencies of case numbers corresponding to each standard syndrome, syndrome element, and symptom were also calculated.

2.3 Network analysis

The network analysis was done in Gephi version 0.9.2.¹¹ The general parameter setting was as follows, “Randomize: On, Use edge weights: On, and Resolution: 1.0. Each node of the network was analyzed by modularity with a community detection algorithm¹² and colored by the result of modularity, the sizes of nodes and their labels were ranked by authority, and the edge thickness was ranked as weight. The network layout was visualized by using the Fruchterman-Reingold layout algorithm”.

2.4 Hierarchical cluster analysis

The hierarchical cluster analysis was performed in SPSS 26 (IBM Corp, Armonk, NY, USA), by setting the parameters as follows, “Cluster method used Ward’s method with Squared Euclidean distance. The transform values were standardized by Z scores. Other settings were default. Then the results of analysis, for example, cluster membership and dendrogram, were generated”.

3 Results

3.1 The results of literature retrieving

A total of 5,884 Chinese articles and 149 English articles were retrieved from Wanfang Data ($n = 2,542$), CNKI ($n = 2,061$), CqVIP ($n = 806$), SinoMed ($n = 475$), PubMed ($n = 67$), Scopus ($n = 32$), Web of Science ($n = 25$), and Embase ($n = 25$). After being merged and de-duplicated by the software of COOC version 9.9, a total of 3,366 Chinese articles and 104 English articles

were selected; and then, according to the inclusion and exclusion criteria, 278 Chinese articles and four English articles were included through manual screening by reading title, keywords, abstract, and full text. The above-mentioned four English articles were excluded for they used the same clinical data that had been used in the Chinese articles. Therefore, all the articles included for further study were 278 Chinese articles. The process flow of literature retrieving and screening is shown in Figure 1 (Fig. 1).

3.2 General information of publication

This study, according to the general information of the 278 articles, reviewed the current situation of the research on CHF syndromes. The changing of publication volume can reflect the general development trend of the theme. Among the included articles, the earliest article was published in 1982, and a case recorded in 1979 was the earliest one studied in these articles. The publication volume on the CHF syndrome study has generally been rising year by year, which reached the peak in 2014 and slightly went down in recent two years, shown in Figure 2 (Fig. 2).

In 276 articles that mentioned the location of cases, the CHF cases were from 28 provinces, autonomous regions, and municipalities. Beijing municipality, Guangdong province, and Shanghai municipality ranked at top three with most cases reported, while Hainan province, Xizang Autonomous Region, and Chongqing municipality has no case reported yet. Due to the limitation of Chinese databases and the criteria of inclusion

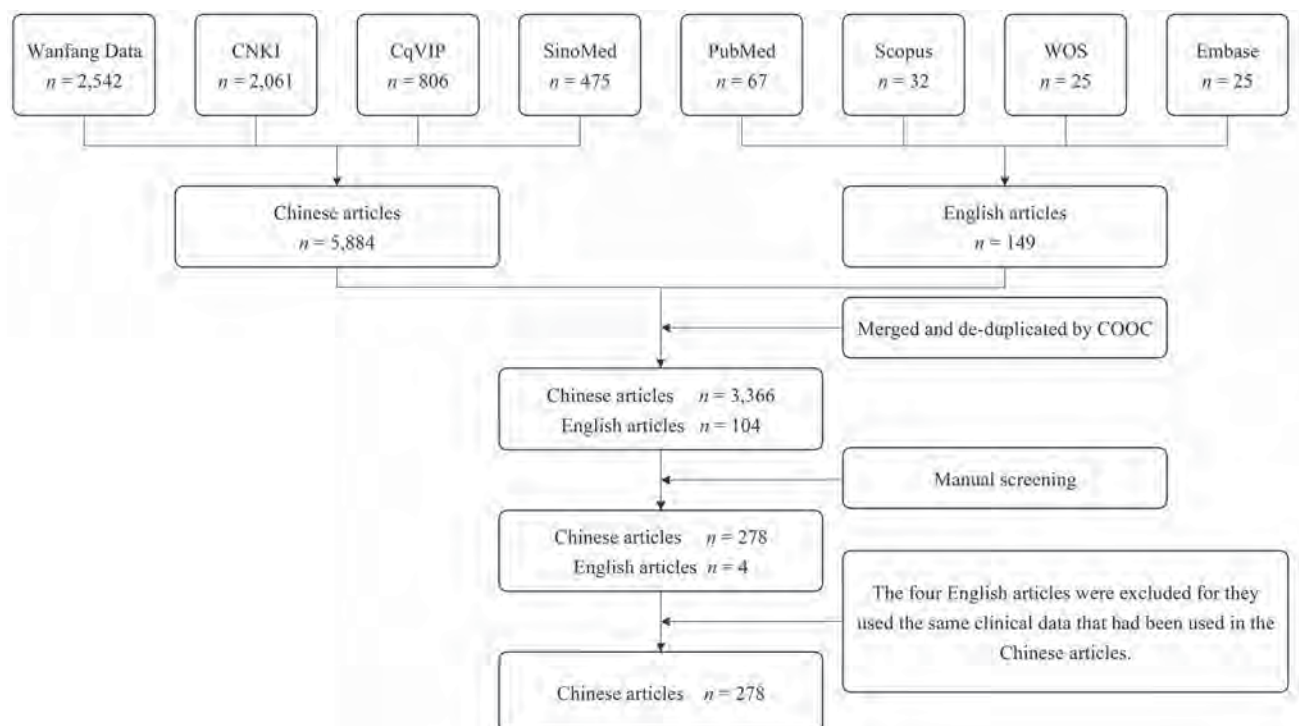


Figure 1 The process flow of literature retrieving and screening (source with permission from: made by the authors)

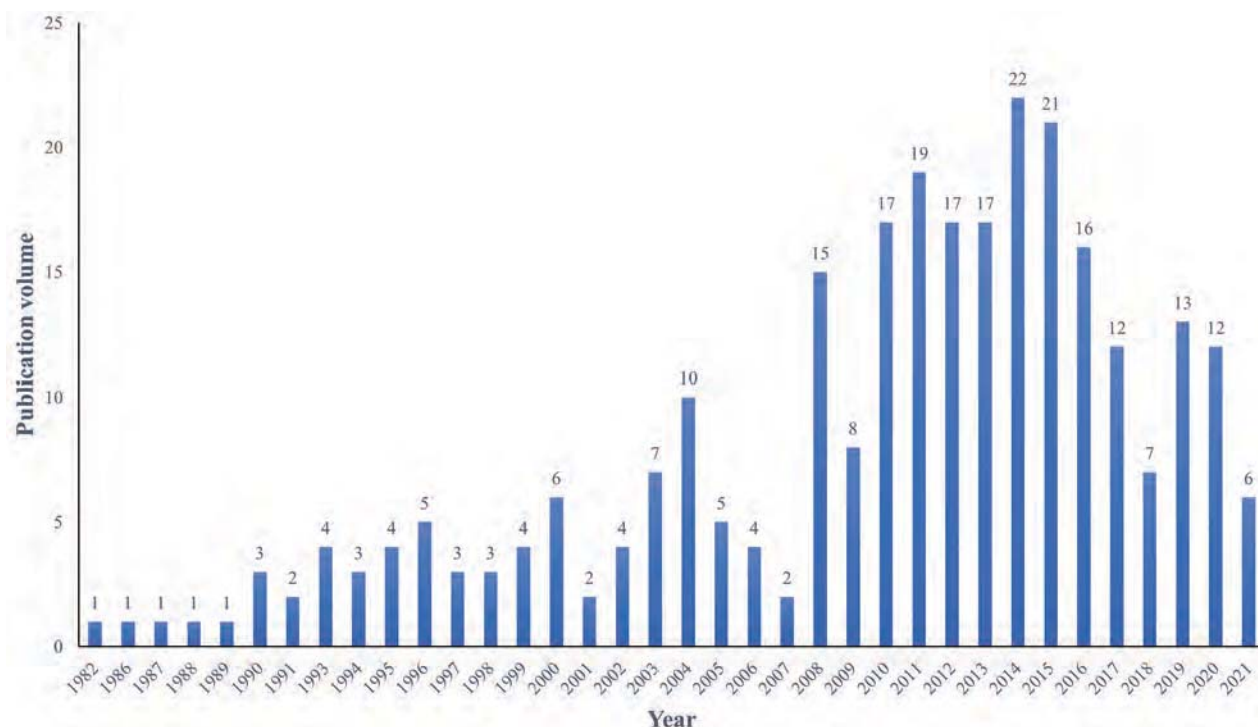


Figure 2 The publication volume of clinical articles on the CHF syndrome study (1982–2021) (source with permission from: made by the authors)

and exclusion, the results did not include the articles published in Chinese language in Hong Kong Special Administrative Region, Macao Special Administrative Region, and Taiwan province. The cases in those regions, therefore, were not included.

According to the data extracted from the article database, the total number of CHF cases was 43,262; the patients' average age (in 194 articles) was 68.6; the male patients (21,350, 52.49%) were slightly more than female patients (19,321, 47.51%) in 253 articles. Regarding the diagnostic criteria, *Zhong Yao Xin Yao Lin Chuang Yan Jiu Zhi Dao Yuan Ze* 《中药新药临床研究指导原则》 *Guidelines for the Clinical Research of TCM New Medicines*^{13,14} published in 1993 and 2002 was the most frequently used TCM diagnostic criterion (146, 36.96%); while the Framingham Risk Score was the most frequently used Western medicine diagnostic criterion (84, 24.68%), as shown in Table 1 (Table 1). The New York Heart Association (NYHA) classifications of heart failure was adopted in 162 articles: with 836 cases of Class I ($n = 836$), Class II ($n = 6,802$), Class III ($n = 11,575$), and Class IV ($n = 6,793$). The most common complicating diseases were coronary artery disease, hypertensive heart disease, and rheumatic heart disease, etc., as shown in Table 2 (Table 2).

3.3 Statistic calculation of syndrome, syndrome elements, and their corresponding cases

A total of 71 syndromes and 31 syndrome elements were extracted from 282 original syndromes. The 31 syndrome elements included ten elements on location

of disease and another 21 elements on nature of disease. The top six most frequently seen syndromes and syndrome elements by their cumulative frequencies and the cumulative frequencies of their corresponding cases are shown in Table 3 (Table 3).

The complex syndromes were further analyzed according to the rule of combination of syndrome elements, which then were found that they usually formed by single, two-, three-, four-, five-, or even six-syndrome elements. Among them, both the ranking by cumulative frequency and the ranking by cumulative frequency of corresponding cases were the same, and the two-syndrome elements combination was the commonest complex syndrome, followed by three-, single-, four-, five-, and six-combinations.

3.4 Network analysis of syndrome elements

The syndrome elements of CHF were usually in the form of combination, as complex syndromes accounted for 89.11%. The network analysis on the syndrome elements extracted from complex syndromes was carried out by the modularity of Gephi. The results of modularity were as follows, “Modularity: 0.170, Modularity with resolution: 0.170, Number of Communities: 4”. The analysis measured all nodes and edges of syndrome elements, and gained the result of a four-community modularity, shown in Table 4 (Table 4). According to the results of modularity, the proportions of each community were 36%, 32%, 24%, and 8%, respectively. Within the Community One (the nodes in purple), qi deficiency, blood stasis, and yin deficiency were ranked at top three

Table 1 The most frequently used TCM and Western medicine criteria for diagnosing CHF

Diagnostic criteria	Cumulative frequency	Relative cumulative frequency (%)
TCM		
Zhong Yao Xin Yao Lin Chuang Yan Jiu Zhi Dao Yuan Ze (《中药新药临床研究指导原则》 Guidelines for the Clinical Research of TCM New Medicines, published in 1993 and 2002)	146	36.96
Diagnosis criteria of blood stasis syndrome set in 1986 by specialties committee of research on activating blood and resolving stasis of Chinese Association of the Integration of Traditional and Western Medicine	24	6.08
Zhong Hua Ren Min Gong He Guo Guo Jia Biao Zhun Zhong Yi Lin Chuang Zhen Liao Shu Yu Zheng Hou Bu Fen (1997) [《中华人民共和国国家标准中医临床诊疗术语·证候部分 (1997)》 State standard of the People's Republic of China on clinic terminology of traditional Chinese medical diagnosis and treatment: TCM syndrome (1997)]	23	5.82
Syndrome differentiation criteria revised in 1986 by national research committee on deficiency syndrome and geriatric diseases of integrated traditional Chinese and Western medicine	22	5.57
Western medicine		
Framingham Risk Score	78	24.68
Chinese guidelines for the diagnosis and treatment of heart failure (2007, 2010, 2014, 2018)	59	18.67
ESC guidelines for the diagnosis and treatment of acute and chronic heart failure (1995, 2008, 2012, 2016)	15	4.75
ACC/AHA guideline update for the diagnosis and management of chronic heart failure in the adult (2005, 2009)	11	3.48
Zhong Yao Xin Yao Lin Chuang Yan Jiu Zhi Dao Yuan Ze (《中药新药临床研究指导原则》 Guidelines for the Clinical Research of TCM New Medicines, published in 1993 and 2002)	10	3.16

ACC: American College of Cardiology; AHA: American Heart Association; CHF: Chronic heart failure; ESC: European Society of Cardiology; TCM: Traditional Chinese medicine.

Table 2 The most common complicating diseases of CHF (top 10)

Disease	Cumulative frequency	Relative cumulative frequency (%)
Coronary artery disease	174	18.11
Hypertensive heart disease	100	10.41
Rheumatic heart disease	99	10.30
Cor pulmonale	83	8.64
Dilated cardiomyopathy	81	8.43
Hypertension	72	7.49
Cardiomyopathy	42	4.37
Type 2 diabetes mellitus	41	4.27
Valvular heart disease	27	2.81
Congenital heart disease	26	2.71

CHF: Chronic heart failure.

by weightiness, as the three major cores of the community, with qi deficiency has the highest weightiness and blood stasis has the highest degree and centrality. Within the Community Two (the nodes in green), heart, yang deficiency, and water retention ranked at top three by degree and weightiness, as the four major cores of the community, with the degree, weightiness, and centrality of heart were the highest, and the centrality of kidney was higher than that of water retention. Within the Community Three (the nodes in orange), phlegm, lung, and fluid retention were ranked at the top three by degree and weightiness. Phlegm, heart, dampness, as well as lung, had higher centrality than others. Phlegm, lung, fluid retention, and dampness were the cores of the Community Three. Within the Community Four (the

nodes in blue), there were only two nodes, that is, yang exhaustion and yin exhaustion, indicating they were closely related with each other, but had less relation with others.

3.5 Hierarchical cluster analysis on CHF symptoms

There were 198 CHF symptoms extracted from the 278 articles, which were a mixture of TCM terms and Western medicine terms in modern Chinese as well as classical Chinese. After standardization, 166 symptoms were gained with their cumulative frequencies of 3,308 in total. After screening by cumulative frequency over four, 102 symptoms remained with total cumulative frequency (3,178), accounting for 96.07% of the 166 symptoms; while those with cumulative frequency below five were blackish complexion, obesity, dry cough, aversion to cold, and other 60 symptoms, with cumulative frequency of 130 in total, which were not taken to the following study.

Among the 102 symptoms, according to cumulative frequency ranking, the top three were palpitations (173), dyspnea (125), and short breath (113), while the bottom three were cold sweating (5), red complexion (5), and pale white complexion (5). There were 18 tongue manifestations: the top three were pale tongue (80), purple tongue (56), and ecchymosis on tongue (52), while the bottom three were light red tongue (9), mirror tongue (8), and dry tongue (6). There were 14 pulse manifestations: the top three were thready pulse (107), weak pulse (77), and feeble pulse (57), while the bottom three were slippery pulse (31), wiry pulse (12), and faint pulse (8).

Table 3 The most frequently seen syndrome and syndrome elements (top 6)

Item	Ranked by	Results (cumulative frequency of case, relative cumulative frequency (%))
Syndrome	Cumulative frequency	Syndrome of qi and yin deficiency (218, 13.83), Syndrome of qi deficiency with blood stasis (180, 11.42), Syndrome of yang deficiency with water retention (147, 9.33), Syndrome of heart blood stasis obstruction (122, 7.74), Syndrome heart yang deficiency (102, 6.47), Syndrome of yang deficiency in heart and kidney (83, 5.27)
	Cumulative frequency of corresponding cases	Syndrome of qi and yin deficiency (8,083, 14.92), Syndrome of qi deficiency with blood stasis (7,387, 13.64), Syndrome of heart blood stasis obstruction (5,507, 10.17), Syndrome of yang deficiency with water retention (4,276, 7.89), Syndrome of phlegm and stasis obstructing the internal (3,569, 6.59), Syndrome of heart qi deficiency (3,397, 6.27)
Syndrome element on location of disease	Cumulative frequency	Heart (422, 51.09), Kidney (165, 19.98), Lung (155, 18.77), Spleen (69, 8.35), Liver (11, 1.33), Stomach (1, 0.12)
	Cumulative frequency of corresponding cases	Heart (13,445, 56.83), Lung (4,719, 19.95), Kidney (3,692, 15.61), Spleen (1,641, 6.94), Liver (89, 0.38), Stomach (35, 0.15)
Syndrome element on nature of disease	Cumulative frequency	Qi deficiency (678, 25.9), Blood stasis (476, 18.18), Yang deficiency (434, 16.58), Yin deficiency (306, 11.69), Water retention (246, 9.4), Phlegm (217, 8.29)
	Cumulative frequency of corresponding cases	Qi deficiency (24,647, 28.02), Blood stasis (19,981, 22.71), Yang deficiency (11,913, 13.54), Yin deficiency (9,626, 10.94), Phlegm (8,247, 9.38), Water retention (6,628, 7.53)

Table 4 The results of network analysis on syndrome elements extracted from complex syndromes

Community	Proportion (%)	Syndrome element	Degree	Weightiness	Centrality
One	36	Qi deficiency	18	1107	19.77
		Blood stasis	20	879	56.06
		Yin deficiency	16	517	17.43
		Qi stagnation	8	61	2.09
		Blood deficiency	4	14	0.00
		Cold	9	13	4.68
		Yang hyperactivity	4	6	0.25
		Wind	2	2	0.00
Two	32	Heart	17	855	25.34
		Yang deficiency	14	774	8.91
		Water retention	13	460	5.03
		Kidney	13	390	9.99
		Spleen	12	206	2.08
		Liver	8	24	2.15
		Obstruction	5	17	0.00
		Essence deficiency	3	13	0.00
Three	24	Phlegm	17	425	20.73
		Lung	14	338	3.13
		Fluid retention	11	172	0.48
		Heart	8	45	4.10
		Dampness	11	36	3.78
		Fire	2	2	0.00
		Blood disorder	2	2	0.00
Four	8	Yang prostration	6	28	23.00
		Yin prostration	1	22	0.00

The CHF symptoms were then analyzed by hierarchical cluster analysis in SPSS. In order to enhance the effect of clustering, palpitation, dyspnea, and oppression in the chest, as the basic and common symptoms, were

removed from the list of 102 symptoms, and the remaining 99 symptoms were taken into the analysis. The visual result of hierarchical cluster analysis was dendrogram, as shown in Figure 3 (Fig. 3).

According to *Zhong Yi Zhen Duan Xue* (《中医诊断学》 *Diagnostics of Chinese Medicine*)¹⁵ and *Zhong Yi Zheng Hou Jian Bie Zhen Duan Xue* (《中医证候鉴别诊断学》 *Syndrome Differentiation and Diagnostics of Traditional Chinese Medicine*),¹⁶ the specialized knowledge of TCM diagnostics and experts' opinions, the five-group clustering plot was finally chosen, and each group of symptoms was identified with a corresponding syndrome, thus the distribution of CHF syndromes was profiled as follows, syndrome of qi and yin deficiency, syndrome of yang deficiency with water retention, syndrome of heart blood stasis obstruction, syndrome of turbid phlegm, syndrome of collapse due to primordial yang deficiency, as shown in Table 5 (Table 5).

4 Discussion

Syndrome differentiation, as one of the key characteristics of TCM, is to diagnose a patient with a certain syndrome based on analyzing the specific symptoms and physical signs collected by means of inspection,

auscultation & olfaction, inquiry, and palpation.^{17,18} As the conclusion of syndrome differentiation of TCM diagnostics and the “target” of treatment, syndrome plays an essential role in TCM basic theories and clinical practice. Only when doctors accurately differentiate the syndrome can they prescribe the most suitable treatment to the patients.

In ancient times, although there was no specific term of “chronic heart failure” recorded, the related syndromes, symptoms, and treatment of CHF were seen in many TCM classics, which can provide a point of reference for studying syndrome of CHF in modern times.¹⁹

Regarding the views on the distribution of CHF syndrome, the first study emerged at the beginning of the 1990s, and the research on CHF syndrome has been increasing and has kept a regular activeness till now. There were few English articles published on the topic, and the volume of Chinese articles was much more than that of English articles, indicating the research in this field was still limited in China. The studies on syndrome and syndrome differentiation were the essence of TCM, but they have not been paid much attention internationally yet. The publicity and international exchange of TCM, especially on those traditional and classical concepts, still need more efforts.

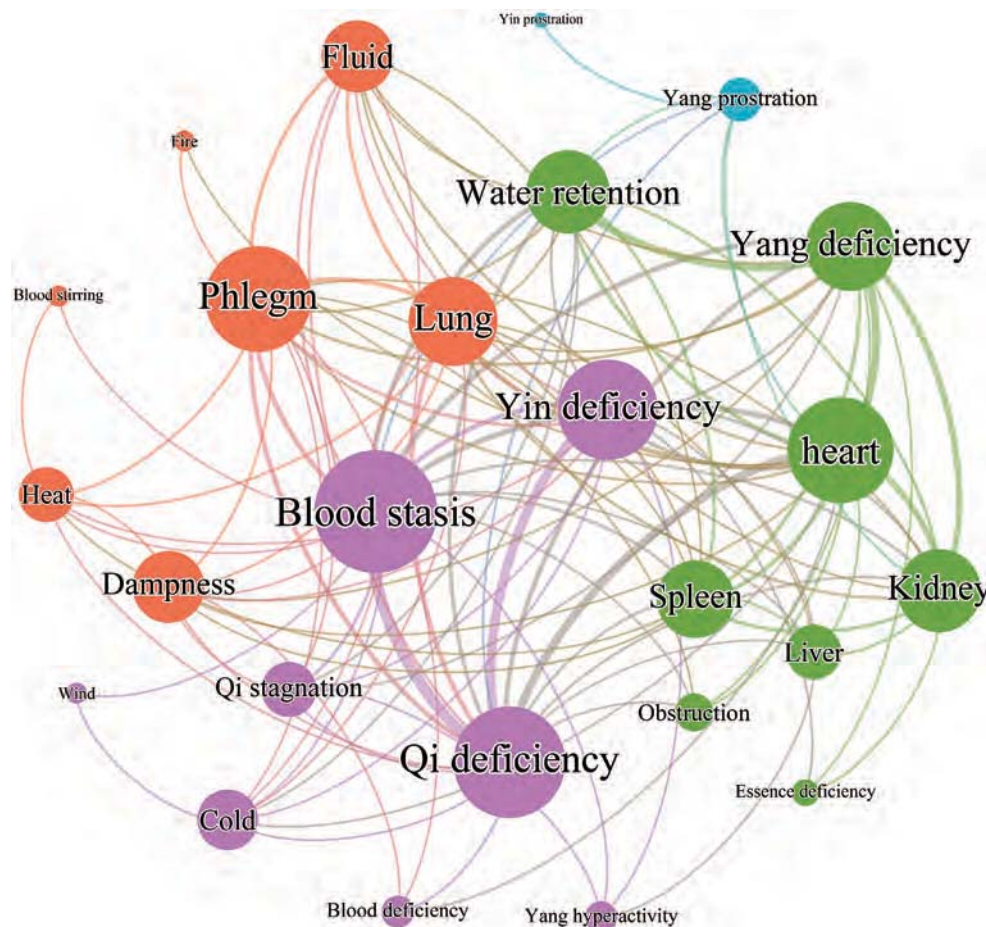


Figure 3 The visualization of syndrome elements modularity (source with permission from: made by the authors)

Table 5 The five-group clustering plot of CHF symptoms and their corresponding syndrome

Grouping	Corresponding syndrome	Symptom (cumulative frequency)
Group 1	Syndrome of qi and yin deficiency	Thready pulse (107), Mental fatigue and weakness (100), Spontaneous sweating (80), Weak pulse (77), Symptoms particularly exacerbated by physical activities (58), Feeble pulse (57), Rapid pulse (51), Red tongue (34), Agitation (33), Hectic cheek (32), Dizziness (31), Vexation (29), Shortage of qi and disinclination to talk (28), Insomnia (28), Dry mouth (26), Thirst (22), Feverish feeling in palms and soles (21), Thin coating (21), Less coating (19), Night sweat (18), Tidal fever (16), Pale complexion (16), Crimson tongue (16), Dry throat (15), Vexing heat in chest Palms and soles (12), Dizzy vision (10), Light red tongue (9), Mirror tongue (8), Peeling coating (8), Dry tongue (6), Scaly skin (6), Amnesia (6), Red complexion (5), Pale white complexion (5)
Group 2	Syndrome of yang deficiency with water retention	Pale tongue (80), Cold limbs (71), White coating (66), Oliguria (55), Deep pulse (50), Fear of cold (42), Swelling (42), Incapability of supination (41), Slow pulse (35), Anorexia (31), Edema (29), Abdominal distension (26), Enlarged tongue (26), Ascites (23), Pallid complexion (22), Slippery coating (22), Soreness and weakness of waist and knees (21), Loose stool (17), Heavy body (14), Teeth-marked tongue (13), Undigested food in stool (13), Hydrothorax (13), Sallow complexion (11), Enlarged liver (8), Tinnitus (7), Moist rales (6)
Group 3	Syndrome of heart blood stasis obstruction	Purple tongue (56), Unsmooth pulse (55), Ecchymosis on tongue (52), Irregularly intermittent pulse (49), Regularly intermittent pulse (46), Chest pain (43), Dim tongue (41), Jugular vein distention (38), Sublingual varices (36), Mass in hypochondria (36), Fixed pain (27), Stabbing pain in chest (25), Dim complexion (22), Cyanotic nails (21), Purple macula (16), Wiry pulse (12), Pain in the precordial regions (5)
Group 4	Syndrome of turbid phlegm	Short breath (113), Cough (43), Greasy coating (35), Slippery pulse (31), Gasping for breath (26), Stuffiness and fullness (18), Nausea (17), Vomit (16), Excessive sputum (12), Sticky sputum (11), White sputum (10), Thin and clear sputum (7), Frothy sputum (6), Yellow sputum (5)
Group 5	Syndrome of collapse due to primordial yang deficiency	Greenish complexion (11), Feeble breathing (8), Faint pulse (8), Profuse sweating (7), Unconsciousness (7), Cyanotic lips (6), Peripheral coldness (6), Cold sweating (5)

CHF: Chronic heart failure.

Although the patients participating in the studies come from all over China, the distribution of case was geographically uneven. Most cases coming from Beijing, Shanghai, Guangzhou, and other regions in eastern China. There are a noticeable number of cases came from Xinjiang Uygur Autonomous Region.

Regarding the distribution of CHF syndromes, although Chinese state organs, specialty committees, as well as eminent TCM masters have presented various opinions, there has been no unified or unanimously agreed view on the topic yet.²⁰

The category of CHF in *Zhong Yao Xin Yao Lin Chuang Yan Jiu Zhi Dao Yuan Ze (Shi Xing)* [《中药新药临床研究指导原则(试行)》 *Guidelines for the Clinical Research of TCM New Medicines (Trial)*, published in 2002] was syndrome of heart-lung qi deficiency, syndrome of qi and yin deficiency, syndrome of yang deficiency in heart and kidney, syndrome of qi deficiency with blood stasis, syndrome of yang deficiency with water retention, syndrome of phlegm and fluid obstructing the lung, and syndrome of yin exhaustion and yang prostration.¹³ The category of CHF in *Zhong Yi Nei Ke Chang Jian Bing Zhen Liao Zhi Nan Xi Yi Ji Bing Bu Fen Xin Li Shuai Jie* (中医内科常见病诊疗指南: 西医疾病部分, 心力衰竭 *Guidelines for diagnosis and treatment of common internal diseases in Chinese medicine: diseases of modern medicine, heart failure*) was syndrome of heart-lung qi deficiency, syndrome of qi and yin deficiency, syndrome of yang deficiency with water retention, hot phlegm congesting in the lung, cold phlegm obstructing the lung, and syndrome of yin exhaustion and yang prostration.²¹

The category of CHF in *Man Xing Xin Li Shuai Jie Zhong Yi Zhen Liao Zhuan Jia Gong Shi* (慢性心力衰竭中医诊疗专家共识 *Experts consensus on the TCM diagnosis and treatment of chronic heart failure*) was the syndrome of primary disease (Phase A), syndrome of heart qi deficiency (Phase B), syndrome of qi deficiency with blood stasis (Phase C, often combined with water retention and turbid phlegm), syndrome of qi deficiency with blood stasis (Phase D, often seen in the refractory end-stage of CHF, and combined with yang deficiency and water retention).⁴ The category of CHF in *Man Xing Xin Li Shuai Jie Zhong Xi Yi Jie He Zhen Liao Zhuan Jia Gong Shi* (慢性心力衰竭中西医结合诊疗专家共识 *Experts consensus on the integration of Chinese and Western medicine diagnosis and treatment of chronic heart failure*) was syndrome of heart qi deficiency, syndrome of qi deficiency with blood stasis, syndrome of qi and yin deficiency and blood stasis, and syndrome of yang qi deficiency and blood stasis, and the above-mentioned syndromes can be combined with water retention and turbid phlegm.²²

Professor Chen Keji (陈可冀), academician of the Chinese Academy of Sciences, categorized syndromes of CHF as: (1) syndrome of qi deficiency with blood stasis: heart qi deficiency combined with blood stasis, heart yang deficiency combined with blood stasis, qi deficiency in the lung and kidney combined with blood stasis, and qi and yin deficiency combined with blood stasis; (2) syndrome of *Zhong Jiao* (中焦 middle Jiao) yang deficiency and syndrome of internal retention of water-fluid; (3) syndrome of kidney yang depletion and syndrome of water retention.²³ Professor Zhang Boli (张伯礼),

academician of the Chinese Academy of Engineering, categorized syndromes of CHF as: syndrome of qi and yin deficiency, syndrome of qi deficiency with blood stasis, syndrome of yang deficiency with water retention, critical syndrome of dyspnea and collapse.²⁴

Zhong Yi Lin Chuang Zhen Liao Shu Yu: Di Er Bu Fen, Zheng Hou (GB/T 16751.2-2021) issued in 2020 included 2060 items of syndromes. The chapter of “Category of heart system syndromes” alone included as many as 42 kinds of syndromes, not to mention the CHF related syndromes under other chapters. *Zhong Yao Xin Yao Yong Yu Man Xing Xin Li Shuai Jie Lin Chuang Yan Jiu Ji Shu Zhi Dao Yuan Ze* (中药新药用于慢性心力衰竭临床研究技术指导原则 Technical guidelines for clinical research of new Chinese medicine in chronic heart failure) issued by the former China’s State Food and Drug Administration in 2017 stipulated that “the syndrome differentiation and classification of syndrome of CHF can refer to consensus and guidelines recognized by TCM community, such as *Experts consensus on the TCM diagnosis and treatment of chronic heart failure* and *Experts consensus on the integration of Chinese and Western medicine diagnosis and treatment of chronic heart failure*, or the standards recommended by TCM textbooks or monographies recognized by the Community”.²⁵ It is thus obvious that how numerous and multifarious the views of the category of CHF syndromes are.

From those efforts and researches, heart qi deficiency is CHF’s fundamental cause; deficiency, blood stasis, and water retention are the key points of CHF’s pathogenesis; and due to complex primary diseases and prolonged progress, the views on the distribution of CHF syndromes were various. So, it is urgently needed to establish a widely accepted distribution of CHF syndromes in line with the complex and dynamic changing pathology of CHF in clinical reality, which can facilitate diagnosis and treatment, as well as syndrome standardization.

In this study, we have included as much clinical data as possible, aiming to reveal the potential distribution of CHF clinical syndromes by objective computer analysis, and further deduce the distribution of CHF syndromes.

The cumulative frequencies of the syndromes that appeared in the clinical research articles can reflect the general opinions and understandings of CHF syndrome distribution among all the authors/experts, while the cumulative frequencies of cases corresponding to the syndromes in the clinical research articles can reflect the pathological progress and distribution of CHF syndromes in the real world. The results of our study showed that the opinions of all the authors/experts on the distribution of CHF syndromes were in line with that of the real world, and both considered syndrome of qi and yin deficiency, syndrome of qi deficiency with blood stasis, syndrome of yang deficiency with water retention, syndrome of heart blood stasis obstruction, syndrome of phlegm and stasis obstructing the internal, syndrome

of yang deficiency in heart and kidney, and syndrome of heart and lung qi deficiency were the common CHF syndromes in clinical practice.

As the elementary component of syndrome, syndrome element is a further analytically thinking based on syndrome differentiation, which can indicate the pathological locations and natures of disease.²⁶ This process of identification does not take into account the combinational relationships among syndrome elements within syndromes, so it can avoid the overabundance of syndrome types. Although the elements may not reflect the pathogenetic development, they can act as anchors for understanding the distribution of syndromes. Therefore, it is convenient to grasp the inner characteristics of illnesses by identifying and analyzing syndrome elements.

We found the syndrome elements on location of disease were heart, kidney, lung, and spleen, and the syndrome elements on nature of disease were qi deficiency, blood stasis, yang deficiency, yin deficiency, water retention, and phlegm. Within the cases with single syndrome elements, the commonest single syndrome elements were blood stasis, qi deficiency, phlegm, yang deficiency, water retention, and yin deficiency. It is obvious that the syndrome elements on location of illness, nature of illness, and single syndrome elements were all within those CHF syndromes which all the authors/experts recognized. Within each group of the syndrome elements on location of illness, nature of illness, and single syndrome elements, there were three pertained to yang while other three pertained to yin, indicating a combined deficiency and excess for CHF.

The results of network analysis on the syndrome elements coming from complex syndromes showed the location of illness of CHF were at heart with qi deficiency, blood deficiency, and yang deficiency as the main syndrome elements. Within each module, there were syndrome elements pertaining to yin and yang, respectively, also indicating the deficiency-excess in complexity of CHF pathology. Based on the nodes, especially those core nodes, we can explain the result of modularity by analogy with CHF syndromes, thus inferring the distribution of CHF syndromes. In the Community One, the core nodes of qi deficiency, blood stasis, yin deficiency, and cold were the key features; in the Community Two, the core nodes of heart, yang deficiency, water retention, and kidney were the key features, indicating the module corresponded to the syndrome of yang deficiency in heart and kidney and the syndrome of yang deficiency with water retention; in the Community Three, the core nodes of phlegm, lung, heat, and fluid retention were the key features, indicating the module corresponded to the CHF syndromes with lung as the location of the illness; in the Community Four, the core nodes were yang prostration and yin prostration which were the signs of crisis, indicating the module corresponded to the terminal stage of CHF. The modules and their corresponding

syndromes reflected the clinical reality and the pathological development of CHF syndromes.

Si Zhen (四诊 four diagnostic methods) are the key features of TCM, by which physicians collect signs and symptoms for syndrome differentiation. In this study, the hierarchical cluster analysis of symptoms was adopted as a simulation of synthetically thinking of syndrome differentiation. Together with TCM knowledge and clinical experience, the results of hierarchical cluster analysis were interpreted for classifying CHF syndromes as syndrome of qi and yin deficiency, syndrome of yang deficiency with water retention, syndrome of heart blood stasis obstruction, syndrome of turbid phlegm, and syndrome of collapse due to primordial yang deficiency.

To synthetically sum up the cumulative frequency counting results of CHF syndromes, syndrome elements, and their corresponding cases, as well as the results of network analysis and hierarchical cluster analysis, we can infer that qi deficiency is the fundamental cause of CHF, which can deteriorate to deficiency of both qi and yin or deficiency of both qi and yang. On one hand, qi deficiency can develop to yang deficiency, deteriorate to deficiency of qi and yang, and eventually to the terminal stage of yang prostration; on another hand, qi deficiency can also develop to yin deficiency, and deteriorate to deficiency of qi and yin. With the development of qi deficiency and pathological progressing, the pathological products, for example, blood stagnation, fluid, water retention, turbid phlegm, will emerge, and the patient may show some signs of excess syndrome. Therefore, the typical nature of CHF is that deficiency in origin and excess in superficiality, and the patients always show intermingled deficiency and excess syndromes.

It can also be concluded that the distribution of CHF syndromes was qi deficiency with blood stasis, deficiency of qi and yin, yang deficiency with water retention, heart blood stasis obstruction, turbid phlegm, and collapse due to primordial yang deficiency; the locations of illness are heart, kidney, lung, and spleen; and the natures of illness are qi deficiency, blood stasis, yang deficiency, yin deficiency, water retention, and turbid phlegm.

5 Conclusion

This study found out the distributions of CHF syndromes and syndrome elements by cumulative frequency analysis, network analysis, and hierarchical cluster analysis from the clinical research articles on CHF syndromes published in and out of China in recent 40 years, which can provide a point of reference for the research on diagnosis and treatment of CHF. It will also contribute to the study on syndrome standardization and objective research of TCM diagnosis.

Due to the limitation of time and recourses, we only tentatively studied CHF syndromes and syndrome

elements distributions. In the future, our research team will compare the distributions of CHF syndromes and syndrome elements distributions, between different time periods or data of different patient groups (according to geographical location, age, or ethnic group). In this way, we hope we can gain a deeper understanding of this topic and have a more comprehensive view of the distributions of CHF syndromes and syndrome elements.

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Ethical approval

This article does not contain any studies with human or animal subjects performed by any of the authors.

Author contributions

ZHOU Yi was responsible for data collection, analysis, and writing of the manuscript. HUANG Pinxian provided methodological advice for the study. HE Jiancheng and LI Xiaoqian were responsible for the conception and design of the study, and reviewed the manuscript.

Conflicts of interest

The authors declare no financial or other conflicts of interest.

References

- [1] Heart Failure Group of Chinese Society of Cardiology of Chinese Medical Association, Chinese Heart Failure Association of Chinese Medical Doctor Association, Editorial Board of Chinese Journal of Cardiology. Chinese guidelines for the diagnosis and treatment of heart failure 2018 (中国心力衰竭诊断和治疗指南2018). *Chinese Journal of Cardiology*. 2018;46(10):760–789. Chinese.
- [2] Chinese Society of Cardiology of Chinese Medical Association, Editorial Board of Chinese Journal of Cardiology. Chinese guidelines for the diagnosis and treatment of heart failure 2014 (中国心力衰竭诊断和治疗指南2014). *Chinese Journal of Cardiology*. 2014;42(2):98–122. Chinese.
- [3] Fu S, Zhang J, Gao X, et al. Clinical practice of traditional Chinese medicines for chronic heart failure. *Heart Asia*. 2010;2(1):24–27.
- [4] Mao JY, Zhu MJ. Experts consensus on the TCM diagnosis and treatment of chronic heart failure (慢性心力衰竭中医诊疗专家共识). *Journal of Traditional Chinese Medicine*. 2014;55(14):1258–1260. Chinese.
- [5] Shou XT, Wang YM, Li XS, Hu ZX, Liu JH. On chronic heart failure from the complexity of syndrome differentiation (从辨证复杂性论慢性心力衰竭). *Western Journal of Traditional Chinese Medicine*. 2021;34(5):140–144. Chinese.
- [6] Anonymous. COOC is a software for bibliometrics and knowledge graph drawing (COOC一款用于文献计量和知识图谱绘制的软件). Available from: <https://github.com/2088904822>. [Accessed on December 18 2021]. Chinese.
- [7] State Administration for Market Regulation, Standardization Administration of the People's Republic of China. Classification and codes of diseases and patterns of traditional Chinese medicine (中医病证分类与代码: GB/T 15657-2021). Available from:

- <https://www.cacm.org.cn/2022/03/15/17225>. [Accessed on February 25 2023]. Chinese.
- [8] State Administration of Traditional Chinese Medicine. Clinic terminology of traditional Chinese medical diagnosis and treatment—Part 2: Syndromes/patterns (中医临床诊疗术语 第2部分: 证候: GB/T 16751.2-2021). Available from: <http://www.natcm.gov.cn/zhengcewenjian>. [Accessed on January 25 2021]. Chinese.
 - [9] Zhu WF. *Study on Syndrome Element Differentiation* (证素辨证学). Beijing: People's Medical Publishing House; 2008. p.162–228. Chinese.
 - [10] China National Committee for Terminology in Traditional Chinese Medicine. *Chinese Terms in Traditional Chinese Medicine and Pharmacy 2004* (中医药学名词2004). Beijing: Science Press; 2005. Chinese.
 - [11] Bastian M, Heymann S, Jacomy M. Gephi: an open source software for exploring and manipulating networks. Paper presented at International AAAI Conference on Weblogs and Social Media; May 17–20, 2009; San Jose, USA.
 - [12] Blondel VD, Guillaume JL, Lambiotte R, Lefebvre E. Fast unfolding of communities in large networks. *Journal of Statistical Mechanics Theory & Experiment*. 2008;(10):10008.
 - [13] Ministry of Health of the People's Republic of China. *Guidelines for the Clinical Research of TCM New Medicines* (中药新药临床研究指导原则). Beijing: Ministry of Health of the People's Republic of China; 1993. Chinese.
 - [14] Zheng XY. *Guidelines for the Clinical Research of TCM New Medicines (Trial)* [(中药新药临床研究指导原则(试行)]. Beijing: China Medical Science Press; 2002. Chinese.
 - [15] Wang YQ. *Diagnostics of Chinese Medicine (Second Edition)* [中医诊断学(第2版)]. Beijing: Higher Education Press; 2016. p.93–146. Chinese.
 - [16] Yao NL. *Syndrome Differentiation and Diagnostics of Traditional Chinese Medicine* (中医证候鉴别诊断学). Beijing: People's Medical Publishing House; 2002. p.28–98. Chinese.
 - [17] Information Office of the State Council of the People's Republic of China. *Traditional Chinese Medicine in China* (中国的中医药). Beijing: People's Publishing House; 2006. Chinese.
 - [18] Solos I, Morris W, Zhu JP, Hong M. Traditional medicine diagnostic codes in ICD-11 and alternative diagnostic classifications in the mainstream healthcare. *Chinese Medicine and Culture*. 2021;4(2):86–92.
 - [19] Li Y. Analysis on thoughts for syndrome and treatment of chronic heart failure (慢性心衰证治思路探析). *Chinese Medicine Modern Distance Education of China*. 2021;19(21):65–67. Chinese.
 - [20] Lu JQ, Li SY, Lu JS, et al. Review on traditional Chinese medicine treatment of chronic heart failure (中医药治疗慢性心力衰竭的研究进展). *Chinese Archives of Traditional Chinese Medicine*. 2020;38(12):145–148. Chinese.
 - [21] Hu YH, Zhang WJ, Yang JY, Li Y. Guidelines for diagnosis and treatment of common internal diseases in Chinese medicine: diseases of modern medicine, heart failure (中医内科常见病诊疗指南: 西医疾病部分, 心力衰竭). *Chinese Medicine Modern Distance Education of China*. 2011;9(18):145–147. Chinese.
 - [22] Chen KJ, Wu ZG, Zhu MJ, Mao JY, Xu H. Experts consensus on the integration of Chinese and Western medicine diagnosis and treatment of chronic heart failure (慢性心力衰竭中西医结合诊疗专家共识). *Chinese Journal of Integrated Traditional and Western Medicine*. 2016;36(2):133–141. Chinese.
 - [23] Li LZ. Professor Chen Keji's experience of treating congestive heart failure (陈可冀治疗充血性心力衰竭经验). *Chinese Journal of Integrative Medicine on Cardio-Cerebrovascular Disease*. 2006;4(2):136–138. Chinese.
 - [24] Zhang BL, Wu MH. *TCM Internal Medicine (10th Edition)* [中医内科学(第10版)]. Beijing: China Press of Traditional Chinese Medicine; 2017. p.23–105. Chinese.
 - [25] China's State Food and Drug Administration. Technical guidelines for clinical research of new Chinese medicine in chronic heart failure (中药新药用于慢性心力衰竭临床研究技术指导原则). Available from: <https://www.nmpa.gov.cn/xxgk/ggtg/qtg-gtg/20171227183101142.html>. [Accessed on August 18 2022]. Chinese.
 - [26] Zhang S, Liao XY, Li BX. Syndrome analysis of traditional Chinese medicine treatment of chronic heart failure (中医治疗慢性心力衰竭的证候分析). *Journal of Sichuan of Traditional Chinese Medicine*. 2020;38(2):208–211. Chinese.

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The Mystery of Diagnostic Wisdom in Traditional Chinese Medicine Contained in *Tian Hui Yi Jian*

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Abstract

Excavated from the Western Han tomb in Tianhui Town (天回镇), Jinniu District (金牛区), Chengdu, China, *Tian Hui Yi Jian* (《天回医简》 *Tianhui Medical Slips*) were penned during the Warring States period by the renowned physician Bian Que (扁鹊) and his students. Since their discovery, the medical, historical, and archaeological communities have given them considerable attention. This paper sorts out the diagnostic content of *Tian Hui Yi Jian* from various aspects of inspection, palpation, inquiry, listening and smelling examination and provides a summary and analysis of four features: the concept of the correspondence between heaven and man is the foundation, the idea of the five elements throughout the whole process, extremely focus on pulse diagnosis, emphasize a comprehensive analysis of four examinations. These analyses can investigate the value and significance of *Tian Hui Yi Jian* in developing traditional Chinese medicine (TCM) diagnosis history. In this way, we aim to reproduce the overview and level of TCM diagnostics at that time, clear up some ambiguous understanding of its development history, and provide a reference for further research on the origin and development of TCM.

Keywords: *Tian Hui Yi Jian* (《天回医简》 *Tianhui Medical Slips*); Traditional Chinese medicine; Diagnostics; Bian Que (扁鹊)

1 Introduction

The priceless legacy of Chinese culture, traditional Chinese medicine (TCM), has developed alongside human pursuits and seen its theoretical framework expand in scope. Over 4,000 years, people have witnessed the development of treatment systems. TCM diagnostics is a science used to investigate the principles of TCM theory and the diagnosis of diseases and symptoms. It is an essential component of Chinese medicine. Packed with natural dialectic rules, it is the epitome of medical wisdom passed down through the ages and has shown to be an excellent guide for illness prevention and treatment. *Huang Di Nei Jing* (《黄帝内经》 *The Yellow*

Emperor's Inner Classic) and *Nan Jing* (《难经》 *Classic of Difficulties*) served as the foundations for its theoretical diagnosis method, and Zhang Zhongjing's (张仲景) *Shang Han Za Bing Lun* (《伤寒杂病论》 *Treatise on Cold Damage and Miscellaneous Diseases*) in the Han dynasty made further developments. "In ancient times, the treatment of diseases was based on inspection, listening and smelling examination, inquiry and palpation (古之治病, 以望闻问切为主)", stated Zeng Boyuan (曾伯渊) in *Yi Xue Pian* (《医学篇》 *The Medical Chapter*). Palpation (切诊) is the process of determining the pulse in order to ascertain the actual state of the sickness, such as cold or heat, deficiency or excess. Inspection is the process of determining color. Smelling and hearing (闻诊) are the processes by which the sound is examined. To claim to be diagnosing a sickness, one must exercise caution, make an open-minded diagnosis, take the pulse of meridians, identify the symptoms and prescribe herbal formulas, and use the utmost discretion.

A Western Han tomb in Tianhui Town (天回镇), Jinniu District (金牛区), Chengdu was saved from excavation in 2012 by a cooperative archaeological team led by the Chengdu Institute of Cultural Relics and Archaeology, and the Jingzhou Cultural Relics Protection Center. During the excavation, many medical slips were discovered in Tomb No. 3. Following their collection and assembly, the valuable 930 bamboo slips were given the name *Tian Hui Yi Jian* (Fig. 1). A magnificent wooden lacquered meridian figure was discovered among the medical sketches, dating back almost a millennium before the bronze acupuncture figure from the Song dynasty. *Tian Hui Yi Jian* (《天回医

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Figure 1 The situation of excavation and cleaning of *Tian Hui Yi Jian* (source with permission from: *Tian Hui Yi Jian*)

简》*Tianhui Medical Slips*) is a book that combines clinical medicine with theoretical support. It was written by the renowned physician Bian Que (扁鹊, 407-310 BC) and his students during the Warring States period, and it is considered a milestone in the academic development of TCM. Together, these works have formed a fairly comprehensive clinical system of treatment based on pattern differentiation (辨证论治). The medical slips have been compiled into eight medical books: *Mai Shu Shang Jing* (《脉书·上经》*The Book of Channels: Upper Classic*), *Mai Shu Xia Jing* (《脉书·下经》*The Book of Channels: Lower Classic*), *Ni Shun Wu Se Mai Cang Yan Jing Shen* (《逆顺五色脉臧验精神》*Zang Experimental Spirit of Five Colorful Pulse*), *Ba Li* (《发理》*The theory of Ba*), *Ci Shu* (《刺数》*Stabbing Number*), *Zhi Liu Shi Bing He Ji Tang Fa* (《治六十病和齐汤法》*Treatment of Sixty Diseases and Qi Tang Method*), *Jing Mai* (《经脉》*The Conduit Vessels*) and *Liao Ma Shu* (《疗马书》*Healing Horse Book*), which involve basic theory, treatment method, prescription, etc. In addition to the four diagnoses of inspection, listening and smelling examination, inquiry, and palpation that are summarized in *Huang Di Nan Jing*, many of these medical books are rich in diagnostic content. These diagnostics include color diagnosis, pulse diagnosis, and judging disease through symptoms and signs. These new insights offer us a better understanding of the academic development history of TCM diagnostics.

2 Diagnostic content in *Tian Hui Yi Jian*

The information mentioned above indicates that the medical slips include a significant amount of diagnostic content. It covers all four examinations, with palpation and inspection (望诊) serving as the primary topics. In addition, there are sporadic other diagnoses within the detailed description of disease signs.

2.1 Inspection (望诊)

The face exhibits the vitality of the five organs, and the internal organs' condition is reflected in the variation in facial hue. According to *Tian Hui Yi Jian*: "The beginning of the disease is very delicate and subtle, and when

it is in the skin, the disease can be judged by the change in the color of the face [始生甚精且微，其在蒿(膏)肤之时，几于色变]".² The basis of the inspection is the color of the face, and it is important to distinguish between normal and sick colors. When a person's facial color is normal, it indicates that their physiological state is normal; all other odd hues indicate illness. The five colors (五色)—cyan, red, yellow, white, and black—were distinguished by the ancients. Regarding color, cyan represents the blockage of the meridians, qi and blood, showing patterns of cold, pain, and infantile convulsions; yellow represents the deficiency of the spleen with retention of moisture, showing patterns of dampness and deficiency; red represents the manifestation of abundant heat that causes upward flow, showing patterns of heat; and white represents the deficiency of qi and blood that cannot nourish the body, showing patterns of deficiency cold and blood deficiency. Black exhibits exuberant cold and water, showing blood patterns associated with malignancy, cold, pain, and water-fluid retention due to renal failure.³

As noted in *Nan Jing Liu Shi Yi Nan* (《难经·六十一难》*Classic of Difficult Issues: The Sixty-First Difficult Issue*), Bian Que placed a high value on the color diagnosis: "The disease in the body can be detected through observation, that is, by observing five colors [in a person's complexion] to identify their corresponding illness (望而知之者，望见其五色，以知其病)". Numerous color diagnosis content in *Tian Hui Yi Jian* was available, including "The heart qi is red, the lung qi is white, the liver qi is cyan, the stomach qi is yellow, and the kidney qi is black (心气者赤，肺气者白，肝气者青，胃气者黄，肾气者黑)".⁴ Although the entire theory of Bian Que's five-color diagnosis cannot be restored, the systematic diagnostic theory and technique of applying five-color diagnosis of illnesses could be roughly outlined at that time, according to the content of *Tian Hui Yi Jian* that is currently available for color diagnosis. In other words, the prognosis of the illness can be inferred by looking at the superposition and variations between the five hues, since the theory is predicated on the natural relationship that exists between the five colors and the five viscera.

2.2 Palpation (切诊)

In TCM, palpation is a special technique for making medical diagnoses. The internal organs, qi, and blood have a close relationship with the creation of the pulse. In order to assess the patient's condition, make a diagnosis, and determine the prognosis, the doctor analyzes the patient's pulse. The depth of a pulse (floating or deep) can reflect the location of disease; the rhythm of a pulse (rapid or slow) can reflect the nature of disease; and the power of a pulse (forceful or feeble) can reflect the deficiency-excess pattern of the disease. Palpation has a special clinical value in predicting the course and outcome of the illness.

As *Tian Hui Yi Jian* states, “Knowing the period of death and life, we should be careful to fine-tune the pulse with the people (知死生之期，谨精脉之与众其人)”, it particularly emphasizes the significance of pulse diagnosis and feels that it plays a vital role in determining death and life.⁵ It records a significant amount of pulse diagnostic content concurrently. There are accounts of typical and aberrant pulses, for example, “The pulse of an average individual beating twice during exhalation (人一息脉二动曰平)”, “A person is considered short of breath if their pulse beats only once every breath (人一息脉一动曰少气)”, “A person’s pulse repeats itself six times in a single breath, a phenomenon known as repetition, before dying (人一息脉六动曰重，重者死)” (Fig. 2).⁶ There is a prediction of the development of the disease based on the pulse, to judge the prognosis of the content, such as: “If a critical pulse condition occurs, like a person unable to eat, usually in less than two days, the person dies, and when heartburn and abdominal distension occur at the same time, the person dies {脉绝如食[颐]不过二日则死烦心与腹胀具则死}”.⁷

Prescriptions for five *Zang* organs (五脏) with aberrant pulses are available. “This is a significant splenic lesion, which causes the qi and blood of the five viscera to become closed and obstructed, just as the spleen is going to fall, sharp as a bird’s beak and strong as the waters of the present stream (脾至如鸟之豆，如水之深，病出于脾，内闭五藏)”. “There is a major lesion of the kidneys when they are about to decrease, hard as a stone pellet from a bird slingshot, and the pulse drops fluently like water passing through it (肾辟辟如弹单石者，病出于肾)”. The following are some techniques for diagnosing

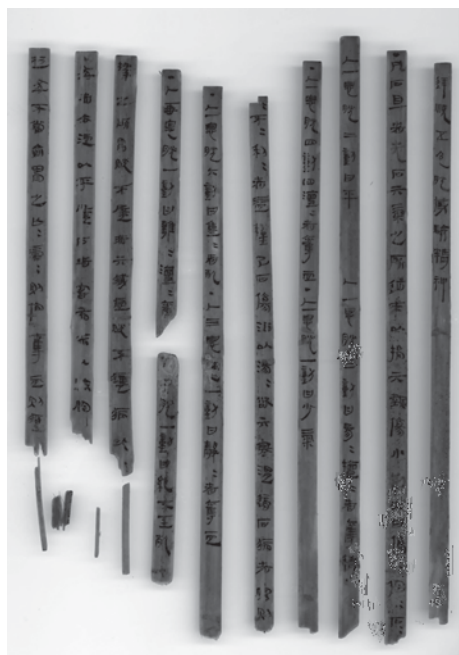


Figure 2 Original text on palpation in *Ni Shun Wu Se Mai Cang Yan Jing Shen* (《逆顺五色脉臧验精神》) *Zang Experimental Spirit of Five Colorful Pulse*, Infrared scan image (source with permission from: *Tian Hui Yi Jian*)¹

a dead pulse: “The law of pulse diagnosis is that the patient’s ankle bone should be touched with both hands; if the left-hand feels as strong as many people pounding rice, the patient’s prognosis is poor; if the left-hand feels no pulsation during a meal, the patient’s prognosis is abysmal; if the patient’s pulse is weak and cannot be touched, but the pulse of all other parts of the body is strong, then the disease can be accurately diagnosed (相脉之过，左手直[置][果][躁]五寸而案之，右手直[置]果[躁]而单[弹]之，应手如参春，死。不至如食间死。地脉盈此独[虚]，则主病)”.⁸ As can be observed, the medical brief provides a very detailed account of pulse diagnosis, suggesting that the physicians represented by Bian Que valued palpation highly and considered it to be the most essential means of making diagnoses.

2.3 Listening and smelling examination as well as inquiry (闻诊与问诊)

To identify the disease, doctors should listen for changes in the patient’s breathing, talking, coughing, and other sounds, and smell for changes in the patient’s excrement and overall body odor. Apart from the aforementioned diagnostic techniques, the patient’s systemic symptoms and indicators can also be assessed. In order to make a thorough and detailed diagnosis and provide a more thorough and reliable basis for accurate judgment of the disease, it is necessary to inquire about the patient’s self-perceived symptoms (such as pain, nature of pain, emotional and psychological symptoms, etc.) as well as the new condition of the disease.

“Prostration, a disease akin to jaundice (yellowing of the body, eyes, and urine as the primary symptom), is one of the aspects of smelling that is documented in *Tian Hui Yi Jian*. Its primary symptoms include a dark complexion, distension and fullness of the chest, phantom odors, and the smell of smoke [蹶风，面黑，匈(胸)偃(胀)，枯闻烟臭].”⁹

In terms of listening, an example was “sounds of frogs in the abdomen; blockages of water (水瘕，鸣室室淅淅，鸣如蛙)”. The symptoms of water in the belly are described as “between the heart and the abdomen, and when pressed, makes a sound of water (在于心腹之间，仰按作水声)”¹⁰ in *Zhu Bing Yuan Hou Lun* (《诸病源候论》 *Treatise on the Origins and Manifestations of Various Diseases*), which is comparable to the information in the No. 403 slip. Based on the contents, one might infer that the water in the gut is likely a significant volume of stagnant water in the chest and belly, which when palpated or auscultated will produce a sound akin to a frog. There are indications that sound like frogs when palpated or auscultated.¹¹

Within *Tian Hui Yi Jian*, the majority of queries are dispersed throughout the disease description. For instance, one inquiry states: “Experiencing pain in the middle of the abdomen, accompanied by discomfort in the waist and spine, inability to lift heavy objects, and

a constant feeling of not being satisfied (伤中少腹，要脊皆痛，不可举重，不可甚饥甚饱)。It elucidates the essence of the agony, as the pain itself cannot be designated as a sensation.

For instance, the statement “Fox’s accumulation of yin less abdominal pain, pain belongs to the heart (狐之积阴.....少腹痛，痛属于心)” serves as a record indicating the specific site of the disease attribution, specifically related to the condition of wind and disease. The individual expresses frustration with the heart’s condition characterized by the smaller qi form of craziness, which is not influenced by specific time frames for experiencing cold or heat. (The descriptions of the symptoms, such as fatigue, irritability, and fluctuating body temperature, were obtained through questioning.)

Furthermore, there are also accounts of emotional symptoms such as “terrified and jittery, easily saddened and fearful (心惕，善悲善恐)”, “anxious and unhappy [皇皇(惶惶)不乐]”, which were gathered through the use of inquiry.

3 Diagnostic features of TCM in *Tian Hui Yi Jian*

3.1 The concept of the correspondence between heaven and man is the foundation

The core tenet of TCM is the inherent interconnectedness and indissolubility between man and nature, stemming from their shared origin. Their physiological changes align with the fluctuations in the natural flow of qi. *Tian Hui Yi Jian* is the earliest recorded document that solidifies and organizes the understanding of the principles governing the physiological functions of the human body. This understanding has its roots in ancient times. The surviving literature utilized the concept of the unity of heaven and man to establish a tangible correlation between natural phenomena and the internal organs of the human body. As an illustration, Bian Que stated that “People possess nine micros (nests), five *Zang* organs, and twelve sections, all quantified in terms of qi [人有九微(窝)五藏十二节，皆量于气]”. The generation and transformation of qi play a crucial role in the functioning of the organs and orifices in the human body. This forms the foundation of *Bi Xi Zhen Fa* (《敝昔诊法》*Bian Que’s Diagnostic Method*).

The notion of the five viscera in relation to celestial phenomena posits that the functioning of human organs, as well as the flow of qi and blood, aligns with the seasonal changes in the sky, according to a discernible pattern. *Tian Hui Yi Jian* employed the concept of the relationship between humanity and the natural world to elucidate the variations in the hue of veins and their corresponding external environment. The alterations in the five viscera will manifest externally and can be utilized for diagnostic purposes. The aforementioned concept is unambiguously conveyed in another instance, as seen by

the following passage: “The correlation between the five colors in the sky and the flow of the pulse corresponds to the five colors (五色通天，脉之出入与五色相应也)”.

The theories presented in *Bi Xi Zhen Fa* establish a comprehensive system based on the core concept of “Heaven”. These theories include the connection of qi to the sky, the association of the five elements with the sky, the influence of heaven on the five organs, and the relationship between heaven and the five colors. This interconnected system forms the philosophical foundation of the diagnostic theory, establishing a fixed and interdependent relationship among the five elements, five organs, and five colors.

3.2 The idea of the five elements throughout the diagnosis

The concept of “*Wu Xing* (五行 five elements)” was initially introduced in the ancient Chinese text *Shang Shu* (《尚书》*Book of Documents*) and subsequently became a prevalent philosophical framework for elucidating natural and societal events throughout the Spring and Autumn Period.¹² The concept of *Wu Xing* is consistently present in the diagnostic content of *Tian Hui Yi Jian*. The system aims to establish a comprehensive relationship between the celestial realm, the earthly realm, and the natural world, utilizing the concepts of “five elements through the sky (五行通天)”, “five colors through the sky (五色通天)”, and “five organs through the sky (五脏通天)”.

Essentially, the concept of “five elements through the sky” establishes connections between entities with similar attributes in other domains, enabling the categorization of all phenomena in the universe based on the qualities of these five elements. *Tian Fu* (天府 Natural Repository) is the title given to the government official responsible for managing the treasury. This position is associated with the metal element of *Wu Xing* theory. “The metal that passes through the sky represents the celestial abode of heaven (金之通天气为天府)”. The “five colors through the sky” corresponds to the five colors that are attributed to *Wu Xing*. Furthermore, there is also the notion of “five organs through the sky (五脏通天)”, referring to “the kidney through heaven represents winter [肾通(通)天为冬]”, “the liver through heaven symbolizes spring [肝通(通)天为春]”, and “the lung through heaven signifies autumn [肺通(通)天为秋]”, etc. Simultaneously, the interplay of generation and restraining among *Wu Xing* establishes the foundation for the theory of “five elements through the sky”. This theory serves as the fundamental conceptual framework for the color diagnosis theory of “five elements corresponding to the colors of *Zang Fu* organs (脏腑)” and the concept of “over-restriction among five elements/phases (五行相乘)”.

Upon analyzing the articles of *Ni Shun Wu Se Mai Cang Yan Jing Shen*, it becomes evident that the red color of the pulse represents the embodiment of heart qi, the white color of the skin represents the embodiment of lung

qi, the cyan color of the tendon represents the embodiment of liver qi, the yellow color of the flesh represents the embodiment of stomach qi, and the black color of the bone represents the embodiment of kidney qi. The concept that the qi of the five viscera is visually represented by five distinct colors is a tangible expression of the diagnostic approach known as the “five organs corresponding to five colors (五行脏色相应)” method. This method aligns with the analogical reasoning employed by early Chinese medicine practitioners. *Tian Hui Yi Jian* examines the symptoms and prognosis of the condition known as “over-restriction among five colors (五色相乘)”. Over-restriction refers to a level of mutual constraint that surpasses the anticipated level, resulting in further debilitation of the affected individual. The term “multiply (乘)” in *Tian Hui Yi Jian* refers to the excessive visibility of the natural color of one’s interior organs. Upon examining the remaining text, it becomes apparent that there is a correlation between the same hue, suggesting that the condition can be treated or even healed. For instance, the statement “cyan over-restrict cyan can be cured for a long time [苍(苍)乘苍(苍)可治而久]”. Additionally, it is mentioned that “Black by black is said to take blood, painless, edema, swelling from the foot [黑乘黑曰夺血, 不甬(痛), 发为水, 重(肿)以足始]”. For individuals who experience excessive restriction between contrasting colors, their condition is considered incurable. As the saying goes, “Red over-restricts black, rendering it untreatable, and ultimately leading to death in winter (赤乘黑, 不治, 以冬死)”.

3.3 An emphasis on pulse diagnosis

Tian Hui Yi Jian extensively covers the topic of pulse diagnosis. The concept that pulse diagnosis is crucial for disease diagnosis is proposed, aligning with the significance attributed to pulse diagnosis in Bian Que school of TCM (扁鹊医派). Additionally, the elements of “five-colored pulse diagnosis (五色脉诊)” are identified, serving as the prominent symbol of Bian Que’s medicine.

The pulse method in *Tian Hui Yi Jian* and *Huang Di Nei Jing* is delineated in distinct manners. According to *Su Wen* (《素问》Basic Questions), “The pulse [of healthy people] beats twice within one exhalation and another twice within one inhalation. One inhalation and one exhalation make up a whole respiration. The pulse may beat the fifth time [during the interval between two] respirations or in a longer respiration. That is how the pulse of healthy people beats (人一呼脉再动, 一吸脉亦再动, 呼吸定息脉五动, 闰以太息, 命曰平人)”.¹³ *Ni Shun Wu Se Mai Cang Yan Jing Shen* refers to a condition when a person’s pulse beats twice after a single exhalation, indicating that the person is in good health. The concept is encapsulated in *Huang Di Nei Jing*, where expiration and inhalation are considered as a one breath. On the other hand, *Ni Shun Wu Se Mai Cang Yan Jing Shen* employs a breathing technique where each breath is synchronized with a single exhalation.

Regarding pulse diagnosis in TCM, *Huang Di Nei Jing* and *Nan Jing* are notable works that depict Huangdi’s pulse diagnosis and Bian Que’s pulse diagnosis, respectively. According to history, it is thought that *Nan Jing* was published at a later time, so the pulse method originated from *Huang Di Nei Jing*.¹⁴ Nevertheless, the content of the pulse method in *Tian Hui Yi Jian* is identical to that of *Huang Di Nei Jing*. The only difference lies in the manner of discussion, which is more concise in the former. Additionally, the terminology used to describe the pulse varies. This observation suggests that the record of pulse diagnosis in *Tian Hui Yi Jian* predates that of *Huang Di Nei Jing*. According to *Shi Ji* (《史记》Records of the Grand Historian), it is mentioned that persons who are the first to discuss the pulse are also known as Bian Que.¹⁵ Bian Que is widely regarded as the progenitor of the theory of pulse diagnosis in Chinese medicine, as well as an accomplished practitioner of this diagnostic technique.

3.4 A diagnostic model based on a comprehensive analysis of four examinations

In *Tian Hui Yi Jian*, it reads: “The symptoms of a woman’s postpartum disease include the abdomen being firm and heavy as stone, alternating fever and chills, a preference for a prone position, and an aversion to fishy smells (女子余病, 少腹坚重如怀石, 寒热好自伏也, 其恶星)”.¹⁶ The symptoms of the woman’s “postpartum disease (余病)” in this sentence are the result of combining the diagnosis of inspection (the abdomen is like a stone), inquiry (cold and heat are reasonable since the ambush, and the abdomen is heavy), palpation (the abdomen is firm), and smelling (fishy smells), which shows that the diagnosis of the disease at that time had already had comprehensive analysis of four examinations to observe the characteristics of the disease’s symptomatology. Comprehensive analysis of four examinations stresses the idea of harmonization, focusing on the overall level of judgment of the state of the organism and advocating the flexibility to master a variety of diagnostic methods combined with diagnostic thinking. This shows that the diagnostic level of TCM in the Han dynasty was very developed and reached the level of cross-reference, corroboration, supplementation, and multi-dimensional multi-perspective rather than emphasizing a single diagnostic method of in-depth study. Simultaneously, it also demonstrates that almost two millennia ago, the medical practices of the Han dynasty encompassed a comprehensive diagnostic theory and clinical system.

4 The diagnostic system differences between *Tian Hui Yi Jian* and *Huang Di Nei Jing*

4.1 *Tian Hui Yi Jian* representing the missing manuscript attributed to Bian Que

Firstly, based on the textual evidence, there is a significant occurrence of the name “敝昔 (bì xī)” in the medical

certificate. It has been established that “扁 (biǎn)” and “敝 (bì)” were connected in ancient times.¹⁷ The phonetic sound of the character “鹄” is derived from the character “昔 (xī)”, which was classified under the same category in antediluvian period. In addition, both “鹄 (què)” and “昔 (xī)” have equal consonants, which allows for a connection between them. Hence, the term “Bi Xi (敝昔)” signifies “Bian Que (扁鹊)”.

Secondly, in terms of literature, *Tian Hui Yi Jian* highlights the following: “A person with two pulse movements within one breath is regarded as a healthy person (人一息脉二动曰平人)”. The concept discussed in *Mai Jing Bian Que Mai Fa* (《脉经·扁鹊脉法》 *The Pulse Classic: Bian Que Pulse Method*): “Bian Que stated that when a person takes one breath, their pulse should beat twice, which is referred to as a flat pulse (扁鹊曰: 人一息脉二至谓平脉)”, bears a striking resemblance to this. The author of *Mai Jing Bian Que Mai Fa* is Wang Shuhe (王叔和) who lived during the Western Jin dynasty in the third century A.D. This monograph is the oldest existing work on pulse science in China and is the most extensive in its field prior to the Han dynasty. The Western Jin dynasty is in close proximity to the Han dynasty, and there is evidence to support the claim that the discovered medical briefs are really Bian Que’s medical books. Furthermore, *Nan Jing Shi Si Nan* (《难经·十四难》 *Classic of Difficulties: Fourteen Difficulties*), which explores the manifestation of impaired pulse and other pulse occurrences, bears a striking resemblance to the *Ni Shun Wu Se Mai Cang Yan Jing Shen. Tang Shu Yi Wen Zhi* (《唐书·艺文志》 *History of the Tang Dynasty: Chronicles of Art and Literature*) asserts that the two volumes of *Nan Jing* was written by Qin Yueren (秦越人). This also validates the existing literature that the discovered medical certificate is Bian Que’s medical book.

In addition to this, the content of the medical slips extensively covers issues on pulse diagnosis. The concept that pulse diagnosis is crucial for diagnosing diseases is proposed, aligning with the significance attributed to pulse diagnosis by Bian Que school of TCM (扁鹊医派). Additionally, the principles of “five-color pulse diagnosis” are identified, representing the most notable characteristic of Bian Que’s medical practice.

Thirdly, in terms of temporal linkages, they are also mutually compatible. Based on archaeological and academic analysis, it is inferred that the central portion of the medical slips was copied between the reigns of Empress Lyu (吕后) and Emperor Wen (汉文帝) of the Western Han dynasty. The interval between the practice of medicine and the instruction of Canggong (苍公), as documented in the *Shi Ji Bian Que Cang Gong Lie Zhuan* (《史记·扁鹊仓公列传》 *Historical Records: Bian Que and Canggong Biography*), is rather close. The individual interred in the tomb dates back to the Jing and Wu eras of the Western Han dynasty. Their status is believed to be on par with the pupils of Cang Gong in terms of seniority. Through thorough verification, the

research team has confirmed that the Tianhu medical slip is really the medical book that was handed down by Bian Que and Cang Gong. This book was brought to Shu (蜀) by Qi and Lu (齐鲁) under the reign of Han Jingdi (汉景帝) and was the predominant medical practice during the Han dynasty.¹⁸

4.2 A close relationship between *Huang Di Nei Jing* and *Tian Hui Yi Jian* based on text

Upon conducting a comparison analysis with *Huang Di Nei Jing*, we have concluded that it is not a “scripture”, but rather a book of interpretation. This book serves as a teacher’s guide for instructing students, and it is referred to as *Tian Hui Yi Jian*. In the time of the book, *Tian Hui Yi Jian* earlier “*Huang Di Nei Jing*” about two hundred years ago, *Tian Hui Yi Jian* for the diagnosis of the pulse method and the description of the dead pulse, such as the above mentioned slip No. 623. It is the same as *Yin Yang Mai Si Hou* (《阴阳脉死候》 *The Yin and Yang Pulse Diagnose the Death Syndrome*) of Mawangdui (马王堆) and *Mai Shu* of Zhangjiashan (张家山), which should be the content of the diagnosis of the pulse after the twelve pulses, and should not be separately separated into a separate type.

Each sentence in *Tian Hui Yi Jian* may be frequently translated into one, or perhaps two or three, articles in *Huang Di Nei Jing*, both in terms of substance and structure. As an illustration, *Mai Jing Shang Jing* specifically emphasizes the concept of “passage to heaven (通天)”, which states that the five viscera, nine orifices, and twelve joints are interconnected with the natural world. This hypothesis, which is of utmost importance in the field of medicine, has unfortunately been forgotten over time. However, it has the potential to provide light on the cultural origins of acupuncture. *Mai Jing Xia Jing* primarily examines alterations in disease patterns, encompassing two main categories: modifications in the classification of diseases according to the twelve meridians, and revisions in the classification of over thirty specific diseases, including wind and paralysis. These diseases are extensively elucidated in numerous articles within *Huang Di Nei Jing*, such as *Su Wen Feng Lun* (《素问·风论》 *Basic Questions: Discourse on Wind*), *Su Wen Bi Lun* (《素问·痹论》 *Basic Questions: Discourse on Blocks*), *Ling Shu Jing Mai* (《灵枢·经脉》 *The Spiritual Pivot: The Conduit Vessels*).

5 Conclusion

Tian Hui Yi Jian obtained from Laoguan Shan (老官山) can be traced back to the writings of Bian Que and his pupils during the later years of the Warring States period. There is a complete diagnostic system in the slips, which is exceptionally extensive in content and remarkably comprehensive in structure, marking a major achievement in the academic progress of TCM. *Tian Hui Yi Jian*

contain substantial diagnostic information encompassing all four examinations, with palpation and inspection being the main subjects. Simultaneously, it encapsulated four diagnostic attributes: The concept of the correlation between heaven and humanity forming the fundamental basis, the idea of the five elements pervading the entire procedure, the significant focus on pulse diagnosis, and the emphasis on a comprehensive analysis of four examinations. The diagnosis system of *Tian Hui Yi Jian* is distinct from that of *Huang Di Nei Jing*.

Archaeological findings serve a vital purpose: to substantiate scriptures and enhance our understanding of history. The ongoing investigation of *Tian Hui Yi Jian* is gradually resolving previous uncertainties regarding the historical development of TCM. This research holds significant value in understanding the overall progress and sophistication of TCM, as well as in exploring the origins and evolution of medical science in China.

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Ethical approval

This study does not contain any studies with human or animal subjects performed by any of the authors.

Author contributions

LI Yitian participated in the research design, writing of the article, conducting the research, and data analysis. YAN Shiyun and CHEN Liyun participated in data analysis. LI Guochen reviewed the article.

Conflicts of interest

The authors declare no financial or other conflicts of interest.

References

- [1] Sorting Group of Tianhui Medicine Slips. *Tianhui Medicine Slips (Upper Part)* [天回医简 (上)]. Beijing: Cultural Relics Press; 2023. p. 36. Chinese.
- [2] Wang YT, Li JM, Jia B. Analysis on the diagnostic theory in *Bi Xi Zhen Fa* (《敝昔诊法》的诊断理论探析). *China Journal of Traditional Chinese Medicine and Pharmacy*. 2017;32(5):2276–2279. Chinese.
- [3] He HJ. Aesthetic significance in color diagnosis in Chinese medicine (中医色诊中的美学意义). *Chinese General Practice Nursing*. 2014;12(30):2802–2803. Chinese.
- [4] Long XH. Consanguinity between meridian theory and Bianque's pulse theory (经脉学说与扁鹊脉法的血缘). *Chinese Acupuncture and Moxibustion*. 2015;35(5):517–523. Chinese.
- [5] Man G, Qi Z, Liu CH, et al. Relationship between the residual *Jingmai* in *Tianhui Medical Slips* and *Jingmai* in *Lingshu* (天回医简《经脉》残篇与《灵枢·经脉》的渊源). *Chinese Acupuncture and Moxibustion*. 2019;39(10):1117–1123. Chinese.
- [6] Lin ZB. *Research on Concept of Disease in the Qin Han Medical Bamboo Silk Literature* (先秦两汉简帛医书的疾病观研究) [dissertation]. Beijing: Beijing University of Chinese Medicine; 2019. Chinese.
- [7] Liu XM. *Research on The Theory of TCM Diagnosis of Bamboo Slips of Medicine from the Han Tombs at Laoguanshan* (老官山汉墓医简中诊断理论及方法研究) [dissertation]. Chengdu: Chengdu University of Traditional Chinese Medicine; 2017. Chinese.
- [8] Li JM, Ren YL, Wang YT, et al. Discussion on the species and naming of medical bamboo slips unearthed from Han tomb in Laoguanshan (老官山汉墓医简的种类和定名问题探讨). *Chinese Journal of Medical History*. 2016;46(5):303–306, 322. Chinese.
- [9] Wang YT. Annotation on Disease Name of “Jia” “Dan” “Feng”, on Bamboo Slips Unearthed from the Han Tomb at Laoguanshan (老官山医简诸“瘕”、诸“癰”、诸“风”病名考释研究) [dissertation]. Chengdu: Chengdu University of Traditional Chinese Medicine; 2016. Chinese.
- [10] Nanjing University of Chinese Medicine. *Proofreading and Explanation of Treatise on the Origins and Manifestations of Various Diseases* (诸病源候论校释). Beijing: People's Health Publishing House; 2009. p. 6. Chinese.
- [11] Li YF, Liu ZH. Research on the origin of TCM pulse diagnosis (中医脉诊起源考). *Guiding Journal of Traditional Chinese Medicine and Pharmacy*. 2023;29(4):220–224. Chinese.
- [12] Li YT, Weng HW, Sang Z. Analysis of the current english translation standardization of five elements characteristic terms in TCM (中医五行特性术语英译标准化现状分析). *Chinese Journal of Library and Information Science for Traditional Chinese Medicine*. 2023;47(6):177–180. Chinese.
- [13] Liu SF. *Summary of Traditional Chinese Medicine Diagnosis Methods* (中医诊法辑要). Beijing: People's Military Medical Press; 2009. p. 6. Chinese.
- [14] Luo M, Feng LM. Discussion on acupuncture and pulse diagnosis in *Huangdi's Inner Classic* (浅谈《内经》针刺与脉诊). *Inner Mongolia Journal of Traditional Chinese Medicine*. 2015;34(11):158–159. Chinese.
- [15] Sima Q. *Records of the Grand Historian* (史记). Wuhan: Chongwen Publishing House; 2010. p. 599. Chinese.
- [16] Ye Y, Zhang Q, Ren YL, Li JM. A preliminary discussion on the contents and value of All Diseases (1), the medical bamboo slips unearthed from Han tomb in Laoguanshan of Chengdu (成都老官山汉墓出土医简《诸病(一)》的内容与价值初探). *Chinese Journal of Medical History*. 2017;47(3):165–168. Chinese.
- [17] Du F. The “Bi Xi” and “Bian Que” in the Laoguanshan medical slips (老官山医简中的“敝昔”与扁鹊名号). *Masterpieces Review*. 2014;(8):15–16. Chinese.
- [18] Cong YM, Wu XL. The *Tianhui Medical Slips* could represent the missing manuscript attributed to Bian Que (《天回医简》或是失传的扁鹊医书). Available from: <https://epaper.scdaily.cn/shtml/scr/20230421/293218.shtml>. [Accessed on April 21 2023]. Chinese.

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Insights on Song Dynasty Medical Exams from *Tai Yi Ju Zhu Ke Cheng Wen Ge* (《太医局诸科程文格》 Examination Answers and Standards of the Imperial Medical Bureau)

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Abstract

The medical education of the Song dynasty constitutes a pivotal aspect within the broader framework of ancient Chinese medical education. The advent of the imperial examination system coincided with the emergence of a medical examination system, which served as the cornerstone for the subsequent evolution of medical education. According to historical records, the Song government established dedicated medical departments, along with comprehensive systems encompassing medical professors, students, and examinations. By examining extant medical historical documents, such as *Tai Yi Ju Zhu Ke Cheng Wen Ge* (《太医局诸科程文格》 Examination Answers and Standards of the Imperial Medical Bureau), researchers and readers can obtain a comprehensive understanding of the medical system that prevailed in the Song dynasty. While the intricate details of medical education during this era are not explicitly documented in historical records, modern researchers have the opportunity to uncover the entire view of medical education, particularly the medical examination system, through rigorous analysis of these extant historical medical documents. Such studies offer valuable insights into the developmental trajectory of the ancient Chinese medical examination system and provide crucial references for contemporary medical education. By conducting in-depth literature research and analysis of *Tai Yi Ju Zhu Ke Cheng Wen Ge*, this study endeavors to reconstruct the authentic scenario of medical examinations in the Song dynasty, as presented in the document, for the benefit of modern readers and researchers.

Keywords: Song dynasty; Medical education; History of medicine; Examination; Medical classics; *Tai Yi Ju Zhu Ke Cheng Wen Ge* (《太医局诸科程文格》 Examination Answers and Standards of the Imperial Medical Bureau)

1 Introduction

During the Sui and Tang dynasties, the central government established *Tai Yi Shu* (太医署 The Bureau of Imperial Doctors) to manage medical affairs nationwide. In the Tang dynasty, *Tai Yi Shu*, which had been part of the *Tai Chang Si* (太常寺 The Department of Rituals) in the Sui dynasty, became an independent agency. *Tai*

Shu was staffed by medical doctors, massage therapists, pharmacists, gardeners, teaching assistants, and religious healing practitioners, who were responsible for specific medical management and teaching tasks. *Tai Yi Shu* was not only a medical management agency but also the core institution for medical education at that time. It was responsible for cultivating medical students, selecting medical talents, and organizing medical examinations. The students of *Tai Yi Shu* came from a wide range of backgrounds, including both commoners and aristocrats. To ensure the quality of medical education, *Tai Yi Shu* established a dedicated teaching staff and implemented a rigorous examination system. *Jiu Tang Shu* (《旧唐书》 Old History of Tang Dynasty) states, “All physicians, medical workers, and medical officials treat patients based on their performance, which is recorded as an assessment criterion”, and, “There is one doctor of pharmacology, one teaching assistant, twenty medical practitioners, one hundred medical workers, forty intern doctors, and two pharmacists”.¹ which fully supports the above viewpoint. Only students who passed the exam could obtain medical qualifications, providing a strong guarantee for the professional level of medical practitioners at that time. In the preface to *Tai Yi Ju Zhu*

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Ke Cheng Wen Ge (《太医局诸科程文格》 *Examination Answers and Standards of the Imperial Medical Bureau*), He Daren (何大任) praised, “Since the establishment of medical science in *Zhen Guan* (贞观), Tang dynasty, and the appointment of doctors in *Kai Yuan* (开元), medical education began to flourish like the imperial scholars educating students. During the *Chong Ning* (崇宁) period of the imperial court, there were standardized examinations, and the system for selecting scholars was prepared”.²

The medical examination system in the Song dynasty was formally incorporated into the national education system. As mentioned in He Daren’s preface above, the medical examination system in the Song dynasty was a continuation and development of the *Tai Yi Shu* examination system in the Tang dynasty. During the reign of Emperor Shenzong of the Song dynasty (宋神宗), the medical examination system in the Song dynasty already had a subject-based concept and assessment system, which was even recognized by scholars in the Qing dynasty. Xu Dachun’s (徐大椿) *Yi Xue Yuan Liu Lun* (《医学源流论》 *Treatise on the Origin and Development of Medicine*) in the Qing dynasty states, “During the reign of Emperor Shenzong of the Song dynasty, internal and external medicine departments were established, and professors and students were appointed, all of whom were assessed and promoted based on their specialization”.³ At the same time, Xu affirmed that the written examination for medical students in the Song dynasty had a relatively complete process and paradigm, but people in the Qing dynasty seemed unclear about the specific situation of this format: “The examination essays all follow a certain format, but I don’t know how many qualified people they recruited at that time. However, their emphasis on medical ethics was the same”.³ It was only when *Si Ku Quan Shu* (《四库全书》 *Complete Library in Four Sections*) compiled the lost book *Tai Yi Ju Zhu Ke Cheng Wen Ge* from *Yong Le Da Dian* (《永乐大典》 *Yong Le Encyclopedia*) that the content of the medical written examination papers of that time was more clearly presented, enabling the academic community to intuitively understand the model of medical examination essays in the Song dynasty.

Tai Yi Ju Zhu Ke Cheng Wen Ge has received attention from the academic community in recent years as an important document for studying the medical examination system in the Song dynasty. In Wang Zhenguo (王振国)’s *Zhong Guo Gu Dai Yi Xue Jiao Yu Yu Kao Shi Zhi Du Yan Jiu* (《中国古代医学教育与考试制度研究》 *Research on Ancient Chinese Medical Education and Examination System*), the author mentions this book in the Song dynasty special topic research, but mainly analyzes it based on the *Song Hui Yao Ji Gao* (《宋会要辑稿》 *The Compilation of the Song Dynasty Council Minutes*).⁴ Han Yi (韩毅) briefly introduces *Tai Yi Ju Zhu Ke Cheng Wen Ge* and provides its outline in *Zheng Fu Zhi Li Yu Yi Xue Fa Zhan: Song Dai Yi*

Shi Zhao Ling Yan Jiu (《政府治理与医学发展: 宋代医事诏令研究》 *Government Governance and Medical Development: A Study of Medical Orders in the Song Dynasty*).⁵ Although some other books also briefly introduce the medical examination system in the Song dynasty, they lack in-depth research. In his article *Tai Yi Ju Zhu Ke Cheng Wen Ge Xue Shu Te Zheng Yan Jiu* (《〈太医局诸科程文格〉学术特征研究》 *Academic characteristics study of “The Academic Feature of the Scientific Process Wenge”*), Xing Yurui (邢玉瑞) deeply explores the academic characteristics of the book. He points out that *Tai Yi Ju Zhu Ke Cheng Wen Ge* not only emphasizes the imparting of medical theory but also the cultivation of practical skills, reflecting the comprehensiveness and practicality of medical education in the Song dynasty.⁶ In their article *Tong Guo Tai Yi Ju Zhu Ke Cheng Wen Ge Tan Tao Song Dai Guan Ban Yi Xue Kao He Te Dian* (《通过〈太医局诸科程文格〉探讨宋代官办医学考核特点》 *Characteristics of official medical examination in Song dynasty discussed based on Test Set for all Subjects of Song Imperial Medical Bureau*), Hu Jiaqi (胡佳奇) et al. reveal the characteristics of officially-run medical assessments in the Song dynasty through in-depth analysis of the book’s content.⁷ Yang Wei (杨威) focuses on exploring the theory of *Wu Yun Liu Qi* (五运六气 five movements and six qi) involved in the book in *Song Tai Yi Ju Zhu Ke Cheng Wen Ge Zhi Wu Yun Liu Qi Tan Tao* (《〈宋太医局诸科程文格〉之五运六气探讨》 *Exploration of the five movements and six qi in Examination Answers and Standards of the Imperial Medical Bureau*).⁸ Zhong Gansheng (钟赣生) conducts a preliminary exploration of the medicinal properties theory in the book in *Tai Yi Ju Zhu Ke Cheng Wen Ge Zhong Yao Xing Li Lun Si Xiang Chu Tan* (《〈太医局诸科程文格〉中药性理论思想初探》 *A preliminary exploration of the medicinal properties theory in Examination Answers and Standards of the Imperial Medical Bureau*).⁹ However, many contents and paradigms of the book still have value and significance for further discussion and exploration, which deserved further exploration.

2 Brief overview of *Tai Yi Ju Zhu Ke Cheng Wen Ge* (《太医局诸科程文格》 *Examination Answers and Standards of the Imperial Medical Bureau*)

Tai Yi Ju Zhu Ke Cheng Wen Ge was completed in 1212 A.D. and compiled under the auspices of He Daren. He had served as Cheng’an Doctor and Special Envoy of the Taiyi Bureau, and authored several books including *Tai Yi Ju Zhu Ke Cheng Wen Ge* and *Xiao Er Wei Sheng Zong Wei Lun Fang* (《小儿卫生总微论方》 *General Discussion and Prescriptions for Children’s Hygiene*). The original book of *Tai Yi Ju Zhu Ke Cheng Wen Ge* has been lost, but there are existing compiled

and annotated versions in the *Si Ku Quan Shu*, a block-printed edition from *Dang Gui Cao Tang* (当归草堂 Angelia Sinensis Tatched Cottage) in 1878 [the fourth year of Guangxu (光绪)], and a lithographic edition from *Liu Yi Shu Ju* (六艺书局 Six Arts Bookstore) from Shanghai in 1905 (the 31st year of Guangxu).

Tai Yi Ju Zhu Ke Cheng Wen Ge in the *Si Ku Quan Shu* contains three prefaces, namely the one in *Qin Ding Si Ku Quan Shu* (《钦定四库全书》Imperially Approved Summary of the Complete Library in Four Sections), the *Original Document* (原牒), and the *Original Preface* (原序). The first preface was written by Ji Yun (纪昀), the chief compiler of *Si Ku Quan Shu*. It introduces six major question types in the book, as well as the origin and value of medical examinations, stating that “by tracing the origins, one can become an expert in a specialized field”.¹⁰ The second preface is by He Daren, explaining the purpose of compiling this book, “It is because the selected examination questions and the subjects that should be studied by various departments have never been widely circulated, so outsiders do not know the right path, and even if they want to follow it, they cannot”.¹¹ The inscription is dated “Respectfully revised and submitted in September of the 46th year of the Qianlong Emperor’s reign”, and is signed by “Chief Compiler Ji Yun, Minister Lu Xixiong (陆锡熊), Minister Sun Shiyi (孙士毅), and Chief Proofreader Lu Feichi (陆费墀)”. There is also an original official document. It was a response from He Daren and his subordinate officials who were responsible for this matter to the *Shang Shu Sheng* (尚书省 the administrative minister in ancient China, responsible for drafting imperial edicts and overseeing governmental affairs) memo, the *Li Bu* (礼部 Ministry of Rites) application, and the *Tai Chang Si* application, so as to “check against the instructions that our bureau has always followed”. In the following text, they respectfully stated, “Our department has now investigated and found that if the imperial court approves the official’s request and directly issues instructions to our bureau to implement the above matters, we humbly request the imperial court to issue instructions for implementation, and wait for further instructions to be issued to the *Tai Yi Shu* to implement the proposed measures”.¹² As for the original preface written by He, it emphasizes that doctors “can serve their parents and monarchs first, then help others, and finally take care of their own health”.² Therefore, “emperors of past dynasties have always advocated and never abandoned it. Wise and skilled people devote themselves to it, and their names are clearly recorded in history”.² It not only emphasizes that good doctors can treat diseases but also benefit the world. According to He’s preface later in the text, the answers in the article were “based on the qualified essays collected by me and my bureau’s instructors, selecting the best ones”.² So, *Tai Yi Ju Zhu Ke Cheng Wen Ge* is actually a collection of medical examination questions in the Song dynasty, and the answers are also from

excellent models by examinees. In He Daren’s words in the original document, the practical need to write this book was: “It is because the selected examination questions and the subjects that should be studied by various departments have never been widely circulated, so outsiders do not know the right path and cannot follow it even if they want to”.² This is also stated in the original preface, “The methods should be put at the beginning of the article, and donations should be made to print and distribute it widely, so that those who are interested in this field can have a model to follow. If talents emerge from this, it will not disappoint the establishment of the examination system”.² This fully demonstrates the attitude of the Song dynasty towards selecting talents from all over the Song regime, and they do not want examinees to lose the opportunity to be selected by the state because they do not know the norms and forms of the examination. In the later preface, He also wrote: “The intention of establishing subjects and schools in our country is to gather talents from all over the Song Regime”,² which further proves the eager attitude of the Song dynasty rulers and the *Tai Yi Shu* towards medical talents.

3 Quest to pass the exam

The book consists of nine volumes, containing a total of 89 test questions. Each volume is a set of test questions, which can be roughly divided into six categories based on the content of the questions: “The first is *Mo Yi* (墨义), which tests the breadth of knowledge through questions and answers; the second is *Mai Yi* (脉义), which tests the precision of pulse observation; the third is *Da Yi* (大义), which tests the mysteries of heaven and earth and the source of the viscera; the fourth is the *Lun Fang* (论方), which tests the methods of ancient people in formulating prescriptions; the fifth is *Jia Ling* (假令), which tests the appropriateness of symptomatic treatment; and the sixth is *Yun Qi* (运气), which tests the principles of the interaction between the yin (阴) and yang (阳) of the year and the human body”.² There were 9 *Mo Yi* questions, covering basic medical theories and related disciplinary knowledge. It assessed students’ breadth of medical knowledge and tests their knowledge reserve through questions, aiming to understand their mastery of basic medical theories. There were 8 *Mai Yi* questions, covering pulse knowledge, which assessed students’ skills in diagnosing pulse conditions, to see if they can accurately perceive pulse conditions and infer the patient’s condition, and to assess their ability to identify and analyze pulse conditions. There were 37 *Da Yi* questions. This section tested students’ deep understanding of medical macro theories and human visceral functions, including the relationship between the universe, nature, and human viscera. It also involved etiology, pathogenesis, and visceral manifestation knowledge, aiming to require students to have a deep understanding and application of traditional Chinese medicine (TCM) theories.

There were 8 *Lun Fang* questions on prescriptions, covering knowledge of prescription science, involving 40 prescriptions. This section examined students' mastery of prescriptions created by ancient medical experts and their compatibility methods, to see if they can be flexibly used, and assesses students' mastery of prescription compatibility, application, and preparation methods. There were 18 *Jia Ling* questions, with hypothetical clinical cases and their differentiation as the content. This part examined students' ability to select appropriate prescriptions for treatment based on patients' symptoms, and tested their ability to analyze clinical symptoms and apply theories, methods, and prescriptions. There were 9 *Yun Qi* questions, covering knowledge of TCM theory of movement of qi, which assessed students' understanding and application of the theory.

3.1 Mo Yi (墨义): classic recitation and explanation in Song's medical exam

Mo Yi refers to the written test on the Confucian classics in the imperial examination. According to the records in *Jiu Tang Shu Xian Zong Ji Shang* (《旧唐书·宪宗纪上》 *Old History of the Tang Dynasty: Emperor Xianzong, Upper Volume*), "On the day of Ren Shen (壬申), the candidates of the Li Bu stopped the oral test and were tested on ten Mo Yi meanings. Those who passed five of the Wu Jing (五经 five Confucian classics) and six of the Ming Jing (明经 well versed in Chinese classics) would be admitted as Jin Shi (进士 successful candidates in the highest imperial examinations)".¹ Even the great Confucian scholar Huang Zongxi (黄宗羲) in the Qing dynasty mentioned in *Ming Yi Dai Fang Lu* (《明夷待访录》 *The Wise Man's Advice to the Future King on How to Govern the Country*), "The Jin Shi in the Tang dynasty were tested on poetry and prose, while the Ming Jing were tested on Mo Yi questions. The so-called Mo Yi meanings refer to ten questions on each classic, five of which required writing the annotations, and the other five required writing the notes".¹³ This form of examination was continued in the imperial examination of the Song dynasty. According to the records in *Xu Zi Zhi Tong Jian* (《续资治通鉴》 *Continuation of the Comprehensive Mirror for Aid in Government*), "Jin Shi were exempted from the textual explanation test and only tested on twenty Mo Yi questions, all of which were based on the main ideas in the classics".¹⁴ Nine Mo Yi questions were included in *Tai Yi Ju Zhu Ke Cheng Wen Ge*, with three in Volume I, three in Volume II, and three in Volume IX.

Mo Yi covered topics such as yin-yang (阴阳) and Wu Xing (五行 five elements), usage of medicine, human organs, principles of disease treatment, medicinal value of herbs, and the relationship between organs and the five elements. The examination of the oretical and herbal medicine content highlighted the high requirements and strict standards for medical students in the Song dynasty.

Looking closely at the examination questions, Volume I emphasized the close connection between nature and medicine, and examined some herbal medicine issues, while Volume II delved into the theory of qi transformation and organ theory. The examination questions in Volume IX not only demonstrated the candidates' profound understanding of ancient medical books such as *Bei Ji Qian Jin Yao Fang* (《备急千金要方》 *Important Formulas Worth a Thousand Gold Pieces for Emergency*) and *Zheng Lei Ben Cao* (《证类本草》 *Materia Medica Arranged According to Pattern*), but also reflected their ability to quote from non-medical classic literature such as *Yi Jing* (《易经》 *The Book of Changes*) and *Chun Qiu* (《春秋》 *The Spring and Autumn Annals of Zuo Qiuming*). In particular, in terms of content and writing, the candidates demonstrated solid medical theoretical foundations and excellent literary and logical literacy. Overall, the examination content not only focused on the examination of basic knowledge, but also emphasized the comprehensive application of medical theories, reflecting the comprehensive and in-depth requirements for the study of TCM.

Mo Yi played an important role in the examination as a common type of assessment at that time. Its core lay in testing candidates' memory and understanding of medical classics, and requiring them to have extensive knowledge and strong memory abilities. Such questions often required candidates to rely on their medical knowledge to explain and interpret specific medical terms, descriptions of diseases, and treatment methods, enabling examiners to accurately evaluate students' grasp of medical basic knowledge and their application abilities. Under the framework of *Tai Yi Ju Zhu Ke Cheng Wen Ge*, Mo Yi meanings not only tested students' memory of medical classics, but also required them to have deep understanding and interpretation abilities of these texts. This assessment method not only strengthened students' memory abilities, but also improved their understanding and application skills, laying a solid foundation for cultivating outstanding medical talents. Mo Yi in *Tai Yi Ju Zhu Ke Cheng Wen Ge* was a valuable examination method, which not only highlighted the high standards of ancient medical education for students' knowledge reserve and application abilities, but also provided valuable references and lessons for later medical education.

3.2 Mai Yi (脉义): medical pulse theory exam in Song's realm unveiled

Mai Yi was namely the broad sense of pulse diagnosis. The entry of Mai Yi in *Zhong Yi Wen Xian Xue Ci Dian* (《中医文献学辞典》 *The Dictionary of Philology of Chinese Medicine*) reads: "The method involves professors and teaching assistants selecting patients, having examinees take the pulse and draw conclusions to test their proficiency in pulse theory".¹⁵ There are eight Mai Yi questions in total, two in Volume I, two in Volume II, two

in Volume VIII, and two in Volume IX. These examination questions not only require the examinees to master the basic knowledge of pulse theory, but also emphasize the deep understanding and application of pulse theory. The two questions in Volume I respectively explore the relationship between human living conditions and pulse changes, as well as specific pulse cases. The two questions in Volume II involve pulse contents in classic medical books such as *Shang Han Lun* (《伤寒论》 *Treatise on Cold Damage*), and examinees need to deeply analyze the pulse cases in the examination questions by citing books such as *Nan Jing* (《难经》 *The Classic of Difficult Issues*) and *Huang Di Nei Jing* (《黄帝内经》 *The Yellow Emperor's Inner Classic*). The examination questions in Volume VIII and Volume IX also focus on testing the examinees' mastery and application of pulse theory, such as the observation of three parts of pulse, the judgment of pregnancy pulse, and the analysis of pulse of specific cases combined with classic medical books. These examination questions not only test the professional knowledge level of the examinees, but also demonstrate the profound connotation and practical value of traditional Chinese pulse theory.

Different from the pulse knowledge discussed in the above paragraph, the answering requirements for *Mai Yi* are longer and contain more contents. Pulse diagnosis is a crucial technique in TCM, as emphasized in the introductory book of TCM, *Yi Xue San Zi Jing* (《医学三字经》 *Three-character Classic of Medicine*): "Pulse diagnosis is subtle and difficult to grasp under the fingers, but it can be understood by tracing its logic and patterns. Holding the pulse in three parts is the standard method, and following this guideline is the best practice".¹⁶ This examination subject placed high demands on both the examinees' pulse theory and practical operation, requiring them to combine classical knowledge with specific clinical scenarios involving patients. Therefore, it required a high level of analytical thinking and practical application. To become a proficient TCM doctor skilled in pulse diagnosis, students needed to possess solid theoretical knowledge of pulse diagnosis in TCM, understand the characteristics, significance, and diagnostic value of various pulse conditions. At the same time, medical students needed to have a certain understanding of common clinical diseases, be able to link pulse conditions with specific diseases, and understand the illnesses reflected by different pulse conditions. They were required to extract key features from complex pulse information, analyze and judge possible health problems. In interpreting pulse conditions, it was necessary to evaluate them using theory and personal experience to avoid misdiagnosis.

3.3 *Da Yi* (大义): analysis of Song dynasty's exam on scriptural lore

The context of *Da Yi* indicates its meaning as "significance or essence". There are a total of 37 *Da Yi*

questions in this book, with three in Volume I, three in Volume II, five in Volume III, five in Volume IV, five in Volume V, five in Volume VI, three in Volume VIII, and three in Volume IX. *Da Yi* questions account for the largest proportion of all question types. As mentioned in *Dong Guan Han Ji Ban Gu Zhuan* (《东观汉记·班固传》 *Records of the Eastern Han Dynasty: Biography of Ban Gu*), "There is no fixed teacher in learning. One does not memorize sentences and phrases, but grasps the essence of the matter".¹⁷ From Han Yu's (韩愈) poem *Song Niu Kan Xu* (《送牛堪序》 *Sending off Niu Kan*), it is stated that "Beyond *Ming Jing*'s halls, words echo, tens of thousands recited, knowledge deep. Meaning grasped, evidence cited, analogies drawn, wisdom seeped".¹⁸ According to the records in *Wen Xian Tong Kao* (《文献通考》 *Comprehensive Textual Research on Historical Documents*), during the Song dynasty's judicial examinations, candidates also had to answer "five questions on the essence of *Xing Tong* (《刑统》 *Criminal Code*)".¹⁹ It can be seen that *Da Yi* has been a familiar examination type for candidates since the Tang dynasty and has frequently appeared in examinations since then.

The content of *Da Yi* covers adaptability based on the time and place, reflecting the idea of harmony between man and nature, including aspects such as the relationship between the four seasons and emotions, medication, treatment of sweating disorders, *Zang Fu* (脏腑) organs and meridians, acupuncture techniques, gynecology and obstetrics, as well as changes in human affairs. Candidates needed to have a deep understanding of classic medical books such as *Huang Di Nei Jing* and *Nan Jing*, and applied them flexibly in their answers. *Da Yi* questions not only tested candidates' mastery of basic theories of TCM, but also focused on their understanding and application of Chinese medical treatment principles. Through citing classic medical books, analyzing cases, discussing treatment principles, etc., candidates needed to demonstrate their profound foundation in TCM and critical thinking abilities. The diverse types of *Da Yi* questions reflect the comprehensiveness and complexity of Chinese medical treatment and are important materials for the study and research of TCM.

The difference between *Da Yi* and *Mo Yi* is quite obvious. *Mo Yi* mainly referred to a simple elaboration around the meaning of the scriptures and their annotations, which tended to be a recitation-based display. One only needed to read the scriptures and annotations thoroughly and organized their language properly to answer the questions. However, *Da Yi* focused more on personal arguments and discussions. The former required candidates to explain and interpret, while the latter required candidates to argue and justify. *Da Yi* questions usually required candidates to conduct in-depth interpretations and explanations of a certain medical issue. This type of question aimed to test candidates' understanding of classics, logical thinking, and interpretation abilities. Answers needed to be logically

clear, well-organized, and self-consistent. According to the answers in *Tai Yi Ju Zhu Ke Cheng Wen Ge*, *Da Yi* mainly examines the accuracy of understanding, the depth of interpretation, the rigor of logic, and the fluency of language.

3.4 Lun Fang (论方): exam insights with practical gleam

The purpose of examining *Lun Fang* is to assess the candidate's mastery of the theoretical and methodological principles of the ancient formulation principles of *Jun* (君 Monarch), *Chen* (臣 Minister), *Zuo* (佐 Assistant), and *Shi* (使 Guide). This is similar to today's pharmacology examination. As stated in *Sui Shu Jing Ji Zhi* (《隋书·经籍志》 *History of Sui Dynasty: Catalog of Books*), "Medical formulas are techniques to eliminate illnesses and preserve life".²⁰ This directly points out the importance of medical formulas in curing diseases and preserving lives. The selection of formulas and the application of *Bian Zheng Lun Zhi* (辨证论治 treatment based on pattern differentiation) are crucial for a TCM physician. *Han Shu Yi Wen Zhi* (《汉书·艺文志》 *History of the Han Dynasty: Art and Literature*) mentions, "Adjusting hundreds of herbs and combining them appropriately".²¹ The *Lun Fang* section in *Tai Yi Ju Zhu Ke Cheng Wen Ge* not only poses questions on individual formulas, but also emphasizes the explanation of medical principles and situational interpretation.

There are a total of eight *Lun Fang* questions in this book. Except for Volume IV, which has no *Lun Fang* questions, each volume has one question. The requirements for answering *Lun Fang* are in the form and length of a short essay, covering aspects such as *Wu Xing* theory in TCM, medication contraindications, the treatment of damp eczema, moxibustion, curse prohibition methods, obstetrics, and pediatric heartache. Candidates needed to have a deep understanding of classic medical books such as *Huang Di Nei Jing*, *Shang Han Lun*, and *Shen Nong Ben Cao Jing* (《神农本草经》 *Shen Nong's Classic of the Materia Medica*), and apply them flexibly in their discussions. Volumes I and II mainly examine the relationship between *Wu Xing* and the pulse of the *Zang Fu* organs, Volume III explores medication contraindications, Volume V focuses on the treatment of damp eczema from *Tai Ping Sheng Hui Fang* (《太平圣惠方》 *Formulas from Benevolent Sages Compiled during the Taiping Era*), Volume VI discusses the use of moxibustion, Volume VII discusses curse prohibition methods, and Volumes VIII and IX cover obstetrics and pediatric heartache treatment respectively. The candidates' answers in the book demonstrated their profound theoretical foundation in TCM and critical thinking skills. They not only cited classics but also emphasize practical applications, reflecting the medical and literary qualities of the Chinese medicine students at that time. These *Lun Fang* questions not only tested the candidates' knowledge

of TCM, but also demonstrate their ability to think independently and solve problems.

3.5 Jia Ling (假令): simulated prescriptions analysis in Song's medical exams prevailed

In ancient examinations, examiners often posed hypothetical symptoms and manifestations of a disease, requiring examinees to diagnose and treat the illness based on these hypothetical conditions. The book contains a total of 18 hypothetical questions, evenly distributed among all volumes. From internal medicine issues such as asthenia with night sweats and febrile disease with palpitations, to surgical problems like wind toxin swelling and various traumatic injuries, and further to obstetrics and pediatrics problems like pregnancy abdominal pain and hydrocephalus, each question required the examinee to diagnose the illness, prescribe a medication based on TCM theory. The examinees needed to answer according to the pathogenesis, pulse conditions, and medication principles, along with attaching a prescription and analysis of the medicinal properties and pharmacology. For instance, for asthenia with night sweats, the examinee might propose *Huang Qi Tang* (黄芪汤 Astragalus Decoction) and *Lu Rong Shi Hu Tang* (鹿茸石斛汤 Pilose Antler and Dendrobium Decoction) as treatment options; for eye diseases, *Ju Hua San* (菊花散 Chrysanthemum Powder) and *Du Huo Fang Feng San* (独活防风散 Pubescent Angelica and Ledebouriella Powder) were chosen. In acupuncture and moxibustion, the examinee provided detailed methods and considerations for treating vomiting and facial wind. The answers to traumatic injuries, obstetrics, and pediatrics questions also reflected the examinee's profound understanding of TCM theory and clinical application skills.

These hypothetical questions not only assessed the examinee's mastery of TCM knowledge, but also tested their clinical thinking and problem-solving abilities. This type of question aimed to evaluate the examinee's actual diagnostic and treatment skills as well as their clinical adaptability. In TCM examinations, hypothetical questions were equivalent to today's case discussions. The questions posed were all based on clinical scenarios, challenging students to develop treatment strategies in clinical settings and conduct detailed analysis of the causes and pathogens. In hypothetical examinations, the examiner provided a virtual medical case, including information on the patient's symptoms and signs. The examinee was required to use this information, combined with their medical knowledge and experience, to provide a diagnosis, treatment plan, and prognosis judgment. The format of hypothetical questions in *Tai Yi Ju Zhu Ke Cheng Wen Ge* was well-regulated, resembling modern medical case study paradigms. All questions required "citing relevant texts as evidence, specifying the main curative effects, origin, nature and flavor, contraindications, primary and secondary ingredients,

dosages, odd and even combinations, and preparation methods of medicinal herbs”.²² Acupuncture questions required “citing relevant texts as evidence, along with referencing *Tong Ren Shu Xue Zhen Jing* (《铜人腧穴针经》 *Acupuncture Classic of Acupoints on the Bronze Man*), specifying the degree of severity, pulse belonging to meridians and collaterals, needle insertion depth, reinforcement and reduction methods, number of moxibustion cones, and acupuncture points”.²² The examinee typically analyzed symptoms and their types first, explained the causes and pathogenesis, and then provided “odd and even prescriptions”, which are specific treatment plans. Many of these contents transcend their era and are worth learning from.

3.6 Yun Qi (运气): analysis in Song’s medical exams unfolded

Yun Qi, mainly examines candidates’ knowledge of *Wu Yun Liu Qi*. Each volume of *Tai Yi Ju Zhu Ke Cheng Wen Ge* contains one question on *Yun Qi* theory, totaling nine questions. These questions are based on *Wu Yun Liu Qi* of different years, requiring candidates to analyze the astronomical and geographical background, predict related diseases, and provide corresponding prescriptions.

For example, in the *Jia Zi* (甲子) year’s question, candidates first explored the astronomical and geographical background, then predicted possible diseases, and proposed *Fu Zi Tang* (附子汤 Aconite Decoction) as a treatment plan. The subsequent *Yi Chou* (乙丑) and *Bing Chen* (丙辰) year questions followed the same pattern, but with different years and prescriptions. In the *Geng Wu* (庚午) year, candidates recommended *Hou Pu Tang* (厚朴汤 Official Magnolia Bark Decoction), while in the *Gui You* (癸酉) year, they suggested *Sheng Ma Tang* (升麻汤 Cimicifuga Decoction), and in the *Gui Chou* (癸丑) year, they chose *Ren Shen Tang* (人参汤 Ginseng Decoction). In the *Jia Yin* (甲寅) year’s question in Volume 7, candidates also quoted theories from *Yi Jing* and also prescribed *Ren Shen Tang*. The *Jia Xu* (甲戌) and *Ji Si* (己巳) year questions corresponded to *Fu Zi Tang* and *Xi Xin Tang* (细辛汤 Asarum Decoction) respectively. These questions demonstrated the depth and complexity of the practical application of *Yun Qi* theory in TCM.

Yun Qi theory, consisting of the *Wu Yun* (五运 five movements) and *Liu Qi* (六气 six qi), utilizes the theories of yin and yang, with *Tian Gan* (天干 heavenly stems) and *Di Zhi* (地支 earthly branches) as interpretive tools to predict the relationships between biological processes and disease prevalence. Its main theoretical basis was manifested in the seven major essays of Wang Bing’s (王冰) *Chong Guang Bu Zhu Huang Di Nei Jing Su Wen* (《重广补注黄帝内经素问》 *Extensive Commentaries and Supplementary Notes on the Basic Questions of the Yellow Emperor’s Inner Classic*) from the Tang dynasty. As briefly mentioned, the examination of *Yun Qi* theory is not limited to questions specifically labeled as “*Yun*

Qi”. Many other questions in the examination also involve the application of knowledge of the *Wu Yun* and *Liu Qi*.

The theory of *Wu Yun Liu Qi* can guide clinical practice in TCM, helping doctors determine the causes, pathogenesis, and progression of diseases, thereby formulating appropriate treatment plans. Based on the changing patterns of *Wu Yun Liu Qi*, doctors can predict and assess the occurrence and development of diseases, providing more precise treatment for patients. By applying the theory of *Wu Yun Liu Qi*, doctors can develop personalized treatment plans tailored to the specific conditions of patients, thereby improving clinical efficacy. Additionally, *Wu Yun Liu Qi* can also be used for disease prevention, achieving the effect of *Zhi Wei Bing* (治未病 treating diseases before their occurrence) by adjusting lifestyle habits and dietary structures. *Yun Qi* questions in *Tai Yi Ju Zhu Ke Cheng Wen Ge* often integrated astronomy, geography, environmental events, health prescriptions, etc., making them not only valuable in terms of literature but also in medicine.

4 Discussion and comments

4.1 Interpreting the wisdom of medical classics

According to statistics, the examination questions in *Tai Yi Ju Zhu Ke Cheng Wen Ge* involve classical medical works such as *Huang Di Nei Jing*, *Nan Jing*, *Shang Han Za Bing Lun* (《伤寒杂病论》 *Treatise on Cold Damage and Miscellaneous Diseases*), *Mai Jing* (《脉经》 *The Pulse Classic*), *Tai Ping Sheng Hui Fang*, *Qian Jin Yi Fang* (《千金翼方》 *Supplement to “Important Formulas Worth a Thousand Gold Pieces”*), and *Zhu Bing Yuan Hou Lun* (《诸病源候论》 *Treatise on the Origins and Manifestations of Various Diseases*) (Table 1). Candidates displayed profound learning achievements and quotation skills in their answers to the corresponding questions. For instance, in one of the questions, the candidate quoted references like *Zheng Lei Ben Cao*, *Bai Yi Fang* (《百一方》 *Supplement to “Emergency Formulas to Keep Up One’s Sleeve”*), and *Bao Pu Zhi* (《抱朴子》 *The Analects of Bao Pu-zi*). In other questions, candidates quoted extensively and presented sufficient arguments. In the ancient times, without open-book exams or search engines, the candidates’ proficiency and understanding of the classics are truly admirable. It can be seen that before the exam, candidates spent a lot of time reading, memorizing, and understanding the classics to achieve such results and performance.

From basic research, the unmentioned works in students’ answers are listed below. Specifically, *Su Shen Liang Fang* (《苏沈良方》 *Fine Formulas of Su and Shen*) is quoted once in Volume 3, Page 51. Similarly, *Lun Yu* (《论语》 *The Analects*) is also cited once in the same

Table 1 The quotation of medical classics in *Tai Yi Ju Zhu Ke Cheng Wen Ge*

Classics	Frequency	Rate of Usage in Classics	Frequency of Quotation	Rate of Quotation (%)
<i>Huang Di Nei Jing</i> (《黄帝内经》 <i>The Yellow Emperor's Inner Classic</i>)	28	45.16	62	36.05
<i>Nan Jing</i> (《难经》 <i>The Classic of Difficult Issues</i>)	8	12.90	17	9.88
<i>Mai Jing</i> (《脉经》 <i>The Pulse Classic</i>)	7	11.29	13	7.56
<i>Tai Ping Sheng Hui Fang</i> (《太平圣惠方》 <i>Formulas from Benevolent Sages Compiled during the Taiping Era</i>)	6	9.68	8	4.65
<i>Qian Jin Yi Fang</i> (《千金翼方》 <i>Supplement to "Important Formulas Worth a Thousand Gold Pieces"</i>)	6	4.84	6	3.49
<i>Shang Han Za Bing Lun</i> (《伤寒杂病论》 <i>Treatise on Cold Damage and Miscellaneous Diseases</i>)	3	3.23	10	5.81
<i>Zhu Bing Yuan Hou Lun</i> (《诸病源候论》 <i>Treatise on the Origins and Manifestations of Various Diseases</i>)	2	3.23	26	15.12
<i>Bei Ji Qian Jin Yao Fang</i> (《备急千金要方》 <i>Important Formulas Worth a Thousand Gold Pieces for Emergency</i>)	2	3.23	5	2.91
<i>Zheng Lei Ben Cao</i> (《证类本草》 <i>Materia Medica Arranged According to Pattern</i>)	2	3.23	2	1.74
<i>Shen Nong Ben Cao Jing</i> (《神农本草经》 <i>Shen Nong's Classic of the Materia Medica</i>)	2	3.23	2	1.16
<i>Sheng Ji Jing</i> (《圣济经》 <i>Classic of Divine Assistance</i>)	1	1.61	9	5.23
<i>Mi Chuan Yan Ke Long Mu Lun</i> (《秘传眼科龙木论》 <i>The Secret Transmission of Long-mu's Ophthalmology</i>)	1	1.61	1	0.58

volume and page. *Wai Tai Mi Yao* (《外台秘要》 *Arcane Essentials from the Imperial Library*) appears once in Volume 5, Page 78, while *Yao Xing Lun* (《药性论》 *Treatise on Medicinal Properties*) is quoted once in Volume 5, Page 81. Additionally, *Shi Jing* (《诗经》 *The Book of Songs*), *Xiao Pin Fang* (《小品方》 *Formulary of Trifles*), and *Zuo Zhuan* (《左传》 *Zuo Qiuming's Commentary on Spring and Autumn Annals*) are each cited once in Volume 9, Page 138.

4.2 Elevating the realm of thought and logical acumen

In the medical examinations of the Song dynasty, candidates' understanding of medical knowledge, theories, and practical operations, as well as their analytical abilities at a considerable level were crucial indicators for evaluating their comprehensive medical abilities. Many people have a bias against the ancient Chinese examination system, believing that exams were mechanical and inflexible. However, the content of *Tai Yi Ju Zhu Ke Cheng Wen Ge* can dispel this perception. In these exam questions, candidates' independent thinking, analytical abilities, and problem-solving skills were fully demonstrated. The examination methods of the examiners were also diverse, not only requiring candidates to memorize medical classics proficiently but also to deeply understand the medical principles and philosophical thoughts behind them. The exam questions were designed ingeniously, covering both direct tests of medical theories and analysis and handling of actual cases.

4.3 Manifestation of literary abilities and writing skills

Research on the examination answers in *Tai Yi Ju Zhu Ke Cheng Wen Ge* revealed that candidates' answers not only demonstrated their mastery of extensive medical knowledge but also their profound understanding of literature and philosophy. Analysis of the answering paradigm showed that to pass the exam, candidates must possess a certain level of literary accomplishment and language expression ability. Being able to skillfully use classical Chinese for writing and expression was a basic requirement for passing the exam. Furthermore, the excellent answers collected in this book indicated that these candidates' proficiency in classical Chinese is extraordinary. They were able to use allusions skillfully, resulting in answers that were not only literarily brilliant but also clear and concise, with a pleasant rhythm.

4.4 Logical patterns and formats of answers

Analysis of candidates' answers revealed that exam answers indeed follow certain logical patterns and formats, with *Da Yi* being the most apparent. Candidates used the phrase *Jin An* (谨按 carefully obey) in some parts of their writing to express respect and format, and at the end of the article, they must append *Jin Dui* (谨对 carefully answer) to indicate the end of the answering content. Therefore, the exam had certain specifications and requirements for the answering format. Different exam questions also had different focuses, such as some emphasizing acupuncture and incantation, while others

were biased towards pediatrics and obstetrics. It can be speculated that these might be different exam types and topics for different specialties. According to the content of some questions, it can be concluded that the exams were generally set in autumn.

5 Conclusion

As a medical history document with research value, *Tai Yi Ju Zhu Ke Cheng Wen Ge* reveals the detailed picture of medical examinations in the Song dynasty. At the same time, it contains profound cultural and educational implications. From the perspective of historical research, *Tai Yi Ju Zhu Ke Cheng Wen Ge* is not only a valuable original document that provides us with precious content on medical education, examination mechanism, and medical philosophy in the Song dynasty, but also a key to interpreting the status of medical education in that era.

The book reflects the examination content, form, and evaluation criteria at that time, outlining a clear framework and training direction for the medical examination system in the Song dynasty. This ancient book is not just a historical record of medical examinations. It is more like a mirror reflecting the technological progress, cultural trends, and educational philosophy of that era. From the perspective of the history of science and technology, the book's examination methods for medical knowledge reveal the exceptional attainments of medical educators and top medical students in the Song dynasty in both theory and practice. And from a deeper cultural perspective, *Tai Yi Ju Zhu Ke Cheng Wen Ge* is undoubtedly a testament to the importance of medical education in the Song dynasty. This emphasis is evident not only from the government's investment in and standardized management of medical education, but also from the respect and recognition of medical professionals in society at that time. This ingrained respect and attitude towards medical education has played an indispensable role in promoting continuous progress in the medical field, and has also set an indelible example for later generations of medical education.

It is worth mentioning that *Tai Yi Ju Zhu Ke Cheng Wen Ge* also has interdisciplinary research significance. It is not only a research treasure for medical historians and education scholars, but also provides valuable research materials for historians, cultural scholars, and others. Through in-depth exploration of this ancient book, researchers can gain a more comprehensive and specific understanding of the specific situation of the medical examination system in the Song dynasty. However, the value of *Tai Yi Ju Zhu Ke Cheng Wen Ge* is not isolated. It is closely related to the social background, cultural atmosphere, and popular concepts of that time. Therefore, when studying and evaluating it, if we can embed it into a broader historical and cultural context for comprehensive examination, we can

accurately understand and utilize its deep-seated meaning and value in modern medical education.

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Conflicts of interest

The authors declare no financial or other conflicts of interest.

References

- [1] Liu L. *Old History of the Tang Dynasty* (旧唐书). Beijing: Zhonghua Book Company; 1975. p. 1729, 401. Chinese.
- [2] He DR. *Examination Answers and Standards of the Imperial Medical Bureau* (太医局诸科程文格). Beijing: China Press of Chinese Medicine; 2021. p. preface 1. Chinese.
- [3] Xu DC. *Treatise on the Origin and Development of Medicine* (医学源流论). Beijing: China Press of Chinese Medicine; 2012. p. 401. Chinese.
- [4] Wang ZG. *Research on Ancient Chinese Medical Education and Examination System* (中国古代医学教育与考试制度研究). Jinan: Qilu Press; 2006. Chinese.
- [5] Han Y. *Government Governance and Medical Development: A Study of Medical Orders in the Song Dynasty* (政府治理与医学发展: 宋代医事诏令研究). Beijing: Science and Technology of China Press; 2014. Chinese.
- [6] Xing YR. Academic characteristics study of "The Academic Feature of the Scientific Process Wenge" (《太医局诸科程文格》学术特征研究). *Journal of Shaanxi University of Chinese Medicine*. 2014;37(2):69–70. Chinese.
- [7] Hu JQ, Liang S, Xu BW, Yao ZA, Guo H. Characteristics of official medical examination in Song dynasty discussed based on *Test Set for all Subjects of Song Imperial Medical Bureau* (通过《太医局诸科程文格》探讨宋代官办医学考核特点). *Education of Chinese Medicine*. 2017;36(5):68–72. Chinese.
- [8] Yang W. Exploration of the five movements and six qi in *Examination Answers and Standards of the Imperial Medical Bureau* (《宋太医局诸科程文格》之五运六气探讨). *Modern Chinese Medicine*. 2010;30(3):63–64. Chinese.
- [9] Zhong GS. A preliminary exploration of the medicinal properties theory in *Examination Answers and Standards of the Imperial Medical Bureau* (《太医局诸科程文格》中药性理论思想初探). *Journal of Beijing University of Traditional Chinese Medicine*. 1988;1:35–36. Chinese.
- [10] Ji Y. Preface. In: He DR, ed. *Examination Answers and Standards of the Imperial Medical Bureau* (太医局诸科程文格). Beijing: China Press of Chinese Medicine; 2021. p. outline. Chinese.

- [11] He DR. *Examination Answers and Standards of the Imperial Medical Bureau* (太医局诸科程文格). Beijing: China Press of Chinese Medicine; 2021. p. preface. Chinese.
- [12] Anonymous. Document. In: He DR, ed. *Examination Answers and Standards of the Imperial Medical Bureau* (太医局诸科程文格). Beijing: China Press of Chinese Medicine; 2021. p. document. Chinese.
- [13] Huang ZX. *The Wise Man's Advice to the Future King on How to Govern the Country* (明夷待访录). Volume 2. 1662. Chinese.
- [14] Bi R, ed. *Continuation of the General Mirror for the Aid of Government* (续资治通鉴). Volume 12. Beijing: Publishing House of Ancient Classics; 1957. Chinese.
- [15] Zhao FX. *The Dictionary of Philology of Chinese Medicine* (中医文献学辞典). Beijing: Publishing House of Ancient Chinese Medical Books; 2000. p. 315. Chinese.
- [16] Chen XY. *Three-character Classic of Medicine* (医学三字经). Beijing: China Press of Chinese Medicine; 2008. Chinese.
- [17] Liu Z. *Annotations to Records of the Eastern Han Dynasty* (东观汉记校注). Beijing: Zhonghua Book Company; 2008. Chinese.
- [18] Han Y. Farewell to Niu Kan (送牛堪序). In: Shanghai Classics Publishing House, ed. *The Complete Works of Han Yu* (韩愈全集). Shanghai: Shanghai Classics Publishing House; 1997. Chinese.
- [19] Ma DL. *Comprehensive Textual Research on Historical Documents* (文献通考). The Photocopy of *Si Ku Quan Shu*. Chinese.
- [20] Wei Z. *History of the Sui Dynasty* (隋书). Beijing: China Social Sciences Press; 2020. Chinese.
- [21] Ban G. *History of the Han Dynasty* (汉书). Beijing: Zhonghua Book Company; 2012. Chinese.
- [22] He DR. *Examination Answers and Standards of the Imperial Medical Bureau* (太医局诸科程文格). Beijing: China Press of Chinese Medicine; 2021. p. *Lun Fang* part. Chinese.

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Traditional Chinese Medicine Recorded by Missionaries (1887—1932): A Study Centered on *The China Medical Missionary Journal*

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Abstract

It was in *The China Medical Missionary Journal* (《博医会报》, *CMMJ*), first published in Shanghai in 1887, that traditional Chinese medicine (TCM) made its academic debut on the international stage. It integrated medical evangelism, hospital reports and world medical development at its beginning, and it was transformed into a purely academic journal in 1907. There are many records related to TCM in it, such as TCM diagnosis, treatment methods and clinical practices. These records show the process of how the missionaries observed, understood, learned, and used TCM. They also reflect the attitudes of medical missionaries towards TCM after experiencing it in its homeland, China at that time. The writings of missionaries on TCM represent a confluence of Eastern and Western medical research and cultural interactions, contributing significantly to the study of modern Chinese medical advancements and Sino-Western cultural exchanges.

Keywords: *The China Medical Missionary Journal* (*CMMJ*); Missionary; Medical Missionary Society; Traditional Chinese medicine

1 Introduction

Medical history is increasingly recognized as a pivotal field within Chinese historiography, with *The China Medical Missionary Journal* (《博医会报》, *CMMJ*) emerging as a critical resource. *CMMJ* (Fig. 1) is esteemed for its historical and scientific significance in the annals of modern Chinese medical evolution. This article rigorously scrutinizes the original documents from *CMMJ*, particularly the depiction of traditional Chinese medicine (TCM) by medical missionaries. It dissects the missionaries' evolving views on TCM, tracing the transition from skepticism to endorsement. Additionally, it evaluates the missionaries' research into Chinese medicinal practices, focusing on their investigation, application, and scientific analysis of Chinese medicine. The article concludes with an

assessment of the cumulative influence of these research dimensions on the progression of modern Chinese medical science.

2 Missionaries' understanding of TCM

2.1 Medical context of the 19th century: a Sino-Western perspective

Western medical science, having undergone significant evolution with the advent of anatomy in the 16th century, physiology in the 17th century, and pathology in the 18th century, experienced a surge in advancement during the 19th century. This period was marked by transformative natural science discoveries—the cell theory, the law of conservation and transformation of energy, and the theory of biological evolution—which collectively accelerated medical and technological progress.¹ Successive developments in high-precision scientific technologies, particularly in bacteriology and pathological anatomy, revolutionized the comprehension of diseases. In stark contrast, TCM has failed to keep pace with the times and still seemed to be shrouded in a veil of conservatism and antiquity. Against the backdrop of China's near-universal lag behind the West in politics, economy, and culture, it was perhaps inevitable that its medical practices would also fall behind.

Joseph C. Thomson, in his discourse within *CMMJ*, critiqued the foundational surgical knowledge of TCM as rudimentary and erroneous, asserting a substantial divergence from scientifically accurate understanding.² He emphasized that TCM lacked knowledge of

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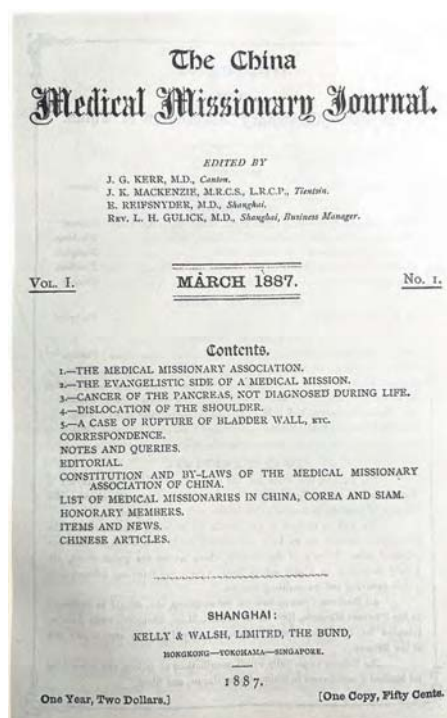


Figure 1 The content of volume 1 of *The China Medical Missionary Journal* (《博医会报》) in March 1887 (source with permission from: taken by the authors)

disinfection, and that all diseases were treated with acupuncture and moxibustion, which he saw as an unscientific misuse. Moreover, in his experience, not only did the patients he treated not improve through acupuncture, but their pain was also exacerbated.³ British missionary James Dyer Ball also wrote in *Zhong Guo Feng Tu Ren Min Shi Wu Ji* (《中国风土人民事物记》 *Things Chinese: Or Notes Connected With China*): “In some cases, the needle has been known to break in the body of the patient, and has had to remain there until extracted by the skill of the Western practitioner. The needle used looks very much like a sewing-machine needle, but is longer and coarser than that. Some of the Chinese doctors have needles two feet long, and are supposed by ardent admirers to be able to drive these instruments entirely through the patient’s body; but the great size of the needles is in reality intended to represent the greatness of the owner’s skill and reputation”⁴ (Fig. 2). To medical missionaries, TCM, perceived as an empirical accumulation devoid of scientific underpinnings, was often associated with superstition and ignorance, thus being conflated with unscientific methods.

Indeed, facilitating a profound understanding of the cognitive frameworks and therapeutic modalities of TCM for missionaries within a brief period was a formidable task. Prior to the Opium Wars, stringent customs restrictions imposed by the Qing government precluded missionaries from entering China or moving about freely. *The Treaty of Wanghia* (《望厦条约》 *Treaty of Peace, Amity, and Commerce, Between the United States*



Figure 2 Book cover for the 1906 edition of *Zhong Guo Feng Tu Ren Min Shi Wu Ji* (《中国风土人民事物记》 *Things Chinese: Or Notes Connected With China*) (source with permission from: <https://archive.org/details/cu31924023259926>)

of America and the Chinese Empire) in 1844 granted medical missionaries the right to practice and establish hospitals in China’s trading ports, yet it was post the Second Opium War that their medical missionary endeavors and scholarly pursuits truly commenced. The aftermath of the wars, with the signing of unequal treaties, expanded the operational scope of missionaries across China, facilitating a new chapter in their engagement with and understanding of TCM.⁵ Therefore, the disparity in medical backgrounds and the restrictive policy conditions also meant that medical missionaries could not achieve an in-depth understanding of TCM in the short term; they too needed time to understand and discover the uniqueness and scientific nature of TCM.

2.2 The dismissive attitude towards traditional Chinese medicine

From the cultural psychology and practical situation of early medical missionaries in China, facing the widespread belief in TCM and the mainstream status of TCM in medical life, they showed a disdainful attitude towards TCM to open up a situation for missionary medicine. They emphasized the efficacy and achievements of Western medicine to win more medical discourse power. First, they criticized the lack of systematic medical education in China and the mixed quality of medical practitioners. Joseph Edkins expressed his disappointment with the group of Chinese doctors in *CMMJ*, comparing

TCM surgeons who lack knowledge of anatomy and physiology to the “barber” of medieval Europe, referring to those who practice medicine without a medical license and lack of medical literacy and knowledge.⁶ This metaphor vividly expressed the questioning of the medical level of modern Chinese doctors. Medical missionaries generally believed that the lack of specialized medical education was the root cause of the backwardness of Chinese medicine, and they questioned the examination and assessment system for Chinese medical practitioners in *CMMJ*: “Does the Hanlin College (翰林院) at Peking still confer medical diplomas?” “Mayers, in his Chinese Government, has two references to the ‘College of Imperial Physicians (太医院)’ . will somebody enlighten us on that ‘College’?”⁷ Therefore, even if the medical level of TCM practitioners was high, they were still subject to criticism in the eyes of medical missionaries. In 1901, H.T. Whiney published an article in *CMMJ* titled “Medical education in China”, pointing out that compared with American medical education, China’s medical education at that time was “deplorable”. He commented, “Medically China is but little in advance of ‘Darkest Africa’, considered apart from what Western nations have done for her, and the light that has come to her from without in years past has done much to prepare the way for extensive reform both in medicine and in other forms of education and civilization, and the experience of the year nineteen hundred is but the Chinese way of breaking with the past, and will eventuate in furthering many of the medical reforms necessary to enable China to be classed with other important nations of the world”.⁸ It cannot be denied that Whiney’s statements were somewhat exaggerated, but they also offered a perception of the limitations in Chinese medicine at that time.

Furthermore, beyond the imperfections in medical education, the resort to witchcraft (巫术) healing practices was a significant point of contention among missionaries of the time. In 1887, *CMMJ* documented a case where a monk, known for his “Folk Remedy (偏方)” for various ailments, would mix incense ash with tea in certain proportions for patients to consume, or perform exorcisms using peculiar rituals to drive away perceived evil spirits from the afflicted.⁹ Such sorcery-based treatments were not uncommon in China, and the missionaries found them absurd, which further fueled their skepticism towards the Chinese medical paradigm.

The missionaries also looked down upon the secret prescriptions of TCM. They recounted a case involving a two-year-old with diphtheria, where the child’s swollen lymph nodes due to inflammation were treated by stuffing an egg into a frog’s mouth, roasting the frog, and then feeding the egg to the child. The author sarcastically remarked, “To the first I side the frog was a mistake, it is a very weak creature, you should have caught a tiger, and have thrust a goose-egg down his throat. This would have been much effective one way or the other”.¹⁰

Another instance involved a recommendation for a woman suffering from severe vomiting and inability to keep food down: “Catch the badger, cut off one foot, roast this thoroughly and pulverise, which may be given to the patient to quiet her troubled stomach”.¹⁰ J.H. McCartney also wrote in *CMMJ* about a woman who insisted on cutting part of her liver to save her mother, a desire stemming from superstitious beliefs prevalent in Chinese medical texts (Fig. 3). He noted that such superstitious notions heavily influenced the doctor-patient relationship at the time.¹¹

The missionaries viewed TCM of that era as a blend of religious and superstitious folk medical practices, with treatments that bordered on the absurd. They commented, “The practice of medicine in China develops a singular medley of experiences, from the solemn and sad, to the grotesque and ludicrous”.¹² Faced with what they perceived as a backward and decaying state of TCM, the missionaries critiqued and expressed dissatisfaction with the field, applying the scientific rationality, perspective, and standards of TCM to their assessments.

2.3 Affirmation of effective traditional Chinese medicine treatments

As early as the establishment of the China Medical Missionary Association (CMMA), there have been voices affirming TCM, but they were not mainstream and were drowned out. In 1887, *CMMJ* published: “Chinese medical practice is often absurd enough, but some of their old wives’ remedies are as efficacious as they are simple”.¹³ Through clinical practice, medical missionaries began to

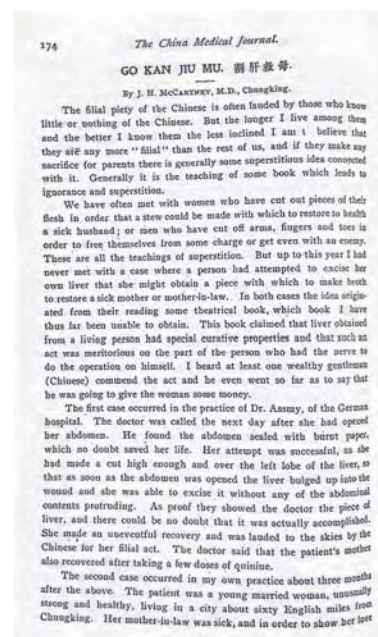


Figure 3 The content about “GO KAN JIU MU 割肝救母” in the third volume of *The China Medical Missionary Journal* in 1908 (source with permission from: taken by the authors)

share effective treatment experiences of TCM, “A cold in the head is rather beneath the notice of our doctors, but it causes a considerable amount of discomfort all the same. The Chinese remedy is very simple. Any Chinese person can obtain some peppermint leaves, and an infusion of these drunk before going to bed generally effects a speedy cure. For headaches, small discs of fresh radish peel to the temples afford great relief”.¹³ In addition, medical missionaries showed great interest in traditional Chinese nurturing (中医养生) and traditional Chinese *Tui Na* (中医推拿). Joseph C. Thomson studied the exercise therapy of TCM, stating that during the health preservation exercise process, attention should be paid to the swallowing of saliva and the friction between the tongue and teeth, describing the exercise posture to be like the movements of cows and dragons, emphasizing that the practice should be carried out three times a day, and with long-term uninterrupted practice, physical functions can be supplemented and restored.¹⁴ They also affirmed the medical value of traditional Chinese *Tui Na*, stating that it can achieve the effect of relieving pain, treating diseases, and aiding sleep, and strongly recommended it to foreign doctors.¹⁵ They also introduced the classic prescriptions from ancient Chinese medicinal books, using *Fu Wei San* (扶危散 The Powder for Saving the Dying) from *Yi Zong Jin Jian* (《医宗金鉴》 Golden Mirror of the Medical Tradition) to treat rabies, which could fight fire with fire, making the urine smooth and allowing the evil poison in the body to be quickly discharged.¹⁶ They also introduced that when Chinese people treat edema diseases, they extract a sensory material called “Senso (蟾蜍)” from the skin of toads, and after testing, it is known that this material does indeed contain elements that relieve edema.¹⁷

Medical missionaries began to affirm the effective treatment of TCM and gradually realized the limitations of their previous understanding of it. In 1916, on the 30th anniversary of the founding of CMMJ, the editorial “Chinese medicine and surgery” analyzed the criticism of TCM by missionaries since the 19th century. They admitted that in the past, to win the support of their home country, they often emphasized the backwardness of TCM. However, if TCM had no effect, it would inevitably be abandoned by the Chinese people. The fact that TCM treatment has existed for centuries must have its significance and rationale. They also criticized the previous attitude of completely denying the “secret recipes (秘方)” of TCM and proposed to investigate and analyze TCM without prejudice.¹⁸ With time, the understanding of TCM by medical missionaries also began to deepen. They studied medical ethics and discussed medical principles with TCM practitioners, began to face TCM positively, and to a certain extent, identified with it, reporting and conveying the effective results of TCM in CMMJ.

3 Research and utilization of TCM medicinal materials by missionaries

3.1 Utilization of effective medicinal materials

Upon their initial arrival in China, the missionaries, accustomed to the European and American continents, found their constitutions ill-adapted to the local environment. Consequently, when afflicted by various diseases such as Japanese filariasis and malaria, both traditional Chinese and Western medical treatments sometimes proved ineffective, even posing a risk to life.¹⁹ Based on statistical data, the American Board of Commissioners for Foreign Missions (ABCFM) reported that in the first two decades of their missionary activities, 45 missionaries died in the regions where they served. Additionally, 31 were compelled to return to their home country due to health issues affecting themselves or their families. Surveys indicated that the average lifespan of missionaries and their families from other mission boards was also significantly lower than the national average.²⁰ This urgent need for survival accelerated the medical missionaries’ research and utilization of TCM, leading them to summarize the characteristics and therapeutic effects of Chinese medicine, and to begin utilizing indigenous medicinal materials. Missionaries embarked on an active exploration of Chinese medicine. Although they initially held a disdainful attitude towards TCM, they have always been interested in Chinese medicine. As their practice with Chinese medicine deepened, they recognized its advantages and value. Consequently, articles discussing how to use Chinese medicine to treat diseases by missionaries were often published in CMMJ.

In 1890, in CMMJ, A.Wm. Douthwaite published an account of a fern species known as *Jin Mao Gou Ji* (金毛狗脊 Cibotii Rhizoma), describing it as follows: “The stalk of this fern is covered with a soft down of fine hair of golden colour A plug of this placed in any cavity, will almost always stop oozing and hemorrhage, short of arterial bleeding, which can be arrested by ligature”.²¹ *Jin Mao Gou Ji* he documented is identified as *Gou Ji* (狗脊 Rhizoma Cibotii) fern, a species of the Osmundaceae family, first recorded in the *Shen Nong Ben Cao Jing* (《神农本草经》 *Shennong’s Classic of the Materia Medica*), with the down on the stem capable of stopping bleeding.²² In his seminal work *Ben Cao Gang Mu* (《本草纲目》 *The Grand Compendium of Materia Medica*), the Ming dynasty pharmacologist Li Shizhen (李时珍) distinctly mentioned that *Jin Mao Gou Ji* not only stops bleeding on the exterior but also has the effects of nourishing the liver and kidneys and strengthening the muscles and bones.²³

Missionaries also discovered that *Dang Gui* (当归 *Angelica sinensis*) was the most frequently prescribed herb in TCM, noting: “It is regarded as a valuable remedy in the treatment of menstrual and puerperal disorders and of sterility in women, though it is also used in a variety of other conditions”.²⁴ Consequently, they

introduced *Angelica sinensis* to Europe for the treatment of uterine diseases.

During the cholera outbreak in Fuzhou (福州) from August to September 1918, missionaries found that the use of kaolin significantly reduced the mortality rate and contained the spread of the epidemic. Kaolin, a natural non-metallic mineral with excellent adsorption, plasticity, and dispersibility, appears as a white powder. They highly affirmed its use in *CMMJ*: “We have had 13 deaths out of these 100 cases, but three of these died within an hour or two after entering the hospital. No treatment of any sort could have saved them. Of the cases which received only kaolin, only one death has occurred”.²⁵ The missionaries actively published their findings on the effective use of indigenous medicinal materials in *CMMJ*, making it a platform for the dissemination of medical academic exchanges.

3.2 Advanced processing

The escalating costs of Western medicines, exacerbated by expensive transportation, have necessitated the quest for efficacious and economical alternatives. In this context, medical missionaries in China turned to the in-depth refinement and processing of Chinese medicine.

Initially, they explored alternative remedies, such as the ventriculi galli mucosa, which Geo. King noted as a valuable digestive aid supported by American research and his clinical practice in China.²⁶ In the absence of santonin and other potent anthelmintic medicines, missionaries, through diligent research and clinical practice, discovered that the plant known as *Shi Jun Zi* (使君子 *Fructus Quisqualis*) exhibits effective anthelmintic properties.²⁷ This plant, with a rich historical pedigree in TCM, is officially recognized in the 2010 edition of *Zhong Guo Yao Dian* (《中国药典》 *Chinese Pharmacopoeia*) for its ripe, dried fruit, which is harvested in autumn when the fruit's skin turns purplish-black. It is indicated for the treatment of ascariasis, enterobiasis, abdominal pain due to helminthic infestation, and pediatric malnutrition.²⁸ Amidst an environment steeped in Chinese medicine, medical missionaries instinctively integrated the application of these herbal remedies into clinical practice, thereby refining and validating their efficacy through empirical outcomes.

Subsequently, missionaries embarked on the purification and processing of indigenous medicines. As documented by A.Wm. Douthwaite in *CMMJ*, “Many native drugs are too impure or of too uncertain composition to be of much use to the physician, but some of them can be purified, and nearly all the apparatus required for that purpose can be made in China. For the manufacture of Sublimed Sulphur, all that is required is an iron pan in which to burn the native sulphur, a tube to convey the fumes to a large wooden box, on the sides of which the flowery crystals will be deposited. Camphor may be purified by means of the same apparatus, but

of course, it should be slowly evaporated, not burned. Soluble crystals, such as PERCHLORIDE or MERCURY (白降丹 *Peh Chiang tan*) or SULPHATE OF IRON (Ts'ing fan 青礬) can be obtained pure by solution, filtration and re-crystallization.....”²¹ These processes, although reliant on local raw materials, were hindered by supply limitations. The innovative work of Wilson in Hanzhong (汉中), Shanxi, who synthesized Nordhausen Sulphuric Acid from local iron sulfates,²¹ broke through these constraints, facilitating the production of a range of chemical medicines. These self-reliant efforts by missionaries in China greatly advanced the study of indigenous medicines, promoting the utilization and refinement of Chinese medicine, reducing the reliance on imported pharmaceuticals, and pioneering medical experimental practices in China. Missionaries did not receive systematic training in TCM theory; however, during the process of advanced pharmaceutical compounding, they became familiar with the knowledge of using Chinese medicine. In some cases, they even surpassed the Chinese in the blending and compounding of certain Chinese medicines. Although they still harbored a dismissive attitude towards TCM, they were more inclined to employ scientific and chemical analysis methods to extract as many active ingredients from Chinese medicine as possible, thereby further fulfilling their medical missionary needs.

3.3 Bernard Emms Read pioneers the scientific classification of Chinese medicines

In 1890, during the first general assembly of CMMA, a committee was established to investigate Chinese medicine. This platform facilitated research into the medicinal value and clinical application of Chinese medicine. Representative researchers included John Glasgow Kerr, A.Wm. Douthwaite, and Joseph C. Thomson, who published a total of nine significant articles in *CMMJ*. Their research primarily focused on the characteristics and clinical value of Chinese medicine, without venturing into new directions. In contrast, Bernard Emms Read, a missionary from the London Missionary Society, initiated research into the scientific classification and examination of Chinese medicines. He categorized medicines into herbal and mineral medicines, emphasizing the differences between the two in actual research. He divided Chinese medicines into three categories: (1) herbal medicines that meet Western medicine standards, such as *Zhang Nao* (樟脑 *Camphora Cumina*), *Rou Gui* (肉桂 *Cortex Cinnamomi*), and *Ding Xiang* (丁香 *Flos Caryophylli*); (2) herbal medicines with plant properties similar to Western medicine standards, such as *Xiang Si Zi* (相思子 *Abrus Precatorius*), *Ma Bian Cao* (马鞭草 *Verbena Officinalis*), and *Ma You* (麻油 *Sesamum Indicum*); (3) medicines with potential value to modern medicine, such as *Che Qian Cao* (车前草 *Plantago Asiatica*), *Zi Luo Lan* (紫罗兰 *Matthiola incana*), and *Kuan Dong* (款冬 *Tussilago Farfara*).²⁹ When organizing

and researching the complex field of Chinese medicinal materials, Read emphasized the standardization of research samples and published requirements and explanations for sample examination in 1923 *CMMJ* (Table 1).

Bernard Emms Read advocated for the scientific classification and research of Chinese medicine, filling a gap in the organization of Chinese medical literature and breaking the preconceived superstitious notions about Chinese medicine held by Westerners. He began to establish the precious value of Chinese medicine worldwide through the form of scientific research reports.

4 Achievements

4.1 Enrich historical medical records

CMMJ holds not only historical significance but also scientific medical value in the modern history of Chinese medicine. It has propelled the scientification of medical research and serves as a precious historical record for the study of TCM. Initially, it was primarily aimed at a foreign medical audience, but as research into TCM deepened, it gradually evolved into a comprehensive collection of Chinese medicine, folk, health, and educational materials. *CMMJ* provided a platform for medical exploration and academic exchange for medical missionaries in China. The medical reports published by these missionaries in *CMMJ* offered a scientific research paradigm and model for modern China’s medical studies. This research model was inherited by local Western medical organizations, ensuring the continuity and development of the modern scientific occupational activity pattern of medical research in China. The Chinese Medical Association (CMA), drawing on the model of

CMMJ, established its publication, *Chinese Medical Journal (CMJ)*.³¹ The research on TCM published by missionaries in *CMMJ* provided a window for the Western medical community to explore Chinese medicine, especially their attitudinal shift, which also offered Westerners a new perspective on TCM. Although their research was inevitably rudimentary and failed to delve deeply into the field of TCM, their pioneering contributions provided invaluable records for future researchers. Their documentation of TCM is an indispensable historical medical resource for the study of modern China. The missionaries’ research on TCM facilitated the *CMMJ*’s transformation from a periodical with distinct religious overtones to a scientific medical journal.

4.2 Promoting the progress of modern Chinese medicine

CMMJ has borne witness to the entire process of the attitude shift of medical missionaries in China towards TCM, from disdain to gradual acceptance, and their recommendations of effective TCM therapies and valuable herbal extracts to the West. Their critiques of China’s medical system and health endeavors played a positive role in propelling the development of medical science and health construction in modern China. In their writings on TCM, the missionaries also emphasized the close relationship between etiology and environment, discussing the need for improved sanitary conditions, which to some extent aroused the awareness of health environments and promoted the rise and development of public health during the Republic of China era. Besides expressing skepticism about witchcraft treatments, the missionaries also addressed social maladies such as alcoholism, opium addiction, and foot-binding, which they

Table 1 Bernard Emms Read’s requirements for sample examination³⁰

Number	Requirements	Description	Example
1	Chinese name		<i>Da Liao</i> 大料
2	Nature of substance	Animal, mineral, vegetable	Fruit of climbing plant
3	Botanical name	Biological characteristics	<i>Illicium religiosum</i>
4	Source of material		Shops in North China
5	Form and method of presentation of drug	Pill, decoction, etc., external or internal, size and interval of dosage	Stewed with meat
6	Nature of disease treated	When possible give scientific diagnosis with clinical laboratory findings if any; urine, blood gastric analysis, feces, etc.	Accidental death or suicide when eaten raw
7	Clinical results from use of drug		None
8	Toxic symptoms referable to the drug	Gastro-intestinal irritation, Nephritis, Nervous symptoms, Wakefulness, Roaring in ears, If fatal, give autopsy results, if any	Gastrointestina rritation Intense convulsions
9	Personal impression of effects of the drug		None
10	Chinese ideas of its toxicity for domestic and other animals		None

Notes: The composition of medicines in pills or composites powders is too obscure. Such should not be sent to the laboratories in China for examination at present. Drugs for examination should be sent each by itself, not mixed with other drugs, and should be accompanied by as much of the above information as possible.

experienced during their medical missionary work, as spiritual diseases of China. They published these issues in *CMMJ*, strongly advocating for the abolition of these malpractices, which objectively advanced the reform of Chinese social customs and the progress of ideological civilization. Although the missionaries' dissatisfaction and sympathy for the backwardness of Chinese medical education were evident in *CMMJ*, their efforts to change this situation were commendable. Their published views sparked some reflection among the Chinese on their education and laid the groundwork for the construction of the modern Chinese medical system. After the Republic of China was established, medical missionaries began to cooperate with the Chinese government to establish medical schools, set up medical education councils, and vigorously carry out public health campaigns. The report templates published by the missionaries in *CMMJ* also served as references for the establishment of modern Chinese medical journals. Their scientific research and extraction of Chinese medicine initiated the process of Westernization of TCM in modern China. Overall, Chinese medicine has been the most intriguing subject for missionaries, although some did exhibit a sympathetic understanding towards TCM, having conducted certain explorations and offered a degree of positive evaluation. Nevertheless, their general inclination was predominantly negative towards TCM. Their perception of the distinction between TCM and Chinese medical remains a significant source of contemporary Western society's assessment of TCM and Chinese medical. This has even influenced the views and understandings of Chinese medical among some Chinese individuals since the 20th century. Consequently, they have championed science and proclaimed the slogan “*Fei Yi Cun Yao* [废医存药 abolishing *Yi* (the theory of TCM) and reserving *Yao* (the medication of TCM)]” which has to some extent promoted the innovation and development of TCM.

4.3 Facilitating the dissemination and communication of medical knowledge

With its rich resources and long history, China was an ideal region for medical missionaries to conduct medical research. The research by medical missionaries on Chinese medicine in *CMMJ*, using Western scientific knowledge to test and refine the components and efficacy of medicinal material, represented an effective integration of Chinese and Western resources. It allowed Western scientific technology to be applied in the field of Chinese medicine. This exchange was invaluable both technologically and medically, representing a valuable exchange of knowledge and culture between the East and the West. The medical missionaries did not confine their collected medical achievements to publication solely in *CMMJ*; their works also appeared in other academic journals in Europe and America. The medical

missionaries made an indelible contribution to promoting global medical exchange and dissemination. The extensive writings of the medical missionaries on TCM made *CMMJ* as an essential medium for the Western medical community to understand China. It served not only as a window for “the eastward dissemination of Western medicine (西医东渐)” but also as a bridge for “TCM's western transmission (中医西传)”. The depiction of TCM by medical missionaries provided the international medical research community with experiences from China, enriching the diversity of global medical content and highlighting the uniqueness of TCM. This uniqueness includes explorations of TCM theory and the systematic organization of traditional Chinese pharmacy. The missionaries were pioneers in breaking down barriers in medical concepts, attempting an integration of Western and Eastern medical practices, and demonstrating a confluence of Western and TCM and comparative studies. They facilitated the development of global medical progress and filled the gaps in TCM.

5 Conclusion

Missionaries' discourse on TCM in *CMMJ* reflects a transformative perspective on indigenous Chinese medical practices. Their progressive engagement with the therapeutics of TCM has evolved from a view of it as conservative and antiquated to one that acknowledges its efficacy, as demonstrated through Western methodologies of experimental and clinical medicine. This shift includes affirmation of traditional treatment modalities and appreciation for the efficacy of Chinese herbal remedies, thus opening new positive avenues for the study of modern Chinese medical development. The missionaries' discussions on Chinese medical education have also facilitated the establishment of contemporary Chinese medical systems. *CMMJ*, preserving these valuable historical records, holds both medical and cultural significance, serving as a platform for academic inquiry and cultural exchange. The writings of missionaries on TCM represent a confluence of Eastern and Western medical research and cultural interactions, contributing significantly to the study of modern Chinese medical advancements and Sino-Western cultural exchanges. *CMMJ* stands as a testament to the missionaries' role in the history of cultural exchanges between China and the West.

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Ethical approval

This study does not contain any studies with human or animal subjects performed by any of the authors.

Author contributions

LI Yanran drafted and translated the article, YAN Na reviewed and modified the article.

Conflicts of interest

The authors declare no financial or other conflicts of interest.

References

- [1] Willian F. *Science and the Practice of Medicine in the Nineteen Century* (19世纪医学科学史). Cao ZF, translated. Shanghai: Fudan University Press; 2002. p. 29. Chinese.
- [2] Joseph CT. Surgery in China. *The China Medical Missionary Journal*. 1892;(4):223–224.
- [3] Joseph CT. Surgery in China. *The China Medical Missionary Journal*. 1892;(4):226.
- [4] Ball JD. *Things Chinese: Or Notes Connected With China*. New York: C. Scribner's Sons; 1906. p. 8.
- [5] Tao FY. The changes in missionaries' views on traditional Chinese medicine (传教士中医观的变迁). *Christianity and Modern China*. 2011;(5):48–77. Chinese.
- [6] Joseph E. Chinese treatment of fevers. *The China Medical Missionary Journal*. 1890;(3):228–231.
- [7] Robert C. Peking eunuchs. *The China Medical Missionary Journal*. 1887;(1):27–28.
- [8] Whitney HT. Chinese medical education. *The China Medical Missionary Journal*. 1901;(3):195–199.
- [9] Mackay GL. Chinese medical theories and practice today. *The China Medical Missionary Journal*. 1887;(4):293–295.
- [10] Randle HR. Native treatment. *The China Medical Missionary Journal*. 1897;(3–4):214.
- [11] McCartney JH. Go Kan Jiu Mu 割肝救母. *The China Medical Journal*. 1908;(3):174.
- [12] Anonymous. Items and notes, eleventh. *The China Medical Missionary Journal*. 1887;(2):158–163.
- [13] Anonymous. Items and notes, twentieth. *The China Medical Missionary Journal*. 1887;(2):158–163.
- [14] Joseph CT. Surgery in China. *The China Medical Missionary Journal*. 1893;(1):3–4.
- [15] Vanderbuegh ED. Massage. *The China Medical Missionary Journal*. 1907;(2):60–63.
- [16] Cormack JG. Treatment of mad dog bite. *The China Medical Missionary Journal*. 1906;(5):209–211.
- [17] Pyman D. Some interesting drugs of tropical origin. *The China Medical Journal*. 1906;(6):435.
- [18] Editorial. Chinese medicine and surgery. *The China Medical Journal*. 1906;(6):434–435.
- [19] Anonymous. Medical reports of the imperial Chinese maritime customs. *The China Medical Missionary Journal*. 1887;(2):136–138.
- [20] Edward V. *Bojia and China's Openness* (伯驾与中国的开放). Dong SX, translated. Guilin: Guangxi Normal University Press; 2008. p. 44–45. Chinese.
- [21] Rey A. PAPER: The use of native drugs by medical missionaries. *The China Medical Missionary Journal*. 1890;(3):100–105.
- [22] Chen DX. *Collected Commentaries and Annotations on "Shen Nong's Classic of the Materia Medica"* (神农本草经集注). Fuzhou: Fujian Science and Technology Press; 2012. p. 54. Chinese.
- [23] Li SZ. *The Grand Compendium of Materia Medica* (本草纲目). Taiyuan: Shanxi Science and Technology Press; 2014. p. 340. Chinese.
- [24] Bernard E. Experiment with Chinese drugs. *The China Medical Journal*. 1923;(7):589–591.
- [25] Wong KC. Kaoling in the treatment of cholera. *The China Medical Journal*. 1919;(6):574–576.
- [26] Geo KA. Cheap substitute for pepsin. *The China Medical Missionary Journal*. 1891;(1):24–25.
- [27] Bernard E. Chinese drugs of therapeutic interest to Western physicians. *The China Medical Journal*. 1923;(7):589–591.
- [28] National Pharmacopoeia Committee. *Chinese Pharmacopoeia, Volume 1* (中国药典, 第一部). Beijing: China Medical Science and Technology Press; 2010. p. 199. Chinese.
- [29] Bernard E. Chinese materia medica (vegetable kingdom). *The China Medical Journal*. 1924;(8):637–645.
- [30] Bernard E. Chinese drugs of therapeutic interest to Western physicians. *The China Medical Journal*. 1923;(7):590.
- [31] Gao X. CMMJ and China's modernization process (《博医会报》与中国医学的现代化进程). In: China Medical Missionary Association, ed. *The China Medical Journal (1887–1931)* [博医会报(1887–1931)]. Beijing: National Library Press; 2013. p. 31. Chinese.

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A Qualitative Analysis of WHO's International Standard Terminologies on TCM

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Abstract

Traditional Chinese medicine (TCM) is increasingly recognized worldwide as a valuable complementary and alternative medicine. To facilitate global research and collaboration in this field, the World Health Organization (WHO) introduced the International Standard Terminologies on Traditional Chinese Medicine in 2022. This international terminology translation standard, IST 2022, goes beyond conventional translation by embracing three innovative features: 1) It reflects TCM's foundational philosophy of unity and opposition, emphasizing the interconnectedness among TCM terms during translation. This approach transcends individual term translations to explore the interrelationships among them. 2) It preserves the integrity of TCM theory by retaining transliterations for unique TCM terms that possess distinct features. 3) It employs innovative xiang (image) cognition, a concept rooted in traditional Chinese thought by helping readers grasp visual and mental imagery associated with each term. This study presents a qualitative analysis based on interviews with 11 TCM translation experts, examining their perspectives on these features and their translational preferences across the IST 2007 and 2022 versions. These findings contribute to the standardization and global harmonization of TCM terminology, advocating for clarity, precision, and the advancement of TCM in the international healthcare arena.

Keywords: Terminology; Translation; WHO; Translation standard; Traditional Chinese medicine

1 Introduction

The need for standardized translation in the field of traditional Chinese medicine (TCM) has become a consensus among scholars. This initiative is crucial for two main reasons: it provides a unified lexicon for TCM practitioners, educators, and researchers to enhance international clinical and academic communication, and it offers an opportunity to refine and clarify the nuanced terminology of TCM. Both individual experts and organizations are dedicated to this cause. Respected figures including influential TCM researchers, educators, and translators, have made substantial contributions to this

endeavor. Works such as *English Translation of Common Terms in Traditional Chinese Medicine* by Xie Zhufan (谢竹藩), *A Practical Dictionary of Chinese Medicine* by Nigel Wiseman and *New Chinese-English Dictionary of Traditional Chinese Medicine* by Fang Tingyu (方廷钰) exemplify their valuable contributions.

Simultaneously, renowned organizations like the World Health Organization (WHO), the International Standard Organization (ISO), and the World Federation of Chinese Medicine Society (WFCMS) are engaging in the publication of their respective TCM translation standards. Among the multitude of international translation standards proposed by various entities, two have been the subject of rigorous study and comparison in China: the *WHO International Standard Terminologies on Traditional Medicine in the Western Pacific Region* (IST 2007), promulgated by the WHO office in the Western Pacific region in 2007, and the *International Standard Chinese-English Basic Nomenclature of Chinese Medicine* (ISN 2007) by the World Federation of Chinese Medicine Society.¹⁻⁴ An in-depth analysis of these two translation standards reveals substantial disparities in translation principles, diction, and their resulting effects on comprehension. Paradoxically, even within a single translation standard, consistency in the translation of TCM medical terms is not always guaranteed. Consequently, the present state of TCM standardization is characterized by the proliferation of translation standards, yet full unification remains a work in progress.⁵ The absence of a one-size-fits-all international standard presents a

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formidable challenge for translators, who must navigate a complex landscape of varying standards, each with its own nuances and requirements.

In this research, we compared IST 2007 and *International Standard Terminologies on Traditional Chinese Medicine* (IST2022) and found their differences in target readership and translation principles. Then we delve further into three such unique characteristics in the translation of TCM terms in IST 2022: 1) the manifestation of TCM's philosophy of unity and opposition; 2) the preservation of the original TCM theory; and 3) the extended application of *Xiang* (image) thinking. Then we conducted a qualitative interview with 11 TCM translation experts to assess their perceptions of these three features and their preferences in translating specific TCM terms found in IST 2007 and IST 2022.

2 Comparison between WHO's two representative international translation standards of traditional Chinese medicine: IST 2007 and IST 2022

WHO maintains a pivotal role in shaping health-care practices worldwide by formulating and publishing universally applicable standards. Over the years, it has consistently released critical terminology standards, including the *WHO International Standard Terminologies on Traditional Chinese Medicine in the Western Pacific Region* in 2007 (IST 2007),⁶ the *International Classification of Diseases 11th Revision* (ICD-11)⁷ in February 2022, and the *WHO International Standard Terminologies on Traditional Chinese Medicine*⁸ on March 3rd, 2022 (IST 2022). Some of WHO's publications on medical translation standards deal with a specific branch or aspect of Chinese medicine such as the translation standards for acupuncture or disease names and symptoms.

Two of them have emerged as particularly comprehensive international reference for TCM: IST 2007 and IST 2022. The primary objective of both these terminology standards is to fulfill the demand for a "common language" that enables professionals in traditional healthcare to engage in effective communication among themselves and with their counterparts in the biomedical community. Simultaneously, these standards serve as benchmarks to guide practices and training within the TCM community. IST 2007 encompasses a wide array of TCM terms within the context of traditional medicine. It extends its scope beyond TCM to include traditional Japanese medicine, traditional Korean medicine, and other traditional medical systems. The primary reference for IST 2007 was Xie Zhufan's *English Translation of Common Terms in Traditional Chinese Medicine*.⁹ In contrast, IST 2022, the latest edition of its kind, was published on March 3rd, 2022, and it focuses exclusively on TCM. IST

2022 includes 3,415 terms, with 3,387 terms featuring detailed descriptions, while the remaining 28 terms serve as general categorizations.

2.1 Expansion of target readership in IST 2022 over IST 2007

IST 2007 primarily targeted professionals or students in the field of traditional medicine, as well as individuals unfamiliar with traditional medicine, such as Western medical practitioners.⁶ In contrast, IST 2022, as stated in its introduction, has expanded its intended readership to include the general public. Compared with IST 2007, IST 2022 adopts a more inclusive stance. This noteworthy shift reflects a profound transformation in the understanding of the role and relevance of TCM in the contemporary world. It emphasizes the adaptability of TCM in the modern world and underscores the importance of making this ancient knowledge system more inclusive and accessible to all.

When an international translation standard was mainly targeted toward readers with a medical background, professionalism and scientism were further emphasized as is evident by the adoption of Doctor and Professor Xie Zhufan's *English Translation of Common Terms in Traditional Chinese Medicine*. Dr. Xie and Paul White proposed that TCM translation "should be aimed at precisely expressing the genuine meaning in the medical sense rather than reflecting Chinese customs, idioms and other folkways".¹⁰ This approach by Xie emphasizes the scientific and clinical aspects of TCM, ensuring that translations are primarily focused on accurately transmitting medical knowledge rather than cultural or literary nuances.

The embrace of a broader readership acknowledges the role of TCM, as a valuable repository of knowledge can offer insights and benefits to a diverse audience. As the readership diversifies to include individuals with varying levels of familiarity with medical terminology and practices, readability and accessibility become of paramount consideration. It underscores the importance of clear, accessible language that facilitates the understanding of TCM concepts and terminologies by individuals who may not have a formal background in medicine or traditional Chinese culture. It recognizes that TCM is not confined to the past but has the potential to play a vital role in addressing health and wellness issues in the present day. Its outreach to a more diverse readership reflects a paradigm shift in how TCM is perceived and utilized. It emphasizes the adaptability of TCM in the modern world and underscores the importance of making this ancient knowledge system more inclusive and accessible to all, thus paving the way for a more comprehensive understanding and application of traditional Chinese medicine in a contemporary context.

In essence, IST 2022's approach exemplifies the evolving perspective on TCM as an open system of

knowledge that can benefit a wide spectrum of readers, from seasoned practitioners to curious laypersons. This expansion of readership and associated modifications in translation principles are emblematic of a more inclusive approach to traditional medicine and its role in the contemporary world. This has led to changes in guiding principles and diction to further cater to the expanded audience. It ensures that the knowledge and wisdom contained in TCM texts are more accessible and applicable to a broader audience.

2.2 Changes in translation principles in IST 2022 over IST 2007

Both IST 2007 and IST 2022 prioritize accuracy in translation, aligning with IST 2007’s focus on “accurate reflection of the original concept of Chinese terms” and IST 2022’s emphasis on “reflecting the accurate and concise meaning of the terms and their Chinese definitions/ explanations” (Table 1). Furthermore, both of them discourage the creation of new English words, as stated in IST 2007’s proposition of “no creation of new English words” and IST 2022’s recommendation to “avoid English neologisms”. Lastly, both of them discourage the extensive use of pinyin in translating TCM terms, with IST 2007 advocating “avoidance of pinyin (Romanized Chinese) use” and IST 2022 suggesting “minimizing the use of Chinese pinyin unless necessary”.

IST 2007 emphasized loyalty and accuracy in translating TCM terms as individual and autonomous units, as articulated in its first principle (Table 1). In contrast, IST 2022 emphasizes more on “the integrity of the theoretical framework of TCM” as outlined in the Introduction Part of IST 2022. Rather than treating TCM term translations as isolated entities, IST 2022 embarks on a more intricate journey. It forges connections, elucidates interdependencies, and constructs a comprehensive network of terminology, firmly grounded within the theoretical landscape of TCM. This approach is akin to weaving a web that interconnects various terms, thereby

reinforcing the integral structure of TCM theory. Within this intricate web of terminology, the philosophical underpinnings and cognitive paradigms of TCM serve as the foundational backbone. IST 2022 acknowledges that TCM’s philosophical tenets, which emphasize balance, harmony, and interconnectedness, are not only integral but also imperative for comprehending the essence of TCM. Thus, this latest standard goes to great lengths to ensure that these philosophical principles are reflected and presented holistically within the lexicon, providing a deeper and more nuanced understanding of TCM.

Equally significant is the shift in the treatment of pinyin, the phonetic Romanization of Chinese characters. IST 2007 adhered to a more traditional stance, not readily embracing the incorporation of pinyin in translations. However, IST 2022’s translation principle, while advocating “minimizing the use of Chinese pinyin unless necessary”, also signifies a notable shift towards a greater acceptance of pinyin as a valuable translational tool, marking a significant difference from IST 2007. This transition is exemplified in the rendering of specific terms, such as “狐惑 (denoting the throat-anus-genital syndrome)” and “膏肓 (referring to the anatomical location between the heart and the diaphragm)”. In IST 2022, pinyin is employed and they are rendered into “hú huò” and “gāo huāng”, respectively.

In IST 2007, recommended by the WHO Regional Office for the Western Pacific, TCM terms were often translated with reference to their Western medical counterparts whenever feasible. This strategy aimed to improve accessibility for non-native readers, who are generally more familiar with Western medical concepts. Renowned scholars such as Xie Zhufan, Li Zhaoguo (李照国), and Giovanni Maciocia supported this approach, considering it essential for the modernization of TCM while preventing misconceptions of it as esoteric. In contrast, IST 2022 adopts a more conservative stance regarding the integration of Western medical terms, believing in “using biomedical terms when appropriate” but also advocating “using literal translation when meaningful”. Scholars such as Nigel Wiseman and Bob Flaws argue that the overuse of Western medical terminology risks diluting the inherent meanings of TCM terms and undermining the independence of the TCM system. This more circumspect approach in IST 2022 reflects a conscious effort to preserve the intrinsic richness of TCM terminology and emphasize its unique character within the medical knowledge landscape.

3 The innovative features of IST 2022

Amidst the plethora of international standards in the realm of TCM, IST 2022 proposed by the WHO on March 3rd, 2022, emerges as the latest edition of its kind. As with its predecessors, IST 2022 provides comprehensive coverage of various TCM theories and practices, encompassing intricate concepts such as the yin-yang

Table 1 Translation principle comparison between IST 2007 and IST 2022

IST 2007 Translation Principles	IST 2022 Translation Principles
1. Accurate reflection of the original concept of Chinese terms	1. Reflecting the accurate and concise meaning of the terms and their Chinese definitions/explanations
2. No creation of new English words	2. Avoiding English neologisms
3. Avoidance of pinyin (Romanized Chinese) use	3. Minimizing the use of Chinese Pinyin unless necessary
4. Consistency with WHO’s <i>Standard Acupuncture Nomenclature</i>	4. Using biomedical terms when appropriate
	5. Using literal translation when meaningful
	6. Striving for conceptual equivalence

(阴阳) theory, the *Wu Xing* (五行 five elements) theory, TCM diagnostics, and formulas. However, it also ushers in a new era marked by distinct stylistic and substantive characteristics that distinguish it from its predecessors.

3.1 Manifestation of TCM’s philosophy of unity and opposition

TCM’s guiding philosophy of unity and opposition, deeply rooted in its yin-yang theory, illustrates the interconnected and opposing forces that underpin the balance of nature. This philosophy holds that yin and yang are not isolated but rather are interrelated and in constant flux. When applied to TCM terminology, it becomes evident that certain terms exhibit inherent opposing and interconnected attributes, forming natural pairs when translated.

In the translation of TCM terms, IST 2022 introduces a noteworthy approach to reflect this duality by incorporating prefixes such as “anti” or “non”. This approach serves to emphasize the underlying unity and opposition between these TCM terms, presenting a holistic picture of their interconnections. By applying this technique judiciously, TCM translators are liberated from the arduous task of providing a unique translation for every TCM term, thereby fostering a deeper understanding of the interrelated logic binding these terms. The examples of translating *Zheng Qi* (正气, anti-pathogenic qi that defends the human body from pathogens) and *Xie Qi* (邪气, pathogenic qi that lead to the occurrence of diseases) as well as *Xun Jing Chuan* (循经传, sequential meridian transmission) and *Yue Jing Chuan* (越经传, non-sequential meridian transmission) may be observed in Table 2.

Take the translation of *Zheng Qi* (正气) as an example. In IST 2022, “正气” is adeptly translated as “anti-pathogenic qi”, starkly contrasting with “邪气”, which signifies pathogenic qi. Drawing upon the wisdom of the *Huang Di Nei Jing* (《黄帝内经》 *The Yellow Emperor’s Inner Classic*), this translation decision dovetails with the statement “*Zheng Qi Cun Nei, Xie Bu Ke Gan* (正气存内, 邪不可干)”. It means, “when the antipathogenic qi is strong within, pathogenic qi cannot invade”. This phrase reflects the concept that a person with a strong and balanced antipathogenic qi is less susceptible to

illness or pathogenic qi. It highlights the confrontation between “正气” and “邪气” when individuals succumb to illness. Pathogenic qi denotes factors that precipitate diseases and afflict individuals, while anti-pathogenic qi embodies the body’s resilient resistance to counteract pathogenic influences. While the convention has often been to translate “正气” as “vital qi”¹¹ or “healthy qi”, emphasizing its role in maintaining health and disease prevention, IST 2022 distinctly opts for “anti-pathogenic qi”. This choice instantaneously communicates to readers that “正气” actively engages in the battle against disease-inducing factors. The translation offers readers immediate insight into their opposing roles.

Another illuminating example lies in the translation of *Yue Jing Chuan*, denoting the atypical transmission of externally contracted diseases based on the six-meridian syndrome differentiation. Conventionally, *Xun Jing Chuan* characterizes the conventional route of disease transmission. This entails the gradual transmission of externally contracted diseases from the body’s exterior to the interior, as symptoms manifest along the associated meridians in a sequential pattern. The established order of disease transmission across the six meridians encompasses Taiyang pattern, Yangming pattern, Shaoyang pattern, Taiyin pattern, and Jueyin pattern.¹² However, *Yue Jing Chuan* represents a deviation from this conventional path, where sequential meridian transmission is eschewed in favor of direct transmission from one meridian disease to another, bypassing one or more intermediary meridians. For example, in cases where Taiyang disease directly transmits to Shaoyang or Taiyin disease, the label “non-sequential meridian transmission” succinctly encapsulates this phenomenon. In IST 2022, the simple addition of the prefix “non” to “sequential meridian transmission” results in “non-sequential meridian transmission” (*Yue Jing Chuan*). This linguistic choice encapsulates the essence of opposition between *Yue Jing Chuan* and *Xun Jing Chuan*, underscoring their inherent differences.

3.2 Preservation of the original TCM theory

The utilization of pinyin (transliteration) in the translation of TCM terms has long been a subject of contention among scholars and practitioners. This debate revolves around the extent to which pinyin should be employed in rendering TCM terms into English and whether it enhances or diminishes the comprehension of these terms.

IST 2007 adheres to a principle that unequivocally discourages the use of pinyin when translating TCM terms into English. This principle was rooted in the belief that the utilization of pinyin offered little or no value in conveying the meaning of the terms. Pinyin, as a transliteration system for Chinese characters, was considered insufficient for effectively conveying the rich and nuanced meanings encapsulated in TCM terms.

Table 2 Terminology translation comparison between IST 2007 and IST 2022 (1)		
Chinese Terms	IST 2007 English Translations	IST 2022 English Translations
正气	Healthy qi	Healthy qi or antipathogenic qi
邪气	Pathogen	Pathogenic qi
循经传	Sequential meridians transmission	Sequential meridian transmission
越经传	Skipping meridians transmission	Non-sequential meridian transmission

Nigel Wiseman, a renowned British researcher specializing in TCM translation, shared a similar perspective. Wiseman's source-oriented approach towards TCM terms translation generally shunned the use of pinyin, except when dealing with essential TCM terms that lacked direct English equivalents.¹³ Such essential terms included “yin (阴)”, “yang (阳)”, and “qi (气)”, which were retained in their pinyin forms due to the intricacies and depth of meaning they encapsulate.

In stark contrast, IST 2022 demonstrates a greater acceptance of pinyin in the translation of TCM terms. This divergence from the IST 2007 paradigm is noteworthy, signifying an evolution in the approach towards incorporating pinyin into the translation process. This shift is reflected in the updated approach to translating terms related to meridians and anatomical structures within the context of TCM.

As Table 3 illustrates, one notable example is the translation of *Ren Mai* (任脉), which refers to the conception vessel in TCM. IST 2007 had translated it as “conception vessel”, explicating its function in English terms. Similarly, “*Chong Mai* (冲脉)”, also known as the thoroughfare vessel in TCM, was rendered accordingly. IST 2022, however, takes a different approach by preserving the pinyin and transliterating these terms. “*Ren Mai*” becomes “ren meridian”, and “*Chong Mai*” becomes “chong meridian”. This shift from providing explanatory translations to retaining pinyin terminology reflects the intention to maintain the authenticity of TCM terms.

Furthermore, the adoption of pinyin extends to the interpretation of related concepts. For instance, *San Jiao* (三焦), which relates to the triple energizers in TCM, is subject to this trend. While IST 2007 chose to translate “*San Jiao*” as “triple energizers” in an effort to elucidate the concept for English-speaking readers, IST 2022 follows a different path. It retains the pinyin term “*Jiao*” and translates “三焦”, as “sanjiao”. Similarly, the divisions within the triple energizers, “*Shang Jiao* (上焦)” “*Zhong Jiao* (中焦)”, and “*Xiao Jiao* (下焦)”, are respectively translated as “upper jiao”, “middle

jiao”, and “lower jiao”. The retention of pinyin in these instances symbolizes a nuanced change in approach.

This evolution towards the use of pinyin in IST 2022 signifies a shift in philosophy, where maintaining the authenticity and originality of TCM terms takes precedence. By retaining pinyin and adopting transliterations, IST 2022 emphasizes the significance of preserving the unique qualities and intricacies of TCM terminology. While pinyin may pose challenges for those unfamiliar with the system, it conveys a depth of meaning and cultural authenticity that might be compromised through explanatory translations.

The contrasting approaches between IST 2007 and IST 2022 offer valuable insights into the evolving philosophies regarding the incorporation of pinyin. While IST 2007 predominantly discouraged the use of pinyin, IST 2022 has embraced it, emphasizing the preservation of the rich cultural and philosophical nuances embedded in TCM terminology. This shift reflects the ongoing efforts to strike a balance between facilitating understanding for non-specialist readers and maintaining the authenticity of TCM concepts. As TCM continues to gain global recognition and importance, the role of pinyin in its translation is likely to remain a subject of interest and evolution within the field of TCM translation.

3.3 Application of *Xiang* (image) thinking

TCM encompasses a myriad of terms deeply steeped in the rich tapestry of Chinese culture and philosophy. For those without a background in TCM, these terms can appear inscrutable and foreign. Even with translated equivalents provided, these expressions may still elude immediate comprehension, thereby necessitating innovative strategies to bridge the comprehension gap and engender a vivid mental representation of these terms. *Xiang* thinking in TCM is “a thinking method that applies reasoning patterns such as association, metaphor, comparison, symbolism, analogy, yin and yang, as well as *Wu Xing* in the deduction, thus reckoning and analyzing the physiological and pathological states in human body.”¹⁴ *Xiang* thinking uses vivid and descriptive terminology to provide readers with a tangible understanding of TCM concepts. By presenting visual images or mental pictures, readers can grasp the essence of a term even when the linguistic or cultural aspects remain elusive. IST 2022 endeavors to imbue TCM terminology with a transcendent quality, propelling it beyond the boundaries of mere words to evoke profound visual understandings within its readers instead of merely seeking linguistic parity. The visual strategies embedded in IST 2022 serve as a bridge, forging connections between readers and the intricate and often abstract concepts included in TCM.

A distinguishing facet of IST 2022 resides in its approach to elucidating disease names, which might otherwise remain cryptic and esoteric to those uninitiated in TCM. These diseases are often christened with

Table 3 Terminology translation comparison between IST 2007 and IST 2022 (2)

Chinese Terms	IST 2007 English Translations	IST 2022 English Translations
任脉	Conception vessel	The Ren meridian
冲脉	Thoroughfare vessel	The Chong meridian
三焦	Triple energizers	Sanjiao
上焦	Upper energizer	Upper jiao
中焦	Middle energizer	Middle jiao
下焦	Lower energizer	Lower jiao
脏腑	Viscera and bowels	Zang-xiang
藏象	Visceral manifestation	Zang-fu
膏肓	Cardiaphragmatic interspace	Gaohuang

descriptive nomenclature in Chinese, yet the connection between the nomenclature and the actual appearance or symptomatology of the condition may remain enigmatic. In light of this challenge, IST 2022 introduces an innovative paradigm of applying *Xiang* thinking that harnesses vivid and descriptive terminology to paint a lucid and compelling portrait of these conditions (Table 4).

Take, for instance, the term *She Chuan Chuang* (蛇串疮), elegantly translated as “snake-shaped sore” within the framework of IST 2022. While some readers might intuitively draw parallels with “herpes zoster” due to shared connotations, the translation “snake-shaped sore” serves a dual purpose. Initially, it categorizes the disease as a “sore”, imparting to readers a rudimentary grasp of the condition’s inherent nature. However, it does not rest there; it proceeds to convey an explicit visual image—that of a snake. This unique visualization is designed to facilitate a dual-layered comprehension by endowing readers not solely with the linguistic meaning but also with a tangible understanding of the disease’s appearance. This visualization acts as a bridge, precipitating comprehension by fostering an incisive mental image that correlates harmoniously with the nomenclature of the disease. Parallel strategies find manifestation in the translation of terms such as “*Gua Teng Chan* (瓜藤缠)” or “melon vine-like nodules”, “*Xian Hou* (线瘰)” or “thread-like warts”, and “*She Pi Xian* (蛇皮癣)” or “snakeskin-like tinea”.

These descriptive and visual translations exemplify IST 2022’s unwavering dedication to transforming TCM from a cloistered discipline into an accessible realm for a broader audience, including those with no prior exposure to the intricacies of TCM. By incorporating these vivid visualizations, IST 2022 achieves more than the simplification of understanding TCM—it augments the overall readability and accessibility of TCM literature. Through this ingenious approach, readers are not merely deciphering linguistic equivalencies; they are actively engaged in the process of constructing a palpable understanding of the subject matter.

Thus, IST 2022’s emphasis on visualizing TCM terminology through the use of descriptive and visual translations epitomizes a pioneering endeavor to render TCM accessible to a global audience. The utilization

of vibrant imagery within the translations augments the lucidity and comprehensibility of TCM terminology. By furnishing readers with clear mental images of these conditions, IST 2022 effectively bridges the chasm between linguistic equivalencies and real-world comprehension. This transformative approach attests to the commitment of IST 2022 in rendering TCM, with its complex and abstract concepts, accessible to a worldwide readership, irrespective of their prior familiarity with the discipline. There are still concerns about whether the images provided can be fully understood and accepted by a global audience of readers from diverse backgrounds. In terms of disease denomination, Barbara Cappuzo believes “the juxtaposition of literal translations and conventional terms offers the twofold advantage of rendering TCM concepts more accessible to the Western audience and, at the same time, preserving the original meanings”.¹⁵

Although IST 2022 incorporates the characteristics mentioned above, there are still aspects that deserve attention. Firstly, while it overall reflects the internal opposition and unity of the terminology, emphasizing the systematic translation of terms, there are inconsistencies in the standardization of terminology translation. Some terms use the base form of verbs, while others use the verb + “-ing” form. Taking the terms related to yin and yang as an example, “*Cong Yin Yin Yang* (从阴引阳)” is translated as “seeking yang from yin”, using the verb + “-ing” form “seeking”, while “*Tiao Li Yin Yang* (调理阴阳)” is translated as “regulate and balance yin and yang”, using the base form of the verb “regulate and balance”.

The use of transliteration is crucial for preserving the distinctive features of TCM and asserting its discourse internationally. However, caution must be exercised during the translation of TCM terminology to avoid excessive phoneticization, which could burden or hinder readers’ understanding. It is advisable to employ transliteration accompanied by concise annotations. For example, in IST 2022, “*San Jiao*” was translated as “*Sanjiao*”, while the 2007 version used “triple energizers”. A viable approach is to translate it as “*Sanjiao* (triple energizers)” using transliteration with concise annotations.

In TCM, certain terms have conceptual frameworks that do not align perfectly with those in Western medicine. For example, the TCM organs *Gan* (肝 liver), *Xin* (心 heart), *Pi* (脾 spleen), *Fei* (肺 lung), and *Shen* (肾 kidney) are not merely anatomical entities but also represent broader systems and functions that may not have direct equivalents in Western medical terminology. Like the translation of “*Shen*”, when it “contains conventional medicine terms with different meanings, it should be differentiated from their modern counterparts by using quotation marks (e.g., ‘kidney’) or italicized fonts (e.g., ‘*kidney*’)”.¹⁶

Table 4 Terminology translation comparison between IST 2007 and IST 2022 (3)

Chinese Terms	IST 2007 English Translations	IST 2022 English Translations
蛇串疮	Herpes zoster	Snake-shaped sore
瓜藤缠	Erythema nodosum	Melon vine-like nodules
牛皮癣	Oxhide lichen	Collar sore
白驳风	Vitiligo	White plaques
猫眼疮	Erythema multiforme	Cat’s eye-shaped sore

4 Experts’ perceptions on the three innovative features and preferences in translating specific terms

To explore the perceptions of experts on IST 2007 and IST 2022, a qualitative interview was conducted. Through in-depth interviews with 11 selected experts, it seeks to validate three proposed characteristics of the IST 2022, and to explore experts’ preferences in translating specific terms between the IST 2007 and IST 2022 (Table 5).

The inclusion criteria for experts are as follows:

- (1) Having at least 10 years of TCM translation experience;
- (2) Having a deep understanding of TCM principles;
- (3) Being Familiar with WHO’s TCM Terminology International Standards (IST 2007 and IST 2022);
- (4) Being Proficient in both English and Chinese
- (5) Obtaining a degree in a relevant field and publication records in TCM or translation;
- (6) Participating in international TCM-related activities and a recognized reputation in the field.

4.1 Experts’ perception on unity and opposition and preferences in translating specific terms

The majority of experts interviewed acknowledged that the IST 2022 effectively showcases the inherent unity and opposition of TCM by presenting interconnectedness between or among terminologies through the strategic utilization of prefixes such as “non-” and “anti-”. Nine experts agreed that IST 2022 effectively reflects the philosophy of unity and opposition inherent in TCM. They appreciated how the standard uses prefixes and other translation methods to illustrate the interconnectedness and contrasting aspects of TCM concepts. However, two experts disagreed. One felt that this approach can sometimes appear “forced” and the other feared that it might detract from clarity. They suggested a preference for straightforward translations.

When translating “Zheng Qi” and “Xie Qi”, most experts believe that both antipathogenic qi and healthy qi are appropriate translations for “Zheng Qi”. Some experts favored “antipathogenic qi” as the preferred term for “Zheng Qi” even when “healthy qi” and “vital qi” remain prevalent. Two experts argued that “antipathogenic qi” more accurately captures the essence of “Zheng Qi”, which encompasses not just healthful energy but also the ability to resist pathogens. They contended that while “healthy qi” is descriptive, it lacks the connotations of resilience and defense against “邪气” that “antipathogenic qi” conveys, albeit with slightly more syllables. Besides analyzing the translation from the TCM perspective, some experts also emphasized the linguistic and semantic harmony in pairing “antipathogenic qi” with “pathogenic qi”. They asserted that this terminology not only aligns with the traditional understanding of these concepts but also reinforces their inherent opposition and unity.

In translating “Xun Jing Chuan” and “Yue Jing Chuan”, most experts agreed that the inclusion of “non-” in the latter term enhances its correspondence with the former. One explained that “sequential meridian transmission” represents the normal process, whereas “non-sequential meridian transmission” implies a deviation or abnormal state. The use of “non-” in the latter term, according to the experts interviewed, not only establishes a clear contrast but also strengthens the idea of opposition and unity between the two concepts, facilitating a more intuitive understanding and correlation between them. Thus, using prefixes such as “non-” and “anti-” in translating TCM terminology by the experts underscores the relationships between concepts and enhances the clarity and precision of the translations.

4.2 Experts’ perception on preservation of the integrity of TCM and preferences in translating specific terms

Ten out of eleven experts supported the use of transliteration for preserving the original TCM concepts and

Table 5 Qualitative interview expert information

No.	Name	Title	Background	Age	Institution
1.	A	Associate Professor	Medicine	44	Shaanxi University of Chinese Medicine
2.	B	Professor	Medicine	60	Henan University of Chinese Medicine
3.	C	Professor	English	47	Shanghai University of Traditional Chinese Medicine
4.	D	Professor	English	44	Shandong University of Traditional Chinese Medicine
5.	E	Ph.D.	Medicine	35	Graduate School of Chinese PLA General Hospital
6.	F	Professor	English	57	Shaanxi University of Chinese Medicine
7.	G	Professor	Medicine	43	Zhejiang University of Chinese Medicine
8.	H	Associate Professor	English	42	Beijing University of Chinese Medicine
9.	I	Associate Professor	Medicine	40	Guangxi University of Chinese Medicine
10.	J	Professor	English	89	Beijing University of Chinese Medicine
11.	K	Ph.D.	Medicine	45	Brazilian College of Chinese Medicine

their cultural significance. They noted that transliteration helps maintain the integrity of terms such as “qi”, “yin”, and “yang”. However, they also emphasized the importance of balancing transliteration with descriptive translations to ensure accessibility and comprehension. One expert did not clearly express a stance but did not contradict the general support for transliteration.

The interviewed experts have concurred on the increased utilization of transliteration in the IST 2022, emphasizing its role in safeguarding the authenticity of TCM theory. Their opinions diverge, however, on the circumstances and extent of transliteration’s application. Concerning the quantity of transliteration, they reached a consensus on the appropriate use of transliteration, rather than its excessive use. One expert suggested a “precise and minimal” approach, stressing that it should not be overused. As for when transliteration should be employed, they suggested the following scenarios: A. Incomplete Translation of TCM Terminology: When translating TCM terms that cannot be fully encompassed by a single or a few facets of their meaning, transliteration becomes crucial. For instance, in the case of “*Ren Mai*” and “*Du Mai*”, four experts with clinical medicine backgrounds favored retaining the pinyin “ren meridian” and “du meridian”, arguing that it conveys a sense of professionalism among foreigners with some Chinese knowledge and that “Ren” and “Du” have broader connotations than “conception” and “governor” respectively, which might seem limiting. Alternatively, three experts referred to industry standards and usage habits, advocating for “Conception Vessel (CV)” and “Governor Vessel (GV)”. Nevertheless, two of these three acknowledged that while these terms are commonly used, they face the issue of “incomplete translation”; “conception” as a translation for “ren” only captures one aspect of its multifaceted nature, encompassing menstruation, childbirth, gynecological disorders, and more. Hence, transliteration is appropriate when full translation proves inadequate, as exemplified by the term “*Sanjiao*”, whose multifarious functions make a pure transliteration more favorable, according to some experts. B. Terms with Distinctive TCM Characteristics Already Integrated into Western Lexicons: For TCM-specific terms that have been incorporated into Western dictionaries (e.g., *The Oxford English Dictionary*) or are widely accepted in their transliterated forms, such as “yin”, “yang”, and “qi”, transliteration is the preferred choice. C. Untranslatability: Transliteration should be resorted to when direct translation is not feasible. However, solely relying on pinyin to translate TCM terms can confuse foreign readers. To address this, adding explanatory translations in parentheses after the pinyin can be a helpful approach. For instance, “*Ren Mai*” can be translated as “Ren meridian (Conception Vessel)” into English. This way, readers who are unfamiliar with the pinyin can still grasp the essence of the term through its explanatory translation.

4.3 Experts’ perception on *Xiang* thinking and preferences in translating specific terms

Eight experts affirmed that IST 2022 successfully incorporates *Xiang* thinking, appreciating how it integrates symbolic and visual elements in translations. They found this approach beneficial for representing TCM concepts. Two experts were neutral, acknowledging the potential insights but noting that cultural differences and the risk of semantic ambiguity could complicate understanding. One expert disagreed, suggesting that while symbolic representation is interesting, it may not always be appropriate for clinical contexts where clarity is essential.

In analyzing the translation of TCM disease denominations, a pivotal approach advocated by several experts emphasizes literal translation augmented with image cognition over direct adoption of equivalent Western medicine terms. Notably, one expert vigorously champions preserving the historical integrity and semantic richness of TCM disease names, opting for expressions like “melon vine-like nodules” over “erythema nodosum” to safeguard the authenticity of Chinese terminology. Another expert posits that TCM disease denominations are often rooted in or even coined from prominent symptoms, necessitating an emphasis on image cognition. Thus, “cat’s eye-shaped sore” is preferred to “erythema multiforme” in translating “*Mao Yan Chuang* (猫眼疮)”, emphasizing the visual depiction. However, an exception is acknowledged for cases where TCM and Western medicine diagnoses converge, such as translating “*She Chuan Chuang* (蛇串疮)” into “herpes zoster”, due to their close correlation.

A consensus emerges among five experts that when TCM disease denominations mirror or closely resemble Western medical terms, the latter may be adopted to ensure comprehension. Conversely, for unfamiliar TCM concepts, a literal translation complemented by an explanatory bracket containing the Western equivalent is proposed, adhering to an order that prioritizes the literal/pinyin form, followed by the Western term. An interesting perspective, espoused by one expert, recognizes that both methods—literal translation with image cognition and borrowing Western disease names—serve distinct purposes in the evolutionary process of TCM translation. Initially, Western terms facilitate comprehension; while eventually, literal translations with image cognition deepen understanding of the TCM essence. This viewpoint underscores the adaptability and developmental nature of TCM terminology translation.

The expert feedback highlights a general agreement on the effectiveness of the three new characteristics in IST 2022, with recognition of their contributions to preserving TCM concepts. While the majority supports the integration of unity and opposition, transliteration, and *Xiang* thinking, there are notable concerns about potential drawbacks and the need for clarity, particularly in clinical settings. This nuanced feedback underscores the

strengths and areas for improvement in IST 2022, providing a comprehensive view of expert opinions on these new characteristics.

5 Conclusion

The majority of research related to TCM translation has traditionally centered on viewing it as a mere language conversion process, primarily concerned with translating TCM terms from Chinese into equivalent English terms. While important, this linguistic and cultural perspective has often led to the oversight of the fundamental essence of TCM's unique thinking pattern. However, the advent of IST 2022 marks a significant departure from this approach. IST 2022 underscores the vital importance of TCM cognitive-oriented translation, embodying three key characteristics:

- a. **Emphasis on TCM Philosophy:** IST 2022 prioritizes the philosophical foundation of TCM, highlighting the principles of unity and opposition within TCM theory. By doing so, it illuminates the interconnectedness and interdependence among TCM terms, transcending traditional linguistic boundaries.
- b. **Preservation of TCM Theory:** IST 2022 strives to retain the original TCM theory by optimizing the use of pinyin, embracing a translational strategy that enhances the connection between TCM's theoretical underpinnings and its linguistic representation.
- c. **Adoption of *Xiang* thinking:** IST 2022 employs the innovative concept of image cognition to create visual associations for complex TCM terms. By presenting readers with vivid mental images, it enhances the comprehension and retention of TCM concepts.

While IST 2022 represents a significant leap forward in TCM translation, it is not without its limitations. Some ambiguities in the translation of certain terms within IST 2022 warrant further study and analysis to ensure the utmost accuracy and clarity in conveying the rich and intricate world of TCM to a global audience. These ongoing endeavors will contribute to a more profound understanding and appreciation of TCM, both as a field of cultural heritage and as a valuable medical science that transcends linguistic and cultural borders.

In the future, the translation of TCM terms will increasingly recognize that it is inherently specific to TCM. To ensure that the translated terms convey the full depth and complexity of TCM knowledge, the translation process must prioritize the preservation of TCM concepts. This approach emphasizes the importance of capturing not just the literal meanings of the terms, but also their cultural, philosophical, and conceptual essence. By making TCM thinking the core focus of the translation

process, we can ensure that readers engage with TCM as a scientific discipline, while also acknowledging its dual attributes as both a science and a cultural tradition. This focus on TCM thinking will lead to more accurate and nuanced translations that respect and reflect the unique characteristics of TCM. As a result, the future of TCM translation will likely involve a greater emphasis on preserving and conveying the scientific and cultural richness of TCM, fostering a deeper understanding and appreciation of this ancient and complex medical system.

The research on the application and dissemination of IST 2022 represents a vital area within the scholarly discourse. Despite the existence of multiple international translation standards for TCM, there is still a lack of comprehensive research on how these standards are being applied and shared. For example, ISN 2007 is primarily used by some publishers in China, while IST 2007 is more commonly used in Chinese medicine colleges in the United States. Therefore, it is essential to address the challenge of promoting the use of IST 2022 and refining the standard based on comprehensive user feedback.

Notes

WHO: World Health Organization
 ISO: International Standard Organization
 WFCMS: World Federation of Chinese Medicine Society
 IST 2007: WHO International Standard Terminologies on Traditional Medicine in the Western Pacific Region
 IST 2022: WHO International Standard Terminologies on Traditional Chinese Medicine

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Ethical approval

This study does not contain any studies with human or animal subjects performed by any of the authors.

Author contributions

LI Weihong and LAI Han drafted the initial version of the paper. Aaron Lee Moore and LI Weihong reviewed the paper. YAN Xiaodan participated in data collection.

Conflicts of interest

The authors declare no financial or other conflicts of interest.

References

- [1] Li YA. Orientalization presented in two international standards of TCM terms (“东方情调化翻译”在两套中医名词术语英译标准化方案中的体现). *Chinese Journal of Integrated Traditional and Western Medicine*. 2011;31(11):1570–1572. Chinese.
- [2] Li ZJ. *Comparative Study on International Standard Terminologies on Traditional Medicine* (中医名词术语英译国际标准化比较研究). Beijing: World Publishing Corporation; 2017. Chinese.
- [3] Fu TT, Du LL, Liu AJ. Comparative study on English translation of TCM pathogenesis terms based on WHO standard and WFCMS standard (基于WHO版和世中联版两大国际标准的中医病机术语英译对比研究). *Journal of Basic Chinese Medicine*. 2016;22(2):252–254. Chinese.
- [4] Zhou E, Su L. Research trend, problems and prospects of English translation of TCM terms (中医药术语英译研究趋势、问题与展望). *Chinese Journal of Integrated Traditional and Western Medicine*. 2022;42(6):754–759. Chinese.
- [5] Ye X, Zhang HX. A history of standardization in the English translation of traditional Chinese medicine terminology. *Journal of Integrative Medicine*. 2017;15(5):344–350.
- [6] World Health Organization. Regional Office for the Western Pacific. WHO International Standard Terminologies on Traditional Medicine in the Western Pacific Region. World Health Organization; 2007. Available from: <https://iris.wpro.who.int/handle/10665.1/5395/>. [Accessed on October 15 2022].
- [7] World Health Organization. International Classification of Diseases (ICD). Available from: <http://icd.who.int/en/>. [Accessed on October 16 2022].
- [8] World Health Organization. WHO International Standard Terminologies on Traditional Chinese Medicine; 2022. Available from: <https://iris.who.int/bitstream/handle/10665/352306/9789240042322-eng.pdf>. [Accessed on October 15 2022].
- [9] Xie ZF. *English Translation of Common Terms in Traditional Chinese Medicine* (中医药常用名词术语英译). Beijing: China TCM Publication Company; 2004. p. 3. Chinese.
- [10] Xie ZF, White P. Comments on Nigel Wiseman's *A Practical Dictionary of Chinese Medicine* (I)—on the “Word-for-word” literal approach to translation. *Chinese Journal of Integrated Traditional and Western Medicine*. 2005;11(4):305–308.
- [11] Unschuld PU, Tessenow H. *Huang Di Nei Jing Su Wen: An Annotated Translation of Huang Di's Inner Classic—Basic Questions*. Berkeley: University of California Press; 2011. p. 167.
- [12] Zhu WF. *Diagnostics of Traditional Chinese Medicine* (中医诊断学). Beijing: China Press of Traditional Chinese Medicine; 2017. p. 209. Chinese.
- [13] Wiseman N. English translation of Chinese medical terms: a scheme based on integrated principles. *China Terminology*. 2004;6(4):30.
- [14] Xu QH. WHO International Standard Terminologies on Traditional Chinese Medicine: use in context, creatively. *Integrative Medicine, Nephrology and Andrology*. 2023;10:1–5.
- [15] Mao J, Wang C. Cultural interpretation on Xiang thinking of traditional Chinese medicine. *Journal of Traditional Chinese Medicine*. 2013;33(4):545–548.
- [16] Cappuzzo B. Intercultural aspects of specialist translation: the language of traditional Chinese medicine in a global context. *European Scientific Journal*. 2022;18(5):25.

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